Supporting the implementation of the 3R concept in the Drina river basin

Recommendations for local waste management practices

Study

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The study was supported by the Embassy of Japan in Hungary.
Executive summary

The aim of the study was to assess the status of waste management in the Drina river basin, and on the basis of this analysis to explore the potential actions on local level and to provide recommendations for measures and actions integrating the concept of “3R” into waste management practices. The study provides the theoretical context for integrated solid waste management and the concept of 3Rs.

Assessment of the status of waste management in the Drina river basin was carried out based on research on 11 selected municipalities in Bosnia and Herzegovina, Montenegro and Serbia.

Status assessment at selected municipalities

On the whole household waste collection is insufficient in most of the municipalities assessed in the study. Between 35 to 90 percent of the population is covered by waste collection system in the municipalities taking part in the survey. Municipal companies that collect waste typically run outdated vehicles with poor condition and the maintenance costs of these old vehicles are substantial. Moreover most of the municipalities are in need of additional waste collection vehicles. The generally low number of waste collection vehicles has an adverse impact on the frequency of waste collection.

The municipalities dominantly dispose waste into landfills that are not sanitary and do not comply with EU standards. Most of these landfills are outdated with declining remaining waste disposal capacities. The majority of the municipalities are in the process of joining regional waste disposal systems, though experience shows that numerous obstacles are hindering cooperation of the settlements in the region. The planned location of the regional landfills, or their distance from the municipality in question often poses serious difficulties for local waste management companies.

In the Drina river basin the inadequate and rudimentary waste management infrastructure leads to illegal dumping of waste. Some municipalities report many smaller waste dumps scattered mostly in the rural areas not covered by waste collection systems; some others report a handful of large illegal dumpsites.

The region with only basic, rudimentary waste management infrastructure is struggling with moving up in the waste hierarchy. In most of the municipalities there is no organized selective collection of waste, recycling or reuse. However there are examples of some local initiatives.

There is no organized composting at municipalities, though in several cases there are plans to introduce such initiatives at public institutions. There is no data on household composting, though it does not seem to be common in the region.

Waste collection fee in the municipalities taking part in the survey typically ranges from 2 to 3.5 EUR per household. In general households pay per m² of their property or pay a fix price (mostly in rural areas). There are only a handful of examples for systems in which households pay after bins or containers collected.

Numerous outdated, non-sanitary landfills in the close proximity of Drina severely jeopardize the ecosystem of the river basin, as well as large number of illegal dumpsites at the riverbanks of Drina and its tributaries. The unique natural resources of the area have come under threat of many unregulated
dumps of untreated or inadequately treated waste. To solve the waste problem of Drina sustainably, it is necessary to synchronize efforts at national and inter-state level because of the trans-boundary nature of the river basin and the importance of its ecosystems.

Evaluation of relevant municipal documents

The majority of municipal strategic documents reviewed include general objectives related to selective collection of waste and recycling. The larger part of those documents contain measures related to specific infrastructure aiming at selective collection and recycling of waste (e.g. waste selection facilities, recycling yards, transfer stations, selective waste collection points, containers). In some cases the exact number of selective waste collection points is specified. In addition to infrastructural aspects, some of the documents appoint certain legal entities to carry out the prescribed plans and actions related to selective waste collection and recycling. Some of the analyzed documents mention the specific waste streams to be collected separately and recycled. In addition to infrastructural aspects, some of the documents appoint certain legal entities to carry out the prescribed plans and actions related to selective waste collection and recycling. Some of the analyzed documents mention the specific waste streams to be collected separately and recycled. Only a handful of municipal documents deal with composting. In some cases composting is mentioned as a measure. Other documents analyzed mention infrastructural aspects of composting among goals, and there is only one document specifying some targets for composting. Very limited number of municipal documents assessed deal with pricing, mostly stressing that the fee paid for waste collection does not cover the real costs of waste management. All the documents analyzed deal with the issue of illegal dumping. Removing waste from illegal dumpsites and the recultivation of those locations are commonly listed among measures.

Recommendations

The status assessment of this study showed that in general municipal waste collection is insufficient in most municipalities in the region, waste facilities are mostly outdated and not complying with EU standards, considerable quantities of waste is being dumped illegally. The region with only basic, rudimentary waste management infrastructure is struggling with moving up in the waste hierarchy.

Seeing that the study deals with local, municipal waste management practices; and that there is a lack of advanced waste management approaches and systems the focus of the recommendations is on low-cost measures that can be implemented by local authorities regardless of larger national and regional programmes or systems.

A number of factors can contribute to the effective introduction of integrated solid waste management and the application of the 3R concept on local level. The application of a strategic planning approach that is analytical in nature ("finding the dots") but also involves synthesis ("connecting the dots") can lead to the development of more efficient and advanced waste management systems.

Reducing waste

The introduction of pay-as-you-throw (PAYT), also called unit pricing can effectively encourage waste minimization. In a unit-pricing or pay-as-you-throw program, waste generators pay for waste collection on the basis of the amount of waste they create. Municipalities in the Drina river basin could introduce systems using unit pricing similar to the one applied in Bajina Bašta, where households pay for waste collection per bin. Such schemes can be introduced parallel with the establishment of regional waste disposal systems. When recycling and composting programs have already been launched in
municipalities, selected recyclable waste can be collected free of charge or for a significantly lower price. At the same time this can enable the increase of the unit price charged for non-recyclable waste.

Experience shows that the implementation of an effective awareness raising strategy aiming at waste minimization, sustainable purchasing habits and rational material use can significantly contribute to achieving waste reduction targets. Environmental education programs can be initiated by municipalities at schools assisting children to acquire a basic comprehension of the problems related to waste and also to acquire the skills needed to solve environmental problems.

