Kosovo

Country Environmental Analysis

Cost Assessment of Environmental Degradation, Institutional Review, and Public Environmental Expenditure Review

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The World Bank team would like to thank, for its cooperation, the Ministry of Environment and Spatial Planning, particularly Mr. Muhamet Malsiu, Director of the Environment Department. The team would also like to express its appreciation to other persons and institutions in Kosovo who contributed information, including Mr. Ilir Morina from the Kosovo Environmental Protection Agency; Mr. Syl Tahirsylaj from the Hydro-meteorological Institute; Dr. Naser Ramadani and Drita Zogaj from the Institute of Public Health; Behxhet Shala and Trandelina Cakaj from the Cleanup and Land Reclamation Project-Project Implementation Unit in KEK; Gerry McWeeney from WHO; Ms. Lisa Mattsson from UNDP; Ms. Luljeta Çeku, Urban Director for Planning and Environment Protection from Pristina municipality; Mr. Fatos Mulla from Sida; Mr. Hysen Abazi from the Department of Forestry; Mr. Bedri Halimi from the Environmental Inspectorate; Mr. Naser Bajraktari from the Water Department; Mr. Ahmet Zejnullahu from the Kosovo Forestry Agency; Mr. Azem Rexha from ICMM; and Mr. Lulzim Korenica, Director of the Environment Department, former Ministry of Energy and Mines.

The World Bank also gratefully acknowledges financial support from the Trust Fund for Country Environmental Analysis.

Abbreviations

ALRI	Acute lower respiratory infection
BLL	Blood lead level
Cd	Cadmium
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
Cu	Copper
DALY	Disability-adjusted life year
EC	European Commission
EIA	Environmental impact assessment
EMMP	Enviornmental Mitigation and Monitoring Plan
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FMCs	Family Medicine Centers
FRIDOM	Functional Review and Institutional Design of Ministries
GDP	Gross domestic product
ICMM	Independent Commission of Mines and Minerals
KEK	Kosovo Energy Corporation
KEPA	Kosovo Environmental Protection Agency
KES	Kosovo Environmental Strategy
KHMI	Kosovo Hydro-meteorological Institute
MESP	Ministry of Environment and Spatial Planning
NEAP	National Environmental Action Plan
NO_x	Nitrogen oxides
O_3	Ozone
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PM	Particulate matter
RR	Relative risk
SIDA	Swedish International Development Cooperation Agency
SO_2	Sulfur dioxide
UN	United Nations
UNDP	United Nations Development Program
WHO	World Health Organization
WWRA	Water and Waste Regulatory Authority

Executive summary

Government's environmental strategies and financing

In responding to environmental issues, the Ministry of Environment and Spatial Planning (MESP) is updating the Kosovo Environmental Strategy (KES) and the National Environment Action Plan (NEAP) for 2011–15, working with ministries, nongovernmental organizations, and other stakeholders. The strategy and action plan identify priorities for air, water, waste, chemicals, biodiversity, and environmental policy.

The environmental priorities for the next five years are completing environmental legislation in harmony with the EU acquis; gradually fulfilling EU standards and efficiently carrying out and incorporating environmental legislation and methodologies in all sectors; and setting up and expanding institutions for the implementation of environmental policies (including capacity building).

The KES lists the following specifics:

- Providing financial and economic instruments for environmental protection.
- Setting up and running an environmental monitoring network throughout Kosovo, with priority to major industrial pollutants and hotspots.
- Gradually increasing the population's access to clean potable water, the sewage network, and municipal waste disposal, with support for programs for recycling wastewater and solid waste.
- Using natural resources such as soil, water, minerals, and forests rationally. Special attention is needed in using limited resources and orienting toward renewables.
- Expanding protected areas and further protecting the natural heritage, along with increasing capacity for efficient management as per the 1992 Rio Declaration on Environment and Development.
- Developing long-term educational and public-awareness campaigns, and generating support for environmentally focused scientific projects.
- Applying energy-efficient concepts in all different economic sectors.

Kosovo's functional budget classification does not show environmental protection as a separate category; however, unlike EU countries, Kosovo seems to spend less on environmental protection as a share of GDP than some neighboring EU-10 countries. Waste management, water, and air quality have been the main priorities for capital expenditures in recent years and much of the capital spending on environmental projects has been made by municipalities, as they have a core competency to provide several environmental services, including green areas

and waste management. A hefty share of environmental financing also seems to come from international donors.

Public resources for environmental projects are likely to become constrained in the medium term, given the government's decision to implement a large multiyear transport infrastructure plan and given that the bulk of environmental spending is directly or indirectly financed from the central budget. Environment-related revenues are marginal: in 2009 they came to only €316,000. In the EU by contrast, environmental tax revenue amounted to 2.4 percent of GDP in 2007—and 3 percent of GDP in Slovenia and 3.4 percent of GDP in Bulgaria.

Cost assessment of environmental degradation and policy recommendations

The objective of this country environmental analysis is to report on the state of the environment and the key environmental issues, and to estimate these issues' health and economic costs. The analysis uses international epidemiological research evidence on the relationship between the population exposed to environmental pollution and the increased risks of health impacts to estimate the environmental disease burden in Kosovo and its associated economic impacts. Costs are measured as, for example, impacts on health (morbidity and early mortality), and are then expressed as annual economic damage costs in euros and as a share of gross domestic product (GDP). By assigning monetary values to environmental degradation, the analysis here achieves four main results. It provides a useful mechanism to rank the relative social costs of various forms of degradation and provides a tool for prioritization of environmental problems. It offers policy makers an instrument to integrate the environment into economic decision making. It expresses the damage costs as a share of GDP, allowing for comparison with other economic indicators. And it gives to different stakeholders a tool for discussing the importance of environmental protection in economic terms—useful in deciding on how to allocate scarce resources and to increase awareness of the "costs of doing nothing" about pressing environmental problems[1].

The annual cost of environmental degradation in Kosovo is estimated at €123 million–€323 million in 2010, with a midpoint estimate of €221 million (table 1). This cost is equivalent to 2.9–7.7 percent of GDP, with the midpoint at 5.3 percent. Costs are indications rather than precise figures, as data gaps are many, some data have not been recently updated –due to country's turbulent history- and not all impacts can be monetized

[1] The World Bank has undertaken this type of study in a range of developing countries, as well as in specific sectors in many countries as the basis for policy discussions on environmental priorities.

Table 1 Estimated annual cost of environmental degradation in Kosovo, 2010

Pollution or contamination\ estimate	Annual cost (€ million)			% of 2010 GDP		
	Low	Mid	High	Low	Mid	High
Outdoor air	37.2	95.6	157.8	0.89	2.28	3.76
Lead	41.7	67.9	94.0	1.00	1.62	2.24
Solid waste	19.0	25.1	31.3	0.45	0.60	0.75
Forests	16.7	18.1	19.5	0.40	0.43	0.40
Water, sanitation, and hygiene	8.0	11.3	14.6	0.19	0.27	0.35
Water from heavy metals	0.4	2.8	5.2	0.01	0.07	0.12
Total	**123.0**	**220.8**	**322.5**	**2.9**	**5.3**	**7.7**

Source: Authors' calculations

Note: These economic assessments provide a range of damage costs reflecting data shortcomings, range applied in valuation of damages, and scientific uncertainties regarding environmental impacts.

With annual costs of environmental degradation of €221 million, Kosovo faces serious social and economic impacts from poorly managed polluting activities and could make huge gains from remedial actions to protect and restore the quality of the environment.

The cost of **outdoor air pollution** in urban areas, with the most significant health effects caused by particulates which are responsible for increases in cardiopulmonary and lung cancer mortality from long-term exposure and for chronic bronchitis and respiratory diseases, has the highest impact with estimated damage costs ranging from €37 million to €158 million per year (0.89-3.76 percent of GDP). Air pollution is estimated to cause 835 premature deaths, 310 new cases of chronic bronchitis, 600 hospital admissions and 11,600 emergency visits each year.

The cost of **lead contamination** has the second highest impact with total economic costs at an annualized loss of €42 million - €94 million (or 1.0-2.2 percent of GDP in 2010). The high impacts for lead are mainly caused by releases from the un-remediated lead and zinc mines and former lead processing facilities mostly near Mitrovica and the continuous use of leaded gasoline –though a new administrative instruction was issued in September 2011 to regulate leaded gasoline. Due to the gradually reducing release of lead to cause human exposure from legacy sources and the expected phasing out of lead in petrol; it is expected that this impact will reduce in time as well.

Ambient air quality could be greatly improved and health impacts ameliorated if the main polluters complied with laws and standards on air emissions, especially from stationary pollution sources. The following policy measures are recommended to achieve greater compliance of key polluters.

Enhance the effectiveness of environmental standards currently in place, **particularly for air pollution.** Air pollution is responsible for the highest costs of environmental degradation in Kosovo and a substantial portion of the air pollution can be attributed to point source pollution of major industries. MESP has issued administrative instructions on limit values for effluents that can be discharged into water, on quality of drinking water, on air quality standards, and on air emission standards. Such measures need to be accompanied by stronger monitoring, inspection, and enforcement of compliance. MESP and its inspectorates could start by adopting relevant guidelines and providing inspectors with monitoring and inspection equipment and improving the emission registration of key industries Significant funding and training are required to improve monitoring of environmental quality information as well as accurately monitoring environmental emissions from key polluters. Given the heavy burden costs of IQ loss in children from exposure to lead, this should include strict enforcements of the lead-fuel phase out.

Rely more on economic instruments, such as fines and charges. That also requires strengthening overall regulatory and enforcement mechanisms. Such charges and fines would increase the private sector's share of environmental expenditures and make it pay for its negative environmental externalities, particularly since a decline in capital spending of MESP is foreseen in the Medium-Term Expenditure Framework 2011–13.

Levying charges and fines already defined in the law could be a good start to initiate change in the environmental performance of some of the biggest polluters, particularly for air pollution which carries the biggest share in degradation costs. Enforcing current environmental regulations will help ensure private sector investment in environmental mitigation measures, generating health benefits and at reasonable costs. For energy efficiency, measures could even be implemented without any cost or with a revenue gain in the longer term. This approach can work only when the private sector invests in pollution reduction and when fines are steep enough to compel firms to take the necessary actions.

Other costs of environmental degradation are substantially lower. The estimated annual costs of inadequate **solid waste collection and disposal**, including that for coal ash amounts to €19 million-€31 million or 0.45-0.75 percent of GDP out of which the highest costs is associated with effects of illegal dumpsites and on property prices. This is caused due to high levels of air pollution, through emissions of, for example, methane (landfill gas), as well as dioxins and fine particles when burned and water pollution, through leachate and the corresponding negative impact on property prices.

Total health costs related to inadequate **water supply, sanitation and hygiene** as well as **heavy metal water pollution** of surface waters are equivalent to €8.4 million - €19.8 million per year (or 0.20 – 0.47% of GDP in 2010), dominated by the costs of morbidity from diarrhea as most

monitored water pollution is from bacteriological sources. Regarding sanitary biological water quality, all main rivers are classified as polluted and with unacceptable levels of biological oxygen demand as well as lack of dissolved oxygen in the rivers, particularly downstream of the discharge of untreated sewage and in addition in smaller streams.

For these more **heavy investment environmental issues,** it is important to **plan strategically with scarce resources**. Kosovo must bring itself in line with European Commission Directives. But public resources for for heavy investment environmental issues such as sanitation/waste water treatment and waste are likely to continue to be more constrained, given the government's decision to push through its large multiyear transport infrastructure plan, the foreseen decline in capital spending of MESP in the Medium-Term Expenditure Framework 2011–13, and the environment already being an underfunded sector (the MESP budget was cut further in 2011). The government should seek donor support for complying with the Directives that require heavy investments based on a strategic sector masterplan.

Strategic sector masterplans for water supply –including river basin management-, sanitation, and wastewater treatment; and waste management should be prepared. These masterplans should take into account the current legislative and regulatory framework, EC Directive requirements, and investment needs for the next 10–15 years. They would include an analysis of the required operational and maintenance costs and take into account affordability constraints related to increasing utility tariffs to achieve long-term financial sustainability of these proposed investments.

With a target of 90% of the population with access to **piped water supply** (against the current 40 percent not connected or poorly served), a total cost estimate of €210 million of investments would be required for water supply. For **wastewater collection/sewerage and treatment**, around €425 million would need to be invested to comply with EU standards and further annual operating costs of around €80 million would be required. Regarding **waste**, there is no comprehensive assessment available of investment needs but a rough estimate based on unit costs would amount to €50 million to develop a basic but sanitary sound collection and disposal system for household waste and approximately double that amount if the system included recycling and composting.

The masterplans can facilitate attracting strategic donor support for specific investment projects phased over such a 15-year period.

For the legacy environmental problems, **a detailed and comprehensive feasibility study and clean-up plan should be prepared**. These legacies are still responsible for widespread environmental and health insults, particularly in the hotspot in Mitrovica.

A masterplan could also be considered for the forest sector. Costs of forest degradation is estimated to amount to € 16.7 million- € 19.5 million per year (equivalent to 0.4% of GDP). An action plan could be prepared to protect forestry against illegal logging and to implement activities that can be undertaken with low investments. Examples include restoring degraded forest areas through natural regeneration, increasing revenues from timber production, biomass, and firewood generation, and establishing regular forest inventories to monitor the health and needs of different forest areas.

For all sectors, it is necessary to build on good European practice in applying environmental impact assessments (EIAs) and environmental mitigation and monitoring plans (EMMPs). These crucial environmental management tools must be run more efficiently and their impact made more effective. EIAs and EMMPs should be reviewed to adopt the good practices already used in the European Union (EU). Greater technical capacity is required for preparing, reviewing, and overseeing EIAs and EMMPs, particularly for large and technically complex infrastructure investments. Capacity building should focus on sectors that are likely to grow and that have heavy environmental impacts, such as energy and mining. They should incorporate EU practices that oblige investors to apply the best available pollution abatement techniques at reasonable cost and properly report on industrial emissions.

The Government should also enhance environmental awareness through greater access to information for the media and other government institutions and greater public participation in EIA procedures for large infrastructure investments and strategic policies. Information on laws and regulations is readily obtainable, but data on the state of the environment need to be strengthened, particularly for air pollution. This would entail stronger environmental monitoring as well as efforts by MESP to share environmental information and monitoring data with citizens—through annual "state of the environment" reports and through indicators that are easy to measure and update. Enhancing awareness of the media on environmental issues and collaborating with civil society organizations help support MESP in enhancing pressure for improvements for improved environmental quality. And given the high disease burden related to air pollution, improving the patient registration system for diseases directly related to air pollution, in line with international classifications, would demonstrate the health impact of environmental degradation and boost public support for change.

The role of the judiciary in environmental management remains weak. This in turn affects cases enforcing environmental legislation, such as illegal mining and forestry, and severely limits the

role of the judiciary in environmental management and citizens' ability to seek recourse to justice for environmental management issues.

Kosovo is well poised to act on these recommendations, for its key sectoral plans and strategies already incorporate environmental considerations. Kosovo's Environmental Strategy and National Environmental Action Plan (2011–15) were updated in 2011. The new KES (2011–21) aims to reduce pollution, protect biodiversity, ensure sustainable use of natural resources, and protect valuable national landscapes. Short-term priorities include implementing the EU acquis, integrating EU environmental structures, and mainstreaming environmental concerns. Sectoral strategies that incorporate environmental objectives or that have implications for environmental quality include the following:

- Kosovo's Energy Strategy 2009–18. This aims to promote environmental awareness in energy activities, energy efficiency, and renewable energy use, and to develop gas infrastructure.
- The Industrial Strategy for Kosovo 2010–13 provides a basis for raising the quality of industrial policy. It envisages a greater role for industry in contributing to GDP, including exports and investment.
- The Agriculture and Rural Development Strategy 2009–13 aims to sustain rural development and improve the quality of life (including infrastructure) through promoting farming and other economic activities that are in harmony with the environment.
- Kosovo's Policy and Strategy Paper on Forestry Sector Development 2010–20 aims to improve capacity to deal with environmental issues related to forestry, enhance capacity of Kosovo institutions to implement and monitor biodiversity action plans, and establish and manage protected zones in compliance with national goals and international agreements.

1 Introduction

Background

In February 2008 Kosovo declared independence. It is taking part in the stabilization and accession process of the European Union (EU), and it has become a member of the International Monetary Fund (IMF) and the World Bank Group. However, 45 percent of the population of around 2 million are estimated to live below the national poverty line, and 17 percent are extremely poor. With a per capita gross domestic product (GDP) of €2,200 in 2010, Kosovo is one the poorest countries in Europe, despite solid economic growth since the end of the war in 1999. And unemployment is around 50 percent.

Kosovo is landlocked and possesses many mineral resources, mainly coal, lead, zinc, chromium, and silver. Current industrial activity and a legacy of former practices have heavy health and environmental impacts and generate economic losses. These environmental issues relate to air pollution, lead and other contamination from mining, water pollution and availability, degradation of forests and land, and untreated municipal and hazardous waste.

Kosovo Environmental Strategy and National Environmental Action Plan

In responding to environmental issues, the Ministry of Environment and Spatial Planning (MESP) is updating the Kosovo Environmental Strategy (KES) and the National Environment Action Plan (NEAP) for 2011–15, working with ministries, nongovernmental organizations, and other stakeholders. The strategy and the action plan identify priorities for air, water, waste, chemicals, biodiversity, and environmental policy and categorize the proposed investment needs into high and medium priorities, as well as high (more than €3 million, with majority funding by donors), medium (€1 million–€3 million, with a mixture of funding sources), and low costs (less than €1 million, with most funding from the government).

The environmental priorities for the next five year are identified as completing environmental legislation in harmony with the EU "acquis";[2] gradually fulfilling EU standards and efficiently carrying out and incorporating environmental legislation and methodologies in all sectors; and setting up and expanding institutions for the implementation of environmental policies (including capacity building).

The KES lists the following specifics:

- Providing financial and economic instruments for environmental protection. These should go hand-in-hand with economic development.

[2] The body of common rights and obligations that is binding on member states.

- Setting up and running an environmental monitoring network throughout Kosovo, with priority to major industrial pollutants and hotspots.
- Gradually increasing the population's access to clean potable water, the sewage network, and municipal waste disposal, with support for programs for recycling wastewater and solid waste.
- Using natural resources such as soil, water, minerals, and forests rationally. Special attention is needed in using limited resources and orienting toward renewables.
- Expanding protected areas and further protecting the natural heritage, along with increasing capacity for efficient management as per the 1992 Rio Declaration on Environment and Development.
- Developing long-term educational and public-awareness campaigns, and generating support for environmentally focused scientific projects.
- Applying energy-efficient concepts in all different economic sectors.

Cost assessment of environmental degradation

The objective of this country environmental analysis, undertaken by the World Bank, is to report on the state of the environment and environmental issues and to estimate their health and economic costs.

The World Bank has undertaken this type of study in, for example, Algeria, Armenia, China, Colombia, the Arab Republic of Egypt, Ghana, Guatemala, India, the Islamic Republic of Iran, Lebanon, Morocco, Pakistan, Peru, Philippines, Senegal, the Syrian Arab Republic, and Tunisia, as well as in specific sectors in many more countries as the basis for policy discussions on environmental priorities.

The analysis uses international epidemiological research on the relationship between the population exposed to environmental pollution and the increased risks of health impacts to estimate the environmental disease burden in Kosovo and its associated economic impacts. Costs are measured as, for example, impacts on health (morbidity and early mortality), impacts on property values, and economic losses of forest degradation, then expressed as annual economic damage costs in euros and as a share of GDP (see box 1).

Box 1. Cost of early mortality

Environmental pollution often represents a risk of early mortality, as do many other public health risk factors such as road traffic. How much of the budget of state authorities should be spent on reducing these risks compared to spending on other sectors such as education and infrastructure? Or in other words, how much should society spend on avoiding one early death? Economists have developed valuation techniques to guide such decisions. One technique is the human capital approach which equates the cost of a loss of a life (or value of avoiding a loss of a life) to the individual's lost future income from the time of death (i.e., the human capital value (HCV)). A more recent technique is based on individuals' willingness-to-pay (WTP) for a reduction in risk of death which is converted to a value of statistical life (VSL) (see Annex 1). These values (HCV or VSL) of avoiding an early death (or cost of an early death) have nothing to do with ethical or moral values of life, but are simply guiding principles for allocating scarce resources among competing social demands. While the HCV is limited to an individual's economic contribution to society, VSL better reflects the values that individuals attached to various trade-offs in daily life involving risks of early death. Both techniques are applied in this report.

By assigning monetary values to environmental degradation the analysis expresses the damage costs as a share of GDP, allowing for comparison with other economic indicators. It provides a useful mechanism to rank the relative social costs of various forms of degradation. It offers policy makers an instrument to integrate the environment into economic decision making. And it gives different stakeholders a tool for discussing the importance of environmental protection in economic terms—useful in deciding how to allocate scarce resources.

These economic damage assessments provide a range of damage costs rather than a precise figure as data gaps are many, some data are old, and not all impacts can be monetized.

This report provides a partial estimate of the costs of environmental degradation in Kosovo. This gives an indication of which environmental problems inflict the largest costs to Kosovo, or, in other words, which environmental problems potentially give the largest benefits if resolved through policy measures. Estimates of the cost of partially or fully abating some of the causes of these environmental problems are also provided. This approach is the first step towards a comparison of benefits and costs of abatement options which allows policy makers to decide if it makes economic sense to spend more on the environment and/or impose stricter regulations.

The costs of degrading the environment are often left out of decision making because of a lack of information on the amount of these costs and an absence of the "market price." This report attempts to quantify the most significant costs of degradation. As data limitations are a constraint, there are environmental areas for which no estimates are available. However, the total costs of degradation give a working estimate for the costs in Kosovo. As many studies have

shown that the costs of environmental degradation are significant relative to GDP, economic policy makers should consider them.

This report also includes an institutional review of environmental policy making, planning, monitoring, and enforcement, and looks at the state budget's environmental spending.

2 Air pollution and lead contamination

Air pollution is a critical environmental problem in urban areas, though less so for the country as a whole. Ambient air quality is particularly bad in Pristina, the Obiliq area, the Drenas area, and Mitrovica. The principal sources of contaminants are sulfur dioxide (SO_2), nitrogen oxides NO and NO_2 (NO_x), ozone (O_3), lead (Pb), carbon dioxide (CO_2), particulate matter (PM or dust), and dioxin.

The main sources are:

- Energy and mining, including the two coal-fired power plants of the Kosovo Energy Corporation (KEK) and its coal-mining area.
- Wood and lignite for household heating.
- Industrial complexes, such as Mitrovica Industrial Park (Trepca), nickel mining and production in Drenas/Gllogovc (Ferronikeli), and the cement factory in Hani Elexi (Sharrcem).
- Public district heating companies (in Pristina, Gjakova, and Mitrovica).
- Transport.
- Landfills of urban and industrial waste (with varying local impacts).

KEK's power plants (Kosovo A and B in Obiliq) are the main source of air pollutants, though NO_x emissions are more equally divided among the power plants, transport, and other industries. Air emissions from the plants are particularly relevant for Pristina's air pollution and the municipalities surrounding them. Further, the decentralized burning of lignite and wood for household heating causes substantial PM emissions.

Air emissions from the power plants are much higher than the European Commission (EC) Directive for Large Combustion Plants allow (table 2.1), though the Particulate Matter emissions from Kosovo B are a factor 3-6 times lower than those of Kosovo A. However, electrostatic precipitators to remove about 90 percent of particles from the flue gas in the stacks are to be installed in 2012 in Kosovo A.

Table 2.1 Estimates of air emissions for key pollutants for 2010 (mg per Nm^3 flue gas)

Power plant	**Kosovo A**			**Kosovo B**		**Limits as per EC Directive 2001/80/EC and Athens Memorandum**
Block	*A3*	*A4*	*A5*	*B1*	*B2*	
SO_2	685	652	829	629	878	400
NO_x	694	700	692	810	811	500
Dust/PM	1,535	1,850	1401	240	428	50

Source: KEK 2010.

Note: Nm^3 is normal cubic meter and is a common unit used in industry to refer to gas emissions

Air quality monitoring, limited in Kosovo, is carried out by the Kosovo Hydro-meteorological Institute (KHMI), which manages two stations. One is in near the Rilindja building in central Pristina, close to a road heavily used by traffic, and is configured to measure only PM_{10}, $PM_{2.5}$, and PM_1 fractions. And the other is a suburban station at the premises of KHMI, equipped with automatic analyzers for sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, and fine particulate matter (PM_{10} or $PM_{2.5}$).

Other monitoring stations have been installed by the Institute of Public Health, but are out of order. Companies with an impact on air quality (KEK, Sharrcem, and Ferronikeli) are obliged to monitor air emissions from their operations and submit them to the Kosovo Environmental Protection Agency (KEPA), though this information is not public.

The air-quality data from KHMI show that PM, notably, exceeds the EC limit value of an average annual concentration of 40 micrograms per cubic meter ($\mu g/m^3$) for PM_{10}, both in the city center (the Rilindja building) and in the suburban area (the KHMI station), and often exceeds the one-day limit value (not to be exceeded more than 35 times a year) of 50 $\mu g/m^3$ (table 2.2).

Table 2.2 Monthly average concentration values for PM_{10} and $PM_{2.5}$, central and suburban Pristina, 2010 and 2011 ($\mu g/m^3$)

	PM_{10}				$PM_{2.5}$	
Month	Rilindja building, 2010	Rilindja building, 2011	KHMI station, 2010	KHMI station, 2011	Rilindja building, 2010	Rilindja building, 2011
January		129.59	72.3			106.62
February		106.48				75.25
March		76.18	44.5	56.0		45.9
April		55.83	37.2	45.2		26.72
May		41.94	36.2	37.2		20.83
June	53.56		43.3		14.33	
July	57.14		47.1		19.92	
August	68.09		44.9		19.61	
September	52.22		40.5		20.55	
October	65.48		42.7		34.26	
November	105.01		78.8		51.36	
December	128.73					

Source: KHMI 2011.
Note: The Rilindja building is in central Pristina; the KHMI station is in the suburban area of Pristina. The EC limit value for average annual concentration of PM_{10} is 40 $\mu g/m^3$.

EC limit values are set on the basis of scientific knowledge to avoid, prevent, or reduce harmful effects on human health or the environment (or both). They are established in the EC Directive on ambient air quality and cleaner air in Europe (Directive 2008/50/EC; table 2.3). Based on recent scientific evidence of health effects of PM the World Health Organization (WHO) revised its guidelines in 2005 to an annual average PM_{10} of 20 $\mu g/m^3$ and $PM_{2.5}$ of 10 $\mu g/m^3$.

Table 2.3 EC limit values, Directive 2008/50/EC

Averaging period	Limit value
SO_2	
One hour	350 μg/m^3, not to be exceeded more than 24 times a calendar year
One day	125 μg/m^3, not to be exceeded more than three times a calendar year
NO_x	
One hour	200 μg/m^3, not to be exceeded more than 18 times a calendar year
Calendar year	40 μg/m^3
CO	
Maximum daily eight-hour mean	10 μg/m^3
Pb	
Calendar year	0.5 μg/m^3
PM_{10}	
One day	50 μg/m^3, not to be exceeded more than 35 times a calendar year
Calendar year	40 μg/m^3

Source: EC 2008b.

Health impacts of air pollution

Substantial scientific research demonstrates public health impacts from air pollution, and especially from particulate matter (PM). The key public health effects of PM are respiratory diseases and cardiovascular effects. According to WHO (2005), the following are attributed to short-term exposure to air pollution: respiratory and cardiovascular hospital admissions, emergency department visits, and primary care visits; use of respiratory and cardiovascular medications; days of restricted activities; work and school absenteeism; acute symptoms (wheezing, coughing, phlegm production, respiratory infections); physiological changes (such as lung function); and even death.

Effects attributed to long-term exposure include mortality due to cardiovascular and respiratory diseases; chronic respiratory diseases (asthma, chronic obstructive pulmonary disease, and chronic pathological changes); lung cancer; chronic cardiovascular diseases; and intrauterine growth restriction (for example, low birth weight at term; WHO 2005).

The following health assessment is based on air pollution by fine particle matter (PM_{10} and $PM_{2.5}$), given the abundant evidence that particles—fine, in particular—have bad effects on health (for example, Ostro 1994; Ostro 2004; Pope and others 2002). $PM_{2.5}$ increases mortality primarily due to cardiopulmonary and lung cancer, and PM_{10} increases morbidity primarily due to chronic bronchitis, lower respiratory illness in children, and other respiratory symptoms.

This assessment followed five steps to quantify the health impacts of air pollution and their costs.

Step 1: Monitoring data on air pollutants

The data from KHMI on air quality show that PM concentrations in Pristina exceed EC limit values and, by even more so, WHO guidelines values (see table 2.2). The table indicates the following annual average ambient air concentrations: urban PM_{10} = 78 μg/m^3 and urban $PM_{2.5}$ = 40 μg/m^3 (Rilindja building); suburban PM_{10} = 48 μg/m^3 (KHMI station).

This suggests that the $PM_{2.5}$ concentration in suburban Pristina is 24 μg/m^3 (0.5*48, following a $PM_{2.5}/PM_{10}$ ratio of 0.5). The table also suggests that during winter the ambient levels of PM_{10} and $PM_{2.5}$ are much higher than at other times of the year. This is likely due to the use of lignite by the power plants in Obiliq and by households (which also use lignite and wood) in their stoves.

