

# Komunalni otpad Municipal Waste

Otpad je jedan od najvećih problema zaštite okoliša u Bosni i Hercegovini. Trenutno se otpad prikuplja u pola gradskih opština. Seoske opštine uglavnom nisu uključene u sakupljanje otpada. Velike količine otpada odlažu se uz ceste, rijeke, u napuštene rudnike i slična mjesta, predstavljajući opasnost po ljudsko zdravlje i okoliš. Strategija upravljanja čvrstim otpadom sugeriše formiranje multikomunalnih distrikta za upravljanje čvrstim otpadom. Projekat Svjetske Banke, čiji početak je predviđen u 2002, ima namjeru da doprinese rješavanju problema okoliša koji su uzrokovani ranijim neadekvatnim upravljanjem otpadom, i da poboljša službe i kapacitete za upravljanje čvrstim otpadom u zemlji (Svjetska Banka, 2002).

Waste is one of the most important environmental problems in Bosnia and Herzegovina. Currently, municipal waste is being collected in half of the urban municipalities. Rural municipalities are generally not included in waste collection. Large quantities of waste are being dumped illegally at roadsides, rivers, abandoned mines, and similar places, posing threats to public health and the environment. The Solid Waste Management Strategy suggests the establishment of multi-municipal solid waste management districts. A project of the World Bank, planned to start in 2002, is intended to help mitigate environmental problems caused by inadequate past waste policies, and to improve services and capacities for solid waste management in the country (World Bank, 2002).

## Glavni trendovi u BIH

**P**ostojeća mjesta za odlaganje otpada su nedovoljna u poređenju sa količinom proizvedenog otpada. Kao posljedica toga, značajne količine otpada odlažu se na nedozvoljena mjesta, kao što su rubovi cesta, seoska smetlišta, rijeke ili napušteni rudnici.

**P**rikupljanje otpada u gradskim područjima je uglavnom zadovoljavajuće (blizu 45% opština). Seoska područja, međutim, nemaju organizovano prikupljanje otpada, tako da odlažu svoj otpad na nedozvoljena smetlišta, što predstavlja veliku opasnost po zdravlje ljudi i po okoliš.

**N**edavno je završena Nacionalna strategija za upravljanje čvrstim otpadom. U centru Strategije je upravljanje otpadom iz domaćinstava. Strategija sugeriše osnivanje multikomunalnih distrikta za upravljanje otpadom, od kojih bi svaki opsluživao 200.000 stanovnika.

**N**aknadu za prikupljanje otpada naplaćuju komunalna preduzeća. Najčešće ta naknada obuhvata u jednom računu prikupljanje otpada, isporuku vode i čišćenje ulica. U Sarajevu, Banjoj Luci, Mostaru, Tešnju i još nekim gradovima, stepen naplate je zadovoljavajući. Međutim, u drugim opštinama, stepen je ispod 40%, što dovodi komunalna preduzeća u situaciju da ne mogu finansirati svoje vlastito održavanje i investirati u novu opremu.

**V**elike količine otpada akumulirane su tokom rata, a značajan dio njih je farmaceutski otpad. BIH nema kapacitete za preradu tog otpada (Svjetska Banka, 2002).

# Komunalni otpad Municipal Waste

## Main BIH Trends

**C**urrent waste disposal sites are insufficient in comparison with the amount of the waste generated. As a consequence, considerable quantities of waste have been dumped at illegal sites, such as roadsides, village dumps, rivers, or abandoned mines.

**W**aste collection in urban areas is mostly satisfactory (approximately 45% of municipalities). Rural areas, however, do not have an organized collection of waste, so they dump their waste at illegal dumps that pose major threats to public health and the environment.

**A**nationwide Solid Waste Management Strategy has recently been prepared. The main focus of the Strategy is household waste management. The Strategy suggests that multi-municipal waste management districts be formed, each serving a minimum of 200,000 people.

**T**he fee for waste management is being collected by the communal enterprises. In most cases this fee covers waste management, water supply, and street cleaning, all on one invoice. In Sarajevo, Banja Luka, Mostar, Tešanj, and some other towns, the bill collection rates are satisfactory. In other municipalities, however, the rate is under 40%, which leads to a situation in which communal enterprises are unable to finance their own maintenance and invest in new equipment.

**L**arge quantities of waste accumulated during the war, a substantial part of which was pharmaceutical waste. BIH does not have facilities for the treatment of such waste (World Bank, 2002).

## Uticaj otpada na okoliš

Uticaji otpada na okoliš su višestruki. Otpad, sam po sebi, predstavlja gubitak materije i energije. Nadalje, otpad zahtijeva dodatnu energiju za sakupljanje, tretman i odlaganje. Odlaganje otpada prouzrokuje degradaciju zemljišta i zagađenje vazduha i vode.