**Reusing waste**

Reuse centers facilitate the transaction and redistribution of unwanted, yet perfectly usable, materials and equipment. Municipalities can provide assistance to shops dealing with purchase and marketing of used items (e.g. offering space for their operation, or providing favourable renting conditions for them). Local authorities can also support the organization Electronic Equipment Exchanges, events that enable the exchange of used electronic items. Local authorities can endorse online portals promoting the exchange of waste products.

Municipalities can offer space for the operation of repair services, or provide for them favourable renting conditions. It is an option for local authorities to organize ‘days for repair’ when residents can benefit from repair services for free or for lower costs and when the municipality makes booklets with a contact list of local repair services available.

There are examples of initiatives aiming at the formalization of informal waste collection in Europe. Under such programs advocacy associations for used item collectors can be established and training programs on the proper ways of collection can be run for the bulky waste collectors.

**Recycling waste**

Implementing a local recycling program offers several economic benefits. Recycling can reduce solid waste collection, transportation, and disposal costs; generate revenues from the sale of recyclable materials; create jobs; provide eligibility for funds. In addition, recycling helps to preserve environmental quality: saves landfill space, preserves resources, conserves energy, reduces air pollution and saves water. There are examples of recycling programs in the region that are developed on a municipal scale. In case there is a potential market for local recyclable materials similar municipal programs can be developed in the region.

Even if local institutions do not have the financial means to establish a municipal composting program with its collection system and the necessary facilities, smaller composting sites can still be installed at municipal institutions. Such municipal demonstration sites can support the promotion of household composting. Schools can be identified as a priority target group for municipal composting schemes. Local authorities can actively support household composting by organizing trainings for residents on composting practices.

**Cooperation among municipalities in the Drina river basin**

Apart from providing recommendations for measures and actions integrating the concept of “3R” into waste management practices the study also aimed at supporting transnational and inter-municipal cooperation for improving waste management services in the Drina river basin.
Introduction

This study was elaborated under the project supported by the Embassy of Japan in Hungary, titled ‘Support to local municipalities in the Western Balkan region in the implementation of integrated solid waste management and the concept of 3Rs’

The aim of the study was to assess the status of waste management in the Drina river basin, and on the basis of this analysis to explore the potential actions on local level and to provide recommendations for measures and actions integrating the concept of “3Rs” into waste management practices. The study provides the theoretical context for integrated solid waste management and the concept of 3Rs.

Drina river basin was selected as a target region for the study as:

- Drina is one of the most relevant trans-boundary watercourse in the Western Balkans connecting three countries in the region,
- the deficiencies of the waste management system in the region induce high environmental pressure on the ecosystem of the watershed,
- as activities could be built on Drina River Committee (DRC), an informal cooperation network of municipalities from the region.

Assessment of the status of waste management in the Drina river basin was carried out based on research on 11 selected municipalities in Bosnia and Herzegovina, Montenegro and Serbia. To support the analysis, information was collected based on in-depth interviews with the representatives of the selected municipalities.

The information gathered from the selected municipalities was supplemented also by desk based research covering the national and local framework conditions in the three target countries and examples of waste management practices from across Europe.

The study also functioned as a supporting document for the Regional Capacity Building Workshop and Stakeholder Consultation held on 26-27 November 2014 in Sarajevo, Bosnia and Herzegovina.

The project activities including the preparation of this study were coordinated under the International Partnership for Expanding Waste Management Services of Local Authorities (IPLA). REC is acting as the Sub-Regional Secretariat of IPLA for Central and Eastern Europe, Selected Black-Sea Countries and Turkey including the Western Balkan region.

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1 Drina River Committee (DRC) was established by municipalities in the Drina watershed area in 2004 with the support from the REC and different international donors.
1 The concept of 3R and Integrated Solid Waste Management

1.1 3R concept

The concept of "3R" refers to reduce, reuse and recycle waste, particularly in the context of production and consumption. It calls for an increase in the ratio of recyclable materials, further reusing of raw materials and manufacturing wastes, and overall reduction in resources and energy used. These ideas are applied to the entire lifecycles of products and services - from design and extraction of raw materials to transport, manufacture, use, dismantling/reuse and disposal. The 3R concept originates from Japan, where the 'Sound Material Flow Society' initiative supporting the concept was driven by the following factors:

- the sheer volume of wastes being generated of the country,
- its rapid industrial development, and
- the limitations of Japan's small land mass.²

In 2004 the former Prime Minister of Japan, Junichiro Koizumi, proposed the 3R Initiative at the G8 Summit held at Sea Island, Georgia, US, and it was formally endorsed by the G8 leaders. As a follow-up activity, a Ministerial Conference launched officially the 3R concept in Tokyo in April 2005 with an overall aim to promote global action on 3R. The launch was considered the first step in changing global consumption and production patterns, and building a sound material-cycle society.³ In March 2006, a Senior Officials Meeting on 3R was organized in Japan resulting in strong commitment of the government and other stakeholders to implement 3R at local, national, and regional level.⁴

Waste minimization can be achieved in an efficient way by focusing primarily on the first of the 3Rs, "reduce," followed by "reuse" and then "recycle":

**Reducing** means choosing to use items with care to reduce the amount of waste generated.

**Reusing** involves the repeated use of items or parts of items which still have usable aspects.

**Recycling** means the use of waste itself as resources.

The 3Rs are meant to be a hierarchy, in order of importance. The waste hierarchy has taken many forms over the past decade, but the basic concept has remained the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste.⁵

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² [http://www.gdrc.org/uem/waste/3r-minimization.html](http://www.gdrc.org/uem/waste/3r-minimization.html)
⁴ [http://www.faculty.ait.ac.th/visu/Prof%20Visu%27s%20CV/Conferance/3/Visvanathan_Kalmar07.checked.%20Latested%20submitted.pdf](http://www.faculty.ait.ac.th/visu/Prof%20Visu%27s%20CV/Conferance/3/Visvanathan_Kalmar07.checked.%20Latested%20submitted.pdf)
Reduce can be achieved by the following measures:

- Reducing the amount of raw materials and energy used per product by changing the design of the product or changing the production process;
- Reducing the quantity of production by extending the life of products or improving repair and maintenance technologies;
- Reducing the amount of disposed waste by reducing the volume of waste or by selecting recyclable raw materials.