In the absence of air quality data from other cities in Kosovo it is assumed that Pristina's annual urban averages (78 μg/m^3 of PM_{10} and 40 μg/m^3 of $PM_{2.5}$) are representative of exposure for the majority of inhabitants in large cities, and that averages in medium and small cities are somewhat lower, at PM_{10} = 60 μg/m^3 and $PM_{2.5}$ = 30 μg/m^3 (i.e., somewhat higher than in suburban Pristina). As PM concentrations in rural areas are more uncertain, no estimate is given, though this of course underestimates the nationwide health effects of PM.

Step 2: Determining the population exposed

The urban share of the population in Kosovo is close to 50 percent. Three population exposure scenarios are applied due to the uncertainties regarding PM concentrations in cities other than Pristina:

- Low: 15 percent population in large cities and 35 percent in medium and small cities.
- Mid: 20 percent population in large cities and 30 percent in medium and small cities.
- High: 25 percent population in large cities and 25 percent in medium and small cities.

Large cities, in which the population is assumed exposed to PM concentrations levels of urban Pristina, correspond to the majority of the population in the two largest cities (Pristina and Prizren) in the "low" scenario and the majority of the population in the 5-6 largest cities in the "high" scenario. City populations are approximated based on preliminary data from the Census 2011.

Step 3: Assessing health impacts from exposure using epidemiological data

The third step is to determine the health impacts of exposure based on epidemiological scientific research of the exposure-response function between exposure to PM_{10} and $PM_{2.5}$ and mortality and morbidity.

Mortality. For mortality, the exposure-response functions for long-term exposure to $PM_{2.5}$ provided by Ostro (2004) are applied.[3]

Mortality baseline data for Kosovo in the assessment are:

- The crude death rate is 6 per 1,000 people.[4]
- The share of cardiopulmonary mortality in total mortality is 66 percent (SOK 2009a).
- The share of lung cancer mortality in total mortality is 3.7 percent, based on SOK (2009a) data (2.8 percent) adjusted upward.
- The share of mortality due to acute lower respiratory infections in total mortality among under-five children is estimated at 12.5 percent, based on average values for Albania, Bosnia and Herzegovina, and Macedonia, for 2008 (WHO 2010a).

Morbidity. Exposure-response coefficients (annual cases per 100,000 people) for PM_{10} from Ostro (1994) and Abbey and others (1995) are used, with Ostro (1994) reflecting a review of worldwide studies and Abbey and others (1995) providing estimates of chronic bronchitis associated with particulates (PM_{10}). Recent epidemiological studies provide relative risks (RR) for morbidity, but without knowledge of the morbidity rate in Kosovo, the assessment uses exposure-response coefficients giving numbers of cases per total population, even if these coefficients are not specific to Kosovo (table 2.4).

Table 2.4 Urban air pollution exposure-response coefficients for morbidity health effects

Health impact (PM_{10})	Unit	Impact per 1 ug/m^3
Chronic bronchitis	100,000 adults	0.9
Hospital admissions	100,000 population	1.2
Emergency room visits	100,000 population	23.5
Restricted activity days	100,000 adults	5,750
Lower respiratory illness in children	100,000 children	169
Respiratory symptoms	100,000 adults	18,300

Source: Ostro 1994; Abbey and others 1995.

Baseline for PM concentrations. A baseline level for $PM_{2.5}$ of 7.5 µg/m^3 is used (Ostro 2004). Given a $PM_{2.5}/PM_{10}$ ratio of nearly 0.5 observed in Kosovo (see above monitoring results), the baseline level for PM_{10} is set at 15 µg/m^3 (for large and for medium and small urban areas).[5]

[3] The relating relative risks (RR)—that is, change of mortality rates—are calculated as follows: cardiopulmonary mortality, RR = exp[0.00893 ($X-X_0$)]; lung cancer mortality, RR = exp[0.01267 ($X-X_0$)]; and acute lower respiratory infection (ALRI) mortality in under-five children, RR = exp[0.00166 ($X-X_0$)], with X = current annual average $PM_{2.5}$ concentration for cardiopulmonary and lung cancer among adults and PM_{10} concentrations for ALRI among children, and X_0 = target or baseline $PM_{2.5}$ concentration.

[4] Based on SOK (2011b), which gives a crude death rate of 3.8 per 1,000 people, to be adjusted for two reasons. First, PRISM Research (2010) demonstrates that only 60 percent of deaths are actually declared. The adjustment leads to a crude death rate of 6.3 per 1,000 people. Second, SOK (2011a) calculates a crude death rate of 5.6 per 1,000 people, which the authors believe to be too low because of reluctance to discuss death.

The health effects of air pollution are converted to disability-adjusted life years (DALYs) to facilitate comparison with health effects from other environmental factors and between mortality and morbidity. A disability-adjusted life year is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. The DALYs per 10,000 cases for the various health impacts are in table 2.5.

Step 4: Physical health impacts

Based on the exposure-response coefficients, annual PM ambient air concentrations, and data on the exposed population, urban air pollution in Kosovo is estimated (midpoint) annually to cause 835 premature deaths, 310 new cases of chronic bronchitis, 600 hospital admissions, and 11,600 emergency visits. The health effects represent a loss of more than 8,700 DALYs a year (table 2.5).

Table 2.5 Estimated health impacts of air pollution in Kosovo, 2010

Health impact	Cases a year	DALYs/10,000 cases	Total DALYs a year
Cardiopulmonary mortality ($PM_{2.5}$)	748–800	80,000	5,987–6,399
Lung cancer mortality ($PM_{2.5}$)	57–61	80,000	458–488
ALRI mortality (PM_{10})	2	340,000	59–63
Chronic bronchitis (PM_{10})	299-320	22,000	658–705
Hospital admissions (PM_{10})	580–620	160	9–10
Emergency room visits (PM_{10})	11,200–12,000	45	50–54
Restricted activity days (PM_{10}) (thousands)	1,976–2,117	3	593–635
Lower respiratory illness in children (PM_{10})	22,900–24,500	65	149–159
Respiratory symptoms (PM_{10}) (thousands)	6,291–6,741	0.75	472–506
Total			**8,435–9,019**

Source: Authors' calculations
ALRI = Acute lower respiratory infections.

These estimated cases are typically much higher than the number of patients registered with respiratory diseases as not all persons with respiratory symptoms go to the doctor or hospital. According to data from the Institute of Public Health in Kosovo, from the number of patients registered in primary health care in 2007, within the group of diseases related to the environment and environmental factors, the single largest group of patients has respiratory diseases—663,353 cases a year or 31.5 percent of total patients (box 2.1).

[5] These baselines, albeit lower than WHO guidelines, are consistent with the lower end of the range of PM concentrations from which mortality due to $PM_{2.5}$ is estimated by Pope et al (2002) (see Ostro, 2004). No lower threshold has scientifically been identified below which health effects of PM does not occur.

Box 2.1 Availability and analysis of ALRI data in Kosovo

Reliable morbidity data are currently difficult to collect in Kosovo, even in the public health system. The Kosovo health system still lacks both human resources and equipment. The health information system is thus not well developed with respect to the record of causes of consultations, especially in primary care centers, also called Family Medicine Centers (FMCs), which are supposed to receive most of the population suffering from acute respiratory symptoms and diarrhoea. Many health centers do not have a computer, and the consultation causes are registered by hand on dedicated forms where the result of the diagnosis should be indicated as per the WHO International Classification of Disease (ICD10). At the municipal level, the main FMC collects information provided by all the FMCs of the municipality. But the protocol of registration is not really standardized and may differ according the health centers. And sometimes the disease codes are not rigorously mentioned.

In the framework of the CEA, it was attempted to collect data on acute lower respiratory infections (ALRI) among under-five children, which air pollution is known to increase (see exposure-response coefficients). This collection was made in the municipalities of Pristina, Mitrovica, Obiliq (polluted cities), and Peja (less polluted city) with a view of comparing the data obtained for a same period. Data collection was not easy and data were not available in a homogeneous manner due to absence of registration protocols with the available results as shown below:

- In Pristina, monthly data were available for all the year 2010 for several types of ALRI but the disease codes were not totally separated (for example, bronchitis and bronchiolitis are put together) and the age of the patients was not indicated, not even categorized (no distinction between children and adults).
- In Mitrovica, monthly data are available for all the year 2010, for only one type of ALRI (pneumonia code J18) and for under-five children.
- In Obiliq, cumulated data are available for a five-month period in 2010, for two type of ALRI (pneumonia code J18 and acute bronchitis J20) and for under-five children.
- In Peja, cumulated data are available for a three-month period in 2010, for two type of ALRI (pneumonia code J18 and acute bronchitis J20) and for under-five children.

Eventually, only data on acute bronchitis in under-five children of Obiliq and Peja have been deemed comparable (number of cases of pneumonia were too low to be considered). Data of Pristina and Mitrovica have just been used to estimate the distribution of cases over the year and adjust Obiliq and Peja data to yearly values. As a result, the annual rate of acute bronchitis among under-five children treated in Family Medicine Centers is of:

- 20.7 cases per 100,000 under-five children a year in Obiliq (highly polluted by air emission from power plants).
- 14.7 cases per 100,000 under-five children a year in Peja (without significant air polluting industries).

However, these results cannot be expressed as incidence rates among the total population of under-five children because they are only based on data collected by the public health centers such as FMCs. The cases treated by private doctors, who are not involved in the national health data collection system, are hence not taken into account. Accordingly, the results presented above underestimate the actual incidence rates.

Step 5: Monetary effects of health impacts

The cost of mortality is estimated using the human capital value as a lower bound of cost and the value of a statistical life as a higher bound. The cost of illness is estimated as a lower bound, and willingness to pay to avoid a case of illness is applied as a higher bound of cost. Willingness to pay is assumed to be twice the cost of illness (see Appendix 1).

The costs of treating illnesses and of time lost due to illness are in table 2.6. Unit treatment costs are economic costs and not subsidized cost of treatment at public medical facilities. Time losses are valued at 50 percent of average wage rates.

Table 2.6 Unit costs of medical treatment and time losses due to illness

Cost of illness	Unit	Unit cost (€)	Cost of illness	Unit cost per case (€)
Hospitalization	Day	50	Chronic bronchitis (PM_{10})	2,748
Doctor visits	Visit	10	Hospital admissions (PM_{10})	403
Emergency visits	Visit	20	Emergency room visits (PM_{10})	41
Value of time lost to illness	Day	10.3	Restricted activity days (PM_{10})	1.3
Value of lost caregiver time	Day	8.2	Lower respiratory illness in children (PM_{10})	41
			Respiratory symptoms	0.3

Source: Authors' calculations, based on medical costs and wage price information from Kosovo.

The estimated total economic costs due to health effects of air pollution in Kosovo range from €37 million to €158 million a year, with a midpoint estimate of €96 million, or 2.3 percent of GDP in 2010 (table 2.7), based on the three defined scenarios of exposed population.

Table 2.7 Costs of health impacts of air pollution, 2010 (€)

Category\estimate	Low	Mid	High
Mortality: adults	29,973,823	84,442,006	142,453,784
Mortality: children	232,258	267,514	304,572
Chronic bronchitis	821,763	1,276,667	1,760,920
Hospital admissions	233,932	362,999	500,131
Emergency room visits	455,463	707,595	975,993
Restricted activity days	2,552,296	3,966,004	5,468,837
Lower respiratory illness in children	931,027	1,439,229	1,992,154
Respiratory symptoms	2,031,439	3,156,141	4,353,499
Total cost (€)	**37,232,002**	**95,618,156**	**157,809,890**
Total cost (% of GDP)	**0.89**	**2.28**	**3.76**

Source: Authors' calculations.

Lead contamination

Lead-related health concerns in Kosovo are associated with:

- Lead emissions to air and water by lead and zinc mines and lead-processing facilities, in particular former lead smelters. Emissions have spread over areas several kilometers wide, known as hotspots.
- Release of lead to air by vehicles fueled by leaded gasoline and possibly other indoor exposure sources such as lead-based paint and lead water pipes. This exposure is likely higher in urban areas.

Kosovo has several lead and zinc mines, most north of Mitrovica. Two others are southeast of Pristina. A lead smelter operated for several decades in Zvecan (a few kilometers north of Mitrovica) until it closed in late 2000. Thus, Zvecan and northern Mitrovica are lead hotspots.

Air emissions of lead have fallen dramatically since Zvecan's smelter was shut, but lead mines and their tailings still contaminate the air (windborne dust), water, and soil (runoff and dust deposition). Similarly, the soil around Zvecan, still heavily contaminated by deposition of leaded particles, is a major source of lead exposure.

The use of leaded gasoline was authorized during the former Yugoslav period and has been regulated in Kosovo only very recently by an administrative instruction issued in September 2011. Other sources of lead exposure (paints and pipes) are not documented.

Lead is well known to impair neuropsychological functioning in children, even at low levels of exposure. Lead tends to accumulate in organs and in blood. Robust associations between blood lead level (BLL) concentrations in children and measures of their IQ were demonstrated long ago. Recent studies show adverse effects on IQ even at BLLs nearly as low as 2 µg Pb per dL of blood (that is, nearly 2 micrograms of lead per deciliter of blood). These studies are used as the basis for estimating the harmful effect of lead on children's intelligence in Kosovo.[6]

The assessment here is based on the results of a study carried out by the World Health Organization (WHO) in 2004 on 296 children under age 4 and living in Mitrovica (north and south), some surrounding towns (Zvecan, Zubin Potok, and Leposavic), and Pristina (McWeeney 2007). Blood samples from children were analyzed for lead with the following main results:

- Zvecan (22 children): mean BLL = 32.59 micrograms per deciliter (µg/dL), standard deviation (SD) = 28.67.
- North Mitrovica (44 children): mean BLL = 14.32 µg/dL, SD = 13.52.
- South Mitrovica (163 children): mean BLL = 6.68 µg/dL, SD = 4.70.
- Zubin Potok (16 children): mean BLL = 4.54 µg/dL, SD = 2.30.
- Pristina (42 children): mean BLL = 3.49 µg/dL, SD = 1.31.

As the lead smelter had been closed during the execution of the WHO assessment, the results demonstrate lead levels many times over that at which lead starts to affect IQ and the persistence of the hotspots—and thus the need to remediate them. The BLL measured among children in Pristina is more representative of the country as a whole and is used for the present

[6] For BLL of 0–10 µg/dL, epidemiological studies show decrements of IQ points per 1 µg/dL BLL from 0.5 IQ points (Lanphear and others 2005) to nearly 1 IQ point (Surkan and others 2007; Jusko and others 2008). For higher BLL, the decrements are 1.9 IQ points per 1 µg/dL at 10–20 µg/dL BLL and 1.1 IQ points per 1 µg/dL at 20–30 µg/dL BLL (Lanphear and others 2005). Lanphear and others (2005), based on a meta-analysis of several studies, report a log-linear dose-response function giving the IQ decrement for a large range of BLL. This function is used here to estimate effects of lead on children's intelligence in Kosovo:

$\Delta IQ = \beta \ln(BLL)$ for $BLL \geq Y$ (1a)

and $\Delta IQ = 0$ for $BLL < Y$ (1b)

Lanphear and others (2005) report a β=2.70 (95 percent confidence interval: 1.66–3.74) for concurrent measurement of BLL (BLL at time of IQ test), which is the BLL measurement to which the authors devote most of their analysis. The confidence interval for β is applied to Kosovo to provide a lower and upper estimate of IQ point losses, and with β=2.70 as a central estimate. Lanphear and others (2005) do not categorically confirm the value of Y, and for Kosovo it is set at BLL= 2 µg/dL, based on a review of the three sources cited.

assessment for areas other than the hotspots of Mitrovica and Zvecan. But as Pristina's population may be more exposed than those in rural areas, the assessment may overstate the effects of lead on children in Kosovo.

Based on the mean value and the standard deviation of BLL observed among children of Pristina and considering a log-normal distribution of BLL among children, it is estimated that more than 95 percent of under-five children in Kosovo (other than in Zvecan and Mitrovica) have a BLL of 2–5 µg/dL. These children are estimated to lose 1.5–4 IQ points during their early childhood, while children in Zvecan and Mitrovica lose 8–10 IQ points. The total (midpoint) loss of IQ points in Kosovo is nearly 60,000 a year, with a range of 37,000–83,000.

Studies by Schwartz (1994) and Salkever (1995) in the United States indicate that a loss of one IQ point reduces lifetime income by up to 1.3–2.1 percent, with an average of 1.7 percent. Applying this income loss to the estimated IQ losses experienced by children in Kosovo, and adjusting for expected future labor force participation, indicates an annualized loss of 1.0–2.2 percent of GDP in 2010 (table 2.8).

Table 2.8 Annual cost of IQ loss in children from exposure to lead, 2010

Category\estimate	Low	Mid	High
Lifetime income loss per lost IQ point (% of income)	1.67	1.67	1.67
Cost per IQ point (for working population, €)	2,365	2,365	2,365
Labor force participation (future, %)	48.1	48.1	48.1
IQ points lost per year	36,686	59,670	82,654
Cost of lost IQ points (€/year)	**41,739,061**	**67,888,835**	**94,038,608**
Cost of lost IQ points (% of GDP)	**1.00**	**1.62**	**2.24**

Source: Authors' calculations.

Climate change

Carbon dioxide and other substances with global warming potential (mainly methane and nitrous oxide) do not directly damage health or the environment, but through global warming the following effects could be expected for the Eastern Europe and Central Asia region (World Bank 2010c):

- Increases in temperatures and precipitation.
- Limited water availability and changing hydrology.
- Rises in sea level.

While southeastern Europe is vulnerable to climate change impacts related to floods and droughts, specific data on possible impacts of climate change in Kosovo are limited. Therefore, climate change is not included in the damage cost assessment.

Estimates of mitigation costs and planned pollution reduction strategies

Various measures are available to mitigate air pollution. A cost-effective mitigation strategy would involve implementing measures that have the lowest cost per unit of benefits, of which health benefits are usually the largest benefit component. Thus, when evaluating mitigation options, an assessment should be undertaken not only of mitigation cost and total air emission reductions but also of expected reduction in population exposure to air pollution and resultant health improvements. Some mitigation options and cost estimates are discussed below and the benefits of these measures most likely exceed by far the costs It is worth noting that it is not possible to compare the costs of remediation with costs of environmental degradation at a macro level of analysis. Typically, costs of degradation are usually measured in relation to ambient level of pollution, for instance health costs related to ambient level of particulate matter in air (all air pollution sources combined). Costs of remediation or abatement are usually measured for a very specific source of pollution (for example: power plant and industrial combustion).

Power

Emissions of fine dust (matter with particle size below 10 micrometers, PM_{10}) are the main cause of health impacts from air pollution. Of the identified emissions of 21,614 tons of PM_{10} in 2009, 78 percent came from KEK's power plants, and roughly two-thirds of that from Kosovo A. Contracts for Kosovo A in ash handling and flue gas treatment worth €34 million should reduce dust emissions in 2012 to around 10 percent of current levels.

The power plants are also the main sources of SO_2 and NO_x. Control measures (flue gas desulfurization or NO_x catalytic reduction) would roughly cost around €50 million for both Kosovo A and B).

In addition to the planned investments in KEK to install Electrostatic Precipitators to reduce Particulate Matter emissions, it is the Government's strategy to: (i) close Kosovo A by 2017 and replace it with a new, state-of-the art, privately operated 600-MW power plant termed the "Kosovo e Re" Power Plant; (ii) attract private investment to rehabilitate and upgrade Kosovo B, including ensuring conformity with EU environmental standards; (iii) privatize electricity distribution inter alia to reduce technical and commercial losses; (iv) step up payment enforcement and raise tariffs to levels consistent with full cost recovery; (v) expeditiously address environmental legacy issues associated with Kosovo A and B; (vi) invest significantly

greater resources in energy efficiency in the near term; and (vii) maximize the use of renewable energy (hydro, solar, wind, geothermal).

Other industries

Other industries are contributors of NO_x (8,860 tons a year) and, to less extent, SO_2 (1,945 tons a year; MEM 2010). Nonpower SO_2 emissions are mainly attributed to Ferronikeli, and recent emission measurements by KEPA suggest that SO_2 discharged into the atmosphere could exceed 4,000 tons a year. Plans or information on abatement measures were not found. Flue gas desulfurization would probably cost more than €10 million in capital.

Sharrcem cement factory is also an important NO_x generator, but much less so than the power sector, and flue gas concentrations are below legal thresholds according to KEPA measurements in 2011. There are no data on whether in the local area around the cement kiln air quality standards are met.

Transport

Transport is a key contributor to air pollution, especially in cities. The Automotive Directive (2004/104/EC) regulates vehicle emissions in the European Union (EU), but standards apply only to new vehicles (the existing stock is exempt). Since the introduction of the first EU standards EURO 1 in 1993, subsequently a further five, more stringent, emission standards have been issued: EURO 2–6.

Technical measures in the transport sector include catalytic convertors to reduce NO_x and volatile organic compound emissions; particle filters to reduce PM_{10} emissions; carbon canisters (placed on fuel tanks to reduce evaporation of fuels); engine management (lambda probe) and modification; low sulfur fuels (diesel) and lead replacement in gasoline; vapor recovery systems (gas stations/distribution tanks); and liquid proof pavement and water treatment for gas stations.

Nontechnical measures can reduce emissions and pollutant levels in cities, such as ring roads; traffic circulation management (to limit cars idling and accelerating from traffic junctions); car-free zones; and closure of town centers to vehicles above a certain age or size (“environmental zones”).

EU directives already have an effect in Kosovo, as many cars are imported from other EU countries. Estimating compliance costs is complicated, as part of the car fleet is imported second hand from the EU and other countries, and cost estimates for environmental measures on different vehicle types are difficult because of the use of integrated technologies. Rough indications of compliance costs per new vehicle are €500 for passenger cars, €650 for light

commercial vehicles, and €4,500 for heavy-duty vehicles (trucks, buses) (averages for 2009 based on CBS 2011a and CBS 2011b).

In addition, new-vehicle sales data are unavailable, so only a very rough estimation can be made of total compliance costs. The car fleet in 2009 was about 380,000 vehicles (Bashkim and others 2010), of which 82 percent were passenger cars, 10 percent light commercial vehicles, and 4 percent heavy-duty vehicles. If new vehicle sales in coming years are about 10 percent of the total car fleet of 2009, annual investment costs (incorporated in the vehicle selling price) are estimated at about €25 million.

Among technical measures, cleaner fuels add costs for users—for diesel of €0.024 a liter (€0.029 a kilogram) and for gasoline of €0.013 a liter (€0.019 a kilogram; based on TME 2009 and CBS 2011c). MEM (2010) indicates that Kosovo uses about 339 kilotons of oil equivalent of transport fuels a year, 69 percent diesel, 21 percent gasoline, and some small fractions of other types of transport fuels. Hence these additional annual costs are estimated at €6.9 million for diesel fuel and €1.3 million for gasoline.

Gasoline stations need to invest in vapor-recovery systems, liquid-proof pavements (for soil protectection), and soil sanitation (if the soil is polluted). Kosovo has an estimated 811 gas stations (results from Kosovo municipalities survey, see appendix 4) and the average costs per station (based on TME 2009 and BOVAG 2011) are roughly estimated at €6,000, €11,000, and €17,000, respectively. Total gas station investment is thus estimated at €5 million for vapor recovery, €9 million for soil protection, and €14 million for soil sanitation.

Another measure that would lead to additional costs, when implemented, is the technical vehicle inspection made every two years (common in many EU countries). Currently in Kosovo an inspection is done upon import of a car but here are no annual car inspections. The costs per vehicle are estimated at €8 for gasoline vehicles—and, for diesel vehicles, €25 for light commercial vehicles and €50 for heavy-duty vehicles (TME 2005). Thus if half the vehicle fleet is inspected each year, total annual costs are estimated at €4 million.

Domestic fuel consumption

Domestic heating and cooking with lignite and firewood is still common in Kosovo. It is highly polluting, as clearly seen during winter in larger cities. But without a natural gas network or infrastructure for other fuels, phasing it out will be hard. A policy shift to phase out domestic use of firewood and lignite would be very expensive, however, and smaller initiatives to improve home cooking and heating devices may be the best first steps.

Lead

Measures to reduce exposure to lead are costly and complex and will require a range of approaches. The first step would be the final cleanup of the lead smelter area and the remediation of tailing disposal sites in the Mitrovica area. Remediation cost estimates for this range from several to tens of millions of euros. These technical measures can be combined with an education program for people living at or near contaminated areas to minimize lead intake by minimizing exposure to all media that contain lead (soil, dust, water, groundwater, and produce from the contaminated areas). Further, enforcement of the newly introduced administrative instruction to phase out leaded gasoline needs to be improved.

Energy efficiency measures

Air pollution can also be reduced through measures to increase energy efficiency and, in line with the Kosovo Environmental Strategy and the government's commitment to follow the EU strategy on the energy sector, the 20/20/20 EU plan[7] raising the energy-efficiency levels in energy generation and consumption and developing economic incentives to reduce energy consumption and increase public awareness on energy efficiency.

In order to support the objective to increase the efficiency in energy use and generation from renewable resources, The Government and the World Bank are developing a proposed US$32.5 million Energy Efficiency and Renewables Project. The Project would aim to retrofit public buildings to substantially reduce their energy consumption and strengthen the supply-chain through training of energy auditors, contractors, vendors and equipment suppliers. The project would also seek to reduce pollution and emissions caused by widespread use of liquid-fuel generators and firewood for household heating inter alia by providing households with incentives to improve energy efficiency and adopt cleaner heating methods.

[7] A 20-percent increase in energy efficiency, a 20-percent increase of the renewable energy share in the energy mix, and a 20-percent reduction of carbon dioxide emissions.

3 Water

Kosovo has few water resources, in four main water basins: the Drini i Bardhe, Ibri, Lepeneci, and Morava e Binçës. Water is distributed unequally across the country and overall demand is is expected to rise due to greater urban, industrial, and agricultural demand. All rivers are classified as being polluted and having unacceptable levels of biological oxygen demand as well as lack of dissolved oxygen due to the lack of operating wastewater treatment systems.

Groundwater reserves appear limited (though data are few), most in western Kosovo, where surface water reserves are also greater. Capacity of existing water resources (groundwater and reservoirs) to meet current and immediate future demand (2013–17) is still adequate for the Gazivoda and Batllava reservoirs, but the third reservoir, Badovc, already reached its supply limit. Investments are therefore needed to improve water security. Most groundwater comes from wells and springs, and most drinking water from surface water.

Access to piped water supply and sanitation is limited (table 3.1). Seven regional water companies provided piped water supply to about 1.23 million people in Kosovo in 2008, and nearly 1 million people had sewerage services (KEPA 2010)—or, based on population figures from the 2011 census, 65 percent and 52 percent of the population, respectively. Water supply systems serving the Serb-majority municipalities and rural areas also provide water.[8]

Rural areas have about 200 water supply systems directly run by communities and villages, covering about 65 percent of the rural population, though few of these systems are hygienic. Nationally, there are no operational wastewater treatment plants yet.

Table 3.1 Household drinking water sources, 2009 (%)

Source	Urban	Rural	Total
Piped water inside building	86.0	45.0	62.0
Piped water outside building	9.2	7.5	8.2
Public tap	0.1	1.5	0.9
Water from covered well	2.7	26.6	16.7
Water from open well	1.6	17.6	11.0
Surface water	0.1	1.5	0.9
Rainwater	0.0	0.1	0.1
Other	0.3	0.2	0.3

[8] According to preliminary results of the 2011 census on the official website (http://esk.rks-gov.net/eng/), the 2011 population is 1.73 million, excluding Serb-majority municipalities such as Zubin Potok, Leposavic, Zvecan, and Northern Mitrovica. Given that Serbs and other minor ethnic groups account for less than 10 percent of the population, Kosovo's population is estimated at 1.9 million.

Source: SOK 2011a.
Note: The total is based on the assumption in SOK (2011a) that 58.5 percent of the population is rural. But if the rural population is 50 percent, 65 percent of the population in Kosovo has piped water inside the building and 9 percent has piped water outside the building.

Water quality monitoring and water pollution

Monitored water pollution comes mainly from bacteriological contamination due to the absence of operational wastewater treatment plants in Kosovo. Twenty-two hydrometric stations operated by the Hydro-meteorological Institute monitor surface water quality. Neither groundwater monitoring nor urban wastewater monitoring exists. The quality of drinking water is monitored by the Institute of Public Health. Monitoring data show that pollution of drinking water arises more from bacteriological contamination than chemical contamination. Most of the bacteria are in water supply systems of small cities and rural areas where an estimated 74–90 percent of wells and springs have wastewater and fecal contamination (KEPA 2010).

For sanitary biological water quality, the rivers are all classified as being polluted and having unacceptable levels of biological oxygen demand as well as lack of dissolved oxygen in the rivers, particularly in smaller streams and downstream of the discharge of untreated sewage (table 3.2).

Industrial water needs are 150 million cubic meters (m^3) a year, around 30 percent of total water consumption.