Mnoge materije koje zagađuju vazduh oslobađaju se za vrijeme rukovanja otpadom i pri njegovom spaljivanju, na primjer: kiseli gasovi, policiklični aromatski ugljikovodici, dioksini, furani, prašina i teški metali. Emisije zagađujućih materija u vazduh za vrijeme spaljivanja otpada mogu se reducirati povećanjem temperature sagorijevanja i uvođenjem čistijih sistema. Komunalne deponije emituju metan, kao nus-produkt pri degradaciji deponovanih organskih materija. Emisije metana iz deponija mogu se smanjiti ukoliko se izbjegava odlaganje organskih materija ili ako se proizvedeni metan sakuplja i koristi.

Deponije takođe dovode do oticanja zagađivača u podzemne vode. Ovo zagađenje je vrlo postojano zato što se većina podzemnih voda nadopunjava veoma sporo. Zagađenje podzemnih voda može se smanjiti prethodnim tretmanom procjednih voda ili otpada spaljivanjem, čime se uklanjaju štetne materije.

Do zagađenja podzemnih voda može doći i kroz okolno tlo koje je kontaminirano curenjem zagađujućih materija iz deponija. Dodatni problem je da zagađenje tla nije lokalnog karaktera, nego često dovodi do zagađenja okolnog tla i podzemnih voda. Remedijacija degradiranog zemljišta traje dugo i iziskuje značajne finansijske resurse.

## Upravljanje otpadom u zemljama OECD-a

Zemlje OECD-a su orjentisane ka minimiziranju količina otpada, ali ta politika još nije stvarno efikasna (količina proizvedenog otpada i dalje raste). Recikliranje, kompostiranje organskog otpada i spaljivanje široko se primjenjuju u mnogim zemljama. OECD podstiče minimiziranje proizvodnje otpada i povećanje stope povrata materijala iz otpada. Takođe postoje prijedlozi da se smanji odlaganje na deponije miješanog otpada kako bi se uklonile sve štetne materije (organski otpad) iz deponija i smanjile emisije zagađujućih materija u vazduh i vodu (OECD, 2001).

## Globalni trendovi i projekcije

U OECD zemljama, proizvodnja komunalnog otpada je porasla 40% između 1980. i 1997. (540 miliona tona u 1997.). Očekuje se da će količina komunalnog otpada i dalje rasti u skladu sa privrednim rastom, tako da će 2020. dostići 770 miliona tona godišnje (rast od 43%). U 1997. godini, 64% otpada je odloženo na deponije. Očekuje se da će, do 2020, taj procenat pasti na 50%.

Porast proizvodnje otpada u OECD zemljama bit će brži nego porast GDP-a. Taj porast će biti prvenstveno uzrokovan promjenama u načinu potrošnje i u veličini domaćinstva (OECD, 2001).

## Global Trends and Projections

In the OECD countries the generation of municipal waste increased by 40% between 1980 and 1997 (540 million tons in 1997). It is expected that the amount of municipal waste will continue to increase in pace with economy growth, reaching 770 million tons per year in 2020 (a growth of 43%). In 1997, 64% of waste was disposed of to landfills. It is expected that, by 2020, this percentage will fall to 50%.

The increase in waste generation in OECD countries will be faster than the increase of GDP. This increase is mostly caused by the changes in consumption patterns and in household size (OECD, 2001).

Tehnološki razvoj doprinosi smanjenju količina otpada: razvoj manjih proizvoda (elektronska industrija); produženje životnog ciklusa proizvoda; upotreba biotehnologije za tretman otpada (uklanjanje toksičnih materija iz otpada - bioremedijacija) (OECD, 2001).

Striktniji standardi za emisije sa deponija i iz spalionica otpada mogu takođe imati pozitivan efekat na upravljanje otpadom. Povećanje cijena računa za prikupljanje otpada i taksi za deponovanje, stimulisanje promjena u načinu potrošnje, tako što će se potrošači stimulisati da kupuju proizvode koji se mogu ili reciklirati ili ponovo upotrebljavati (pakovanja za piće, baterije, automobilske gume), su samo neki od načina koji se koriste u zemljama OECD-a da bi se smanjio negativan uticaj otpada na okoliš (OECD, 2001).

## Upravljanje otpadom u Bosni i Hercegovini

Tačni podaci o količinama proizvedenog otpada u BIH ne postoje. Moguće je, međutim, pretpostaviti da je opšti trend povećanja količine otpada isti kao i u većini zemalja svijeta. Ogromne količine otpada su akumulirane tokom rata, uključujući jednim dijelom i farmaceutski otpad koji je došao u vidu humanitarne pomoći. U BIH ne postoje postrojenja za preradu te vrste otpada. Inventar opasnog otpada postoji samo u Sarajevskom kantonu. Recikliranje i ponovna upotreba otpada su vrlo rijetki (REC, 2000).