Reuse can refer to the following measures:

- Repeatedly using products after washing or other proper measures (reusable cups, returnable bottles, used clothing, etc.);
- Reusing parts derived from dismantled used products.

Recycle is to use all or a part of a used product as a raw material in the same or other products by shredding, recovery of valuable materials or other proper measures.\(^6\)

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1.2 Integrated Solid Waste Management

According to UNEP’s definition Integrated Solid Waste Management (ISWM) refers to the strategic approach to sustainable management of solid wastes covering all sources and all aspects, covering generation, segregation, transfer, sorting, treatment, recovery and disposal in an integrated manner, with an emphasis on maximizing resource use efficiency. ISWM based on the 3R approach aims at optimizing the management of solid waste from all waste generating sectors (municipal, construction and demolition, industrial, urban agriculture and healthcare facilities) and involving all stakeholders (waste generators, service providers, regulators, government and communities).

1.3 The waste hierarchy

The waste hierarchy is a concept analogous to the 3R concept that has appeared in environmental literature and in some EU member-states environmental legislation. In 2008 it became part of the European legislation. The European waste hierarchy refers to the five steps included in the article 4 of the Waste Framework Directive (Directive 2008/98/EC):

- **Prevention** - preventing and reducing waste generation.
- **Reuse and preparation for reuse** - giving the products a second life before they become waste.
- **Recycle** - any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes composting and it does not include incineration.
- **Recovery** - some waste incineration based on a political non-scientific formula that upgrades the less inefficient incinerators.
- **Disposal** - processes to dispose of waste be it landfilling, incineration, pyrolysis, gasification and other finalist solutions.

![Figure 2: The waste hierarchy](http://www.igd.com/our-expertise/Sustainability/Packaging-waste/3517/Energy-Recovery-and-Disposal/)


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1.4 Other relevant concepts

**Eco-design**

Eco design is defined by the International Electrotechnical Commission as a systematic approach which takes into account environmental aspects in the design and development process with the aim to reduce adverse environmental impacts.

Eco-design strategies relevant for industrial symbiosis include among others: easier maintenance and repair, modular product structure, enhancing material recyclability, reuse of product and remanufacturing/refurbishing.⁹

**Zero waste**

The zero waste concept is closely related to industrial ecology and industrial symbiosis. The Zero Waste International Alliance provided the following definition to zero waste in 2009:

“Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.”

Waste prevention and material efficiency are important aspects of the zero waste concept. Waste prevention is concerned with the top elements of the waste hierarchy – strict avoidance, reduction at source and product re-use.¹⁰

**Extended Producer Responsibility (EPR)**

Extended Producer Responsibility is “a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product.”¹¹ EPR is “an environmental policy approach in which a producer’s responsibility (financial and/or physical) for a product is extended to the post-consumer stage of a product’s life cycle”.¹²

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2 General overview of waste management situation in South East Europe

In recent years, the generation of municipal waste has risen steadily in the Western Balkans, and it is currently estimated to be at levels similar to those in the EU new Member States (however, data on solid waste are poor). The generation of municipal waste per capita in the region is estimated to have increased sharply from 2003 to 2007 - with 40% from 234 to 330 kg/cap. The increase is linked to the steady increase in GDP over these years - though the growth in waste outstripped the growth in GDP.\textsuperscript{13}

Municipal waste collection is insufficient in most countries in the region, especially in rural areas. Large number of waste facilities is outdated. Abandoned or poorly managed landfill sites are a problem in many areas. Illegal dumping of waste remains a major problem, in part due to a lack of waste management facilities. As a result, uncontrolled landfills pose considerable risks to public health and the environment. Overall, waste management services and infrastructure in the region are weak, and the municipal companies that collect waste often use outdated vehicles. In some parts of the region, municipal solid waste is not collected regularly.\textsuperscript{1} The main option for treatment of municipal waste in all countries is still landfilling.\textsuperscript{14}

One of the most difficult challenges in the region is that of how to develop waste management systems that comply with EU legislation, and are at the same time affordable for consumers and businesses. Regional waste collection and disposal schemes have been developed and countries are in the process of constructing new waste management infrastructure that includes incinerators, landfills and composting facilities. Efforts are also underway to strengthen and improve management of waste service companies and public-private partnerships, to open the waste market to the private sector, to raise public awareness and to increase the use of economic instruments to minimize waste and stimulate recycling, particularly of packaging. Despite these efforts, waste management services and infrastructure remain relatively underdeveloped in all of the Southeast European countries and generally lack advanced waste management practices such as separate waste collection.\textsuperscript{15}

The level of recycling in general is low in the region, and although there is potential for the recycling of municipal waste, little progress has been made, largely due to the limited practice of separate waste collection. Any recycling that does take place is not the result of environmental regulation, but driven by economic forces, and tends to focus on industrial waste rather than municipal waste.\textsuperscript{15}

Quantities of packaging waste, waste of electrical and electronic equipment and end-of-life vehicles are growing rapidly in Western Balkans, but comprehensive recycling programmes are not in place. Mining waste is a significant problem in many parts of the Western Balkans, as the region is rich in lignite, bauxite, metal ores and other mineral resources. The volume of mining and industrial waste in the region is most likely far greater than that of municipal waste, but data are not available.\textsuperscript{13}

Hazardous, industrial and medical wastes are very often sent to municipal waste landfills, due to the lack of adequate treatment and safe disposal facilities.\textsuperscript{14}