Main industrial polluters are the Kosovo Energy Corporation (KEK), Ferronikeli, and Sharrcem, as well as Trepca, Kishnica, Artana, and other mines. Polluted water from industry and mining is mainly acidic, with heavy metals such as cadmium and lead in the wastewater. Water quality at river springs is good. Surface water quality deteriorates after discharges of urban and industrial wastewater, but the annual average environmental quality standards for the priority substances (heavy metals) defined by the European Union (EU) for inland surface waters and other surface waters are in general not exceeded, except for cadmium, lead, and nickel (table 3.2). There are no monitoring data available on the impact of agricultural pollution on surface water.

Table 3.2 Surface water quality of the main river basins in Kosovo

River basin	Drini i Bardhe	Ibri	Lepeneci	Morava e Binçës	Water quality classification	
Monitoring stations	24	17	6	5		
Sanitary-biological water quality(mg/l)						
BOD_5—highest registered value	6.74 (2007) 7.22 (2008) 7.22 (2009)	19.8 (2007) 18.43 (2008) 15.1 (2009)	15.67 (2007) 11.97 (2008) 6.8 (2009)	approx. 6 (2007) approx. 5 (2008) approx. 5 (2009)	Pristine rivers	< 1 mg/l
					Moderately polluted	2–8 mg/l
					Municipal sewage[a]	20 mg/l
Dissolved oxygen—lowest registered value	6.6 (2007) 5.8 (2008) 5.7 (2009)	4.2 (2007) 2.2 (2008) 1.8 (2009)	6.1 (2007) 6.0 (2008) 7.0 (2009)	5.8 (2007) 6.0 (2008) 7.0 (2009)	No aerobic aquatic life	0–0.2 mg/l
					Problematic for aerobic aquatic life	0.2–6 mg/l
Highest heavy metal pollution of priority substances (mg/l)						
Cadmium	0.01	0.02	0.01	0.01	0.00045–0.0015[b] maximum allowable concentration depending on water hardness	
Lead	0.1	0.1	0.07	0.07	0.0072[b] annual average	
Nickel	0.9	0.2	0.2	0.2	0.02[b] annual average	

Source: KEPA (2010) for the actual pollution levels in the rivers; EC (2008a) for the water quality classifications.
Note: Chemical oxygen demand and total suspended solids are not reported. BOD_5 = the biological oxygen demand expressed in milligrams of oxygen consumed per liter of sampling during five days of incubation at 20°C.
a. Efficiently treated after tertiary treatment.
b. Based on EC 2008a.

Surface water pollution levels are likely to be higher than monitored, because of gaps in the monitoring network for industrial wastewater effluents and surface water quality, particularly downstream of major industrial and mining complexes and discharges of untreated wastewater.

Environmental impacts from agricultural water pollution

Agriculture has traditionally been important in Kosovo, accounting for as much as 25 percent of total output, but its share has fallen to 12 percent in recent years. Apart from the competitive challenges facing the sector that prevent Kosovo from being largely self-sufficient in food are those of environmental management, a particular problem in the watershed areas.

The Danube watershed of Kosovo comprises three main river basins: Ibar, Sitnicia, and Morava. It is in northeast Kosovo, draining about 5,500 square kilometers, approximately 52 percent of Kosovo and covering 17 of the 33 municipalities. Management of nutrients from agriculture in the Danube watershed is largely uncontrolled and unregulated. On livestock farms, manure

storage facilities are generally absent, with manure stored in heaps outside barns, close to roadside drains, and along river banks. It is estimated that, from livestock alone, about 19,000 tons of nitrogen are produced each year, much of it leaching into soil and local water bodies.[9]

With the absence of piped drinking water in most rural villages, and dependence on backyard wells and local springs/ponds as the primary source of potable water, 90 percent of samples tested high for nitrates in 2009 (as well as fecal contamination). However, quantifying health impacts is difficult due to a lack of data.

Health impacts from contamination of water sources

Inadequate water supply, poor sanitation (such as toilet, sewerage, and wastewater treatment facilities), and unhygienic practices are associated with waterborne illnesses and mortality. The most common illness: diarrheal disease. Providing safe drinking water and sewage collection and following good hygiene practices play an important role in reducing the risk of diarrhea. Based on the population coverage of drinking water supply and sanitation in, an estimated 85 percent of diarrhea is attributable to inadequate quality and quantity of water supply, sanitation, and hygiene in Kosovo (SOK 2011a).[10] Muçaj and others (2010) show no downward trend in waterborne diseases in Kosovo.

As most monitored water pollution is from bacteriological sources, three main health impacts are considered: mortality and morbidity among children under five years of age, , and morbidity among the population aged five years and older.

Diarrhea: mortality (under-five children)

Under-five children (estimated at around 150,000 in Kosovo in SOK 2011b) is the population group most severely affected by diarrhea. Using the approach developed by the World health Organization (WHO), an estimated 13 under-five children in Kosovo die each year because of poor water, sanitation, and hygiene, giving an annual loss of about 440 disability-adjusted life years (DALYs; Fewtrell and others 2007).

The WHO approach is based on the link between repeated diarrhea in early childhood and child underweight, which in turn increases the risk of child mortality from other infectious diseases such as acute lower respiratory infections and measles. The basic data are:

- 345 under-five child deaths in 2010 (SOK 2011b).

[9] Estimates of World Bank agriculture consultant.

[10] In 2009, with the support of the United Nations Children's Fund and the United Nations Population Fund, the Statistical Office of Kosovo (SOK) undertook the Demographic, Social and Reproductive Health Survey in Kosovo (SOK 2011a). Based on a sample of 3,992 household and 23,695 people, the survey is the most recently published work on demography and health status of the population.

- Average prevalence of severe (0.7 percent), moderate (2.7 percent), and mild underweight (13 percent) among children—including averages for Albania, Bosnia and Herzegovina, and Macedonia.
- Relative risk of mortality from diarrhea and other infectious disease according to categories of underweight (Fishman and others 2004).
- Attributable share of diarrhea deaths among under-five children associated with inadequate water, sanitation, and hygiene—estimated at 85 percent (SOK 2011a; Pruss and others 2002; Fewtrell and others 2007).

Diarrhea: morbidity (under-five children)

Statistics of acute diarrheal disease are reported by SOK and some reports (see Muçaj and others 2010), but these statistics exclude cases of not visiting health centers and thus underestimate the true figure. To overcome this bias, estimates of diarrheal morbidity in under-five children were based on two-week prevalence rates among such children reported by household surveys (Demographic and Health Surveys, Multiple Indicator Cluster Surveys) in the neighboring countries of Albania, Bosnia and Herzegovina, and Macedonia, which are 4.7–7.2 percent, with an average of 6 percent.[11] This prevalence rate can be converted to an incidence rate of 0.06*52/2.5 = 1.25 cases a year[12]—that is, 188,105 cases a year among under-five children in Kosovo, of which 85 percent are attributed to inadequate water, sanitation, and hygiene.

An estimated 59 DALYs a year are lost from morbidity in under-five children. This is based on an average duration of diarrheal disease of four days; 85 percent of cases avoided per capita a year if safe water and adequate sanitation are provided to the entire population and good hygiene practices are fully observed; a disability severity weight of 0.11 (Murray and Lopez 1996);[13] and an average age weight of 0.31.

Diarrhea: morbidity (people ages 5 and older)

An estimated 449 DALYs are lost from morbidity each year in this population. International statistics show that the incidence of diarrhea among peoples ages 5 and older is on average around 20 percent of that among under-five children, which implies for Kosovo 0.2*1.25 = 0.25 cases per person a year. For a population ages 5 and older of 1,900,000–150,100 = 1,749,900, the annual number of cases is 0.25*1,749,900 = 438,595, of which 85 percent are attributed to inadequate water, sanitation, and hygiene.

[11] During the surveys, households are asked about the occurrence of diarrhea for their under-five children in the two preceding weeks.
[12] The division by 2.5 weeks instead of 2 weeks is justified by the fact that some reported episodes will have started before the two-week prevalence period and some will have ended after.
[13] On a scale of 0 (perfect health) to 1 (death).

Cost of diarrhea

The cost of health effects is estimated as follows:

- Mortality is valued using the human capital value as a lower bound, and the value of a statistical life as a higher bound of cost.
- The cost of illness is estimated as a lower bound, and willingness to pay (assumed to be twice the cost of illness) to avoid a case of illness is applied as a higher bound of cost.

Cost of illness includes medical costs of treating diarrhea and time spent by family members to care for sick children. It is assumed that about 60 percent of children with a case of diarrhea seek medical treatment.[14] Visiting a doctor costs an estimated €10 a visit (the economic cost, not the price charged at subsidized public services).

Many children with diarrhea also receive medicines such as oral rehydration salts (ORS), antibiotics, intravenous solutions, and medicines. There are no statistics in Kosovo on the proportion of children receiving medicines for diarrhea, but in neighboring countries 40 percent of children receive ORS,[15] and in Albania 39 percent receive antibiotics, 4 percent intravenous solutions, and 7 percent other medicines to control diarrhea. These data are applied to under-five children in Kosovo to estimate the cost of medicines for treating diarrhea, which is €1.0 for ORS, €4 for antibiotics, €2 for intravenous solution, and €2 for other medicines.

For the population ages 5 and older with diarrhea it is assumed that 30 percent attend medical treatment, 10 percent receive antibiotics, 2 percent receive intravenous solution, and 2 percent receive other medicines. These treatment rates are lower than for young children because treatment rates of diarrhea tend to decline sharply with age.

In addition, when a child is ill, a caregiver (family, neighbor) uses her or his time to look after the child. This time has an opportunity cost, either for leisure or other activities. It is assumed that two hours a day is spent on caring for a child with diarrhea, and for those attending medical treatment, two hours. For the population ages 5 and older with diarrhea it is assumed that one hour a day is lost due to illness. These time losses are valued at 50 percent of average wage rates in Kosovo.

Heavy metal pollution

Annual industrial water pollution from Trepca is estimated at a minimum level of 140 tons of zinc, 6 tons of lead, and 0.4 tons of cadmium if some known point sources are considered. If concentrations in the Iber River near Mitrovica are taken as an indicator, total annual pollution levels are more in the order of 400 tons of zinc, 100 tons of lead, and 10 tons of cadmium. As

[14] Based on treatment rates in Albania (DHS 2008–09).
[15] According to DHS and MICS household surveys in 2005-09 in Albania, Bosnia and Herzegovina, and Macedonia.

no health assessment of this pollution is available in Kosovo, expected health effects and their costs are approximated by transferring health damage costs per ton of heavy metal pollution from the Netherlands following the benefit transfer method and based on the pollution load near Trepca (appendix 1).[16]

Total health costs related to inadequate water supply, sanitation, and hygiene and to heavy metal water pollution are equivalent to 0.20–0.47 percent of GDP in 2010, dominated by the cost of morbidity from diarrhea (table 3.3). The health effects represent a loss of 946 DALYs a year.

Table 3.3 Costs of diarrheal disease and heavy metal water pollution, 2010 (€)

Health effect\estimate	Low	Mid	High
Diarrheal disease: mortality	1,735,414	1,932,980	2,130,547
Diarrheal disease: morbidity	6,256,000	9,384,000	12,512,001
Health effects of heavy metals	161,825	1,979,336	3,796,847
Total	**8,153,239**	**13,296,316**	**18,439,394**
% of GDP	**0.19**	**0.32**	**0.44**

Source: Authors' calculations.

Estimates of mitigation costs

Among the various discharges of contaminated effluents to surface water and groundwater, bacterially contaminated wastewater causes the biggest health impacts and negative economic effects. And the pollution of surface waters from industrial effluents plays a subordinate role.

Sanitation

Sanitation programs to solve these problems should comprise piped water supply networks (mainly to rural areas), sewerage systems to collect water from households (also largely to rural areas), sewage treatment before discharge to surface water, and investments to address diffuse pollution from agriculture.

The government has planned substantial investment in water supply and sewerage networks (under the Ministry of Environment and Spatial Planning, €31 million for 2010–12). Most investment to date, however, has been funded by donors who contributed €8.5 million in 2008 toward water sanitation projects.

Total investment needs for sanitation (safe water supply and wastewater collection/sewerage and treatment) have not been assessed in much detail.

[16] Health damage costs per ton of heavy metal pollution is transferred from the Netherlands to Kosovo by multiplying by the ratio of GDP per capita in Kosovo relative to the Netherlands.

For **water supply** (drinking water preparation plus network), a rough unit price indicator of €350 per inhabitant can be applied to estimate the costs of providing safe drinking water to underserved areas (OECD 2005). With a target of 90 percent of the population with access to piped water supply (against the current 40 percent not connected or poorly served), around 600,000 people would require these investments, costing an estimated €210 million.

For **wastewater collection/sewerage and treatment**, the following simple estimate of investment is based on international benchmarks for unit costs to comply with EU standards. About 50 percent of the population is served by sewerage systems, against a desirable rate of 90 percent. Around 0.7 million inhabitants would thus require connections. Further, some sewage is collected and discharged without treatment, so with additional future sewerage connections, the wastewater from around 1.6 million inhabitants of Kosovo will need to be treated.

A 10-year period is assumed for the costs of complying with EU regulations, based on the following:

- About 90 percent of sewage is collected (the rest by private septic tanks).
- All sewage is treated biologically (in larger settlements phosphor and nitrogen are also reduced).
- In small settlements (fewer than 2,000 inhabitants) reed beds or septic tanks are used (OECD 2005).

The costs and investments to extend sewerage systems and build treatment plants are generated by applying the MOSES model (TME 1999a,b). To use the model, the division of the population of Kosovo over types of settlements (by size) is roughly assessed. Next the discharges (expressed as chemical oxygen demand [COD], phosphorous compounds [P-total], and nitrogen compounds [N-total]) of wastewater are estimated by means of annual standard emission factors per inhabitant equivalent (45 kg COD, 0.9 kg P-total, and 4 kg N-total).

By size of settlement, the additional sewage to be collected and the kind of treatment required are estimated, which would reduce discharges of COD, P-total, and N-total by the amount required to meet EU standards. To assess the investments needed to upgrade water sanitation to EU standards the model applies “unit investment” per type of technology (by size). For sewerage systems the unit investment per inhabitant varies from €670 to €770; for wastewater treatment from €70 to €120 (reed beds cost about €35 per inhabitant; RIZA 2006). With reduction targets met, estimated total investments are shown in table 3.4.

Table 3.4 Estimated investment and annual operating costs, wastewater collection/sewerage and treatment (€ million)

	Total investment		Annual operating costs		
	2010–15	2010–20	2010	2015	2020
Sewerage	122	250	21	31	42
Treatment	64	174	0	12	38
Total	**185**	**424**	**21**	**43**	**80**

Source: TME 1999a,b.

To comply with EU standards around €425 million needs to be invested in wastewater collection/sewerage (mainly in suburban and rural areas) and treatment (countrywide). In 2010 the annual costs of operating the sewerage system were around €20 million. When full compliance is achieved, annual running costs are estimated to be €80 million.

Industrial wastewater treatment

The investment to stop discharges of acid water from mining and heavy metals from (former) Trepca operations are included in the estimated investments presented in chapter 4. Investments for industrial effluents that require biological treatment are included in the cost estimates for wastewater treatment in the previous section.

For the three main industrial operators—KEK (coal-fired power plants), Ferronikeli (nickel mining and production), and Sharrcem (cement)—water consumption is a more important issue than wastewater generation. KEK's effluents exceed certain discharge quality limits and investments are needed, but their direct health impact is much less significant than the effects of sewage discharges. According to international benchmarks for these industries, the effluents of Ferronikeli and Sharrcem are not expected to be of major concern (WHO 1989).

Policy recommendation applicable to water sector

As Kosovo must align itself with European Commission directives, and public resources for environmental projects are likely to become more constrained in the medium term, the government should seek donor support for complying with the directives that require heavy investments. The government could consider developing 10-year strategic masterplan for water supply, sanitation, and wastewater treatment, including a management plan for the main river basins. This masterplan should consider the investment needs for the long term. They would include an analysis of the required operational and maintenance costs and take into account affordability constraints related to increasing utility tariffs to achieve the long-term financial sustainability of proposed investments. It can facilitate attracting donor support for specific investment projects phased over 10–15 years.

4 Solid waste

Kosovo lacks proper waste management for virtually all solid waste types (domestic, industrial, health care, and hazardous). Collection, classification, recycling, and treatment systems as well as infrastructure for municipal waste are missing. Data and accessible waste-information systems are paltry. Cost recovery for services is low. Illegal landfills and inappropriately constructed and managed industrial landfills abound. And appropriately constructed and operated hazardous waste facilities are lacking—Kosovo has no licensed hazardous waste incineration facilities, for example.

These shortfalls cause serious health and environmental impacts, either from uncontrolled or poorly controlled waste disposal facilities or (particularly in rural areas) from the large amounts of waste simply uncollected, dumped at illegal dumpsites (often near rivers, causing additional environmental hazards), or burned. Large volumes of coal ash (from the lignite-fired power plants) and mining waste are also dumped each year, without any measures for recycling.

This section estimates the amount of waste disposed at landfills and their condition. As data on waste generation and disposal are poor, the estimates of economic damage cover only municipal solid waste (including "backyard burning") and coal ash disposal from the power plants.

For municipal solid waste, the methodology is largely as for European Union (EU) accession countries (Ecotec and others 2001) and for landfills (COWI 2000). This means that emissions to air and to water (leachate) are estimated, and then unit values for these air and water pollutants are applied to assess the economic damage.

For coal ash disposal, it has been assumed that coal ash could (as in many EU countries) be used partly to substitute primary construction materials like cement and sand.[17] It has been assumed that the economic damage of not recycling coal ash can be assessed by equating it to the costs of production of the primary materials that have to be used in its place.

Municipal solid waste and other waste in landfills

Reliable data for waste generation in Kosovo do not exist. The annual total amount of municipal solid waste generated is about 395,000 tons, based on data indicators for waste per person a day (GOPA 2010c). As Kosovo recycles virtually no waste, either it ends up in landfills, is dumped illegally, or is burned. It can be assumed that the current waste management practice will lead to high levels of pollution of groundwater and air (through emissions of methane

[17] In many European countries, all the coal ash from power plants is used in cement.

(landfill gas), for example, but also dioxins and fine particles when burned). The economic damage associated with poorly controlled municipal solid waste management is divided into three main impacts, discussed below: emissions to air from regulated landfills, illegal dumps, and backyard burning; discharges of pollutants in leachate to soil, groundwater, and surface water; and impact of waste dumping on property values.

This is only a partial analysis, as the potential contamination of soils due to bad waste management is only partly covered (by the assessment of leachate from landfills, but not from illegal dumpsites or dumpsites on industrial sites, and so on).

Collection rates

Roughly 90 percent of Kosovo's houses in urban areas have regular waste collection, but in rural areas the figure is closer to 10 percent (KEPA 2009). More detailed figures per region are in table 4.1, which shows that average collection coverage is around 41 percent.

Table 4.1 Waste collection coverage, 2008

Region	Inhabitants	Population served	Population served (%)
Pristina	892,506	464,103	52
Peja excl Gjakove	256,487	74,381	29
Gjakove	127,007	67,313	53
Mitrovica	316,957	91,918	29
Prizren	423,797	165,343	39
Gjilan excl Ferizaj	269,449	70,057	26
Ferizaj	96,993	33,948	35
Total	**2,363,885**	**967,063**	**41**

Source: KEPA 2009.

An estimated 218,000 tons of waste were disposed of in regulatory landfills in 2008, according to KEPA (2009), or 0.62 kilogram (kg) per person a day for the serviced population.[18] It is safe to assume a higher volume of waste per capita in urban areas than in rural areas due to higher incomes. GOPA's 2010 estimate for waste generation of 395,000 tons a year implies that subtracting the current levels of waste going to regulated landfills leaves at least 177,000 tons a year of municipal solid waste burned by households or dumped in unregulated locations.[19]

Because landfills receive other waste as well, the collection of municipal solid waste is less than 218,000 tons a year, thus illegal dumping or open burning of waste can be safely assumed to comprise at least 200,000 tons a year. It is also assumed that 40 percent (80,000 tons) of the uncollected municipal waste is burned in the backyard, and 60 percent is illegally dumped

[18] Not all this waste is domestic.

[19] GOPA's data are based on indicators of kilogram of waste per person a day, which provides an estimate of 395,000 tons of waste a year for 2009 in Kosovo.

(120,000 tons; table 4.2). For illegally dumped waste it is assumed that 30 percent of the illegal landfills are on fire.

Table 4.2 Annual municipal solid waste and other comparable waste by disposal route (tons)

	Amount
Municipal solid waste generated	395,000
Municipal solid waste collected/landfilled (%)	41
Municipal solid waste landfilled (high estimate)	195,000
Other waste landfilled (low estimate)	23,000
Waste not collected	200,000
Backyard burning	80,000
Illegal dumps	120,000

Source: Authors' calculations.

Emissions to air from regulated landfills, illegal dumps, and backyard burning

By estimating the emissions to air from solid waste disposal, the damage from poor waste management can be partly assessed indirectly (table 4.3). Annually, waste disposal results in emissions of 345,000 tons of CO_2, nearly 11,000 tons of CH_4, about 2,300 tons of PM_{10}, and 0.12 kg of dioxins. Although the amount of solid waste burned in backyards or illegally dumped is about the same as waste disposed at official/regulated landfills, emissions of PM_{10} and dioxins from these practices are three times as high, and emissions of CO_2 are about twice as high.

Table 4.3 Estimated emissions to air from municipal waste, 2010 (tons, unless otherwise indicated)

Pollutant	Landfills (official/ regulated)	Backyard burning	Illegally dumped	Total
Landfill not on fire (%)	83		70	
CH_4	1,922		8,921	10,842
CO_2 from biogas capture and burning	19,664			19,664
CO_2 from landfill	30,825		14,310	45,136
Landfill on fire (%)	17		30	
CO_2	67,931	146,640	65,988	280,559
PM_{10}	556	1,200	540	2,296
Dioxins	0.00002928	0.0000632	0.00002844	0.000121

Sources CH_4: 106.2 kg/ton of waste based on gas production per ton waste (= 100 m^3, Ecotec and others 2001), CH_4 contents (= 60 percent) and weight of 1 m^3 CH_4. *CO_2 from biogas burning*: 1.137 kg/kg of CH_4 (90 percent of CH_4 is captured and burned). CO_2 from landfill: 170.36 kg/ton of waste based on gas production per ton waste (= 100 m^3, Ecotec and others 2001), CO_2 contents (= 35 percent) and weight of 1 m^3 CO_2. CO2 landfill on fire: 1,833 kg/ ton of waste based on C-content of municipal solid waste (50 percent) and atomic weight. PM_{10}: 15 kg/ton of waste dioxins 0.00000079 kg/ton of waste, based on U.S. EPA 1997 (emission factors); authors' calculations and municipal questionnaire (see appendix 4).

By applying unit damage cost estimates for air pollutants, the total damage costs of air pollution due to poor waste management is estimated at €11 million–€22 million a year (table 4.4).[20] But as costs related to climate change emissions (CO_2 and CH_4) are global costs and thus largely borne by the rest of the world they are not included in the costs to Kosovo. Costs related to PM emissions are, however, included in the estimated damage cost. These PM emissions occur largely in rural areas and their impacts (e.g., health effects) are additional to health effects of PM in urban areas estimated in the Air Pollution section. The Particulate Matter emissions originating due to poor waste management are about 15% of the amount compared to the PM emissions of the power plant.

The annual damage to Kosovo of €5.2 million–€9.5 million (0.12–0.23 percent of Kosovo's GDP in 2010) is attributable to PM and dioxins air pollution connected with the waste management system, other than climate emissions.

Table 4.4 Annual costs of air pollution linked to waste management (€)

Air pollutants\ estimates	Emissions (tons/year)	Unit damage cost		Unit	Total damage costs (€/year)	
		Low	High		Low	High
CH_4	10,842	232	465	€/ton	2,519,000	5,038,000
CO_2	345,358	11	22	€/ton	3,820,799	7,641,598
Climate change emissions					*6,339,799*	*12,679,598*
PM_{10}	2,296	1906	3451	€/ton	4,376,059	7,923,686
Dioxins	0.00012092	6.4	12.8	€/mg	778,783	1,547,374
Local emissions					*5,154,841*	*9,471,060*

Source: Authors' calculations.

Leachate from landfills

Damage linked to leachate is inadequately understood. A report for the EU (COWI 2000) identified only three studies that attempted to assess the damage costs related to leachate. Two of these studies assessed the damage as a total per ton of waste, trying to quantify either the cleanup costs (of €0–€1.54 per ton of waste) or the damage to health (mortality and morbidity, of €0–€1.09 per ton; COWI 2000). The third identified damage costs related to different pollutants, focusing on heavy metals and dioxins (ECON 1995).

[20] Unit damage cost is €11–€22 per ton of CO_2 and €232–€465 per ton of CH_4. Unit damage costs (D_K) of PM_{10} and dioxins in Kosovo are transferred from a study of unit damage costs in the Netherlands (D_N) and are calculated as follows: $D_K = D_N * (gdp_K / gdp_N) * (p_K / p_N) * (e_K / e_N)$, where $gdp_K / gdp_N = 0.0688$ is the ratio of GDP per capita in Kosovo and the Netherlands, $p_K / p_N = 0.449$ is the ratio of population densities in the two countries, and $e_K / e_N = 1.77$ for PM_{10} is the ratio of annual emissions per square kilometers of land area in the two countries. The ratio of emissions is not included in the calculations of D_K for dioxins.

To estimate damages associated with leachate, the estimated discharges of chemical oxygen demand and nutrients are used. In addition, an estimate is made of the discharges of heavy metals in leachate (based on emission factors for a mature landfill). With unit damage values for the substances discharged with leachate, an estimate is made of the associated economic damage of the lack of leachate control or treatment (table 4.5).

Table 4.5 Estimated annual discharges from leachate of landfills and economic damage cost

Pollutant	Emission factors (g/L of leachate)	Emissions (tons/year)	Unit damage costs (€/ton) Low	Unit damage costs (€/ton) High	Total damage costs (€/year) Low	Total damage costs (€/year) High
Chemical oxygen demand	0.3	61	3	125	186	7,632
Phosphorous compounds	0.013	3	499	6,255	1,323	16,567
Nitrogen compounds	0.14	29	999	1,268	28,494	36,165
Copper	0.00008	0.016	478	24,973	8	407
Nickel	0.00028	0.057	1,148	24,973	65	1,425
Chromium	0.00075	0.15	24,973	1,673,516	3,816	255,734
Zinc	0.00020	0.041	96	24,973	4	1,018
Total					**33,896**	**318,948**

Source: Leachate is estimated at 203,750 cubic meters a year. Emissions factors are taken from various international studies. Unit costs are transferred from estimates in other countries and adjusted by the difference in GDP per capita between Kosovo and these countries.

The annual economic damage linked to leachate is put at €34,000–€319,000 a year—a large range of uncertainty, which is understandable given the little work done on assessing leachate damage. However, leachate is less of a monetary burden than air pollution related to waste management.

It is remarkable that damage associated with the discharge of heavy metals is small. One reason may be that the estimated unit damage values for heavy metals are relatively low, but it is also due to the relative small amounts of heavy metals released in leachate.

Impact of waste dumping on property values

Many studies have attempted to discern the relationship between, for example, road traffic and industrial noise and property prices (EFTEC/RIVM 2000, for instance), and for the influence of clean surface water nearby (Brouwer and others 2007). No specific study is available on the influence of illegal dumping of waste on property prices in Kosovo, but a hedonic pricing meta-analysis has been carried out in the United States on the influence of landfills (Richard 2005), which shows that lower volume landfills lower adjacent property values by 2.5 percent, on average, with a gradient of 1.2 percent per mile. This means that the areas around a landfill for which property values are lower (converting from miles to kilometers) are 8.0 square kilometers (km^2) for up to 1 mile and 24.1 km^2 for 1–2 miles or a total affected area of 32.1 km^2.

The average decline in property prices is (8.0 x 2.5 percent + 24.1 x 1.2 percent)/32.1 = 1.5 percent of the property value. Kosovo has about 140 illegal dumpsites (Halili 2009), thus the total area in which such dumpsites influence property prices is estimated at 4,500 km^2 (or 41 percent of Kosovo's land area). Assuming that the average value of farmland is €4 per square meter (published compensation for expropriation in Kosovo), the annualized cost of illegal landfills and of more widespread illegal dumping of waste along roadsides and waterways is €14 million.[21] As smoke and air pollution from fires at dumpsites is one of the factors affecting land values, €1.2 million–€2.3 million is subtracted to avoid double counting.[22]

Coal ash

Annually about 1.16 million tons of coal ash are currently generated and dumped in Kosovo. The associated damage is assessed based on the assumption that coal ash could replace primary construction materials like cement and sand. In most EU countries coal ash (as well as mining waste and other large, fairly homogenous, relatively nonhazardous wastes) is used in construction. The local price of raw materials (sand) is €15 per m^3. The extraction costs (roughly the same as dredging costs) are €3.50 per m^3. Assuming a specific weight of sand of 2 tons per m^3, the unit costs per ton are estimated at €1.75–€7.5. With the estimated 1.16 million tons of coal ash generated, the annual damage associated with ash dumping is put at €2 million–€8.7 million.

Table 4.6 summarizes the total estimated annual costs of inadequate solid waste collection and disposal, including that for coal ash. The highest cost is associated with effects of illegal dumpsites on property prices.