Postojeća mjesta za odlaganje otpada su nedovoljna u poređenju sa količinom proizvedenog otpada. Kao posljedica toga, značajne količine otpada su odložene na nedozvoljenim mjestima - pored puteva, na seoskim smetljištima, riječnim koritima ili napuštenim rudnicima. Ova mjesta predstavljaju opasnost za podzemne vode koje obezbjeđuju pitku vodu za stanovništvo, a samimi tim i rizik za ljudsko zdravlje usljed spiranja i curenja zagađujućih materija. Smetljišta često gore, proizvedeći materije koje zagađuju vazduh; smetljišta su često neograđena, tako da ljudi i životinje ulaze i time povećavaju rizik od širenja infektivnih bolesti (REC, 2000).

U Federaciji Bosne i Hercegovine, tijelo koje je nadležno za Federalnu politiku upravljanja otpadom je Federalno ministarstvo prostornog uređenja i okoliša. Odgovarajuća kantonalna ministarstva su odgovorna za istu politiku na kantonalnom nivou.

U Republici Srpskoj, odgovornosti su slične kao u Federaciji: Ministarstvo za urbanizam, stambeno-komunalne djelatnosti, građevinarstvo i ekologiju je odgovorno za Republičku politiku i zakonodavstvo. Ne postoje kantoni, ali je opštinska organizacija slična onoj u Federaciji.

Prikupljanje i odlaganje otpada, kao i naplata usluga od potrošača su zadatak lokalnih komunalnih preduzeća. Prikupljanje otpada u urbanim područjima je uglavnom zadovoljavajuće (u oko 45% naselja). Seoske oblasti, međutim, nemaju organizovano prikupljanje otpada, tako da ga odlažu na nedozvoljena mjesta koja predstavljaju opasnost za zdravlje ljudi i okoliš (World Bank, 2002).

# Komunalni otpad

## Municipal Waste

U većini slučajeva račun za komunalne usluge uključuje upravljanje otpadom, snabdijevanje vodom i čišćenje ulica. U Sarajevu, Banjoj Luci, Mostaru i Tešnju, kao i nekim drugim gradovima, stope naplate su zadovoljavajuće. U drugim opštinama, međutim, stope su ispod 40%, što dovodi do situacije u kojoj su komunalna preduzeća u nemogućnosti da finansiraju sopstveno održavanje i da ulažu u novu opremu. Dugoročni cilj ovih preduzeća je da se sama finansiraju, kao što je to slučaj u Sarajevu i Tešnju (World Bank, 2002).

Državna vlada je identifikovala problem upravljanja otpadom kao jedan od prioriteta u razvoju države. Nedavno je završena Nacionalna strategija za upravljanje otpadom. Glavni fokus strategije je upravljanje otpadom iz domaćinstava. Strategija predlaže da se formiraju distrikti za upravljanje otpadom koje će koristiti više opština (minimum 200.000 ljudi). Otpad bi se odlagao na velike deponije koje bi takođe dijelilo više opština međusobno. Prema tome, nekoliko gradskih i seoskih opština bi imalo jednu deponiju. Ova preporuka je bazirana na procjeni da bi održavanje više manjih deponija koštalo više nego održavanje manjeg broja vrlo velikih deponija (World Bank, 2002).

Implementacija Strategije je pod znakom pitanja, zbog ograničenih fondova. Stoga je Vlada odlučila da implementira Strategiju u tri faze, od kojih će svaka trajati pet godina. Prvu fazu (2001-2005) će finansirati Svjetska banka, a ciljevi su uglavnom rehabilitacija postojećih deponija, programi za podizanje svijesti stanovništva, kao i uvođenje prikupljanja otpada u naselja gdje ono trenutno ne postoji. Projekat Svjetke banke bi trebalo da se implementira tokom 2002-2006. finansijske godine pod nadzorom Federalnog ministarstva za prostorno uređenje i okoliš (World Bank, 2002).

### **The Impacts of Waste on the Environment**

The impacts of waste on the environment are many. Waste, by definition, represents a loss of material and energy. It requires additional energy for collection, treatment, and disposal. Waste disposal causes land degradation, air, and water pollution.

Many air pollutants are released during waste management and incineration, such as: acidic gases, polycyclic aromatic hydrocarbons, dioxins, furans, dust, and heavy metals. Raising the temperature of incineration, and introducing cleaner systems may reduce the emission of air pollutants during incineration. Municipal landfills emit methane as a by-product of the degradation of the organic matter disposed. Methane emissions from landfills can be reduced either by avoiding the disposal of organic matter, or by collecting and using the methane.