New environmental legislation including municipal waste management is already in place in most of the countries in the region; however, it is poorly enforced and implemented.\textsuperscript{14}

\textsuperscript{13} EEA (2010) Environmental trends and perspectives in the Western Balkans: future production and consumption patterns. No 1/2010
\textsuperscript{14} Sida (2012) Western Balkan – Environment and climate change policy brief
**Bosnia and Herzegovina**

The insufficient waste disposal system capacities in Bosnia and Herzegovina has led to considerable quantities of waste being dumped illegally at roadsides, in rivers, abandoned mines, and similar places, posing threats to public health and the environment. No waste incineration facilities are currently operated in the country. Recyclables separated from the mixed municipal waste amount to less than 5% of the total municipal waste mass (estimate), while at least 95% of the collected mixed municipal waste is disposed of mostly on non-sanitary disposal sites. In Bosnia and Herzegovina only about 60% of the population is served by organized waste collection schemes.\(^\text{16}\)

There is no countrywide strategic planning of investment for waste management infrastructure in Bosnia and Herzegovina. There are limited economic instruments in place to promote recycling and prevention of waste generation. Capacity to manage industrial and hazardous waste is weak.\(^\text{17}\) The issues related to waste management are further aggravated by the fact that waste management policy and legislation is shared among entity ministries responsible for environment and corresponding cantonal ministries in the Federation of Bosnia Herzegovina.

**Montenegro**

While the legislative framework of waste management is advancing in Montenegro, further efforts are needed for its implementation and enforcement. The development of an integrated waste management system remains at an early stage, with waste continuing to be disposed of in open sites or in multiple unauthorized dumps.\(^\text{18}\)

According to official governmental data total annual waste in Montenegro is around 190,000 tons; half of which, only around 95,000 tons, is collected. The rest ends up in illegal dumpsites. Only two sanitary landfills (in Podgorica and in Bar) have been constructed in the country, which complies with EU regulation. Still six more regional centers for waste treatment need to be constructed in the country according to the National Strategy for Waste Management.\(^\text{19}\)

**Serbia**

Serbia has six EU compliant regional sanitary landfills currently functioning. The collection rate of household waste has increased from 72% to 78%.\(^\text{20}\)

There are no waste combustion plants (incinerators) or other waste to energy facilities. Selection of waste and its separation is on very low level. Until 2009, landfill sites have not been constructed according to European standards and they do not meet minimum technical requirements which protect the environment and public health. They have been built without bottom liner systems for landfill gas collection and treatment and leachate treatment systems, often located on a location outside the city where some sort of excavation was done. There are goals in government policy regarding reduction of


\(^{17}\) EC (2013) Bosnia and Herzegovina 2013 Progress report

\(^{18}\) EC (2013) Montenegro 2013 Progress report

\(^{19}\) http://www.greenfudge.org/2014/03/19/waste-management-in-montenegro-major-challenge/

\(^{20}\) EC (2013) Serbia 2013 Progress report
biodegradable waste in Republic of Serbia, and they are stated in The Regulation of Waste Disposal, but their application will start in year 2016.\textsuperscript{21}

According to estimations, approximately 40\% of household waste finishes up in unlicensed and unregulated landfill sites. However the number of illegal landfills in Serbia decreased from 4,600 in 2009 to 1,600 by 2012.\textsuperscript{22}

3 Legal and policy background for waste management in the target countries

Bosnia and Herzegovina

Bosnia and Herzegovina has a complex state structure. Competences over environmental affairs, including waste related issues, are held by entities and district: Republic of Srpska (Ministry for Spatial Planning, Construction and Ecology), Federation of Bosnia and Herzegovina (Ministry of Environment and Tourism) as well as Brcko District (Department for Communal Affairs). On the state level, there is the Ministry for Foreign Trade and Economic Relations which, through Department for Environment Protection, coordinates the cooperation of the aforementioned structures. The Cantons of the Federation of Bosnia and Herzegovina also have ministries with competences over environmental issues. Local self-government units (municipalities and cities) are responsible for communal waste management.

Due to the complex structure, strategic and legislative acts related to waste management issues exist on several levels:

- Solid Waste Management Strategy of Bosnia and Herzegovina (2000)
- Law on Waste Management of the Federation of BiH (2003; 2009)

Montenegro

In Montenegro, competences over environmental affairs, including waste related issues, are held by the Ministry of Sustainable Development and Tourism. Local self-government units (municipalities and cities) are responsible for communal waste management.

The most important strategic and legislative acts related to waste management issues in Montenegro are:

- Waste Management Strategy of Montenegro (drafted in 2013; not adopted yet)
- Law on Waste Management of Montenegro (2011)

\textsuperscript{21} ISWA (2012) State of the Nation report. Landfilling practices and regulation in Serbia
\textsuperscript{22} http://www.setimes.com/cocoon/setimes/xhtml/en_GB/features/setimes/articles/2012/07/23/reportage-01
The new waste management plan is expected to be developed in near future, after the Waste Management Strategy has been adopted.

Republic of Serbia

Competences over environmental affairs, including waste related issues, in the Republic of Serbia are held by the Ministry of Agriculture and Environment. On the level of the Autonomous Province of Vojvodina there is the Provincial Secretariat for Urban Planning, Construction and Environmental Protection. Local self-government units (municipalities and cities) are responsible for communal waste management.

The most important strategic and legislative acts related to waste management issues in the Republic of Serbia are:

4 The target region of the study

4.1 The Drina river basin

Drina River originates with the confluence of the Tara and Piva rivers both of which rise in Montenegro, and follows a northerly course for 346 kilometres to enter the Sava. Its upper course is through canyons and gorges, while its lower course is wider. The Drina constitutes a large part of the boundary that separates Bosnia and Herzegovina to the west from Serbia to the east.