Table 4.6 Costs of inadequate solid waste collection and disposal, 2010 (€)

Impact\estimate	Low	Mid	High
Air emissions from waste disposal (other than climate change emissions)	5,154,841	7,312,951	9,471,060
Leachate of landfills	33,896	176,422	318,948
Effects of illegal dumpsites on property prices	11,735,859	12,253,943	12,772,027
Coal ash from power plants	2,031,750	5,369,625	8,707,500
Total	**18,956,900**	**25,113,357**	**31,269,813**
% of GDP	**0.45**	**0.60**	**0.75**

Source: Authors' calculations.

[21] Total value of decline in property prices discounted at 3 percent over 30 years.
[22] Damage cost of air emissions from fires at illegal dumpsites is one-fourth of the cost of emissions from all waste burning.

Estimates of mitigation costs

The largest environmental impacts from inadequate waste management in Kosovo stem from unsanitary disposal or burning of household waste and the effects of industrial waste dump sites. Most industrial waste and mining waste in particular was produced in previous decades, but, because of the uncontrolled manner in which most of the waste was disposed of, the waste disposal sites still affect groundwater and surface water quality and cause dust problems.

Domestic waste management

Kosovo has a network of solid waste landfill sites that in principle could cover the country's needs. But the system is poorly functioning with facilities and operations in dire need of investment because of poor tariff collection and because most of the population is still not served at all. Despite the approximately €20 million that donors (mainly the European Agency for Reconstruction) have raised to construct or improve landfills, environmental control measures are not up to standard—or have even deteriorated since constructed. To substantially eliminate the environmental impacts of backyard waste burning, "wild tipping," and poorly controlled waste disposal sites, investment is required in landfill rehabilitation—possibly developing one or two more landfills—and in waste collection and transport/transfer equipment, increasing service levels from 41 percent of the population to more than 90 percent.

There is no comprehensive assessment available of investment needs. A rough estimate based on unit costs (€8 per ton a year for landfill disposal and €28 per ton a year for collection) would be €50 million to develop a basic but sanitary sound collection and disposal system for household waste. This would more or less double if the system included recycling and composting.

Current tariffs for domestic waste of €3–€4 a month per household could be enough to cover both capital and operating costs of a basic but acceptable national waste management system. This would translate into operational costs for the system of some €20 million a year. The fact that the system is poorly functioning with facilities in dire need of investment and operational capital is due to the poor collection of tariffs and that most of the population is still not served at all.

Industrial waste management

Managing ongoing industrial waste generation can be financed from operational revenues. The Kosovo Energy Corporation (KEK) is currently investing €8.6 million in the ash disposal system of the Kosovo A power plant to stop open dumping of dry ash, to be operational in 2012. KEK is receiving funding from the World Bank and the Netherlands Western Balkans Environmental

Program to remove hazardous chemicals from the Kosovo A site and remediate the ash dump area of Kosovo A (through the Clean-up and Land Reclamation Project). The value of donor contributions is $14.5 million. These investments and cleanup operations will largely reduce KEK's waste to a manageable level.

Many studies have investigated the environmental contamination and potential control and remediation measures to manage the environmental impacts of Trepca's former operations. The two main impacts are discharges to surface water of runoff and mining water from tailing ponds, waste dumps, and mining sites with water discharge of high acidity and often heavy metals; and the release of dust from waste disposal areas and mine-tailing facilities.

Various studies present various estimated costs, from several million to hundreds of millions of euros. The lower range of cost estimates mainly relates to urgent, simple, and immediate control measures. Golder (2004) estimates €40 million for a comprehensive environmental remediation program that includes Trepca's tailing disposal facilities and mines. Other studies give similar estimates. Such a program would substantially reduce the discharges of heavy metals to water and dust problems from various mining objects, waste disposal sites, and smelter areas.

A more difficult problem is the lead and other heavy metal deposits that were dumped in a wide area of northern Kosovo around Mitrovica. Most studies suggest a program to educate the population on how to deal with local agriculture produce and reduce other exposures to the local and widespread contaminants. Such a program has to be intensive and last several years, but costs would be lower than a cleanup program for Trepca tailing disposal facilities and mines.

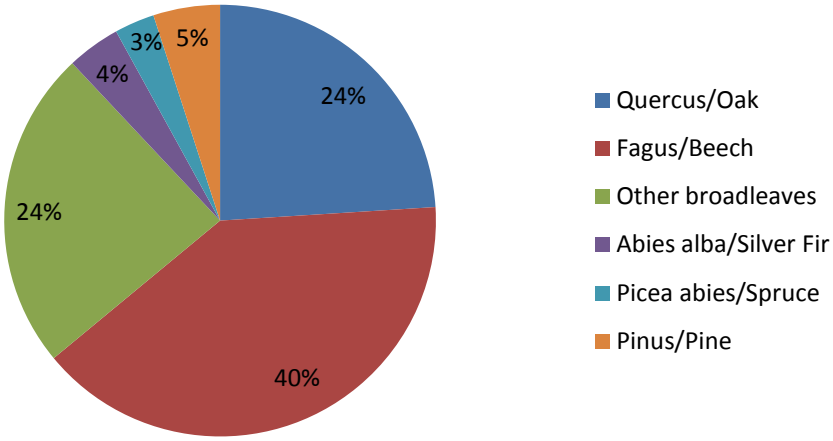
Policy recommendation applicable to waste sector

Also for the waste sector, Kosovo must bring itself in line with European Commission directives, and donor support for complying with the directives that require heavy investments will be crucial. The government could consider developing a 10–15-year strategic masterplan for waste management (including hazardous waste), which should also take into account phased investment needs for the long term, analyzing required operational and maintenance costs and affordability constraints related to increase of utility tariffs.

5 Forest and land resources

The *National Forest Inventory Report* of the Food and Agriculture Organization of the United Nations put the total forest area at 464,800 hectares (ha; about 40 percent of total land area), of which 278,880 ha were public—that is, under the control of the Kosovo Forest Agency—and 185,920 ha private. Broadleaved forest species dominate (figure 5.1). Coppice forest and high altitude forest or beech and conifers are critical for biodiversity, but much less represented (FAO 2003). Due to lack of funds, only one inventory was undertaken and no subsequent forests inventories were done.

Figure 5.1 Distribution of forest species



Source: FAO 2003.

Potential economic importance

FAO (2003) estimated that, after the state forest industries are privatized and the supply of wood from the forests is predictable, about 5,000 people could be employed directly in forestry and wood processing, with further job opportunities in forest-related activities such as medicinal and herbal plants, wild mushrooms, and berries. But privatization of state forest industries is lacking. Wood processing is extremely fragmented, with many small, primary processors. Development is hampered by raw material supply problems and a lack of proper forest management plans, regulations, finance, and access to markets.

The forests represent an economically important renewable natural resource with the potential to supply wood and nonwood products. Kosovo currently imports most of its construction

timber and more than half its fuelwood because forests were not properly managed in past decades—or now.

Forest degradation and deforestation

Beyond the economic losses of improperly managed forests, the main problem is ecological degradation (deforestation is not a key issue). Forests provide environmental services such as watershed and erosion protection as well as carbon sequestration (in addition to forest products).

Since 1990 forests in Kosovo have been under pressure. The majority of illegally harvested timber is used for firewood, as this is the main source of heating, even in some urban areas. Further, heavy harvesting occurred after the war, where many houses were burned down. For rebuilding these houses, raw materials were taken from the forests, mainly illegally. FAO (2003) estimated that some 40 percent of public and 29 percent of private forests had been subject to illegal harvesting, and that many young and middle-aged forests urgently needed management interventions, including cleaning and thinning (both precommercial and commercial). FAO (2003) estimated that Kosovo needed around 1 million cubic meters (m^3) a year of fuelwood to meet heating needs.

Illegal activities are concentrated in the most valuable forest areas with the thickest and oldest trees. During illegal harvesting, the best part of the tree is taken while the rest is left in the forest, causing problems due to it being a source of insects and other diseases and a source of forest fires. In steep terrain, overharvested areas are sensitive to erosion.

In areas with good natural regeneration, efforts are required to bring the forests back to the desired stage with proper silviculture treatment. Silviculture, especially precommercial thinning that has to be done in the young stage of forest development, is costly and will have impacts on the forest administration budget. In coppice forests density is high, averaging 5,000 trees a hectare.

To allow for a variety of plants, animals, and birds, it is important to generate spacing in forests. Yet the current forest structure and forest degradation do not provide a good enough habitat for biodiversity and wildlife. No inventory of biodiversity has been made and no legal mechanisms protect biodiversity. In addition, no “red list” or “red book” has been drafted.

Economic losses of forest degradation

The evaluation assessed the following: the value of forests that are in good ecological condition; the value of ecologically degraded forests; and the area of forest that moves from a

good to a degraded ecological condition every year. The analysis follows the following resource valuation techniques.

The main areas of degradation of environmental resources are forests and agricultural land. Most environmental resources have no apparent market, or the market operates in an imperfect way, sending the wrong price signals. These resources often have the characteristics of public goods, presenting a rationale for using various indirect monetary valuation techniques. The underlying principle for economic valuation is that consumers' willingness to pay for an environmental benefit, or their willingness to accept compensation for environmental degradation, gives the appropriate basis for valuation.

Total economic value is the term used to refer to the whole class of values that have an origin in human behavior and that are amenable to economic analysis (Perman and others 1996). It can also be defined as the monetary measure of the change in society's well-being due to a change in the quantity or quality (or both) of environmental assets (Pearce and others 2002). To consider the effects of various changes on all aspects of human well-being, total economic value can be disaggregated into use and nonuse values, and is the sum of them—that is, direct use, indirect use, option value, bequest value, and existence value (table 5.1).

Table 5.1 Economic taxonomy for environmental resource valuation

Total economic value				
---------- Use values ----------			---------- Nonuse values ----------	
Direct use	**Indirect use**	**Option value**	**Bequest value**	**Existence value**
Outputs directly consumable	Functional benefits	Future direct and indirect values	Use and nonuse value of environmental legacy	Value from knowledge of continued existence
• Food • Biomass • Recreation • Health	• Flood control • Storm protection • Nutrient cycles	• Biodiversity • Conserved habitats	• Habitats • Prevention of irreversible change	• Habitats • Species • Genetic • Ecosystem

Source: EFTEC/RIVM 2000.

Use values comprise:

- Direct use value, where a resource is actually used for market purposes, either commercial harvesting or recreation (such as timber logging, fishery, swimming, and hiking).
- Indirect use value, where there is a social benefit from the ecosystem (for example, water purification, erosion protection, and carbon sequestration).
- Option value, where individuals are willing to pay for future use of the resource (for instance, future visits to national parks).

Nonuse values comprise:

- Existence value, which reflects the "moral," or philosophical reasons for environmental protection, unrelated to any current or future use.
- Bequest value, which reflects public willingness to pay to ensure that future generations enjoy the same environmental benefits.

The first task in identifying any of these values is to determine how environmental changes affect social well-being. The second is to estimate the monetary value of changes, using a range of valuation techniques.[23]

For Kosovo, the economic value of forests was subdivided into direct use values (timber, firewood, nonwood forest products, hunting, and recreation); indirect use values (loss of plant nutrients, agricultural losses, protection of water reserves and water purification, as well as carbon sequestration); and option, bequest, and existence values (the option value of pharmaceutical products, biodiversity conservation, and cultural value; table 5.2). For each of these categories, the value was estimated for forests in good and degraded ecological condition (table 5.2).

*Timber and firewood***.** The average stock of wood in Kosovar forests in good ecological condition is estimated at 114 m^3 per ha. On average, 10 percent of the wood can be used as timber, and the rest as firewood. The value of timber in the forest, before transport, processing, marketing, and use, is estimated at €30 per m^3. The value of firewood is estimated at €10 per m^3. The total value of a hectare forest in good ecological condition is thus €342 for timber + €1,026 for firewood = €1,368. In degraded forests the loss in value of timber is assumed to be $2/3^{rd}$ of €342 and the value of firewood reduced to 80 percent of €1,026—that is, €821 per ha.

Nonwood forest products. Natural forests produce a wide range of other products than wood. International studies (such as Lampietti and Dixon 1995) have identified values for grazing animals in forests, and collecting products like mushrooms and herbs. In Serbia, in the framework of the National Strategy for Sustainable Use of Natural Resources of 2005, it was estimated that annually €73 of nonwood forest products was harvested per hectare of forest, mainly based on the value of mushrooms/truffles, animal products (game), and plants, herbs, and fruits harvested. In Kosovo's similar forests, the value applied is €75 per ha for forests in good ecological condition, to take account of inflation in 2005–10. The net present value (for 100 years at a 4-percent discount rate) gives a total value of €1,838 per ha.

[23] These valuation techniques can be divided into two approaches. The first, revealed preference techniques, derives preferences from information on existing markets. Preferences are revealed directly or indirectly from the market operations in which environmental goods and resources play a significant role. Valuation techniques here include observation of market prices, averting behavior, hedonic pricing, travel cost method, random utility, and discrete choice models. The second group, stated preference techniques, determines preferences directly from consumers, using various types of questionnaires, and can entail contingent valuation techniques and hypothetic choice modeling.

For degraded forests 80 percent of the above value is assumed—€60 a year per ha, for a total value of €1,470 per ha.

*Hunting***.** The amount of hunting in Kosovo is unknown, but it is reasonable to assume that it takes place in Kosovar forests as it does in Serbian forests. As the potential benefits of animal products are already included in nonwood forest products, this evaluation deals with income from permits and licenses. Other studies (such as Turker and others 2005) adopt conservative estimates of about $1 per ha annually for such income. This assessment uses €1 for forests in good ecological condition for a total value of €25, based on the above net present value calculation. For degraded forests a zero value is assumed.

Recreation. No information is available on the economic value of forests for recreation in Kosovo. Some studies have looked at other countries and various forest types (see, for example, Pearce and Pearce 2001). In Europe, this assessment estimates that the average recreational value of forests is $80 per ha. Taking a conservative approach and correcting for income levels, currency movements, and inflation, a recreational forest value of an annual €5 per ha seems reasonable for Kosovo. This leads to a total recreational value of forests of €123 per ha.

Indirect use values. Forests play a role in various natural cycles, reducing nutrient losses and erosion, regulating and purifying water resources, and sequestering carbon. It is hard to estimate a value for each of these categories in Kosovo. A conservative estimate of €25 per ha a year has been used for all categories together.[24] The total value is €613 per ha. For degraded forests 80 percent of these values are assumed (€20 per ha a year, for €490 per ha total value).

Carbon sequestration. An ecological healthy forest can take up about 5 tons of carbon dioxide (CO_2) a year. With a CO_2 price of €11,[25] the annual value of carbon sequestration is €55 per ha. The net present value is €1,356 per ha. For degraded forests 80 percent of these values are taken.

Bequest and existence values. Bequest values are defined as the willingness to pay to preserve natural resource for future generations, while existence values are the values which are placed on for instance a forest even though individuals may never use it. The nonuse functions of forests such as biodiversity, landscape, respect for the right or welfare of non–human beings including the forest ecosystem are considered under this category. As no specific information is available on Kosovo, a conservative estimate of these values of €10 per ha a year for forests in

[24] Pearce and Pearce (2001) estimate watershed benefits of forests up to $50 per ha a year. Daly-Hassen and Ben Mansoura (2005) estimate benefits of $10 per ha a year due to higher agricultural output.

[25] This is the lowest CO_2 price on the EU CO_2 market in March 2010–March 2011. As the upper bound for CO_2, the highest value (future 2020) of €22 per ton of CO_2 is used.

good ecological condition is assumed.[26] For degraded forests a value of zero is assumed. This value is assumed to also include the option value of the forests.

Table 5.2 summarizes the values per hectare of forest.

Table 5.2 Value of forests, 2010 (€ per ha)

Estimate	Low		High	
	---------- Ecological condition ----------			
Category	**Good**	**Degraded**	**Good**	**Degraded**
Direct use values				
Timber	342	114	342	114
Firewood	1,026	821	1,026	821
Nonwood forest products	1,838	1,470	1,838	1,470
Hunting	25	0	25	0
Recreation	123	0	123	0
Indirect use values				
Plant nutrients, agricultural productivity, and water management	613	490	613	490
Carbon sequestration	1,356	1,084	2,711	2,169
Option, bequest, and existence values	245	0	245	0
Total	**5,566**	**3,980**	**6,922**	**5,064**

Source: Authors' calculations.

Degradation costs between €1,587 (low estimate) and €1,858 (high estimate) per ha. Annual degradation of forests is estimated at 26,309 ha a year. This is calculated by dividing the annual illegal wood cut of 600,000 m^3 a year by the annual average stock of wood in Kosovar forests of 114 m^3 per ha, generating a net area of 5,262 ha of degraded forests a year. Based on the assumption that about 50 percent of the wood is taken from a forest during illegal cutting, the gross area of annual forest degradation is 10,500 ha a year. So the total annual loss of value from degradation is assessed at €16.7 million–€19.5 million, equivalent to 0.40–0.47 percent of GDP in 2010 (table 5.3). Estimates of mitigations costs were not available and thus have not been included.

[26] World Bank (2005) uses values of $8–$16 and $2 per ha forest for bequest and existence values. Pearce and Pearce (2001) refer to option values of $70 and existence values of $12–$45 per ha.

Table 5.3 Annual costs of forest degradation

Degradation			
Total area (ha)		464,800	
Good condition (ha)		299,331	
Degraded (ha)		165,469	
Annual area degraded (net, ha/yr)		5,262	
Factor gross/net degradation		2	
Annual area degraded (gross, ha/yr)		10,524	
	Low	Mid-point	High
Value of forest in good condition (€/ha)	5,566	6,244	6,922
Value of degraded forest (€/ha)	3.980	4,522	5,064
Loss in value due to degradation (€/ha)	1,587	1,722	1,858
Annual costs of degradation midpoint (€ million)	**16.7**	**18.1**	**19.5**

Source: Authors' calculations.

Other land resources

Agricultural productivity is hurt by the following policy and environmental impacts: land conversion; land fragmentation; land contamination by industrial establishments; and land contamination through garbage disposal and landfill sites. The most pressing problem is the conversion of agricultural land to construction land. Before the war, 1,000 ha were lost annually to construction, and this figure has increased steeply after the war with a rough estimate of about 5,000 ha annual loss of agricultural land (appendix 4). Economically quantifying agricultural land losses to construction is difficult as they represent not only an environmental loss but an economic gain. To what extent Kosovo's agricultural potential is not met because of loss of agricultural land due to environmental issues related to construction, or because of land fragmentation and an undeveloped sector in general, is hard to assess.

Land degradation is also seen in the industrial decades-old pollution in the radius of the Mitrovica (Trepca) smelting plant and KEK's power generation plants in Obiliq. Soil and plant tests have shown that farmland within 25 kilometers of Mitrovica is contaminated with lead, zinc, mercury, and cadmium, and is unsuitable for agriculture because of the health impact.

Recommendation

A masterplan could also be considered for the forest sector. An action plan could be prepared to protect forestry against illegal logging and to implement activities that can be undertaken with low investments. Examples include restoring degraded forest areas through natural regeneration, increasing revenues from timber production, biomass, and firewood generation,

and establishing regular forest inventories to monitor the health and needs of different forest areas.

6 Mining, manufacturing, and energy in Kosovo

This section focuses on the industrial activities and energy consumption in Kosovo that have environmental impacts. Given the objective of the country environmental analysis, it is not the purpose here to present a comprehensive overview of the status of these sectors in Kosovo. The impacts of waste and air and water pollution are already presented in the previous chapters, but as mining, manufacturing, and energy is such an important sector in Kosovo and its economic and historic and future environmental impacts are also big, this sector is separately discussed in this chapter.

Historically, mining and energy production accounted for much of Kosovo's prewar economy, but industrial output slumped in 1999, reflecting in particular the de facto closure of Trepca's mining and metallurgical operations and struggles related to keeping Kosovo's power plants at adequate production levels.

Kosovo has been working toward a market-oriented economy but the development of viable and productive domestic industries has so far shown disappointing results. This is illustrated by its ratio of exports to imports, which is the lowest in the Balkan region. In 2009 Kosovo imported $2.3 billion in goods and services and exported only $238 million, resulting in a trade deficit of about 42 percent of GDP (CIA 2011; World Bank 2010a).

Kosovo's leading sectors are energy, telecommunications, forestry, agriculture, metal processing, construction materials, base metals, leather, machinery, and appliances (CIA 2011; see also table 6.1).

Table 6.1 Contribution to GDP by sector

Sector	2005	2006	2007
Agriculture and fishing	11.3	11.7	12.0
Mining	0.6	0.6	0.7
Industry, energy, and water supply	13.1	12.9	11.2
Construction	8.4	8.9	10.0
Wholesale and retail trade	10.2	10.2	9.4
Hotels and restaurants	0.7	0.8	0.7
Transport, storage, and communication	4.2	4.6	3.6
Financial intermediation	2.5	3.0	4.4
Real estate and business services	12.8	12.8	12.4
Public administration and defense	16.8	15.0	13.2
Education	2.8	2.8	2.7
Health and social work	1.7	1.3	1.1
Community, social, and personal services	1.4	1.3	1.5
Taxes on products	13.5	14.1	17.1
Total	**100.0**	**100.0**	**100.0**

Source: SOK 2009b.

The following sections present a first-line analysis of economic activities and their observed (or estimated) environmental impacts for (mineral) mining and metallurgy (base metals); manufacturing (in particular cement production and food processing); and energy. Activities related to forestry and agriculture are discussed in chapter 5. Other activities such as telecommunications have little environmental impact or, as with metal workshops, are limited in scale.

Mining and metallurgy

The mining and metallurgy sector in Kosovo is mainly represented by the Trepca lead–zinc industrial complex; by Ferronikeli, a producer of iron–nickel alloy; and mining in quarries and processing of construction materials, including cement (table 6.2).

Table 6.2 Production of mineral commodities

KOSOVO: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2005	2006	2007	2008	2009
METALS						
Ferroalloys, ferronickel (38% Ni), gross weight[e]		--	--	2,100	18,500	15,600
Lead-zinc:						
Ore, gross weight:		12,200	63,517	69,953	139,670	105,157
Lead content of ore		530 r	2,760 r	3,040 r	6,080 r	4,570
Zinc content of ore		430 r	2,230 r	2,460 r	4,900 r	3,690
Concentrate, gross weight		--	--	--	--	9,737
Metal:						
Pb, refined		--	--	--	--	4,250
Zn, refined		--	--	--	--	5,487
Nickel:						
Ore, wet		--	--	145,882	292,362 r	316,520
Ni content of ore (1.25%)		--	--	1,820	3,660	3,960
Ni content of ferronickel[e]		--	--	800	7,100	6,000
INDUSTRIAL MINERALS						
Cement[e]	thousand metric tons	450	450	470	590	600
Clay, bentonite[3]		--	--	16,200	20,800	35,600
Limestone	cubic meters	NA	NA	NA	1,917,196	4,776,127
Marl	do.	264,814	254,386	260,707	322,007	215,259
Pumice and related materials, volcanic tuff	do.	NA	NA	NA	45,005	58,788
Sand and gravel, excluding glass sand	do.	14,894	34,268	41,621	44,498 r	23,754
Silica sand (glass sand)	do.	NA	NA	NA	27,325	6,550
MINERAL FUELS AND RELATED MATERIALS						
Lignite	thousand metric tons	6,391	6,532	6,715	7,885 r	7,839

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. do. Ditto. NA Not available. -- Zero.

[1]Table includes data available through June 11, 2010.

[2]In addition to commodities listed, other aggregates and construction materials were believed to have been produced, but available information is inadequate to make reliable estimates of output.

[3]Estimate based on reported production in cubic meters: 2007—27,614; 2008—35,382; and 2009—60,501.

Source: USGS 2010.

There were other mining activities outside Trepca and Ferronikeli, particularly for bauxite, magnesium, iron ore, and chromium ore, but they stopped in 1999 or earlier.

There is some evidence of informal lead smelting from the recycling of old car batteries, and although this practice can have serious health and environmental impacts, it cannot be further discussed for lack of data.

Ferronikeli

Ferronikeli was privatized in 2006 and is now the only fully operational mining and metallurgical plant in Kosovo. It extracts lateritic nickel ore from three open-pit mines (Dushkaja, Suka, and Gllavica). The mineral processing, smelting, and refining plant initially calcines the ore to reduce the carbonates and remove the contained moisture, in two rotary kilns. These kilns feed two 45 megawatt (MW) electric reduction furnaces. The crude ferronickel is further reduced using oxygen lances and cast into 25 kilogram (kg) ferronickel ingots at nickel grades of 30–50 percent, averaging 35 percent.

Production after privatization increased to 6,000 tons per year (t/a) of nickel in 2009, from ore mined in Kosovo (316,520 tons) and imported pretreated ore.

The main impacts from nickel ore mining are on the landscape, including disposal of overburden material, water management issues (discharge of pit water, mining process water), and erosion. The ore is processed at the smelter complex, and thus impacts from mining, when managed adequately, should be limited. Indeed, KEPA monitoring results and complaints from the area where the plant is located indicate air pollution problems with the smelter activities but do not show particular concerns with the mining operations.

The main air emissions from the smelter complex stem from the kilns and electric furnaces—the two furnaces unfortunately still operate without electrostatic filters. Other emissions originate from process water.

The facility disposes of the slag (that remains from ore processing) onsite. After decades of operation, the “black mountain” of slag weighs about 3 million tons. All wastewater from the complex, more than 500 meters from the Drenica river, is treated before discharge into the river. The slag disposal site is much closer to the river.

Analysis of discharges from the Ferronikeli complex into the Drenica river and river water quality both upstream and downstream of the discharge points showed that loads of heavy metals and other pollutants as well as concentrations in the river are below environmental limits and are virtually insignificant (table 6.3; Veliu and others 2007). The researchers noted that the overall quality of the Drenica river was poor due to organic pollutants loads and attributed this to discharges of untreated sewage water. The same study also found no

concentrations of iron, nickel, cobalt, or chromium in local groundwater wells near the complex that exceeded environmental limits.

Table 6.3 Emissions and waste production, Ferronikeli, 2011

Emissions to air	**SO_2 (t/a)**	**NO_x (t/a)**	**PM_{10} (t/a)**	**Remarks**
Based on 4,000 production hours	3,280	270	305	
Discharges to Drenica river	**Volume (m^3/a)**	**Pollutants (t/a)**		
From smelter facility	No data	Not significant		Some values of cadmium in river water marginally exceeded limits (up to 0.019mg/l)
From slag heap		Not significant		
From mines	No data	Not significant		
Solid waste	**Slag (t/a)**			
	300,000			

Source: Estimates based on KEPA monitoring data 2011.
Note: Based on production of 6,000 tons per year of nickel in 2009.

Trepca Industrial Complex

The Trepca Industrial Complex consists of several mines, three ore concentrators with tailings disposal facilities, a lead smelter, a zinc smelter, and several industrial sites and auxiliary facilities—in total 40 operations with its core business in lead and zinc production.

It was once the largest industry and employer in Kosovo by far, but since 1999 most activities have stopped, and today a marginal level of mining and ore processing remains for maintenance and mine development purposes. Both the lead and zinc smelters have been fully withdrawn from operation. About 105,000 tons of ore were extracted from some of Trepca's mines in 2009 (a small fraction of prewar levels) to produce concentrates for export, equivalent to 4,250 tons of lead and 5,487 tons of zinc.

The mines and concentrators had inadequate environmental controls before 1999 and this has not changed. The key point is that most of the environmental emissions from these sites—particularly dust emissions from contaminated sites and waste dumps as well as discharges to groundwater and surface water from mines, contaminated sites, and waste dumping areas—are continual and have little relationship with production. In other words, the environmental legacy of the Trepca sites arguably far exceeds, and over a much wider area, the direct environmental impacts of limited production of concentrates from lead-zinc ores. For this

reason, the environmental issues at the Trepca sites and their impacts are discussed under *Pollution from historical contamination*, below.

Quarrying of construction materials

Kosovo is rich in minerals suitable for construction materials, and with the surge since 2008 in road construction and other works, their use has jumped, more than doubling from 2008 to exceed 5 million cubic meters (m^3) in 2009.

Little information is available on the environmental impacts of the many registered and often semiformal and informal pits.[27] Typical impacts from open-pit extraction of construction materials are dust emissions (PM), landscape/visual impacts, erosion, and discharge of runoff and process water with suspended solid contents to surface waters.

The typical emission load to air from international literature (such as U.S. EPA 1997) for a stone quarrying volume of 5 million m^3 a year is 50,000 kg PM a year.

Manufacturing

Cement production

PM (PM_{10}), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and carbon dioxide (CO_2) are the primary emissions in cement manufacturing. Small quantities of volatile organic compounds, ammonia (NH_3), chlorine, and hydrogen chloride (HCl) may also be emitted. Hazardous emissions may also include residual materials from the fuel and raw materials or products of incomplete combustion.

Typical cement kilns emit around 0.15 kg PM per ton of product to the atmosphere, about 3 kg per ton of NO_x, and 900–1,000 kg per ton of CO_2. Actual emissions depend largely on technology, control measures, type of fuel and product, and need to be verified. SO_2 emissions for instance may fall in a range of 0.3–4 kg per ton of product, mainly depending on the type of fuel and the alkalinity of the processed materials (U.S. EPA 1997).