Landfills also cause the leaching of pollutants into groundwater. This pollution is very persistent, because most groundwater is replenished very slowly. The pollution of groundwater can be reduced by pretreatment of leaching waters or waste by incineration in order to remove the harmful substances.

Groundwater pollution may also be caused by run-off from the surrounding soil, contaminated by the leaching of pollutants from landfills. An additional problem is that soil pollution is not localized, but often causes the pollution of adjacent land and groundwater. The remediation of degraded land takes a long time and consumes significant financial resources.

### **Waste Management in OECD Countries**

OECD countries are oriented towards waste minimization, although this has not really been effective (the amount of waste produced is still growing). Recycling, composting of organic waste, and waste incineration are widely used in many countries. OECD is encouraging the minimization of waste generation and increase of the recovery of materials from waste. There are also suggestions for reduction of the landfilling of the mixed waste in order to remove all harmful substances (organic waste) from landfills and to reduce the emissions of air and water pollutants (OECD, 2001).

Technological developments have contributed to waste minimization: these include the development of smaller products (electronics industry); increase in the life-cycle of products; and use of biotechnology for waste treatment (removing toxic substances from waste - bioremediation) (OECD, 2001).

More stringent standards for emission from landfills and waste incineration plants may also have positive effects on waste management. Imposing higher waste collection charges and landfill taxes; or stim-

ulating changes in consumption patterns by encouraging consumers to buy products that are reusable and recyclable (beverage containers, batteries, cars, tires) are some of the means used in OECD countries in order to minimize pressures from waste on the environment (OECD, 2001).

## **Waste Management in Bosnia and Herzegovina**

Exact data on the quantities of waste generated in BIH does not exist. It is, however, possible to assume that the general pattern is an increase in waste quantities as in most other countries. Huge quantities of waste accumulated during the war, part being pharmaceutical wastes that came as humanitarian aid. In BIH, there are no facilities for the treatment of this type of waste. An inventory of hazardous waste exists only for the Sarajevo Canton. Practices of waste re-use and recycling are poorly developed (REC, 2000).

Current waste disposal sites are insufficient in comparison with the amount of waste generated. As a consequence, considerable quantities of waste have been dumped at illegal sites, such as roadsides, village dumps, rivers, or abandoned mines. These places represent a threat to the groundwater that supplies water to the population and consequently a risk to public health caused by run-off and leaching of pollutants. Waste dumps often burn, releasing air pollutants; dumps are usually not fenced, so animals and people can come in, which increases the risk of the spread of infectious diseases (REC, 2000).

In the Federation of Bosnia and Herzegovina, the body responsible for the federal waste management policy and legislation is the Federal Ministry of Physical Planning and Environment. The corresponding cantonal ministries are responsible for the same policy at cantonal levels.

In Republika Srpska, the division of responsibilities is similar to that in the Federation: the Ministry of Urbanism, Housing, Public Utilities, Civil Engineering, and Ecology is responsible for the republic's policy and legislation. There are no cantons, but municipal organization is similar to that in the Federation.

Waste collection, disposal, and collection of rates from customers are the responsibilities of the local communal enterprises. Waste collection in urban areas is mostly satisfactory (approximately 45% of municipalities). Rural areas, however, do not have organized collection of waste, so the inhabitants dump their waste at illegal dumps that pose major threats to public health and the environment (World Bank, 2002).

In most cases the communal fee covers waste management, water supply, and street cleaning, all in one invoice. In Sarajevo, Banja Luka, Mostar, Tešanj, and some other towns, the bill collection rates are satisfactory. In other municipalities, however, the rate is under 40%, which leads to a situation where communal enterprises are unable to finance their own maintenance, or to invest in new equipment. The long-term objective for these companies is to become self-financing, as is the case in Sarajevo and Tešanj (World Bank, 2002).

The State Government has identified the waste management problem as one of the priorities in the country's development. A Nationwide Solid Waste Management Strategy was recently prepared. The main focus of the Strategy is household waste management. The Strategy suggests that multi-municipal waste management districts be formed, each serving a minimum of 200,000 people. There would be multi-municipal landfill sites to store the waste. This means that several urban and rural municipalities would use one disposal site. This recommendation is based on the estimate that maintaining a large number of smaller landfills would cost more than having a small number of very large landfills (World Bank, 2002).

The implementation of the Strategy is in doubt because funds are limited. As a consequence, Government has decided to implement the Strategy in three phases, lasting five years each. The first phase (2001-2005) will be supported by the World Bank, and the aims are chiefly the rehabilitation of existing landfills, public awareness programs, and introduction of waste collection into those areas where it does not exist yet (World Bank, 2002). The project should be implemented during the financial years 2002-2006 under the supervision of the Federal Ministry for Physical Planning and Environment.