The Drina river basin encircles the central part of the Dinaric mountains, including a very small part in Albania and ending in the Pannonian plain. The river basin covers 19,946 km² of mostly mountain terrain and is a home to 650,000 people. The largest part of the catchment area (35%) is in Bosnia and Herzegovina, 34% in Montenegro, 30% on Serbian territory and less than 1% in Albania. The main right tributaries of Drina are Ćehotina, Lim, Uvac, Rzav and Jadar, the left tributaries Sutjeska, Prača and Dranjača.
The area is a unique natural resource. The Drina crosses three national parks: the Durmitor National Park in Montenegro, Sutjeska National Park in Bosnia and the Tara National Park in Serbia. The Drina River Basin is home to the second deepest canyon in the world, the Tara River Canyon. At nearly 100 km long and about 1800 m deep, the canyon is protected as a UNESCO World Heritage site.

Drina has very torrential character in its upper catchment, the erosion and flood risks are limited by 771 km of dikes. Drina and its tributaries are used for domestic and industrial water supply and irrigation, and in hydropower plants. There are several hydropower reservoirs along its tributaries and three on the Drina river itself, in Visegrad, Bajina Basta and Zvornik. The region is rich in mineral resources and has a long history of mineral resource extraction activities.

Lim is the largest tributary of the Drina and the most important river in Montenegro. Lim is 193 km long and it has a catchment area of 5,967.7 km², including territory of four countries – Albania, Bosnia and Herzegovina, Montenegro and Serbia.

Čehotina rises in northeast Montenegro, and its watershed area is shared with Serbia and Bosnia and Herzegovina. It is Drina’s second largest tributary after the Lim and its catchment area is 1,237 km².

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Table 1: Municipalities within the Drina river basin
The 11 municipalities selected for the assessment of this study are indicated with bold letters in the above table.
River Tara is 148.4 km long and its catchment covers an area of 2,006 km². The Piva river basin is located high in the Montenegrin mountains. The Piva Hydroelectric Power Plant is one of the largest in Europe, creating the artificial Piva Lake at an altitude of 675 m above sea level.

![Figure 3: Schematic map of Drina river basin](image)

### 4.2 The Drina river basin in the context of the study

The EU Water Framework Directive (Directive 2000/60/EC) and the EU Waste Framework Directive (Directive 2008/98/EC) establish a legal framework to protect and restore clean water across Europe and ensure its long-term sustainable use. The directive calls for a river basin approach, supporting a model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries.

In line with the EU Waste Framework Directive (Directive 2008/98/EC) EU Member States shall take the necessary measures to ensure that waste management is carried out without endangering human health, without harming the environment and, in particular without risk to water, air, soil, plants or animals.

Drina river basin was selected as a target region for the study as:

- Drina is one of the most relevant trans-boundary watercourse in the Western Balkans connecting three countries in the region,
- The river catchment could serve as a pilot area for addressing cross-border and inter-regional aspects of integrated solid waste management in light of the EU Water Framework and Waste Framework Directives
- the deficiencies of the waste management system in the region induce high environmental pressure on the ecosystem of the watershed,
- activities could be built on Drina River Committee (DRC), an informal cooperation network of municipalities from the region.
Figure 4: Detailed map of Drina river basin
5 Status of waste management at selected municipalities in the Drina river basin

Bosnia and Herzegovina

Federation of Bosnia and Herzegovina

Goražde

Goražde is a city and municipality in eastern Bosnia and Herzegovina on the Drina river. It is located between Foća, Rogatica and Višegrad, and is administratively part of the Federation of Bosnia and Herzegovina and the center of the Bosnian Podrinje Canton. The population of the municipality is slightly above 22,000; the town itself has a population of over 12,000 inhabitants.

Local waste collection services cover 65% of the territory and 80% of the population of the municipality. Typically poorly inhabited areas and neighbourhoods with holiday homes are not covered, where waste arising is minimal. The local communal service company runs three waste collection vehicles. The municipality is in need of additional waste collection vehicles, the low number of trucks adversely influence the frequency of waste collection.

The landfill of the municipality does not comply with EU standards; it was planned to only be a temporary landfill. A number of illegal waste dumps are scattered around in the area of the municipality. The landfilling rate is low, 20% landfilling rate, composting and waste incineration with energy recovery. In this study three municipalities are specified, but the capacity would be sufficient for more.

In Goražde two companies deal with the treatment of secondary raw material. These companies pay for the handover of metal and paper waste. There is no organized composing activity in the municipality.

For waste management services households pay 0.35 EUR per m² of floor area, which is equivalent with a 2.5-3.5 EUR amount on a monthly basis. Legal entities are obliged to pay a higher fee. In case of a new sanitary landfill the fee would need to be at least tripled. Mostly only legal entities are fined for illegal waste dumping, though the fines are very low.
The Local Environmental Action Plan (LEAP) of the Municipality of Gorazde 2011-2016 was adopted in 2010. Also, uncontrolled waste disposal is considered as a threat to biodiversity of Drina River by The Local Action Plan for Biodiversity (LBAP) of the Municipality of Gorazde, adopted in 2011, also deals with waste related issues considering uncontrolled waste disposal a threat to the biodiversity of Drina river. Another document relevant for waste issues on municipal level is the Waste Management Adjustment Plan for Communal Waste Landfills developed in 2014.

Kladanj

Kladanj is a town and municipality in Tuzla Canton, Bosnia and Herzegovina. It is administratively part of the Federation of Bosnia and Herzegovina entity. Kladanj is located along the river Drinjača, at the base of Konjuh mountain. The municipality has a population of 16,000.