In 2009, 600,000 tons of cement were produced in Kosovo (Department of Interior 2009). With the emission factors given above, the following emissions to air are estimated (table 6.4).

Table 6.4 Emissions from cement production, 2009

Emissions to air	SO_2 (t/a)	NO_x (t/a)	PM_{10} (t/a)	
	300	1,800	90	

Source: U.S. EPA 1997.

[27] Semiformal pits are authorized as part of infrastructure works, but without full environmental and mining licensing.

Food processing

Agro-processing in Kosovo was traditionally dominated by socially owned enterprises, which would get their raw materials input from farmers. But these companies are no longer active and new private companies have started operations in recent years, with output slowly increasing. Most local processors are still small, covering just 30 percent of local market needs, with the balance imported. Table 6.5 shows the scale of food processing relative to what the available technical capacity is in food processing.

Table 6.5 Capacities and outputs in the food processing industry, 2009

Type	Technical capacities t/year	Exploited
Wheat processing	1,200,000	20%
Animal food	110,000	12%
Milk	59,422	60%

Source: Investment Promotion Agency of Kosovo (www.eciks.org).

In addition, Kosovo has a beer brewing capacity of 325,000 hectoliters a year (17,600 tons per year of malt).

Again, only emissions factors are available to estimate releases to the environment from food processing (WHO 1989). Discharges to surface water are the largest environmental impacts (table 6.6).

Table 6.6 Estimates for emissions from food processing, 2009

Discharges from	**Volume (m^3/a)**	**Biological oxygen demand (t/a)**	**Suspended solids (t/a)**	
Wheat processing	Not significant			
Animal food production	Not significant			
Milk processing (40kt/a)		40	2	
Beer brewing (32.5 kt/a)		350	140	
Solid waste	**Organics (t/a)**			
	No data			

Source: WHO 1989.

Energy generation

Kosovo has two lignite-fired thermal power plants operated by the Kosovo's publicly owned Electricity Company (KEK). They are Kosovo A, built in 1962–75 with an installed capacity of 800 MW, of which 325 MW is effectively available; and Kosovo B, operational since 1983/84 with an installed capacity of 678 MW, of which 540 MW is available.

The main impacts from power plants are from air emissions. With environmental controls, particularly for Kosovo A, not complying with European Union (EU) norms, such emissions are high (table 6.7).

Table 6.7 Air emissions from power generation by KEK, 2009

Emissions to air	SO_2 (t/a)	NO_x (t/a)	PM (t/a)	CO_2 (t/a)
Kosovo A	6,750	6,240	10,780	2,364,250
Kosovo B	13,470	14,520	5,970	4,689,620
Total	**20,220**	**20,760**	**16,760**	**7,053,870**

Source: KEK 2010; MEM 2010.

In addition to stack emissions, which are expected to be reduced in 2012 after KEK has installed the electrostatic precipitators, substantial dust emissions come from Kosovo A's ash disposal, coal-handling, and mining operations. Ash disposal, at around 1 million m^3 a year, is the major impact of waste generation from electricity production (though the planned construction of a wet-disposal system for Kosovo A's ash should greatly curtail these emissions in 2012).

Water consumption at Kosovo A and B is around 12 million m^3 a year. Discharges from the power plants to the Sitnica river remain untreated and are thus of concern, but compared with those of untreated sewage from nearby population centers, they are limited. Mining can be a source of mineral discharges particularly, and sulfates can be a concern. Incidents of phenol discharges have been reported.

KEK's ash disposal and mining operations on average in the last 50 years have taken away roughly 20 hectares of land a year in an area that is dominated by agricultural land, but they have also affected areas with houses and (so far partly) the village of Hade.

Pollution from historical contamination

As seen above, beyond the direct impacts from current production, the legacy impacts of historical operations remain, even if they were discontinued in 1999. The dominant source of current pollution and environmental impacts that stem from historical activities is mining, the clearest examples being old, poorly maintained mining and waste disposal sites.

This section focuses on the legacy issues with Trepca and KEK. Nonindustrial waste disposal sites, particularly those for domestic waste, are discussed in chapter 5 of the main report.

Trepca Industrial Complex

Trepca's operations since 1999 have fallen dramatically. The legacy environmental impacts are thus of much greater significance than those from the very limited current activity.

Many studies have been conducted to investigate Trepca's potential for revival, if privatized, including assessments of the company's environmental liabilities. Data from these studies paint the following picture (particularly MonTec 2007; ICMM, Felske, and Hara 2006; UNMIK 2001; TekSam 2004; Humboldt University Berlin 2005; Sida 2004; and Golder 2004).

The Trepca Industrial Complex consists of seven lead-zinc mines, three concentrators, one lead smelter, one zinc smelter, and a number of industrial sites. The mines and concentrators are in three clusters. North of Mitrovica around Leposavic, where a concentrator is located, are the Belo Brdo mine, Crnac mine (both semi-open with some maintenance/mine development–based production), and Cicavica mine (abandoned). The Stari Trg mine is near Mitrovica with a concentrator in Prvi Tunel. The third cluster is not far from Pristina and has three mines—Novo Brdo/Artana (some mine development and maintenance exploitation), Ajvalija (no production), and Kisnica/Bodovac (flooded), around the concentrator in Gracanica/Kisnica.

The lead and zinc ore produced in the mines is upgraded in concentrators that separate inert materials from the lead and zinc minerals, producing the zinc and lead concentrates for the smelters. The residues from the concentrators, called tailings, are essentially inert materials, but they often contain substantial volumes of heavy metals, depending on the effectiveness of the concentrator. Tailings are disposed of in tailing dams or tailing ponds with dams that are constructed using tailings as well. The limited volumes of concentrates currently produced are exported. The lead and zinc smelters, both in Mitrovica, are out of operation. The smelter sites have large waste dump areas for slag. At the lead smelter site in Zvecan, with donor support some important cleanup works have been executed to clear the worst lead waste materials. Many of the waste and tailing disposal sites have materials with metal contents (lead, zinc, silver) that is of financial interest for reprocessing.

All Trepca's mines, the concentrators, the tailing disposal facilities of the three concentrators, and the two smelters are adjacent or near surface waters, and all but one are in the Iber/Sitnica catchment area. The exception is the Novo Brdo/Artana mine, which, with an old tailing disposal facility, is by the Krivareka river in the Morava and Binçës river basin. Because much mining waste (overburden material generated to uncover ores in open-pit mining and materials from excavations) was used for back-filling purposes, this mining waste is of limited concern at Trepca's mining sites.

The main sources of nonproduction-related pollution are:

- Mine tailing ponds and dams/heaps—dust, erosion, contaminated runoff water and seepage water, and groundwater contamination. Both dust and discharges contain heavy metals.
- Site contamination and onsite storage of waste at the two smelter sites—dust, contaminated runoff water and seepage water, and groundwater contamination. Both dust and discharges contain heavy metals
- Acid mine drainage—mine water discharge, often with high acidity and containing heavy metals.
- Soil contamination from dust and other emissions deposits—deposits of PM containing heavy metals causing soil and groundwater contamination and uptake in crops and plants for grazing.

Data on the substantial and complex environmental releases over a vast area are scattered, incomplete, and often inconclusive. Table 6.8 summarize the data that could be found or have been derived from literature on discharges to surface water.

Table 6.8 Discharges to surface water from Trepca's sites (not production related)

Discharges to	Volume (m^3/h)	Zinc (t/a)	Lead (t/a)	Cadmium (t/a)
Trepca-Sitnica river (from Stan Trg mine)	300[a]	26	2.7	
Krivareka-Morava and Binçës river (from Novo Brdo mine)	250[a]	110	1.5	
Ibar River (from northern mines)	700[e]	3.2	1.4	0.4
Gracanica-Sitnica river (from Kisnica mine)	800[c]	57.5 mg/l in local river	1.22 mg/l in local river	0.07 mg/l in local river
Discharges from tailing disposal facilities and smelter sites	No data			
Impacts from combined discharges on Ibar river water quality near Mitrovica	108,000 (average river flow)	4.6–5.7 mg/l[d] 0.45 mg/l[a] 0.3[b]	0.85–0.97 mg/l[d] 0.14 mg/l[a] 0.1 mg/l[b]	0.03–0.05 mg/l[d] 0.01 mg/l[a] 0.02 mg/l[b]
Same for Sitnica	46,000	2.6 mg/l[a]	1.15 mg/l[a]	0.12 mg/l[a]

a. MonTec 2007.
b. KEPA 2010.
c. UNMIK 2011.
d. TekSam 2004.
e. Humboldt University Berlin 2005.

Before discharges from domestic sources or industrial sources are made (or both), upstream river water in Kosovo is of excellent quality, most at EU drinking water standards, which are 0.005 milligrams per liter (mg/l) for cadmium, 3.0 mg/l for zinc, and 0.01 mg/l for lead. Most reports on the impacts of Trepca sites refer to the overall poor quality of river water and state that the impacts from sewage discharges (biological oxygen demand, suspended solids) strip many streams of any aquatic life, thus possibly worse than the impacts from industrial discharges.

The impacts of airborne emissions and releases to groundwater are even harder to quantify than water discharges. Therefore most studies have focused on concentrations of pollution in the air, soil, and groundwater rather than impacts on the environment.

Some key findings of studies into environmental and health impacts from dust emissions and deposits are:

- The population in the Mitrovica area, of some 110,000 inhabitants, is exposed to dust containing lead, local produce with elevated lead levels and possible other exposure paths. As a result around 25 percent of the children in Mitrovica in 2002 had blood lead levels above the threshold of 10 micrograms per deciliter (MonTec 2007; McWeeney 2007).
- Lead deposits from airborne emissions have contaminated an area of more than 25 square kilometers of Mitrovica and its direct vicinity. This area covers Northern Mitrovica in full and part of Southern Mitrovica, with lead concentrations in the soil above 450 milligrams of lead per kilogram of soil (mg/kg), which WHO considers the maximum acceptable level.
- Local crops, mainly vegetables, show elevated lead levels as well, of 0.1–10 mg/kg of product (University of Sienna 2004), way above the EU limit of 0.1–0.3 mg/kg, depending on the type of vegetable.

KEK's lignite mining and power generation

KEK has been operating the lignite Bardh and Mirash mines and the lignite-fired power stations Kosovo A and B for many decades without adequate environmental controls (even for the time) or plans for sustainable operations and closure of mines after depletion. And at Kosovo A, a small industrial complex was active in the 1980s and part of the 1990s where chemicals and fertilizer were produced from lignite gasification. KEK's historical activities have resulted in a range of legacy issues. The most important are as follows.

Coal ash from Kosovo A and B has never been used for production of useful materials and is disposed on land. Main environmental impacts are from Kosovo A ash disposal site, still in use, because this ash is dumped in a dry manner with conveyor belt transport, generating up to

7,000 t/a of dust released to air. The Kosovo A ash dump has accumulated more than 40 million tons of ash and is currently being remediated under the World Bank Cleanup and Land Reclamation Project. Under the same project and with major investments from KEK, an alternative ash disposal system is being installed to be operational by the end of 2011 to divert the ash as watery slurry into the exhausted Mirash mine, virtually eliminating the dust problem. This water transport system is already in operation for Kosovo B, but prior to disposal into the same mine pit, the ash from Kosovo B was also disposed on open land. This Kosovo B former ash disposal facility is less of a problem because of the different wet disposal method, but adequate environmental and flood-protection measures have not been put in place.

Material (overburden) once removed to open the lignite mines was dumped on close to 1,000 ha of land, making this area at the time unsuitable for purposes such as agriculture—the main land use before mine development. The Cleanup and Land Reclamation Project is stabilizing, reshaping, revegetating, and building some access roads, though much of the land will not be suitable for agriculture again. Still, roughly half the land (say 500 ha) has potential for redevelopment, and a large part of this in following decades has been used for agriculture informally.

Hazardous chemicals. The former gasification plant area stills holds large quantities of hazardous chemicals, around 25,000 tons, in tanks in a poor condition. These chemicals are being safely removed under the Cleanup and Land Reclamation Project, which should be completed before the June 2012.

In the past some chemicals, mainly tars and phenols, were dumped in the Kosovo A ash dump and even in old underground mining galleries. Site investigations showed that these hazardous materials in the ash dump are well contained and do not pose a risk to groundwater systems, but this is less certain for waste dumped in old mining galleries. Some of the private water wells in Dardishte, a nearby village, show slightly elevated levels of phenol.

There is no adopted plan for closure of the existing Mirash and Bardh lignite mines, but it is expected that this can be fully incorporated (part already is) in developing a new lignite mine in the Sibovc lignite field.

KEK also possesses other hazardous materials, including radioactive sources at the Kosovo A site and polychlorinated biphenyls in both active transformers, as well as equipment that has been taken out of operation.

The current Cleanup and Land Reclamation Project with the Kosovo A wet ash transport investment has a budget of more than $25 million, sufficient for the activities to reclaim overburden areas, remediate the Kosovo A ash dump, and remove chemicals from the former gasification site. Estimates for additional cleanup operations vary widely but are in the order of

€30 million. KEK has included the item of historical environmental liabilities in its balance sheet of 2009 with €14 million for removing the ash dump and decommissioning the contaminated former gasification plant at the Kosovo A site.

Other legacy issues

There are many more former mining sites in Kosovo and abandoned industrial sites in Kosovo, but data on their size, volumes, and categories of material present and environmental impacts do not exist. It can reasonably be argued, however, that the legacy issues related to Trepca's and KEK's historical operations make up a good deal of the total legacy issues in Kosovo.

7 Institutional review

This review looks at the environmental institutional setup in Kosovo, including environmental legislation; sectoral plans and strategies; institutional capacity; and the main environmental management policy tools.[28] It relies on assessments conducted in Kosovo in 2008–10, including the Functional Review and Institutional Design of Ministries (FRIDOM 2008), and on EC reports on Kosovo's progress in harmonizing environmental legislation with that of the EU (EC 2009a and EC 2010).

Kosovo has made several important strides in drafting and issuing laws and administrative instructions on general environmental protection, nature protection, energy, mining, agriculture, and forestry; drafting environmental standards on air emissions and liquid effluent, as well as drinking water quality; and enhancing its environmental institutional capacity, such as setting up MESP as well as KEPA. Important challenges remain, however.

Environmental legislation

Kosovo has an elaborate legal framework for protecting the environment. The constitution recognizes environmental protection as one of the principles on which the Republic of Kosovo is based. The key laws pertaining to the environment include those on environmental protection; environmental impact assessment; strategic environmental assessment; Kosovo water; air protection; waste management; integrated prevention pollution control; nature conservation; and agricultural land.

Yet the Functional Review, having compared the number of EU directives, regulations, and decisions with those issued in Kosovo, showed the huge volume of work required to bring Kosovo in line with the EU directives, especially issuing administrative instructions. Enforcing environmental legislation also remains a steep challenge (EC 2010 and 2011).

Sectoral plans and strategies

Key sectoral plans and strategies incorporate environmental considerations. Kosovo's Environmental Strategy (KES) and National Environmental Action Plan (NEAP) (2011–15) were updated in 2011. The new KES (2011–21) aims to reduce pollution, protect biodiversity, ensure sustainable use of natural resources, and protect valuable national landscapes. Short-term priorities include implementing the EU acquis, integrating EU environmental structures, and mainstreaming environmental concerns. Sectoral strategies that incorporate environmental objectives or that have implications for environmental quality include the following:

[28] A longer form is in appendix 2.

- Kosovo's Energy Strategy 2009–18. This aims to promote environmental awareness in energy activities, energy efficiency, and renewable energy use, and to develop gas infrastructure.
- The Industrial Strategy for Kosovo 2010–13 provides a basis for raising the quality of industrial policy. It envisages a greater role for industry in contributing to GDP, including exports and investment.
- The Agriculture and Rural Development Strategy 2009–13 aims to sustain rural development and improve the quality of life (including infrastructure) through promoting farming and other economic activities that are in harmony with the environment.
- Kosovo's Policy and Strategy Paper on Forestry Sector Development 2010–20 aims to improve capacity to deal with environmental issues related to forestry, enhance capacity of Kosovo institutions to implement and monitor biodiversity action plans, and establish and manage protected zones in compliance with national goals and international agreements.

Institutional capacity

The main responsibility for environmental protection and management is with MESP responsible forsetting the country's environmental policy. MESP consists of an environment department for nature protection, waste management, air protection, and industrial issues; and a water department. The environmental inspectorate is under the minister of environment responsible for inspection activities.

MESP has few resources, however, and its already low budget has been further decreased in 2011, presenting heavy challenges to its role in environmental management and policy setting (EC 2011; see also chapter 8).

KEPA is responsible for professional, supportive, scientific, and research tasks including environmental monitoring, environmental information management, and research. It also has some administrative responsibilities such as issuing opinions on environmental impact assessments (EIAs) and on environmental consents for construction permits, issuing opinions on nature protection areas, and organizing the Environmental Protection Information System (Sida 2009 and administrative instruction no. 22/03 on the establishment of the Kosovo Environmental Protection Agency). KEPA also runs KHMI as well as the Institute for Nature and Environmental Protection of Kosovo, and has three environmental directorates: for monitoring, for information systems, and for programs and reports.

Other government bodies with responsibilities for the environment include the Ministry of Agriculture, Forestry and Rural Development and Kosovo Forest Agency; the Ministry of Energy

and Mining , responsible for drafting and implementing energy and mining policies, for promoting reduction of environmental pollution in these two sectors, for energy efficiency, and for renewable energy which transformed into the Ministry of Economic Development in 2011; and the Independent Commission of Mines and Minerals (ICMM), responsible for regulating mining activity. ICMM issues exploration and mining licenses, a process that often requires environmental consent from MESP (frequently based on an EIA), Kosovo Forest Agency, and municipalities. Issuing such licenses require better coordination among agencies with environmental responsibilities (EC 2011).

Municipalities are tasked with environmental protection, monitoring, and management of natural resources within their boundaries (Sida 2009). Some municipalities have an environmental unit, usually within the department of urban planning, often with only one or two staff members. The transfer of some responsibilities from national to local municipalities during 2009/2010 has, however, further burdened already stretched municipal resources (EC 2009a).

Environmental management tools

Kosovo's environmental management relies mainly on licensing (environmental permits), EIAs, and (less so) monitoring and enforcement.

Licensing

At the national level MESP issues environmental permits, environmental consent, and water permits; and at local level municipalities are responsible for issuing municipal authorizations and municipal environmental permits. Permits target industrial development, infrastructure projects, urban construction, mining, and agriculture and forestry. Provisions for environmental permits are in the environmental protection law, environmental impact assessment law, and relevant administrative instructions.

The licensing process requires a high degree of coordination between MESP, the licensing agency, and municipalities. The shortage of staff and resources places onerous challenges on such coordination, with the result that there is a risk of confusion over the authority and procedure for obtaining relevant environmental licenses, especially for larger, more complex establishments, generating complaints from clients of long waits and complicated procedures (FRIDOM 2008).

EIAs

EIAs are used as environmental management tools and are linked to the environmental permit process. An EIA is a prerequisite for MESP to issue an environmental consent, which is needed for the relevant agency to issue a construction permit. EIAs were first applied in 2003, although

due to the lack of a database of industrial facilities, and because existing facilities were granted environmental consent without an EIA, this led to quite a few new projects establishing facts on the ground after which they requested environmental consent, thus avoiding the need to prepare an EIA.

It is possible to enhance the effectiveness of EIA through optimizing screening procedures, ensuring meaningful public participation and stakeholder consultation, and increasing reliance on the variety of environmental management and policy tools that are allowed by the environmental protection law. A review of EIAs in EU countries (GHK 2010) indicates that the environmental benefits of EIAs are widely recognized across all member states, ranging from resource savings to better project design and increased public acceptance of large development projects. Even though the environmental impact assessment law calls for licensing of EIA consultants, the relevant system is not yet in place..

The EIA department at MESP deals with many EIAs per staff relative to other EU countries (table 7.1). In view of MESP's few human and financial resources, the EIA process should be improved in realistic steps.

Table 7.1 Comparison of staff and number of EIAs, selected EU countries

Country	Average annual EIAs (2005–08)	No. of staff	No. of EIAs per staff member
Kosovo	100	3	33
Slovak Republic	670	90	7
Belgium	183	30	6
Latvia	11	22	6
Estonia	80	19	4
Denmark	125	45	3
Greece	425	160	3
Finland	38	15	3
Czech Republic	117	80	1

Source: Non-Kosovo: GHK 2010; for Kosovo: Information from MESP in June 2010.

The Law on Strategic Environmental Assessment (SEA) was adopted in 2010, and Kosovo has carried out one SEA as part of a World Bank–financed project. It is important that SEA is applied in the context of Kosovo's economic and development plans, and SEA and EIA are used in complementary manner.

Monitoring and enforcement

Environmental legislation requires installations that could have an effect on pollution to send monitoring reports to MESP, although these reports' quality varies greatly. The environmental inspectorate at MESP is responsible for environmental inspections of air, water, and waste emissions from industrial activities. However, as with other government agencies, it has staff shortage and retention issues because of higher private sector salaries. The department has too few inspectors for the number of environmental problems.

Inspections are carried out on the basis of annual plans. For facilities, inspection plans are prepared from the register of enterprises and according to priority (that is, estimation of hazard). The inspection of facilities focuses on verifying permit status, including availability of environmental permit and relevant authorizations/permissions, as well as conditions in the permits. Samples are not collected and no handheld monitoring devices are available to inspectors. The inspection procedures are carried out based on inspectors' experience (most of whom have undergone training), as inspection manuals detailing procedures have not been prepared to date.

The inspectors are all based in the environmental inspectorate offices in Pristina, following a change in 2009 that aimed to enhance coordination and efficiency. However, this move increased logistical requirements for inspections in areas further afield. In cases of noncompliance, the environmental inspectorate refers the cases to the judicial system, leading to delays from lengthy legal backlogs.

Legislation sets fines for violations, although few fines are handed out. Environmental laws define fines for violation of the relevant articles of €100–€50,000, depending on whether the violator is a natural or legal person or entity, on the law, and on the article. But imposing fines comes up against weaknesses in the monitoring and inspection system, as well as the judicial backlog. Only in 2011 was an industrial facility fined for noncompliance for the first time—€40,000 for its failure to record emissions.

Further steps

Efforts are needed to enhance the effectiveness of environmental standards. Kosovo has issued administrative instructions on limit values for effluents that can be discharged into water (KEPA 2010), on quality of drinking water, on air quality standards, and on air emission standards. Such measures need to be accompanied by stronger monitoring, inspection, and enforcement systems to ensure compliance. Government agencies can start by adopting relevant standards and guidelines, using manuals, and providing inspectors with monitoring and inspection equipment. However, significant effort still needs to be made to ensure that environmental

quality is monitored. This would enhance the ability to make relevant information available to the public, as well as strengthen the public's awareness of environmental priorities.

MESP is already reaching out to the public through publications such as *Mjedisi* magazine and the *Environmental Newsletter* (published with UNDP-Kosovo). MESP and KEPA's website provides information on activities and responsibilities, as well as legal and regulatory documents. Still, given that Kosovo's environmental protection law identifies the principle of public access to information and participation in decision making as one of the basic principles for environmental protection, access to information, participation in decision making, and access to justice should be strengthened.

In order to strengthen the capacity of Kosovo's environmental and energy regulatory authorities, the World Bank and the Government are working towards proposed Additional Financing for the Energy Sector Clean up and Land Reclamation Project. The additional finance would focus on in order to strengthen the capacity within the Ministry of Environment and Spatial Planning and the Kosovo Environmental Protection Agency and its inspectorates related to coal-fired power plants, including open cast mining, in the following areas: (i) Environmental Impact Assessment Review; (ii) permitting tasks as they are defined in the Kosovar legislation as well as the relevant EU regulation; and (ii) inspections to monitor compliance with the permit conditions, including emission monitoring obligations and (annual) environmental reporting.

Despite progress in developing the judicial system, the role of the judiciary in environmental management remains weak—as a factor of broader weaknesses facing the judicial system, including the backlog of court cases and overall low efficiency (EC 2010). This in turn affects cases on enforcing environmental legislation, such as illegal mining and forestry, and severely limits the role of the judiciary in environmental management and citizens' ability to seek recourse to justice for environmental management issues.

Finally, to expand the use of economic instruments and incentives (which it rarely uses), Kosovo should develop strong regulatory and enforcement mechanisms, and strengthen its institutions. Only then can it ensure that the economic incentives it puts in place function effectively.

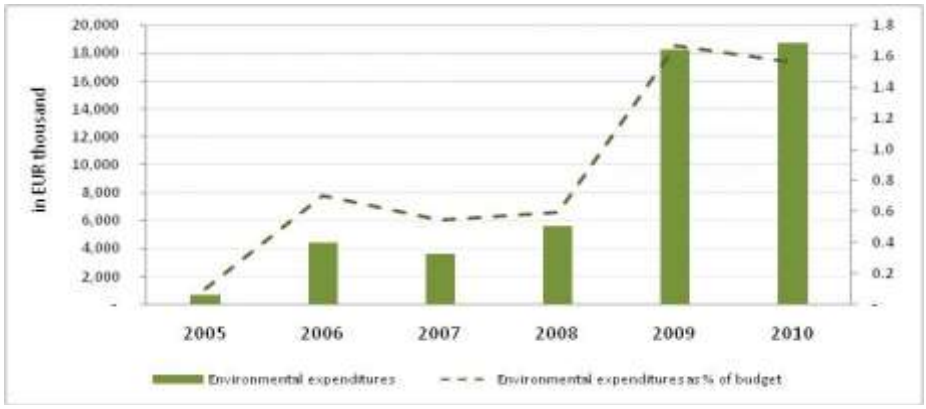
8 Public environmental expenditure review

This section examines Kosovo's public resource allocations and spending patterns related to environmental issues. Depending on data availability, environmental expenditures are analyzed by spending agency (ministry, regulatory agency, other institutions), by type of expenditure (current, capital), and by environmental domain (water, air, waste).

Public spending on environment in Kosovo comes from four main sources: central government, municipalities, donors, and publicly owned enterprises, such as water and waste management companies. While data on budget-financed expenditures seem to be comprehensive and reliable, complete information on donor-financed projects and expenditures of publicly owned enterprises is lacking as these have been largely pushed implemented outside the budget framework.

Central and municipal government spending on the environment rose during 2007–10 (figure 8.1). The main environmental responsibilities lie with MESP and the Water and Waste Regulatory Authority (WWRA). Their budgets have increased several-fold since 2006 (figure 8.23). However, the increase has been in line with the overall growth in spending, and the share of environmental expenditures in the overall central budget decreased slightly between 2009 and 2010. In this period, public expenditures soared mainly due to the large expansion of capital investment (mostly in transport infrastructure) but also due to rising current expenditures (on salaries, for example).

Figure 8.1 Environmental spending, central and municipal



Source: Ministry of Finance.
Note: The right axis is percentage of GDP.

It is difficult to compare Kosovo's environmental expenditures with those of other countries in the region given the lack of common data analyses. For example, Kosovo's functional budget classification does not show environmental protection as a separate category, unlike EU

countries.[29] Kosovo seems to spend less on environmental protection as a share of GDP[30] than some neighboring EU-10 countries (table 8.1) (though the difference would be smaller if spending of other budget users and environment-related publicly owned enterprises were included).

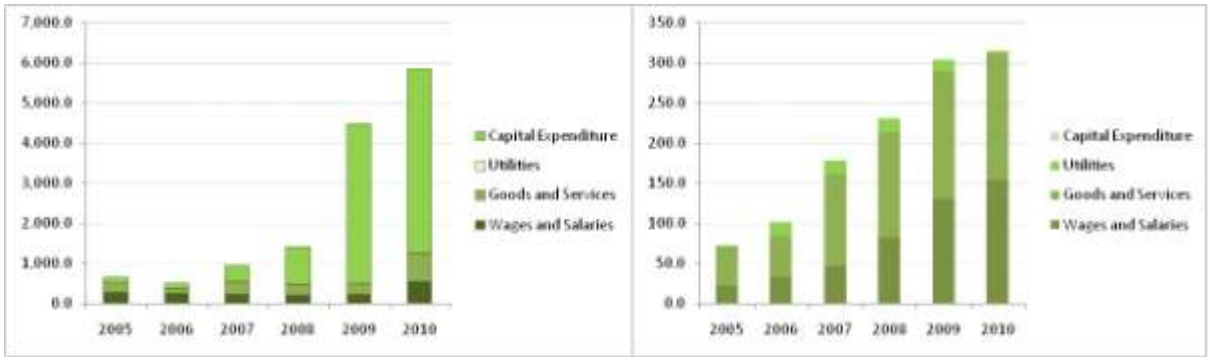
Table 8.1 Environmental expenditure (% of GDP)

	2005	2006	2007
Slovenia	0.68	0.61	-
Romania	0.23	0.54	0.59
Bulgaria	0.38	0.36	0.5
Slovakia	0.26	0.26	0.24
Kosovo	0.02	0.14	0.10

Source: Ministry of Finance, Eurostat.

For MESP, appropriations for wages and salaries, and goods and services, were fairly stable until 2010, and the increase in spending was on the capital side, particularly in 2008 and 2009. In 2010, all expenditures increased. WWRA in contrast has no responsibility for capital investments and its budget goes mainly on wages and salaries, and goods and services. The wage bill almost tripled between 2007 and 2009 as a result of new hiring and salary increases (figure 8.2).