In the territory of the municipality the collection of municipal solid waste covers approximately 35% of the population. Geographically the town of Kladanj and 2-3 neighbouring villages are covered. The low collection coverage rate is a direct consequence of the fact that the municipality can afford to operate only one waste transport vehicle. The local landfill will be closed in the near future as it is not complying with the EU regulations. Kladanj is going to join neighbouring municipalities for the establishment of a regional sanitary landfill and the existing landfill is planned to be used as a transfer station in the future. The lack of proper infrastructure leads to illegal dumping of waste. Within the framework of the Local Environmental Action Plan all the illegal dumpsites are monitored in the municipality.

In a joint effort with local producers the municipality has started the establishment of a selective collection system for packaging waste (i.e. paper, glass and plastic). As yet, two collection points were set up in town Kladanj. According to the plans within 200 meters of all public buildings a selective waste collection point will be established. The municipality also intends to set up a recycling yard by use of federal funds, where waste compaction and further processing of selected waste streams would take place. Composting of organic waste is not taking place at public institutions, home composting is not common in the municipality. The monthly waste collection fee is approximately 3.50 EUR plus VAT for households. Legal persons are paying based on the size of their site area.


Republika Srpska

Foča

Foča is a town and a municipality in Bosnia and Herzegovina on the Drina river, in the Republic of Srpska entity. According to the 2013 census the town has a population of over 12,000 inhabitants, while the total population of the municipality is nearly 20,000.

More than 85% of Foča town population is covered by the municipal waste collection system. In addition also some smaller settlements in the municipality are included in the system. In the center of the municipality waste is collected daily, in the surrounding area with low population density every 2-3 days.
The local public utility company operates one waste transportation vehicle and in addition three smaller open trucks. The municipality is in need of additional waste collection vehicles.

The predominant option for treatment of waste is landfilling in the municipality. The outdated landfill itself, located 2-3 kilometres from the town, does not comply with EU standards. It is close to its end-of-life; in a couple of years it will be filled up. Following its closure Foća intends to join to the planned regional waste management system. Despite the fact that the location has already been identified for the regional sanitary landfill, the investment has not started thus far, seeing that only six municipalities with 60.000 inhabitants could be secured for the operation of the system, while the prerequisite for the EBRD loan would be to extend the system to a minimum of 100.000 inhabitants.

There are no illegal dumpsites with considerable size in the municipality, rather smaller dumps are scattered around in the area. The local public utility company regularly clears these sites.

There is no separate waste management plan for the municipality; it is integrated under the Local Environmental Action Plan adopted in year 2010. The waste collection fee is approximately 3.50 EUR per household. Legal persons are paying based on the size of their site area. The fee covers the costs of waste management, but not those of other responsibilities (e.g. street sweeping, cemetery management) of the local public utility.

Višegrad

Višegrad is a town and municipality in eastern Bosnia and Herzegovina resting on the Drina river and in the Republic of Srpska entity. Municipality of Višegrad has slightly more than 11 000 inhabitants.

The estimated quantity of waste generated in the municipality is around 10 m³ per day. Approximately 50% of that amount (i.e. 5 m³) has been collected and disposed at the landfill. Hazardous waste is not treated separately – there is no substantial industrial activity in the municipality, therefore the amount of hazardous waste is considered insignificant.

There is no organized recycling in the municipality, no waste incineration, no organized composting, no organized waste separation, and no organized reuse.

Waste collection is carried out by “Komunalac” JSC from Višegrad. In urban parts of the municipality waste is collected on a daily basis.

All the waste collected in the municipality is disposed at the landfill located nearby the Višegrad-Ustipraca main road, in the direct proximity of Drina river. Facilities at the landfill are not adequate. The Landfill is neither constructed nor managed properly. It is just a natural depression filled with disposed waste. At the site waste is burning almost constantly.

Illegal dumpsites are present in rural areas of the municipality, but their size is not considerable. During 2013 many of them were cleaned up due to efforts of the municipality.

Waste issues are under the competences of the Department for spatial and housing-communal affairs. It works in close cooperation with the Department for inspection. Municipality has environmental/ecological inspection. Communal affairs are also under the competences of the Communal Police.

Waste collection is financed through monthly fees. The municipality also subsidizes/supports “Komunalac”. Purchasing of new equipment for waste collection is planned.

The level of awareness on waste issues is considered to be very low.

Višegrad has no waste management plan on municipal level. The LEAP expired in 2010. The Municipal Development Strategy is valid until 2016.
Zvornik

Municipality of Zvornik is located in the north-eastern part of Bosnia and Herzegovina, in the Republic of Srpska entity. Municipality covers the area of 371, 95 km² and according to the preliminary results of the 2013 census it has 63,686 inhabitants living in 18,233 households. City of Zvornik is located on the left bank of the Drina river.

Organized waste collection system covers 45% of municipality’s population i.e. 43% of households. According to estimations, 25,029 t of waste is generated in the territory of the municipality every year. The percentage of collected waste is proportional with the percentage of the system coverage.

There is no organized waste selection on the territory of the municipality, no organized reuse, no organized composting. There are baskets for separation of PET waste in the city center. This PET waste is taken by private entrepreneurs (Eko-Prom company). All the waste collected is disposed to the local landfill – at a site called Tilic Ada with the size of 9.234 m² - without any treatment. This landfill is located on the bank of river Drina, very close to settlements and drinkable water sources. It has no fence, no drainage and gas control systems, and it may be considered as a risk for the environment and especially a risk for the health of the population living nearby. This landfill has to be closed and recultivated after the new regional landfill becomes operational.

The construction of the new regional landfill has been started on the location Crni Vrh, 15 km from the center of the city of Zvornik. This project is financed through a loan of the World Bank, i.e. International Development Association. The construction is planned to be finished in the beginning of 2015, when the landfill is to become operational. It will be used by nine municipalities from both entities: Zvornik, Osmaci, Šekovići, Kalesija, Sapna, Milići, Srebrenica, Bratunac i Vlasenica. Considering the fact that those municipalities altogether have around 200,000 inhabitants as well as the fact that area of the landfill is 4.8 ha with the capacity of 40,000 t/year, it has been estimated that this landfill will be functional for a period of 20 years.