Figure 8.2 Expenditures by sector of MESP (left) and WWRA (right), (€ thousand)



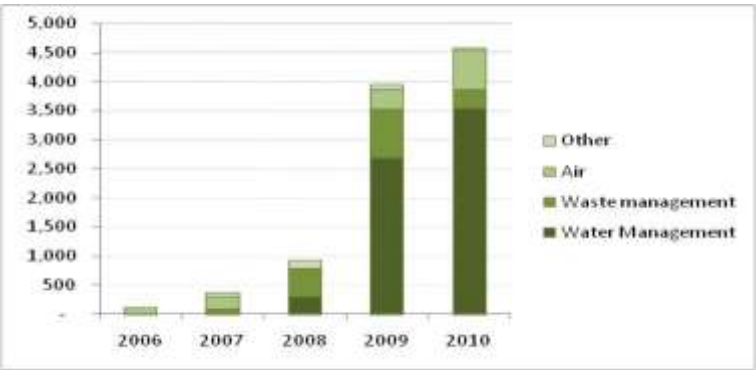
Source: Ministry of Finance.

In terms of the environmental domain of expenditures, waste management, water, and air quality have been the main priorities for capital expenditures in recent years (figure 8.3). Water and waste management projects accounted for the bulk of capital spending in 2008 and 2009.

[29] Environmental protection expenditure is the money spent on all purposeful activities directly aimed at preventing, reducing, or eliminating pollution or any other degradation of the environment. It includes both capital and current spending.
[30] Environmental expenditures of MESP, WWRA, and municipalities.

In 2010, half of the €4.7 million capital budget was spent on water management and the rest on waste management, air pollution, and the like (appendix 3).

Figure 8.3 MESP's environmental capital expenditures by domain (€ '000)



Source: Ministry of Finance.

The execution of budgeted environmental expenditures has varied greatly, mostly as a result of inconsistent implementation of capital projects. For MESP, the execution rate fell in 2006 (picking up thereafter) in parallel with a budget increase (table 8.2). In 2006–08, implementation of capital projects was unsatisfactory, with execution rates much lower than among other budget users. In 2009, however, the capital execution rate picked up sharply and was above the average rate for all central government capital projects. Still, there is still room for improving budget implementation, especially of capital projects.

Table 8.2 Budget execution rates for MESP and WWRA, 2005–09 (%)

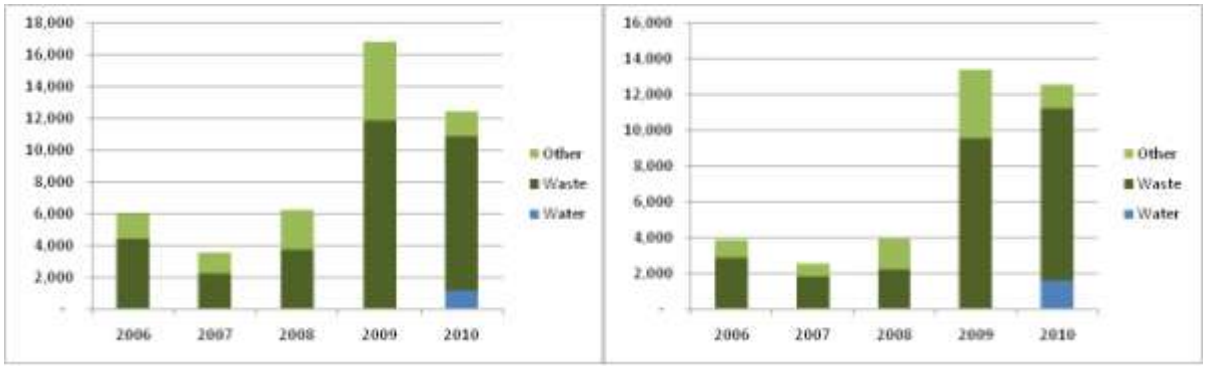
	2005	2006	2007	2008	2009
MESP					
Wages and salaries	99.2	99.8	98.9	95.8	96.2
Goods and services	99.7	100.0	97.3	68.8	90.8
Utilities		98.7	100.0	95.3	80.5
Capital expenditure	100.0	18.3	43.8	51.6	90.2
WWRA	2005	2006	2007	2008	2009
Wages and salaries	72	73	92	87	84
Goods and services	82	79	79	88	86
Utilities			42	24	85
Capital expenditure	99	39	95	0	n/a

Source: Ministry of Finance.

Much of the capital spending on environmental projects has been made by municipalities, as they have a core competency to provide several environmental services, including green areas and waste management. Environmental capital expenditures rose from €3.9 million in 2006 to

almost €13.5 million in 2009 (figure 8.4). More than three-quarters of expenditures were related to waste management. The midyear budget review in July 2010 planned €14.1 million-worth of environmental projects in 30 (of 35) municipalities; €7.5 million was to be funded by the central budget and €6.6 million from municipalities.

Figure 8.4 Municipal capital expenditures by domain, budgeted (left) and actual (right), 2006–10 (€ thousand)



Source: Ministry of Finance.

Execution of environmental projects at the municipal level has been weak (see figure 8.4). In 2006–08, execution rates were around 65 percent, with no major differences by domain, though variations among municipalities stood out. In Prizren for example (one of the largest municipalities), execution of capital and current expenditures was highly satisfactory (above 90 percent in 2007 and 2008). Overall implementation of projects improved substantially in 2009 when 83 percent of budgeted expenditures were realized, the same as MESP's execution rate. Some of the reasons for the earlier unsatisfactory implementation lie in the institutional and legal setup and are not only related to environmental projects. For example, municipalities collect most of their own-source revenues toward the end of the year, such that there is not enough time to complete the tender procedures for investment projects.

Other budget users manage environment-related funds. The Ministry of Agriculture, Forestry and Rural Development is responsible for forest management, with outlays of €0.44 million in 2010 (table 8.3). Spending on these categories is expected to remain stable in the medium term. Some other budget users may also occasionally have environmental-related expenditures. For example, in 2010, almost €4 million is spent on environmental projects by seven other budget users. Examples of such projects include installment of filters in Trepca mine (financed by the privatization agency) and others.

Table 8.3 Environment-related expenditures by other budget users, 2010 (€ thousand)

Institution	2010
Ministry of Finance	1,362
Ministry of Agriculture	445
Kosova Agency of Privatization	306
Assembly	10
Ministry of Local Government	112
Ministry for Communities	97
Total	**2,332**

Source: Midyear budget review 2010.

A hefty share of environmental financing seems to come from international donors, though the amount cannot be determined for lack of data. The donor-coordination unit in the Ministry of European Integration maintains a donor database that should include all donor-financed projects in Kosovo, but coverage of donors and projects may not be complete. Nor does it have data on completed projects (it was set up not long ago).

According to the donor database, donors committed at least €4.7 million for environmental projects in 2009 (table 8.4). The EU is among the largest donors in this area, as with other countries in the region. (To help improve environmental standards, the EU had committed around €7 million in both 2007 and 2008,[31] some for improving water supply and some for water and waste management.) Kosovo, as a potential candidate for EU accession, will need to adopt comprehensive EU legislation in this area. As seen in the *Institutional review* section, the investment required to achieve this goal is substantial, as Kosovo's level of compliance is extremely low. EC (2010) concludes that Kosovo's alignment with EU environmental standards is at an early stage, though recent progress has been made in adopting (but not enforcing) legislation.

Table 8.4 Donor-financed environment activities and commitments, 2009 (€ thousand)

Project name	Amount
Closing of eight municipal uncontrolled dumpsites	2,656
Small Infrastructure for water and sanitation	1,302
Rural Water and Sanitation Support Project in South-Eastern Kosovo	469
Supervision of works for closing of municipal dumpsites	199
Development of water polluters cadastre in Kosovo	53
Recycling of plastic trash and environment	23
Total	**4,702**

Source: Ministry of European Integration donor database.

[31] EC Liaison Office in Kosovo website.

Other donors in the sector include the Swedish International Development Agency (mainly involved in forestry protection and development of environment strategy), KfW, USAID, the Austrian Development Agency, and the Swiss government (all focused on sanitation).

The World Bank has maintained a focus on the environment. Its main engagement is through the Cleanup and Land Reclamation Project (for about $10 million and supported by an additional €3 million from the government of the Netherlands). The project finances cleaning of the environment from KEK-accumulated ash over the last 40 years by relocating, reshaping, and covering the ash dump, and reshaping and foresting the overburden dumps; cofinancing supply of new equipment for hydraulic transport of ash from KEK to the Mirash mine to avoid ash dust of its current dry ash transport and dumping system; and removing hazardous chemical waste from the former gasification site.

Public resources for environmental projects are likely to become constrained in the medium term given the government's decision to implement a large multiyear transport infrastructure plan, beginning with a highway to Albania expected to cost close to €1 billion over four years. Also, the midyear budget review 2010 cut environmental spending by €2.6 million across all institutions, with about two-thirds from new projects and the rest from projects in the pipeline. The Medium-term Expenditure Framework 2011–13, which was revised following the midyear budget review, envisages a decline in capital spending of MESP in 2011–13 relative to 2010 (table 8.5) and a ceiling on current expenditures.

Table 8.5 MESP's Medium-term Expenditure Framework 2011–13 (€ thousand)

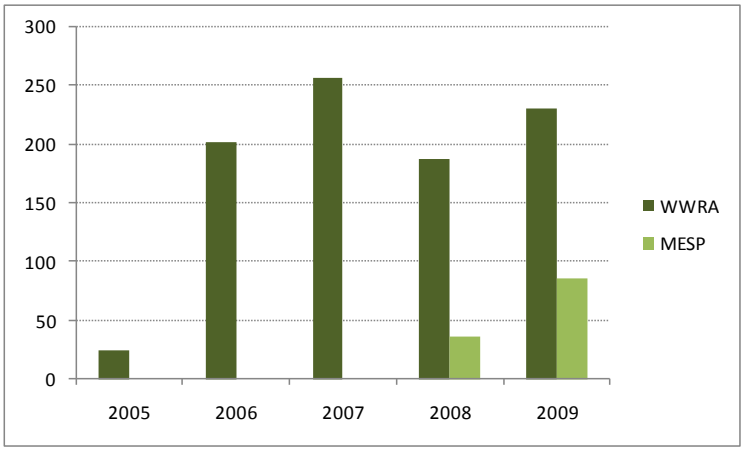
	2010	2011	2012	2013
Wages and Salaries	1,034	1,137	1,137	1,137
Goods and Services	1,311	1,364	1,370	1,370
Capital Expenditures, of which:	9,411	5,901	6,080	6,000
on environment	*2,368*	*2,294*	*2,478*	*2,478*
on water resources	*2,277*	*1,300*	*1,300*	*1,300*
Total	**11,776**	**8,402**	**8,587**	**8,507**

Source: Medium-term Expenditure Framework 2011–13.

The Medium-term Expenditure Framework 2011–13 incorporates financing of several important projects such as building temporary storage for hazardous waste, establishing an air quality monitoring network, and constructing a contagious-waste sterilization plant. In addition, MESP has identified other projects that may be financed if additional funding is identified. These include building regional dump sites for municipal waste in Mitrovica and Peja; improving and extending infrastructure for collecting and accumulating waste and garbage; and raising staff numbers for implementing the law on protection of radiation and nuclear safety.

The bulk of environmental spending is financed from the central budget. Environment-related revenues are marginal: in 2009 they came to only €316,000 (figure 8.5), from two agencies. (In the EU by contrast, environmental tax revenue amounted to 2.4 percent of GDP in 2007—and 3 percent of GDP in Slovenia and 3.4 percent of GDP in Bulgaria.[32]) Most of the revenue is collected by WWRA from its provision of services, although these funds covered only about 80 percent of WWRA's budget in 2008 and 2009 (in previous years revenues were higher than WWRA's expenditures). MESP began to collect revenue from licenses for recreational activities in 2008 (€85,000 in 2009). No data show whether municipalities collect environment-related revenue, and no extrabudgetary environment funds have been established.

Figure 8.5 Environmental revenues of WWRA and MESP (€ thousand)



Source: Ministry of Finance.

In the EU-10 countries, extrabudgetary environmental funds and, to less extent the private sector, have been an important source of financing. For example, in Croatia, the two extrabudgetary funds—Croatian Waters and the Environment and Energy Efficiency Fund—are estimated to have provided around 30 percent of total environmental financing in 2006–08. Revenues arise from charges from polluters, environmental users; municipal, hazardous, and industrial waste; waste-packaging systems; and motor vehicles. It is unclear how much private investors bear environmental costs in Kosovo, but this figure seems to be very low.

Other possible sources of financing environmental projects in other countries are accumulated savings or profits of publicly owned enterprises. Improving the financial performance of local utilities, such as water and sanitation companies, and waste collectors, could release resources for capital investment. The majority of these in Kosovo are subnational publicly owned

[32] An environmental tax is a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment. Total revenues for environmental taxes include taxes on transport, energy, pollution, and resources (Eurostat).

enterprises. Improving technical efficiency and introducing cost-based tariffs and better collection would either reduce the subsidies to these companies or increase their profits. Unfortunately, few data are available about their efficiency or financial position, so further analysis is needed to assess this avenue.

The Medium-term Expenditure Framework 2011–13 states that the water sector is facing several challenges, including poor level of billing and collection, and high fixed and operating costs. In response, WWRA's medium-term priorities are to realign the fee structure, promote competition through benchmarking, monitor performance of service providers, and develop a plan for accumulated arrears.

Further steps

As public financing for environmental projects under the Medium-term Expenditure Framework is constrained, the government should seek donor support specifically for complying with the Directives that require heavy investments. A good way forward is the preparation of a strategic sector masterplans for the key sectors requiring heavy investments: water supply, sanitation and wastewater treatment as well as (hazardous) waste management, which would include Improving the financial performance of the local utilities through costs recovery tariffs and collection improvement.

For those environmental issues where the key interventions have to be addressed by the private sector, opportunities exists to increase the private sector's share of environmental expenditures and make it pay for its negative environmental externalities through charges and fines. The government can achieve this by enhancing the effectiveness of environmental standards currently in place, particularly for air pollution.

Appendix 1 Health costing approaches and benefit transfer

Monetary valuation of health impacts

Health outcomes can be grouped into mortality and morbidity.

Costs of mortality. These can be estimated through the human capital approach or the value of a statistical life approach.

The human capital approach values a life at the present value of future income lost due to early mortality. The human capital value for Kosovo is thus based on current and projected future wage rates in the country. It is estimated at €134,800—€141,700 for a child of one to three years, and €37,200 for an adult whose death involves 10 years of life lost.

The value of a statistical life approach generally gives higher monetary costs of mortality. It reflects the individual's willingness to pay for a marginal reduction in the risk of death. The value of a statistical life is based on the fact that risk of death is implicit in everyday actions and decisions. When one evaluates job opportunities and salaries, for example, one considers all the features of the job, including the health risk inherent in the work. As the value of a statistical life for Kosovo is unavailable, this study draws on a meta-analysis by Navrud and Lindhjem (2010). Their meta-analysis is based on stated preference studies from a database of more than 1,000 value of statistical life estimates from multiple studies in more than 30 countries, including countries with GDP per capita similar to Kosovo's. Navrud and Lindhjem provide an empirically estimated benefit transfer function (see below) from these studies that can be applied to Kosovo:

$$VSL = e^{(0.0433 + 1.022 \ln(gdp) - 0.445 \ln(r))} \qquad (A1.1)$$

where *VSL* is expressed in purchasing power parity (PPP) adjusted dollars; *gdp* is GDP per capita in PPP adjusted dollars; and *r* is the change in risk of mortality.[33] The VSL is then converted to euros by multiplying by the PPP rate.

This gives a value of a statistical life in Kosovo of €165,500 for the year 2010. This value is only a little higher than the human capital value for young children but is more than four times that for adults.

Costs of morbidity. These can be estimated through the cost of illness approach or estimates of willingness to pay for avoiding an episode of illness. Cost of illness includes medical treatment

[33] This BT function implies that the income elasticity is 1.022, meaning that VSL varies across countries in proportion to their PPP adjusted GDP per capita level. A change in risk of mortality of 1.10,000 is applied, which is a magnitude often used in VSL studies.

and value of time lost due to illness. Time losses are valued at wage rates. Willingness to pay for avoiding an episode of illness is higher than the cost of illness because it reflects the value that individuals attach to avoiding pain and suffering as well as other burdens of being ill, including financial costs (Alberini and Krupnick 2000; Cropper and Oates 1992; Dickie and Gerking 2002; Wilson 2003). This report assumes willingness to pay to be twice as high as cost of illness.

A common measure of health effects

This report provides estimates of DALYs (disability-adjusted life years) caused by environmental health risks. The DALY approach was developed to provide a common measure of the disease burden for various illnesses and premature mortality (Murray and Lopez 1996). The measure combines years of life lost and years lived with disease or disability, which are weighted according to severity. The DALYs are not monetized in this report, but are presented to compare the aggregate health effects of, for instance, air pollution and inadequate water supply, sanitation and/or hygiene.

Benefit transfer: unit damage costs

Benefit transfer is a common method of economic valuation of environmental changes. Its essence is to use previous valuation studies of similar environmental performances in other countries or regions, and then, with necessary adjustments, to apply these findings to the case under review, producing estimates for specific environmental damage.

Yet relying on results from previous studies may create problems. It is not always methodologically correct simply to transfer and apply data on physical impact, geographic aspects, and local population preferences from previous studies, and benefit transfer is more accurate if local influences are fewer. In contrast, for global impacts such as climate change and ozone layer depletion, this approach is justified.

When local characteristics are more strongly felt, therefore, previous results should be used with care. Adjustments should be made for income, population size and characteristics, background conditions, and other determinants that have current data.

Boyle and Bergstrom (1992) propose the following three criteria for successful benefit transfer application:

- Similarity of the environmental good or service to be valued.
- Similar demographic, geographic, economic, and social characteristics or the ability to adjust for these kinds of parameters statistically.

- Evidence of sound economic and statistical methodology applied in the preliminary study.

Appendix 2 Detailed institutional review

This institutional review provides an overview of the environmental institutional setup in Kosovo. It includes a concise overview of the following aspects of institutions relevant to environmental policy making, planning, monitoring, and enforcement, which are considered key characteristics of good policy, institutions, and governance:

- Policy making: assessment of the policy, legislative, and regulatory framework for protecting and managing specific environmental resources.
- Administrative efficiency: the structure of environmental administration within the overall administrative machinery; human resource and technical capacity with respect to key environmental concerns.
- Implementation and impact: The manner in which environmental policies are implemented and the effect on the ground.

The review relies on earlier assessments conducted in Kosovo in 2008–2010, including the Functional Review and Institutional Design of Ministries (FRIDOM 2008), which aimed to improve how the government and its component bodies are organized. An important consideration was Kosovo's aim to harmonize its environmental legislation with that of the European Union (EU), and so the review focused on good practice in the EU and on European Commission (EC) reports on progress in harmonizing Kosovo's environmental legislation.

Kosovo has achieved the following:

- Establishing the Ministry of Environment and Spatial Planning (MESP) and the Kosovo Environmental Protection Agency (KEPA).
- Drafting and issuing laws and administrative instructions on general environmental protection, nature protection, energy, mining, agriculture, and forestry.
- Drafting environmental standards on air emissions, liquid effluent, and drinking water quality.
- MESP is reaching out to the public through publications such as *Mjedisi* magazine and the *Environmental Newsletter* (published with UNDP-Kosovo). The website of MESP and KEPA[34] provides information on activities and responsibilities, as well as legal and regulatory documents (which are also available on the site of the national assembly).

[34] www.ammk-rks.net/.

Legal framework

Article 7 of the constitution of Kosovo recognizes the protection of the environment as one of the principles on which the constitutional order of the Republic of Kosovo is based, and article 52 recognizes the responsibility for the environment as a fundamental right, including responsibility for nature and biodiversity, environment and national inheritance; opportunity to be heard by public institutions and consideration of public opinions on issues that affect their environment; and consideration of the impact on the environment by public institutions in their decision making.

Key laws on the environment in Kosovo include:

- Law on environmental protection (no. 03/L-025)—*adopted*—aims to promote the establishment of healthy environment for population of Kosovo by gradually bringing in EU standards for the environment. The law tasks MESP with responsibility to draft administrative measures and ensure environmental sustainability in Kosovo. It also tasks municipalities with applying the basic principles of environmental protection.
- Law on environmental impact assessment (no. 03/L-024)—*adopted*—aims to prevent or mitigate the adverse impacts of proposed projects, and regulates procedures for identification, assessment, reporting, and administration of the environmental impacts of a proposed project, to provide all relevant information on the environment for decision making by MESP for issuing its environmental consent.
- Law on strategic environmental assessment (no. 03/L-015)—*adopted*—aims to ensure a high level of protection of the environment and human health through the strategic environmental assessment of plans and programs.
- Kosovo Water Law (no. 2004/24)—*adopted*—aims to improve water resources management, rational use, long-term planning, and conservation and protection of water resources, and to establish standards in line with EU policy, law, and general standards. The law bases water management on the following: the principles of the holistic nature of natural processes and the dynamics of water as well as the links between interdependent components of aquatic ecosystems; the permanent protection of good quality and proper water use; ensuring protection of people and property from damaging effects of water; and application of best available techniques and new scientific research.
- Law on air protection (no. 2004/30)—*adopted*—assigns responsibility for setting air quality and emissions standards; identifies main air quality indicators; and sets obligations for protection of air quality.
- Law on waste management (no. 02/L-30)—*adopted*—regulates waste management responsibilities and activities, including the identification and classification of waste, the

planning of waste management, organizing and determining the conditions for waste management activities, the issuing of licenses, and determining environmentally sound conditions for waste management. The law aims to ensure that waste management is conducted in a way that minimizes risk of harm to human health and the environment by preventing pollution of water, air, soil, and risk of harm to biodiversity; offensive smells, vermin, and other nuisances; risk of fire and explosions; and adverse effects on objects or places of special interest, such as nature-protected zones designated under the law.

- Law on integrated prevention pollution control (no. 03/L-043)—*adopted*—aims to prevent industrial pollution by preventing or reducing wastes and emissions to the air, water and land, and sets provisions for permitting of installations. The law relies on best available techniques.
- Law on nature conservation (no. 02/L-18)—*adopted*—relies on principles of collaboration, sustainability, integration, polluter-pays, education and schooling, responsibility, and effective management for nature conservation. It sets the strategy and action plan for nature conservation, and assigns the responsible bodies for nature conservation (MESP, Institute of Kosovo for Nature Conservation within KEPA, and offices of the municipal administration at local level).
- Law on agricultural land (no. 02/L-26)—*adopted*—regulates the use and protection of agricultural lands and sets provisions for classification of agricultural lands, change of use of agricultural lands, and prevention of pollution and erosion control in agricultural lands.

The functional review carried out by the FRIDOM project of MESP prepared a comparison between the number of EU regulations (including directives and decisions) and those issued in Kosovo, as an indication of the size of the work required to bring Kosovo in line with EU regulations. Moreover, implementing and enforcing environmental legislation remains a challenge (EC 2010).

Key sectoral policies and programs

Several sectors beyond the environment have influence on and participate in environmental management. The key sectoral policies and programs include the following:

The environment. The National Environmental Action Plan (NEAP) (2006–10) aims to improve the quality of the environment in Kosovo, and consequently the quality of public health. It sets priority activities for the environment sector. The Kosovo Environmental Strategy (KES) and the NEAP were updated in 2011. The KES 2011–21 identifies priorities and sets goals for environmental sustainability in Kosovo. It identifies the long-term objectives of pollution

reduction; protection of biodiversity; rational and sustainable use of natural resources; and protection of valuable landscapes. In the short term, it identifies as priorities integration with the legislation and structures of the EU, as well as environmental mainstreaming.

Energy. Kosovo's Energy Strategy 2009–18 sets several strategic objectives for the energy sector including achieving security of supply, restructuring the sector, developing and rehabilitating generation capacity, expanding transmission and distribution, and promoting foreign investment. It also aims to promote environmental protection awareness in energy activities, energy efficiency, and renewable energy use, and to develop gas infrastructure.

Industry and small and medium enterprises. The Industrial Strategy for Kosovo 2010–13 provides a basis for raising the quality of industrial policy. The document envisages a greater role for industry in contributing to GDP, exports, and investment.

Agriculture and rural development. The Agriculture and Rural Development Strategy 2009–13 sets several objectives for the sector including increased income levels; improved efficiency and competitiveness of farming; improved efficiency and competitiveness of processing and marketing of agricultural products; improved quality and hygiene standards; increased employment opportunities; facilitated entry to the EU; and sustainable rural development and improved quality of life (including infrastructure) through promotion of farming and other economic activities that are in harmony with the environment.

Forestry. Kosovo's Policy and Strategy Paper on Forestry Sector Development 2010–20 sets objectives for the environment and forestry in improving capacity to deal with environmental issues related to forestry; enhancing capacity of Kosovo's institutions to implement and monitor biodiversity action plans; and establishing and managing protected zones in compliance with national goals and international agreements.

Main institutions in environmental management

Central agencies

MESP. The ministry was established as a department within the United Nations structure and subsequently became a ministry in 2002–03. MESP responsibilities include setting the country's environmental policy; developing environmental legislation, norms, and standards and issuing relevant guidelines; ensuring implementation of policies and enforcing relevant legislation; and coordinating activities for environmental protection, water management, environmental inspection, and spatial planning. MESP is also responsible for developing environmental education and promoting community awareness and participation in environmental protection (FRIDOM 2008). MESP has an environment department (dealing with nature protection, waste management, air protection, and industrial issues), and a water department. The

environmental inspectorate is under the minister of environment responsible for inspection activities.

KEPA, established in line with law No. 03/L-025 on environmental protection, and following the issuance of relevant administrative instruction, is an agency under MESP, reporting directly to the minister of environment. KEPA is responsible for professional, supportive, scientific, and research tasks, including environmental monitoring, environmental information management and research, as well as various administrative responsibilities such as issuing opinions on environmental impact assessments, issuing environmental consents for construction permits, issuing opinions on nature protection areas, and organizing the Environmental Protection Information System (Sida 2009 and Administrative Instruction no. 22/03 on the establishment of the Kosovo Environmental Protection Agency). KEPA comprises the Kosovo Hydro-meteorological Institute, and the Institute for Nature and Environmental Protection of Kosovo, and consists of three directorates—for environmental monitoring, for environmental information systems, and for drafting reports and environmental programs**.** KEPA is also responsible for the Kosovo Cadastral Agency (FRIDOM 2008).

Ministry of Agriculture, Forestry and Rural Development. The Department of Forestry within the Ministry of Agriculture is responsible for policy making for the forest sector. It has a regulatory function of preparing strategy, laws, legislature, projects, and development programs in forestry, hunting, and ecotourism. The department employs about 19 staff.

Kosovo Forest Agency. The executive arm of the Ministry of Agriculture, the Agency is responsible for regulating issues related to forests and forest lands, administration and management of public forest lands and forests in national parks in Kosovo, in addition to those cases where the law specifically assigns it any other authority of government. The main responsibilities of Kosovo Forest Agency include implementing forest-related legislation; monitoring the development of forest resources in Kosovo; regulation of forests and forest lands; and administration and management of public forest lands and forests in national parks in Kosovo (Ministry of Agriculture 2010). In 2010, a memorandum of understanding signed between the Ministry of Agriculture, Forestry and Rural Development and the Ministry of Local Governance transferred part of its responsibilities for issuing licenses for cutting forests in private land and for forest guards to local municipalities.

Ministry of Economic Development. This ministry is responsible for drafting and implementing energy and mining policies, as well as promoting reduction of environmental pollution in energy and mining sectors, energy efficiency, and renewable energy sources (MEM 2010)—responsibilities previously assumed by the Ministry of Energy and Mining before its integration into the Ministry of Economic Development in 2011. The Energy Strategy of Kosovo (2005–15)

and the new Energy Strategy 2009–18 aim to reach so-called 20/20/20 EU plan[35] in terms of renewable energy and energy efficiency targets.

Independent Commission of Mines and Minerals (ICMM). This agency is responsible for regulating mining activities in Kosovo. The commission issues exploration and mining licenses—the issuance of which frequently requires environmental consent from MESP (often based on an environmental impact assessment [EIA]), Kosovo Forest Agency, and local municipalities.

Local organizations—municipalities

According to the law on environmental protection, the municipalities are tasked with fully applying the principles of environmental protection (as detailed in the law), as well as to cooperate with MESP for preparation of plans for protection of the environment and sustainable development within their territory according to this law; enforce laws and inspect enforcement of the laws related to the protection of environment and sustainable development within their territory; prepare and provide information related to the protection of the environment and sustainable development for citizens; and plan for the protection of the environment and sustainable development within municipality territory.

Kosovo has made efforts to assign responsibilities to local administrations. Municipalities in Kosovo are responsible for environmental protection, monitoring, and management of natural resources within their boundaries (Sida 2009). Each municipality has an environmental unit, usually within the department of urban planning, and usually consisting of one or two staff. For example, the directorate of urban planning, construction, and environmental protection has responsibilities for pollution reduction, protection of natural resources within municipal boundaries, monitoring, issuance of construction permits and ensuring compliance, as well as the administrative functions on ensuring proper land use. The transfer of responsibilities and duties from national to local municipalities has, however, further burdened already stretched municipal resources (EC 2009).