Waste which has not been collected is undoubtedly disposed on illegal dumpsites. There are 23 identified illegal dumpsites with more than 0.5 t of waste as well as many smaller dumpsites. Every year the municipality of Zvornik organizes activities of their removal.

By the contract with the municipality, responsibility for waste collection is given to „Vodovod i komunalije“ JSC. This enterprise has 37 employees in the unit dealing with communal hygiene.

Waste collection is financed through monthly fees. For private persons it is calculated per m² in the urban area (0.099 KM/m²) and per household in rural areas (6 KM per household). For legal persons, this service is paid according to the size of their site area as well as the volume and the type of waste they generate.

Within the municipality there are several private companies trading with secondary raw materials.

Waste issues are under the competences of the Department for Housing Communal and Traffic Affairs – Section for Traffic Affairs, Parking, Infrastructure and Ecology. This section closely cooperates with the Department for Inspection, as well as with the Communal Police.

According to the draft Waste Management Plan of the Municipality of Zvornik 2014-2019, which is to be adopted in the period to come, numerous activities and measures directed towards raising awareness in the field of waste management have been planned.
Montenegro

Bijelo Polje

Bijelo Polje is a town and municipality in northeastern Montenegro on the Lim River. It has an urban population of 15,400 according to the 2011 census.

Around 60% of the population of the municipality is covered by the waste collection system i.e. around 70% of generated waste is collected (10 000 – 12 000 tons/year). The estimated quantity of waste generated in the municipality is around 15 000 tons/year. There is no substantial industrial activity in the municipality, therefore the amount of hazardous waste is considered insignificant.

Waste collection is carried out by the public utility “Lim”. The company has 4 new and 2 old waste trucks, and at the same time it also operates tractors for collection of waste in narrow streets difficult to access. Frequency of waste collection varies according to different parts of the municipality. In urban areas waste is collected on a daily basis.

All waste collected in the municipality is disposed at the landfill located around 8 km from the city center. The landfill is in a relatively satisfactory condition. There are bulldozers present at the site. Every day landfilled waste is being covered by a layer of soil in order to prevent odour and moving of waste by wind.

There is no organized recycling in the municipality, no waste incineration, no organized composting, no organized waste separation, and no organized reuse. Waste pickers are present, but there is no precise information on the amount of waste they collect.

Illegal dumpsites are present in rural parts of the municipality. Due to the fact that those parts are sparsely populated, these dumpsites are very small. Many of them are cleaned up from time to time, but in general they reappear.

Waste issues are under the competences of the Secretariat for housing-communal affairs and affairs. They work in close cooperation with Communal Police. Environmental inspection in Montenegro is on state level.

Waste collection is financed through monthly fees: per m² in the urban area, per household in rural areas. Willingness to pay is higher for legal than for private persons. This can be related to the low level of awareness of residents on waste issues.

Waste collection in the municipality has been considerably improved by the EU due to donation of new trucks.

The regional landfill planned in northern part of Montenegro is expected to improve waste management in Bijelo Polje considerably. It is especially important to establish a proper recycling system. There is a lot of room for further cross-border cooperation in waste related issues.

Bijelo Polje has no LEAP. The local waste management plan is in the process of finalization.
**Mojkovac**

Mojkovac is a town and municipality in northern Montenegro. The Municipality of Mojkovac has around 10,000 inhabitants.

According to available data, around 800 tons of waste is generated on the territory of the municipality per year. About 75% of that amount (i.e. 600 tons) is being collected and disposed at the landfill. There is no separate treatment of hazardous waste. Around 9.5 tons of hazardous waste (mostly medical waste) is disposed at the landfill every year mixed with communal waste.

There is no organized recycling in the municipality, no waste incineration, no organized composting, no organized waste separation, and no organized reuse. Some Roma waste pickers are present from time to time, but there is no precise information on the amount of waste they collect.

Around 90% of the territory of urban Mojkovac and around 40% of the territory of the rural part of municipality are covered by waste collection system. Waste collection is carried out by the public utility “Gradac” Mojkovac. The company is in the process of transformation at the moment (it will become Ltd.). According to provided data, the waste collection system covers 951 household and 204 legal persons. Work of the company is financed from municipal budget (it is not profitable) as well through the monthly waste collection fee. Willingness for payment is around 75%. Fee is to be paid per m² is 0.03 EUR for private persons; 0.75 EUR for legal persons.

All the waste collected in the municipality is disposed at the landfill located 3 km from the town center, nearby the main road. Facilities at the landfill are in accordance with provisions of the law. In the outskirts of the town there are also five illegal/unmanaged dumpsites, with an estimated amount of around 360 m³ of waste.

Small illegal dumpsites are present in rural areas of the municipality.

Waste issues are under the competences of Department for spatial management and sustainable development. Communal affairs are also under the competences of the Communal Police.

The biggest obstacles for improving waste management in Mojkovac are very low level of awareness on waste issues and insufficient infrastructure. However considerable steps forward have been done in recent years. Two “green islands” have been established, in order to promote waste separation; seven illegal dumpsites have been cleaned up; several workshops were held in schools, in order to increase the level of awareness on waste.

Mojkovac has no LEAP. There is a draft Local waste management plan, which has to be harmonized with the waste management plan of the state (still to be adopted).

The construction of the regional sanitary landfill in northern Montenegro is expected to increase the quality of waste management practices, but there are also some other options to be taken into consideration.