Information, public participation, and access to justice

Information and public participation play an important role in policy making. The EU is party to the Aarhus Convention on access to information, public participation, and access to justice—which in its turn makes the convention applicable to EU institutions.

The Aarhus Convention sets out a general right of access to information on the environment where information can only be withheld in certain circumstances, and emphasizes the need to make access easy, including making information available on request, as well as collecting and

[35] A 20-percent increase in energy efficiency, a 20-percent increase of the renewable energy share in the energy mix, and a 20-percent reduction of carbon dioxide emissions.

publishing information in an easy to understand and readily available form. The Convention gives the public a right to participate in decisions pertaining to the environment, such as whether to allow specific activities (such as roads), plans, and programs that affect the environment, and policies and laws—based on the premise that only by working with the public will decisions be made that provide a good environment and that meet the needs of local communities for a better quality of life (DETR 2000). Finally, the Convention sets out rights of access to justice and highlights rights of appeal against decisions to refuse requests for information on the environment, against failures of law in decision-making processes, or against actions that are illegal under a country's environmental laws (DETR 2000).

Kosovo's environmental protection law identifies the principle of public access to information, which gives the right to all natural and legal persons to be informed on environmental state and participate in decision-making processes as one of the basic principles for environmental protection. It also aims to stimulate public participation on activities related to environmental protection. The law further makes provision for public access to information, and participation of public in decision-making processes in strategic impact assessments, EIAs, processes for water license and integrated license issuance, and issuing legislation.

The law also identifies several reports on environmental quality as being open to the public and charges the authorities responsible for setting the environment strategy to do so in a manner that involves the public. MESP and KEPA have several documents that are available electronically, including laws and regulations, as well as KEPA-issued publications such as the State of the Water report. However, much effort is still needed to ensure that environmental quality is monitored which would also enhance the ability to make relevant information available to the public in Kosovo.

Population surveys in Kosovo indicate that, for general priorities, environmental protection ranks low next to economic and political priorities such as employment and economic development, and corruption (NDI and UBI 2010). Surveys carried out in 2006 and 2009 (UNDP 2006 and 2009), asked respondents on most important problems facing Kosovo: almost 46 percent of respondents cited unemployment as the main priority, and only 1 percent environmental pollution. In 2009, lack of jobs (44 percent of respondents) and lack of economic growth (22 percent) were the most important issue facing their municipality—with only 1 percent of respondents identifying environmental pollution as the main issue, and 3 percent identifying it as the second most important issue (UNDP 2009).

Nevertheless, in surveys that focused exclusively on environmental issues, respondents most often cited environmental pollution (including air quality, waste, pollution in general, and water pollution) as the main environmental problem facing Kosovo (Hyseni 2008). Pollution was also identified by several focus groups as one of the major concerns relating to safety and security

due to possible concerns about public health (air pollution, soil and water contamination) (Forum for Civic Initiatives and Safeworld 2010).

FRIDOM (2008) identifies over 30 nongovernmental and community and civil society organizations active in Kosovo with around 2,800 members, working on issues on environmental education and awareness, environmental legislation, nature protection, rural development, and sustainable development. The work of environmental nongovernmental organizations remains donor driven, though there has been cooperation between these organizations and MESP.

The judiciary has an important and distinct role in environmental management by ensuring that such management operates under the rule of law through enforcing compliance with rules and standards, as well as reviewing the legality of decisions made by administrative agencies.

Yet in spite of progress in developing the judicial system, the role of the judiciary in environmental management remains weak—as a factor of broader weaknesses facing the judicial system, including a backlog of court cases and overall low efficiency (EC 2010). This in turn affects cases on enforcing environmental legislation, such as illegal mining and forestry, and severely limits the role of the judiciary in environmental management and citizens' ability to seek recourse to justice for environmental management issues.

Tools for environmental management

Kosovo's environmental protection law lists several instruments for environmental management. Kosovo relies mainly on licensing (environmental permits); EIAs; monitoring and enforcement; and (to a limited extent) economic instruments and incentives.

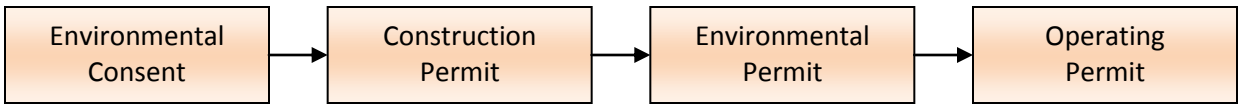
Environmental permits

Environmental permits are one of the main instruments for environmental management in Kosovo. They come in several forms, issued at the national level (by MESP) and at the local level (by municipalities), and target a range of activities that could cause pollution or significant environmental impacts, such as industrial development, infrastructure projects, urban construction, mining, and agricultural and forest activities.

The main agencies responsible for issuing these permits in Kosovo are municipalities (municipal authorizations and municipal environmental permits), and MESP (environmental consents, environmental permits, and water permits). Provisions for environmental permits are set in the environmental protection law, environmental impact assessment law, and the relevant administrative instructions. The main types of environmental permits (as described in legislation) include:

- Projects that require an EIA:
    - *Environmental consent*: a written authorization issued by MESP for obtaining a construction permit (or any other permit). It is required for projects that undergo an EIA (in Annex 1 and those that require EIA in Annex 2 of the law). An EIA is required before environmental consent is issued.
    - *Environmental permit*: a document issued by MESP for obtaining an operational permit. The environmental consent would further specify if an environmental permit is required, and if required, if it should be obtained before an operational permit is granted by the relevant permitting authority.
- Projects that do not require an EIA:
    - *Environmental authorization*: an official legal document issued by MESP allowing the holder to develop the activity or execute the project, issued by the municipality for projects that do not require an EIA.
    - *Municipal environmental permit*: a document issued by the relevant municipality for activities that have an impact on the environment.

Figure A2.1 Sequence of environmental permits in Kosovo



Source: Shala, Krypa, and Veselaj 2004.

The process entails much coordination between MESP, the agency that is responsible for issuing the construction and/or operation permits (such as the ICMM for mining licenses that require an environmental consent before a mining license is issued), municipalities, and the departments and agencies within MESP. The current shortages of staff and resources, however, place onerous challenges on such coordination, with the result that often there is a risk both of confusion over the authority and procedure for obtaining the relevant environmental license, especially for larger, more complex establishments, and of complaints from clients of long waiting periods and complicated procedures (FRIDOM 2008), resulting (in some instances) in relevant agencies proceeding with the requested licenses without waiting for the environmental consent from MESP.

EIAs

The applicable laws are the law on environmental protection; the law on environmental impact assessment, which assigns to MESP the responsibility for applying EIA procedures; and the law on strategic environmental assessment, which aims to ensure a high level of protection of the environment and human health through the strategic environmental assessment of certain

plans and programs, as well as the applicable administrative instructions on environmental impact assessment. Table A2.1 presents a summary of the legal framework for EIAs.

Table A2.1 Summary of legal framework for EIAs in Kosovo

Item	Kosovo legislation
Environmental authorities -	MESP
Entities and authorities with responsibility for environmental issues, particularly regarding EIA	KEPA Municipalities where the project is located
Legal character of EIA - Legal character of EIA instrument	- Instrument to prevent and mitigate adverse impacts of proposed public and private projects - Requirement that allows MESP to obtain and take into account all relevant information regarding the environment for issuing the Environmental Consent.
Goal - Activities subject to EIA: distinguishes between countries which EIA refers only to projects and works and those that also include policies, plans and programs (strategic environmental assessment)	- Public and private projects that would include execution of construction works, of other installations or other schemes, removal or decommission of installations or schemes, other interventions in the natural surroundings and landscape including the extraction of mineral resources and those involving rehabilitation works. - Business objects and installations that were built without undergoing an EIA or which do not have a work permit. - Strategic environmental assessment: Plans and programs
Screening - Procedure to determine whether an activity is subject to EIA and the extent of the respective study	- Applicant sends filled questionnaire to MESP. - MESP determines whether EIA is required based on definitions in EIA law of projects that require the EIA (Annex 1 to the law), and those that may require an EIA (Annex 2) based on criteria (Annex 3 to the law) such as characteristics of the project, location, and potential significance of the potential impact.
Scoping - Procedure by which scope and focus of EIA is defined (through dissemination of information to stakeholders and consultation on planned activity); if there is no specific procedure, the regulations define the minimum scope	- Defined by legal framework. Scope includes potential impacts on population, flora, fauna, soil, water, air, climatic factors, material assets. - Applicant may request that MESP states in writing its opinion regarding information on environmental impact - Applicant prepares the scoping report.
Types of EIA instruments - Different types of EIA instruments, their level of complexity and their focus	- Full EIA report for projects listed in Annex 1 to the law and those of Annex 2 of the law which are likely to have significant effects on the environment. - Simplified environment report may be required for projects listed in Annex 2 to the law. - State owned enterprises may be exempt from this requirement.
Decision making responsibility - Authority responsible for final decision in the EIA process	- MESP decides based on granting the environmental consent.

Item	Kosovo legislation
Terms of reference (TORs) - Who defines the content of the TORs and who conducts the corresponding study	- No provisions for defining content of TOR. MESP is to issue guidelines on the preparation and review of the EIA report. - EIA is prepared by licensed legal and natural persons (relevant Administration Instructions to be issued).
Requirements - Requirements in the TORs related to the impacts that must be taken into account by the EIA	- Impacts should include direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive, negative that result from: existence of the project, use of natural resources, and emissions.
Institutional coordination - Consultation with public entities and organizations in the EIA process	- KEPA will provide available information that is necessary for review. - Relevant municipal authority provides opinion on the EIA report. - KEPA provides opinion on EIA report to MESP taking into consideration opinion of the municipal authority.
Citizen participation - Provisions for the involvement of the general community or specific parts of the community as well as those directly interested in the EIA process	- Conclusions and recommendations of EIA report and proposal decision for environmental consent are subject to public debate.
Dissemination - Public notification and dissemination of information generated in the EIA process	- The applicant shall make the EIA report available to the public—the nontechnical summary of the EIA report and the proposal decision will be displayed. - Public must be informed through public information media including an announcement in at least one daily newspaper of the date, place, and time of the public debate.
Reports - Provisions regarding the information that those undertaking an activity have to submit to the authority or to the public throughout the activity's development	- No provisions in the law
Monitoring - Monitoring and supervision that public authorities conduct regarding fulfillment of the requirements placed on those undertaking an activity subject to EIA	- The environmental protection inspectorate within MESP is responsible for all inspections of projects and for implementation of the provisions of the law. - The environmental protection inspector ascertains that complete fulfillment of conditions and implementation of mitigation measures as per environmental permit is carried out.
Alternatives - Analysis of various alternatives to the planned activity, including not carrying it out	- Outline of main alternatives studied by developer should be included in EIA report and indication of main reasons for the selected alternative.
Environmental management plan - Planned measures to apply during project implementation to address issues and meet requirements identified in the environmental analysis process	- EIA report should include description of measures envisaged to prevent, reduce and offset an significant impact on the environment (mitigation measures).

Source: Adapted from Sanchez-Triana and Enriquez (2007).

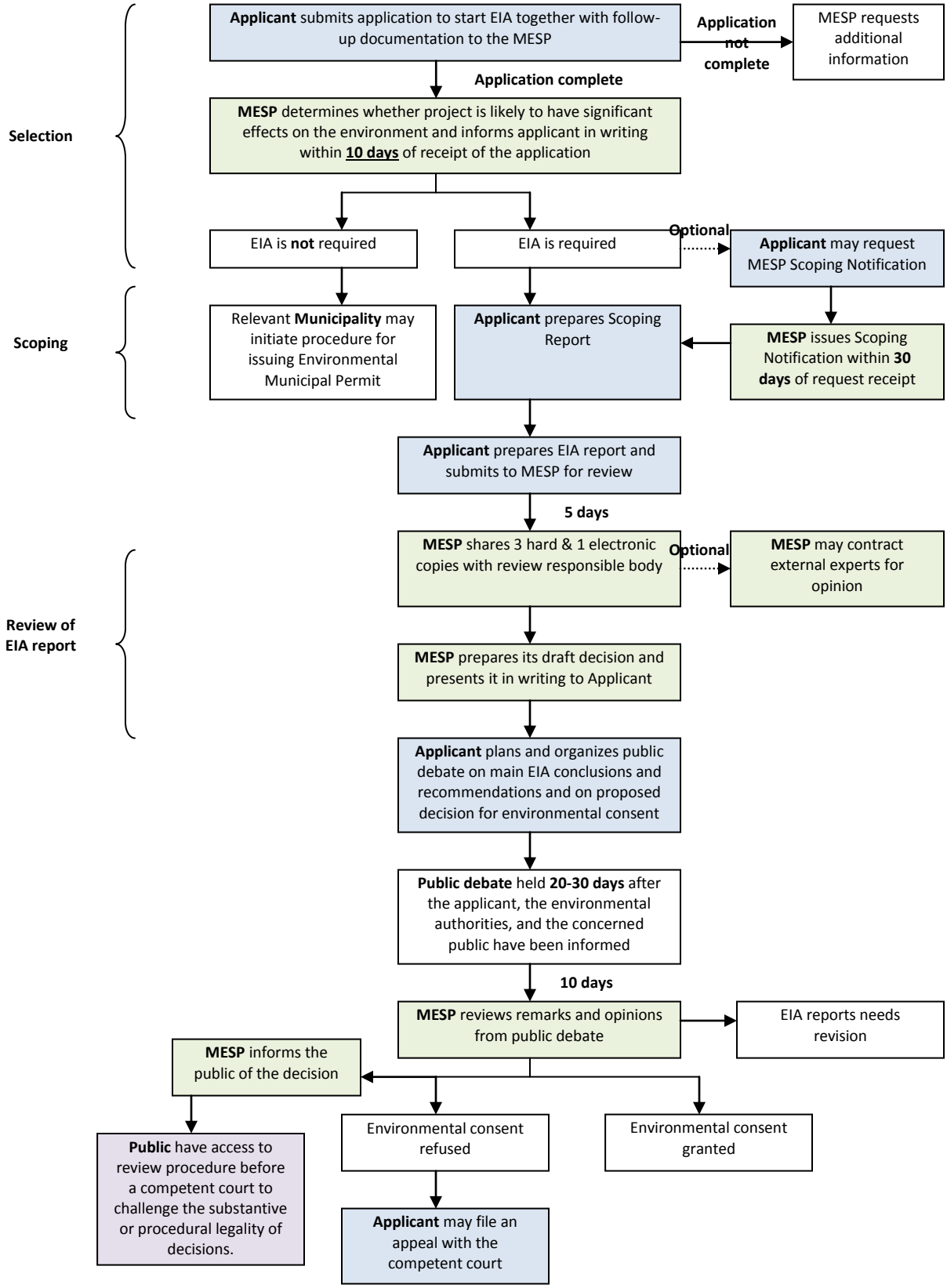
EIAs are viewed as an environmental management tool in Kosovo, and are linked to the environmental permitting system in the country: the preparation of an EIA report is a

prerequisite for issuance of an environmental consent by MESP, which in turn, is needed for the issuance of a construction permit by the relevant agency. EIAs were first used in 2003, but due to a lack of database of existing activities, and because existing activities were provided with environmental consent without an EIA, this resulted in a situation where some new activities resorted to establishing facts on the ground after which they requested environmental consent—thus avoiding the requirement to prepare an EIA. Figure A2.2 presents an overview of the EIA process in Kosovo as per Law no. 03/L-214 on Environmental Impact Assessment.

Screening. Environmental screening is intended to ensure that proposed projects are subject to the appropriate extent and type of environmental assessment. An effective screening system is key to ensuring that activities with significant impacts undergo an EIA process, while at the same time screening out smaller activities that would not benefit from an EIA but would rather contribute toward burdening the EIA system. Kosovo relies on checklists for screening, according to the legal framework. (Annex 1 to the EIA law contains activities that require an EIA, while Annex 2 to the EIA law contains those activities that may require an EIA depending on certain criteria that are listed in Annex 3 to the EIA law.) Kosovo faces difficulties, as do other EU member states, in ensuring sound screening and tackling the variations in applying thresholds and adopting case-by-case screening (COWI 2009). The World Bank screens projects in accordance with the magnitude, severity and irreversibility of impacts and classifies into: Category A if a proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented and a full EIA is required; category B if a proposed project is likely to have potential adverse environmental impacts on human populations or environmentally important areas that are less adverse than those of Category A projects and for these projects a full EIA is not required however environmental analysis is appropriate; Category C if a proposed project is likely to have minimal or no adverse environmental impacts and beyond screening, no further EA action is required; and Category FI if a proposed project involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

MESP may benefit from reviewing the screening process and the steps taken by some other member states, summarized in COWI (2009), which would refine screening through the following: simplified procedures for small development applications (as in some member states); elaboration of screening criteria by adopting thresholds; improved guidance on applying screening procedures; and publication of practices explaining hard cases and the decisions.

Figure A2.2 EIA Process in Kosovo in Accordance with Law no. 03/L-214 on EIA



Scoping of EIA. Scoping is the stage of the EIA process where the issues and impacts that are likely to be important are identified and, based on them, the terms of reference for the EIA are prepared. In many countries, public consultation is a requirement during scoping, and many EU member states have also made scoping mandatory and are providing for public consultation during scoping (EC 2009b). Public consultation during scoping is also a requirement of the World Bank operational directive OP 4.01 on Environmental Assessment for category A projects, that requires consultations with project-affected groups and local non-governmental organizations about the project's environmental aspects shortly after environmental screening and before the terms of reference for the EA are finalized. In Kosovo, public consultation is not required during scoping, even though EIA law states that the concerned public shall be given early and effective opportunities to participate in all phases of the EIA procedure, including the decision-making process. Moreover, in some cases, the applicant of the project bypasses the screening and scoping stages, by submitting an EIA report and applying for environmental consent—thus making the EIA less effective as a planning or environmental management tool.

Public participation in EIA process and public disclosure. These elements contribute toward ensuring that environmental aspects are taken into consideration in decision making and ensure transparency in it (EC 2009b). MESP is responsible for ensuring that public debates are conducted during the review stage of the EIA, and should take the public's views into consideration in its opinion on the EIA. The law requires the applicant to disclose the nontechnical summary of the EIA report and the proposal decision.

World Bank policy requires that consultation with project-affected groups and local NGOs about the project's environmental aspects for all category A and B projects is initiated as early as possible in the process and their views are taken into consideration. As mentioned above, for Category A projects, the consultation is carried out at least twice: shortly after environmental screening and before the terms of reference for the EA are finalized; and once a draft EA report is prepared. Bank policy also requires that consultation with such groups continue throughout project implementation as necessary to address EA-related issues that affect them. The World Bank makes the EIA report available through its InfoShop.

In line with good practice identified in the EU and World Bank, public participation could be enhanced through consultation at screening or at scoping stage, establishing timeframes for consultations and disclosure, and developing guidelines on good practices for making EIA documents available to the public.

Responsible parties for preparation, approval, and supervision. The proponent is responsible for preparing the EIA, and bears the costs. Even though the law calls for licensing of EIA consultants, the relevant licensing system has not been implemented . In many cases, the quality of EIA reports requires improvement (EC 2011). The EIA is reviewed by the environment

department at MESP. The law allows for MESP to form an expert group to review EIA reports—and while the law allows for external experts to be part of the external group, in most cases it consists of three to five MESP staff. The EIA sector in MESP is responsible for EIAs. The sector had three staff in June 2010. MESP receives around 100 EIAs a year, which may be too many for the few staff involved. Table A2.2 shows the comparable—and lighter—burdens on staff in other EU countries. About 3 percent of EIAs are not accepted.

Table A2.2 Comparison of staff and numbers of EIAs, selected EU countries

Country	Average annual EIAs (2005–08)	No. of staff	No. of EIAs per staff member
Kosovo	100	3	33
Slovak Republic	670	90	7
Belgium	183	30	6
Latvia	11	22	6
Estonia	80	19	4
Denmark	125	45	3
Greece	425	160	3
Finland	38	15	3
Czech Republic	117	80	1

Source: Non-Kosovo: GHK 2010; for Kosovo: Information from MESP in June 2010.

A review of EIAs in EU member states (GHK 2010) indicates that their environmental benefits are widely recognized in all member states, ranging from resource savings to better project design and increased public acceptance of large development projects. It is important to ensure that EIAs in Kosovo are applied in a manner that maximizes their benefit to environmental planning and management and are in line with EU and World Bank good practice through optimizing the screening procedures, ensuring meaningful public participation and stakeholder consultation, and increasing reliance on the variety of management and policy tools allowed by the environmental protection law. Kosovo has carried out one strategic environmental assessment, with World Bank support, but it is important that SEAs are applied in the context of Kosovo's economic and development plans.

Standards, monitoring, , and enforcement

Standards. Kosovo has issued administrative instructions on permissible limit values for effluent that can be discharged into water, on quality of drinking water, and on draft air emission standards (KEPA 2010).

Monitoring and enforcement. Environmental legislation in Kosovo requires that installations send monitoring reports to MESP. The reports provided vary, however. For example, in 2010, Ferronikeli provided bi-monthly monitoring reports to the environmental inspectorate—but the inspectorate does not have the capacity to verify the reports.

The environmental inspectorate in MESP is responsible for carrying out environmental inspection in Kosovo. It was established in 2004. According to the administrative instruction on establishing of environmental protection inspectorate (no. 2/2004), the inspectorate is responsible for, among other things, carrying out inspections of air, water, and waste emissions from industrial activities; inspection of activities that result in complaints; and management and exploitation of natural resources (cutting of forests, extraction of sand in rivers, etc.) in terms of environmental protection.

The inspectorate had 14 inspectors in June 2010—four for water, five for the environment and air, four for building permits, and one for nature. As with other government agencies, the inspectorate suffers from staff shortages and staff retention due to competing private salaries. The inspectorate does not have enough inspectors for the number of environmental problems faced.

Inspections are made through preparation of annual plans, which are based on complaints that are received as well as on field requests. For facilities, the inspection plan is prepared from the register of enterprises and on priority (based on estimation of hazard). The register is updated from data received from the field and through cooperation with municipalities as well as from registers at the Ministry of Trade and Industry.

The inspection of facilities focuses on verifying the status of permits, including availability of environmental permits and relevant authorizations, as well as conditions stated in the permits. The inspectorate carries out inspection of various activities, verifying that an activity has been issued with an environmental consent (such as mining and quarrying), as well as environment and water permits. In cases of noncompliance, the inspectorate refers cases to the courts, which suffer from delays due to the legal backlog.

Samples are not collected and no handheld monitoring devices are available to inspectors. The inspection procedures are carried out based on inspectors' experience (most of whom have undergone training), since there are no inspection manuals detailing procedures. The inspectors are all based in the environmental inspectorate offices in Pristina, following a change in 2009 that aimed to enhance coordination and efficiency. At the same time, however, this move increased logistical requirements for inspections in areas that are further afield. The environmental inspectorate prepares quarterly reports to the minister of the environment on its activities.

Economic instruments and incentives

Economic instruments and incentives are used rarely in Kosovo. Kosovo's environmental laws define fines for violation of the relevant articles, with fines ranging from €100 to €50,000 depending on whether the violator is a natural or legal person, as well as on the law (different

laws set different minimum and maximum fine levels), and the article violated. The following laws all contain articles on penalties for violations: environmental protection (03/L-025); nature protection (03/L-233); environmental impact assessment (03/L-024); water (no. 2004/24); integrated pollution prevention and control (03/L-043); agricultural land (02/L-26); noise protection (02/L-102); waste (02/L-30); and air protection (no. 2004/30).

Imposing fines succumbs to weaknesses in the monitoring and inspection system, as well as the judicial backlog. Only in 2011 was an industrial facility fined for noncompliance for the first time—€40,000 for its failure to record emissions. The systems for environmental standards, monitoring, and enforcement need to be strengthened if fines and charges are to be applied. Relevant legislation for the use of revenues of the fines and charges would need to be adopted. Moreover, to expand the use of economic instruments, Kosovo must develop strong regulatory and enforcement mechanisms, and strengthen its institutions. Only then can it ensure that economic incentives that are put in place can function effectively.

Appendix 3 Ministry of Environment and Spatial Planning's environmental budget, 2010

(€ thousand)

Sector	Amount
Environment Department	2,170
Construction of facilities for temporary conservation of dangerous residues	*291*
Establishment of air quality monitor network in Kosova	*371*
Construction of plants for sterilization of infective residues	*671*
Rehabilitation of old landfills in Kosoova municipalities	*300*
Development of socio-economic plan for Bistrica river	*300*
Cleaning of Lepenc river from azbest pollution	*177*
Other	*60*
Water resources department	2,629
Adjustment of riverbed Klina and Skenderaj	*879*
Fixing of Mirusha riverbed in Gjilan	*300*
Collector construction in Street B-lagjja e Spitalit (cofinancing with municipality of Pristina)	*1,000*
Construction of sewerage network and septic tank in the village Tomoc - Istog	*101*
Construction of sewerage network in Deçan	300
Total	**4,800**

Source: Ministry of Finance.

Appendix 4 Municipal survey

This appendix presents the results of an early-2011 municipal survey on environmental issues and responsibilities. The survey is not sufficiently representative to use as direct statistical basis for the country environmental analysis, but it provides more information on the environment in Kosovo's municipalities.

The survey used a questionnaire with eight sections:

- Land use: respondents were asked to indicate the total area of the municipality and how the land was used (roads, built-up area, agriculture, forests/nature, water). Also questions addressed currently operational economic activities that may cause environmental problems.
- Potentially polluted locations (from the past). Both the number and area of potentially polluted sites were asked.
- Economic structure. Respondents were asked to give an indication of the economic structure in the municipality.
- Environmental situation. This question addressed the opinion on the severity or urgency of various municipal environmental issues (water supply, sewerage and sanitation, waste management).
- Waste management. This addressed issues like access to waste management services (public/private); disposal routes of collected and not-collected waste; the availability of a landfill, and budgets and a way to finance waste management.
- Water management. Connection rates for water supply and sanitation (sewerage) were reviewed.
- Agriculture. Respondents were asked to indicate the types of main crops and the number of livestock in the municipality.
- Energy. An indication of industrial fuel use and the use of fuels for heating.

Kosovo has 37 municipalities, but only 35 municipalities responded to the survey (table A4.1).

Table A4.1 Municipalities, inhabitants and area (km^2)

	Inhabitants		Area	
Municipality	**Own survey**	**Census**	**Own survey**	**Census**
Deçan	60,000	38,984	180	294
Dragash	45,000	33,584	435	434
Ferizaj	144,351	108,690	345	345
Fushë Kosovë	55,000	34,718	83	84
Gjakovë	153,000	94,158	584	587
Gjilan	136,000	90,015	390	392
Gllogoc	78,300	58,579	276	276
Graçanicë	20,000	11,006	50	131
Hani i Elezit	10,650	9,389	83	83
Istog	52,000	39,294	454	454
Junik	9,600	6,078	50	78
Kaçanik	38,174	33,454	211	211
Kamenicë	51,000	35,600	414	405
Klinë	55,000	37,585	308	309
Kllokot[a]		2,551		29
Leposaviq	19,960		536	536
Lipjan	69,115	57,474	338	338
Malishevë	74,000	54,664	306	306
Mamushë	6,000	5,513	23	11
Mitrovicë[a]	115,000	71,601	326	336
Novobërdë	9,996	6,720	204	204
Obiliq	32,000	21,548	105	105
Partesh[a]		1,787		23
Pejë	150,000	95,723	603	603
Podujevë	130,145	87,933	633	633
Prishtinë	471,630	198,214	854	514
Prizren	214,963	178,112	603	627
Rahovec	78,674	55,053	276	276
Ranillug	6,000	3,785	78	89
Shtërpcë	11,000	6,913	247	248
Shtime	35,000	27,288	134	134
Skenderaj	75,000	51,317	374	374
Suharekë	83,000	59,702	361	361
Viti	68,564	46,959	297	270
Vushtrri	104,000	69,881	345	345
Zubin Potok	11,485		329	329
Zveçan[b]	16,600			104
Total population	**2,690,207**	**1,733,872**	**10,836**	**10,878**
Total population, corrected		**1,781,917**		

Source: Respondents of questionnaire and preliminary results of population and housing census (ESK 2011).
Note: The sample covers municipalities with about 98 percent of the population.
a. No response.
b. Data from Wikipedia (2011).

By comparing the results from the questionnaire with those from the census, respondents (on average) overestimated the population of their municipalities by 50 percent. The purpose of the survey is not to provide exact data, but instead to provide an overview of the environmental issues in each municipality. Land use

This question looked at how land is used for roads, built-up area, agriculture, forest/nature, and water (table A4.2).

Table A4.2

Land use	Km^2	% of total
Area	10,836	100
Roads (roads, railroads, airports)	Answers incomparable[a]	
Built-up area (living, industrial land, offices, parks, sporting facilities)	535	4.9
Forest/nature	4,240	39.1
Agriculture	5,442	50.2
Water	190	1.8
Total reported	10,407	96.0

Note: The answers are incomparable (some report km, others km^2), for built-up area the answers are incomplete (some report 0). This is also the case— to less extent—for forest/nature and agriculture.

Also some questions on specific locations were included (33 responses):

Gasoline stations	Number of gasoline stations in municipality	811
Industrial settlements	Number of industrial settlements (> 10 workers)	92
Scratched vehicles dumps	Number of scratched vehicles dumps	14,188
	Area of scratched vehicles dumps (hectares)	131

The reported number of gasoline stations, industrial sites and scrap yards give a first indication of potential polluted soils. For the number of "scratched vehicle dumps" the answers may be biased (sometimes it looks as if the total number of vehicles is mention instead of the dump sites).

Potentially polluted locations

To get insight in potential future problems with polluted soils, soil contamination questions were included on dumpsites and abandoned service and industrial sites (30 responses):

Old dumpsites/landfills	Number	69
	Hectare	54
Mining waste	Number	16
	Hectare	1919

Ashes (lignite)	Number	17
	Hectare	353
Car scrap yards	Number	90
	Hectare	60
(old) gasoline stations	Number	70
	Hectare	8
(Closed) factories	Number	58
	Hectare	738

Economic structure

Respondents were asked to indicate the economic structure in the municipality (either by turnover or employment) (25 responses):

Sector	Share (%)
Agriculture	25
Industry	10
Private services	38
Public services (including public servants, public health care, public schools)	26

Each municipality was asked to report the economic structure in percentages. To estimate the economic structure in total Kosovo these percentages have been weighted by total populations of the municipalities. In some cases an obviously agricultural municipality reports little or no share of agriculture in total economic activity.

Environmental situation in the municipality

Respondents were asked to give their opinion on the importance of certain environmental problems in their municipality (0 = no problems; 10 = very problematic) (30 responses):

Environmental problem	Importance of problem (0 = no problems; 10 = very problematic)
Water supply	4.6
Sewerage	7.8
Waste water treatment	9.1
Waste management	7.1
Contaminated land	2.8
Air pollution	3.6
Others	0.7

The discharge of wastewater is reported to be the most urgent problem (sewerage and wastewater treatment). Waste management is also seen as a major problem in the

municipalities. The most visible problems (water, sewage, solid waste) are reported as problematic.

Waste management

Public services are active in waste management in all responding municipalities of Kosovo. Private private contractors are active in 30 percent% of municipalities.

Who is in charge of waste management in your municipality? (%)	
Public company/service	30
Private waste contractor	10
Service of neighboring municipality	3

Less than half of the population of Kosovo has access to waste management services (waste collection and landfill) (33 responses):

How many households are connected to the waste collection system?	**1,192,298**	**45%**

What is the disposal route of municipal solid waste? (34 responses) (%)	
Not collected	*55*
Landfilled uncontrolled, within municipality	4
Landfilled uncontrolled, outside municipality	2
Landfilled controlled, within municipality	13
Landfilled controlled, outside municipality	26
Composted/biodegraded	0.1
Recycling	0.2

For the main part of municipal solid waste the disposal route is unknown/unclear (not collected). Most collected waste is landfilled controlled and recycling or composting is reported, but as a very small part.

The survey results also give an indication of the disposal routes for waste not collected:

If part of the waste is not collected what happens to it? (32 responses)		
	Reported by number of municipalities	**%**
Total response	32	100
Illegal dumping	27	84
Dumping/”storage” on own terrain	13	41
Backyard” burning	15	47
Heating	5	16

In more than 80 percent% of municipalities illegal dumping is mentioned as disposal route for noncollected waste. In almost half of the municipalities "backyard burning" is reported as disposal route (potentially creating air pollution by dioxins, PAHs). Eleven municipalities report a landfill in operation (some municipalities make use of landfill in a neighboring municipality). In 12 of 21 municipalities it is reported that the landfill is sometimes on fire, also in municipalities which report that there is no functioning landfill.

Water management

Of the population represented in the survey (all respondents specified this item), 65 percent has access to piped drinking water, and 56 percent are connected to sewerage.

Agriculture

The table below gives an overview of the most important crops/products from agriculture as mentioned in the survey

Main agriculture production/crops within municipality (20 responses)	
Type of crop/product	**Mentioned by respondents**
Wheat	19
Corn/maize	17
Oat	10
Barley	13
Rye	6
Potato	4
Vegetables/cabbage	6
Fruits/strawberries	5
Grapes/vineyard	2
Milk	2
Meat	1
Honey	1

Twenty-five municipalities have reported "Agriculture land lost due to construction and other activities." It is claimed that in total 265 km^2 is lost. This would imply that about 6.8 percent of agricultural land in these municipalities (3,881 km^2) is used for construction purposes in the last decade. Twenty-four municipalities have reported the current use of agricultural land for livestock and crops. It can be calculated that about 65 percent of agricultural land in these municipalities (3,668 km^2) actually is in use for these purposes. This would also imply that about one-third of agricultural land is currently not productive.

Energy

Two questions in the questionnaire addressed the energy use in municipalities.

The first question addresses industrial fuel use:

Which are the main fuels used in industry? (20 responses) (%)	
Heavy fuel oil	17
Wood	75
Brown coal	8
Waste materials	1

The overall percentages per fuel have been calculated by weighting the percentages reported by municipalities with the total population per municipality.

The second question addressed the fuels used for heating in winter time:

Which are the main "fuels" used for heating (in winter time) (34 responses) (%)	
District heating	8
Heavy fuel oil	10
Wood	73
Brown coal	6
Waste materials	1
Electricity	2

The overall percentages per fuel have been calculated by weighting the percentages reported for municipalities by total population per municipality. The results show that wood is the dominant fuel heating, which may cause (relatively) high levels of PAHs in ambient air during the winter period, which may cause health problems (EC, 2001).

Bibliography

Abbey, D., et al. 1995. “Long-Term Ambient Concentrations of Particulates and Oxidants and Development of Chronic Disease in a Cohort of Non-smoking California Residents.” *Inhalation Toxicology* 7: 19-34.

Alberini, A., and A. Krupnick. 2000. “Cost-of-illness and Willingness-to-pay Estimates of the Benefits of Improved Air Quality: Evidence from Taiwan.” *Land Economics* 76: 37–53.

Armstrong et al (2003), “Cancer risk following exposure to polycyclic aromatic hydrocarbons (PAHs): a meta-analysis”, Ben Armstrong, Emma Hutchinson, and Tony Fletcher, Prepared by the London School of Hygiene and Tropical Medicine for the Health and Safety Executive 2003, Research Report 068.

Bashkim et al, 2010, “Ecology And Road Transport In Republic Of Kosova”, by Dr. sc. Bashkim I., Baxhaku, Dr. sc. Naser B. Lajqi Mr. sc. Shpetim B. Lajqi, University of Prishtina, Faculty of Mechanical Engineering, Prishtina, presented on the 14th International Research/Expert Conference ”Trends in the Development of Machinery and Associated Technology” TMT 2010, Mediterranean Cruise, 11-18 September 2010.

Boyle, K.J., and J.C. Bergstrom. 1992. “Benefit Transfer Studies: Myths, Pragmatism and Idealism.” *Water Resources Research* 28 (3): 657–663.

BOVAG, 2011, “Number of gas station in the Netherlands”, website of BOVAG (federation of car dealers and repair)

Brouwer et al., 2007, “De Baten van Wonen aan Water: Een Hedonische Prijsstudie naar de Relatie tussen Huizenprijzen, Watertypen en Waterkwaliteit” (The benefits of living near water, a hedonic pricing study on the relationship between property prices, water typology and water quality), by Roy Brouwer, Sebastiaan Hess, Alfred Wagtendonk, Jasper Dekkers (IVM, Free University Amsterdam).

CBS, 2011a, “Milieukosten verkeer, Wat behelst het onderzoek?” (Environmental costs Transport, what is involved in the research), Dutch Central Statistical Bureau, 2011.

CBS 2011b, “Motorvoertuigen; verkopen naar voertuigtype, per maand” (Motor vehicles, sales per vehicle type, per month), Dutch Central Statistical Bureau, 2011.

CBS 2011c, “Motorbrandstoffen voor vervoer; afzet” (Motor fuels for transportation, sales), Dutch Central Statistical Bureau, 2011.

CIA (Central Intelligence Agency). 2011. *The World Fact Book*. https://www.cia.gov/library/publications/the-world-factbook/index.html

COWI, 2000, “A Study on the Economic Valuation of Environmental Externalities from Landfill Disposal and Incineration of Waste”, report to the European Commission, DG Environment, October 2000.

COWI. 2009. “Study concerning the report on the application and effectiveness of the EIA Directive. Final report.” Prepared for the European Commission, DG ENV. June. http://ec.europa.eu/environment/eia/pdf/eia_study_june_09.pdf.

Cropper, M., and W. Oates. 1992. “Environmental Economics: A Survey.” *Journal of Economic Literature* XXX: 675–740.

Daly-Hassen, H., and A. Ben Mansoura. 2005. “Tunisia.” In *Valuing Mediterranean Forests: Towards Total Economic Value,* ed. M. Merlo and L. Croitoru. Wallingford, United Kingdom: CAB1 Publishing.

DETR (Department of Environment, Transport and the Regions). 2000. *Public Participation in Making Local Environmental Decisions: The Aarhus Convention Newcastle Workshop Good Practice Handbook*. London.

Dickie, M., and S. Gerking. 2002. "Willingness to Pay for Reduced Morbidity." Paper presented at "Economic Valuation of Health for Environmental Policy: Assessing Alternative Approaches," Orlando, Florida, March 18–19.

EAR (European Agency for Reconstruction). 2006a. "Support to the Ministry of Environment—Republic of Montenegro." The European Union's CARDS Programme for Montenegro. EuropeAid/120666/D/SV/YU. Institutional Analysis—Final report.

———. 2006b. "Support to the Ministry of Environment—Republic of Montenegro. EuropeAid/120666/D/SV/YU." Legislative proposals pertinent to the establishment of the EPA and approximation report.

———. 2009. "Support to the Development of the Environment Sector in Montenegro." Final report.

EC (European Commission). 2001. "Ambient air pollution by Polycyclic Aromatic Hydrocarbons (PAH).Position Paper", European Commission, Prepared by the Working Group on Polycyclic Aromatic Hydrocarbons, July 27th 2001.

———. 2008a. "Directive 2008/105/EC of the European Parliament and of the Council on Environmental Quality Standards in the Field of Water Policy." December 24.

———. 2008b. "Directive 2008/50/EC of the European Parliament and of the Council on Ambient Air Quality and Cleaner Air in Europe." May 21.

———. 2009a. "Kosovo Under UNSCR 1244/99 2009 Progress Report accompanying the communication from the commission to the European Parliament and Council. Enlargement Strategy and Main Challenges 2009-2010, Brussels.

———. 2009b. "Report from the commission to the council, the European Parliament, the European economic and social committee and the committee of the regions on the application and effectiveness of the EIA Directive (Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC)." Brussels, 23.7.2009. COM(2009) 378 final.

———.———. 2010. "Kosovo 2010 Progress Report, Communication from the Commission to the European Parliament and the Council. Enlargement Strategy and Main Challenges 2010–2011."

2011. "Kosovo 2011 Progress Report, accompanying the Communication from the Commission to the European Parliament and the Council. Enlargement Strategy and Main Challenges 2011-2012." Brussels

Ecotec, et al. 2001a. "The Benefits of Compliance with the Environmental Acquis for the Candidate Countries." With EFTEC, IEEP, TME, and Metroeconomica, London.

———. 2001b, "Poland : Implementation of the Directive on Landfills", Final Report to DG Environment, Author: Jochem Jantzen, Zbigniew Karaczun (Warsaw University), Mark Hilton (ECOTEC), Patrick ten Brink (ECOTEC), David Smith (ECOTEC), The Hague, Warsaw, Birmingham, Brussels 10 July 2001.

EFTEC/RIVM. 2000. "Valuing the Benefits of Environmental Policy: The Netherlands." Economics for the Environmental Consultancy Ltd., London and Rijksinstituut voor Volksgezond heid en Milieu, Bilthoven. June 30.

ExternE. 1997. *ExternE National Implementation the Netherlands: Externalities of electricity production in the Netherlands*, by C. Dorland, H.M.A., Jansen, D. Tol, and D. Dodd of the Institute for

Environmental Studies (IVM), Vrije Universiteit, Amsterdam, for the European Commission, JOULE III.

Fewtrell, L., R. Kaufmann, and A. Prüss-Üstün. 2003. "Lead—Assessing the Environmental Burden of Disease at National and Local Levels." *Environmental Burden of Disease Series*, No. 2, WHO, Geneva.

Fewtrell, L., A. Prüss-Üstün, R. Bos, F. Gore, and J. Bartram. 2007. "Water, Sanitation and Hygiene: Quantifying the Health Impact at National and Local Levels in Countries with Incomplete Water Supply and Sanitation Coverage." *Environmental Burden of Disease Series*, No. 15, WHO, Geneva.

FAO (Food and Agriculture Organization of the United Nations). 2003. *National Forest Inventory Report*. Rome.

Fishman, S.M., L.E. Caulfield, M. De Onis, M. Blossner, A.A. Hyder, L. Mullany, and R.E. Black. 2004. "Childhood and Maternal Underweight." In *Comparative Quantification of Health Risks—Global and Regional Burden of Disease Attributable to Selected Major Risk Factors*, ed. M. Ezzati et al. Geneva: WHO.

Forum for Civic Initiatives and Safeworld. 2010. "A Matter of Trust: Public Perceptions of Safety and Security in Kosovo, 2009/2010." http://www.saferworld.org.uk/downloads/pubdocs/A%20matter%20of%20trust_ENG_WEB.pdf.

FRIDOM. 2008. "Functional Review of the Ministry of Environment and Spatial Planning." FRIDOM Project, Pristina.

GHK. 2010. "Collection of Information and Data to Support the Impact Assessment Study of the Review of the EIA Directive. A Study for DG Environment." Final report submitted by GHK, London, September 30. http://ec.europa.eu/environment/eia/pdf/collection_data.pdf.

GOPA. 2010a. "Potential and Opportunities for Waste Management Programs in South-East European Countries. Country Report. "Waste Management, Republic of Kosovo." Bad Homburg, Germany, July.

GOPA Consultants. 2010b. "South East Europe (SEE). Opportunities for German FC interventions in selected SEE countries." Final study report (draft 1). German Financial Cooperation in the Waste Management Sector.

GOPA Consultantsc. 2010c. Country Report. "Waste Management." Annex 4 to the final report.

Halili et al, 2009, "National Background Report on Environmental Research For Kosovo (Under Unscr 1244)", prepared by Fetah Halili, PhD, Full Professor, Faculty of Mathematical and Natural Sciences, Department of Biology, University of Prishtina; Agim Gashi, PhD, Assistant Professor, Faculty of Mathematical and Natural Sciences, Department of Biology, University of Prishtina; With contribution from Dukagjin Pupovci, PhD, Full Professor, Kosova Education Center.

Humboldt University Berlin. 2005. "Ecological and Economical Assessment of Environmental Problems after Restarting the Lead Zinc Mining Process in the Trepca Mines Complex and the Connected Post-refining Industrial Processes."

Hyseni, M. 2008. "Perception of and Attitudes Towards Biodiversity by Experts and Lay Persons in Kosovo—A Key to Conservation." Master's Thesis. Institute of Environmental Sciences, University of Zurich.

ICMM (Independent Commission of Mines and Minerals), Felske, and Hara. 2006. "Technical and Strategic Review of the Trepca Lead/Zinc/Silver Complex under the United Nations Interim Administration Mission in Kosovo." Pristina

UNMIK (United Nations Interim Administration Mission in Kosovo). 2001. “Executive Summary: Technical Audit, Environmental Assessment and Financial Viability Study of Trepca, Kosovo.” UNMIK and Department of Trade and Industry

Jusko, TA., C.R. Henderson Jr., B.P. Lanphear, D.A. Cory-Slechta, P.J. Parsons, and R.L. Canfieldl. 2008. “Blood Lead Concentrations < 10 µg/dL and Child Intelligence at 6 Years of Age.” Environmental Health Perspectives 116 (2):243–248.

Katy Norman UNDP Bratislava Regional Centre, Gabriel Regallet, International Consultant, Tush Markaj, National consultant. 2010. “UNDP Human Rights Based Approach (HRBA) to Improving Water Governance in Europe & CIS Programme.” Kosovo Sector Assessment.

KEK (Kosovo Energy Corporation). 2010. *Annual Environmental Report*, Pristina

KEPA (Kosovo Environmental Protection Agency) and MESP (Ministry of Environment and Spatial Planning). 2009. “The State of Waste in Kosovo 2008.” Pristina.

———. 2010. “The State of Nature in Kosovo.” MESP, KEPA, KINP, Pristina.

KHMI (Kosovo Hydro-meteorological Institute). 2011. “Monitoring Data Air Pollution: Monitoring Station at Rilindja Building in Prishtina and Monitoring Station in KHMI.” Pristina.

KEPA (Kosovo Environmental Protection Agency). 2010. “The State of Water in Kosovo.” Pristina.

Lampietti, J.A. and J.A. Dixon. 1995. “To See the Forest for the Trees: A Guide to Non-timber Forest Benefits.” Environment Department Paper 013, World Bank, Washington, DC.

Lanphear, BP., R. Hornung, J. Khoury, et al. 2005. “Low-level Environmental Lead Exposure and Children’s Intellectual Functions: An International Pooled Analysis.” *Environmental Health Perspectives* 113 (7): 894–99.

McWeeney G. 2007. “Draft Health Risk Assessment of Lead Pollution in Mitrovica Region, Kosovo.” Supported by WHO.

MEM (Ministry of Energy and Mining). 2009. “Republic of Kosovo’s Energy Balance for the Year 2008.” Pristina.

MEM (Ministry of Energy and Mining). 2010. “Republic of Kosovo’s Energy Balance for 2009.” Pristina.

MESP (Ministry of Environment and Spatial Planning). 2011. “Revising and Updating the Kosovo Environmental Strategy 2011–2015.” DRAFT.

Miller, T. 2000. “Variations Between Countries in Values of Statistical Life.” *Journal for Transport Economics and Policy* 34 (2): 169–188.

Minergo. 2009. “Review of Procedures for Licensing of Mining Activities in Kosovo.” Pristina. September 30.

Ministry of Agriculture, Forestry and Rural Development. 2010. “Policy and Strategy Paper on Forestry Sector Development 2010 – 2020. Retrieved October 2, 2010 from Ministry of Agriculture, Forestry and Rural Development: http://www.mbpzhr-ks.net/advCms/documents/291687_Strategy_for_Forestry_in_Kosovo_2010_2020.pdf

Ministry of Agriculture. 2010. “KFA Responsibilities.” Retrieved June 29, 2010 from Kosovo Forest Agency: http://www.ks-gov.net/mbpzhr/Agencies/AgjensioniPyjoriKosoves/tabid/72/language/en-US/Default.aspx

MonTec. 2007. “Environmental Assessment and Remediation Action Plan (EARAP): Stan Trg/Stari Trg and Artana / Novo Brdo Mines, Kosovo.” Final Report. May 15. UNDP, Kosovo Mission, Pristina.

Muçaj S., S. Kabashi, S. Gashi, et al. 2010. “Prevalence of Water and Food-borne Diseases in Kosova.” National Institute of Public Health of Kosova, Faculty of Medicine, Pristine University, Sector for Public Health, Municipality of Pristina.

Murray, C.J.L., and Lopez, A.D. 1996. “The Global Burden of Disease.” Geneva, World Health Organization, Harvard School of Public Health, World Bank.

National Research Council. 2010. “Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use.”

Navrud, S., and H. Lindhjem. 2010. “Meta-analysis of Stated Preference VSL Studies: Further Model Sensitivity and Benefit Transfer Issues.” Environment Directorate, OECD.

NDI (National Democratic Institute for International Affairs) and UBI Consulting. 2010. “Public Opinion in Kosovo: Baseline Survey Results.” November.

OECD, 1997, “Sourcebook on Environmental Funds in Economies in Transition”, Paris, 1997.

OECD, 2005 - revised 15 July, “Rural cost functions for water supply and sanitation (EXD/PCM/EN/NMC/04/125) Technology Overview and Cost Functions”, Report no. P-60777-A-1. Paris

OSCE (Organization for Security and Cooperation in Europe) and UNMIK (United Nations Interim Administration Mission in Kosovo). 2008. “Water Supply Issues in Kosovo.”

Ostro, B. 1994. “Estimating the Health Effects of Air Pollution: A Method with an Application to Jakarta.” Policy Research Working Paper 1301, World Bank, Washington, DC.

———. 2004. “Outdoor Air Pollution: Assessing the Environmental Burden of Disease at National and Local Levels.” *Environmental Burden of Disease Series* No. 5, WHO, Geneva.

Pearce, David W., and Corin G.T. Pearce. 2001. “The Value of Forest Ecosystems. A Report to the Secretariat Convention on Biological Diversity.” Background document. February.

Pearce, D. (ed.), C. Pearce, and C. Palmer. 2002. *Valuing the Environment in Developing Countries*. Cheltenham, UK: Edward Elgar.

Perman, R., Y. Ma, and J. McGilvray. 1996. *Natural Resource and Environmental Economics*. London and New York: Longman.

Pope, C. A., R.T. Burnett, M.J. Thun, et al. 2002. “Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution.” *Journal of the American Medical Association* 287: 1132–1141.

PRISM Research. 2010. “Death Registration in Kosovo.” UNFPA.

Pruss, A., Kay, D., Fewtrell, L., and Bartram, J.,2002. Estimating the Burden of Disease from Water, Sanitation and Hygiene at the Global Level. Environmental Health Perspectives,110(5):537-42.

Richard C., 2005, “Do Landfills Always Depress Nearby Property Values?”, May, 2005, Rural Development Paper No. 27, The Pennsylvania State University.

Riinvest. 2008. “Forest Industry, Challenges of Development and Balanced Use. Final Report.” Pristina, January 16.

RIZA (2006), “Kennissysteem Maatregelen, Kostenkentallen maatregelen” (Knowledge system Measures, Unit costs of measures), december 2006, Lelystad (NL)

Salkever, D.S. 1995. “Updated Estimates of Earnings Benefits from Reduced Exposure of Children to Environmental Lead.” *Environmental Research* 70: 1–6.

Sanchez-Triana, E., and S. Enriquez. 2007. “A Comparative Analysis of Environmental Impact Analysis Systems in Latin America.” Paper presented at the Annual conference of the International Association for Impact Assessment.

SCE, OIEau. 2011. “Water Security for Central Kosovo, Ibër River Basin and Ibër Lepenc Water System. Draft Final Report.” March.

Schwartz, J. 1994. “Societal Benefits of Reducing Lead Exposure.” *Environmental Research* 66: 105–12.

Scott, A.J. 2005. “Real-life Emissions from Residential Wood Burning Appliances in New Zealand.” Ministry of Environment, New Zealand.

Shala, B., L. Krypa, and T. Veselaj. 2004. “Overview of EIA / SEA system in Kosovo/a.” Presentation. MESP.

Sida (Swedish International Development Cooperation Agency). 2004. “Environmental Remediation at Paddock Tailings Area, Gracanica, Kosovo.”

———. 2009. “Kosovo: Development of SIDA Strategic Environmental Interventions 2009–2013.” Study Report. Final report. Copenhagen and Stockholm, November.

Statistical Office of Kosovo (SOK). 2007. *Series 4: Population Statistics, Kosovo Vital Statistics. Pristina, 2006*. Ministry of Public Services, Pristina, *September. http://esk.rks-gov.net/eng/*

———. 2009a. *Causes of Death in Kosovo 2006 and 2007*. Ministry of Public Administration, Supported by UNFPA, Office in Kosovo, Pristina, September. *http://esk.rks-gov.net/eng/*

———. 2009b. *Series 3: Economic Statistics, Structural Business Survey 2005, 2006 and 2007.* Ministry of Public Administration, Pristina, December.

———. 2010. *Series 5: Social Statistics, Health Statistics in Kosovo 2008*. Ministry of Public Services, Pristina, April.

———. 2010. *Series 2: Agriculture and Environment Statistics, Survey on Municipal Waste 2009*. Ministry of Public Administration, Pristina, December. www.ks-gov.net/esk.

———. 2011a. *Demographic, Social and Reproductive Health Survey in Kosovo, November 2009*. Ministry of Public Administration, Supported by UNFPA and UNICEF, Pristina, February.

———. 2011b. Statistics of Deaths in Kosovo 2010.

Surkan PJ., A. Zhang, F. Trachtenberg, et al. 2007. “Neuropsychological Function in Children with Blood Lead Levels <10 mg/dL.” *NeuroToxicology* 28: 1170–1177.

TekSam. 2004. “Environmental Management in Kosovo, Heavy Metal Emissions from Trepca.” http://rudar.ruc.dk/handle/1800/

TME (Institute for Applied Environmental Economics). TME, 1999a, “MOSES, manual”, Jochem, Jantzen, The Hague, January 1999.

———. 1999b, “Using “Moses” for Cost- and Cost Effectiveness Assessment of Environmental Policy, some applications”, Paper prepared for the “Workshop on techno-economical databases on production processes and related emission abatement options”, Angers (France), 28-29 October 1999, by Jochem Jantzen and Coen Sedee.

———. 2004. “Assessment of The Economic Value of Environmental Degradation in Serbia, Final Report,” by Jochem Jantzen, Radmilo Pešic (University of Belgrade, College of Agriculture, Dept. of Agricultural Economics), September, Environmental Capacity Building Programme 2003. An EU funded project managed by the European Agency for Reconstruction, 03/SER01/09/002, Belgrade.

———. 2005, “Ex-Post Estimates of Costs to Business of EU Environmental Policies, Case Study Road Transport”, Jochem Jantzen and Henk cvan der Woerd, This report was commissioned by: European Commission, DG Environment, September 2005.

———. 2006. “The Economic Value of Natural and Environmental Resources.” Background training document by Jochem Jantzen, The Netherlands.

———. 2009, “Milieukostenmodel” (Environmental cost model), model applied in commission of the Dutch Environmental Planning Agency (MNP), 2009.

Turker, M., M. Pak, and A. Ozturk. 2005. “Turkey.” In *Valuing Mediterranean Forests: Towards Total Economic Value*, ed. M. Merlo and L. Croitoru. Wallingford, United Kingdom: CAB1 Publishing.

UNDP. 2006. “Kosovo Mosaic: Public Services and Local Authorities in Focus.” www.ks.undp.org.

———. 2009. “Kosovo Mosaic: Public Services and Local Authorities in Focus.” www.ks.undp.org.

———. 2010. “Decentralization and Local Governance in Kosovo: Challenges and Opportunities Report.” Blue Ribbon Report no. 1

———. 2011. “Public Pulse.” Report 1. www.ks.undp.org.

UNFPA. 2005. “Demographic, Social and Reproductive Health Situation in Kosovo. Results of a Household Survey. Pristina. July 2003.”

University of Sienna. 2004. “Environmental Geochemistry of Soils of the Kosovska Mitovica Region (Northern Kosovo).”

U.S. EPA. 1997. “Evaluation of Emissions from the Open Burning of Household Waste in Barrels.” Washington, DC. November.

USGS (U.S. Department of the Interior U.S. Geological Survey). 2010. Mineral Commodity Summaries 2010. US Government Printing Office, Washington, DC

Veliu, Agron, Afrim Syla, and Sadri Gashi. 2007. “The Influence of Ferronikeli Smelter in Surface and Ground Waters of the River Drenica.” *Natura Montenegrina*, Podgorica 7(2): 535-540. http://www.pmcg.co.me/NM7/Veliu%20NM7.pdf.

WHO (World Health Organization). 1989. “Management and Control of the Environment.” Geneva.

———. 2002. *World Health Report: Reducing Risks, Promoting Healthy Life.* Geneva.

———. 2005. *Air Quality Guidelines, Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Oxide. Global Update 2005*. Geneva.

———. 2009. *Global Health Risks. Mortality and Burden of Disease Attributable to Selected Major Risks.* Geneva.

———. 2010. *World Health Statistics 2010.* Geneva.

———. 2010. “European Detailed Mortality Database.” http://data.euro.who.int/dmdb/.

———. 2011. *World Health Statistics 2011.* Geneva.

Wilson, C. 2003. “Empirical Evidence Showing the Relationships between Three Approaches for Pollution Control.” *Environmental and Resource Economics* 24: 97–101.

World Bank. 2005. “Islamic Republic of Iran Cost Assessment of Environmental Degradation,” by M. Sarraf, M. Owaygen, G. Ruta, and L. Croitoru. Washington, DC. June 30.

———. 2008. *Environmental Health and Child Survival: Epidemiology, Economics, Experiences.* Washington, DC.

———. 2010a. “Kosovo: Unlocking Growth Potential: Strategies, Policies, Actions. A Country Economic Memorandum, 29 April.” World Bank Report No. 53185-XK. Poverty Reduction and Economic Management Unit, Europe and Central Asia Region. Washington, DC. http://go.worldbank.org/SKC9IMEMC0.

———. 2010b. *Worldwide Governance Indicators.* Washington, DC.

2010c. Adapting to Climate Change in Eastern Europe and Central Asia. Washington DC

———. 2011. “Project Concept Note for Proposed Grant for Agricultural Pollution Control Project.” Washington, DC, June.