**Pljevlja**

Pljevlja is a town and municipality located in the north-western part of Montenegro. It is the third largest settlement in the country, after Podgorica and Nikšić, covering an area of 1.346 km². According to the results of the 2011 census, there are 31,060 inhabitants living in the municipality (19,622 inhabitants in the city and 11,438 inhabitants in rural parts). The municipality of Pljevlja is among the driving forces of country’s economy due to its coalmine and thermal power plant (which provides 40% of the country’s electricity needs).
The service of waste collection is conducted by PE “Čistoća”. There are 599 legal persons and entrepreneurs as well as 6,168 of private citizens registered for using this service. Approximately 90% of the urban population is covered by waste collection services. All the waste collected on the territory of the municipality is disposed on the temporary landfill „Jagnjilo“, which does not comply with EU standards. The area of this landfill is around 10,000m2, while the volume of disposed waste is around 25,000 m3/7,500 tons per year. Every year the competent secretariat sends report on the volume and the types of waste to the Montenegrin Environmental Agency.

PE “Čistoća” owns 7 special garbage trucks (produced in the period 1995 to 2012) as well as 5 tractors (produced in the period 1981 to 2009).

Within the municipality’s administration, waste issues are under the competences of the Secretariat for Housing – Communal, Traffic and Water Affairs. This secretariat closely cooperates with the Communal Police.

Although the waste has been regularly collected, from time to time some illegal dumpsites appear. Those dumpsites are outside the urban area, and after they are identified PE cleans the site. By introducing the container system the residents already do not use the major dumpsites. Experience shows that if containers are provided residents make use of them. The municipality places the containers to places with special territorial characteristics (holes, slopes) that are favoured for illegal dumping.

In accordance with the Law on Waste and the Local Waste Management Plan of the Municipality of Pljevlja 2010-2014, which both prescribe selective waste collection, containers for selective waste collection (for paper, PET and tin cans) are positioned within the urban area. Furthermore, the Secretariat for Spatial Planning intends to define the locations and equipment for recycling yard and green islands.

In line with the National Strategic Master Plan for Waste Management adopted in 2004 a sanitary regional landfill will be established for Zabljak and Pljevlja municipalities in Pljevlja as one of the eight foreseen landfills in Montenegro. Presently there are two sanitary regional landfills in the country (in Podgorica and in Bar) and another is under construction in Herceg Novi. As opposed to the specifications of the above master plan, a recent study ordered by the government suggested the establishment of only five regional landfills for Montenegro. This plan would imply that 11 municipalities in the northern part of the country would use one regional landfill in Berane, and waste would need to be transported more than 100 km away from Pljevlja across a difficult, mountainous terrain.

The fee for waste collection services for individuals and also for legal persons is determined by the size of the property. For households, this fee is 0,085 EUR/m2 (for property size up to 50 m2), 0,078 EUR/ m2 (for property size from 50 m2 to 80 m2) and 0,068 EUR /m2 for larger size properties. The same mechanism (the fee price decreases as the size of the property increases) is applied for legal persons and entrepreneurs. Percentage of payment is around 73% (2013).

The municipality of Pljevlja has a Local Environmental Action Plan (LEAP), a Biodiversity Plan, as well as a Plan for Air Quality Protection.

In close cooperation with competent ministries, NGOs and other partners, the municipality of Pljevlja intends to conduct numerous measures and activities related to raising awareness on environment and proper waste management.
Serbia

Bajina Bašta

Bajina Bašta is a town located in the western mountains of Serbia. The town lies in the valley of the Drina River at the eastern edge of Tara National Park. It is the administrative seat of the Bajina Bašta Municipality in the Zlatibor District. The population of the town is slightly above 9,000 inhabitants, while for the municipality it is at 26,000.

The municipality has a 50% coverage rate for the collection of municipal solid waste. Two trucks are operated in Bajina Bašta for the collection of communal waste and a third open truck is used to transport bulky waste. In the second half of 2014 an additional waste transportation vehicle is expected to be put into operation.

Municipal solid waste is transported to the Regional Sanitary Landfill Duboko in Užice that has been recently established with the assistance of a loan from the World Bank. The transfer of waste to Užice (the distance is 34 km from Bajina Bašta) can pose problems in wintertime owing to the mountainous terrain and a steep summit on route.

The old landfill of Bajina Bašta, that was located adjacent to the bank of river Drina, has been closed down recently as it did not comply with applicable regulations.

A selective waste collection scheme is planned to be established in the municipality, which is based on a wet and a dry fraction. The wet fraction includes bio waste, ash and diapers. The dry fraction includes all the waste streams that are appropriate for recycling. The dry fraction will be transported to the Užice landfill where it will be further segregated. Bajina Bašta will be incentivized to separate the dry and wet fractions before transferring it to the regional landfill, as it will need to pay less for the dry recyclable fraction than for mixed waste. The municipality could not yet identify an adequate location for the local waste transfer station. It is intended to establish a municipal composting facility and the municipality also plans to support household composting.

At semi-urban sites or along the river 17 illegal waste dump yards were identified. Waste is also dumped illegally into the hydropower reservoir on Drina River at Bajina Bašta. The waste dumped at settlements upstream on river Lim and Drina accumulate at the dam of the Bajina Bašta reservoir. Though this is an inter-state problem, Bajina Bašta municipality needs to provide the means (also financial) to solve it. Two boats are operated by the municipality to clear the waste accumulating in the reservoir.

Seven companies in the municipality have a license for treatment on non-hazardous waste. These typically take over in exchange for a modest fee electronic waste, end-of-life vehicle and used tyres from locals and transport them to one of the few large recycler companies in Serbia.

Waste collection is one item in the bill issued for communal services that include also water services and wastewater collection and disposal. For households waste collection costs approximately 2 EUR per bin. Legal persons pay after the number of containers/bins. Usually only legal persons are sanctioned for illegal dumping.

The preparation of the Local Waste Management Plan is in progress. The Regional Waste Management Plan for Municipalities of Zlatiborski and Moravicki Region was developed in 2011 (covering seven municipalities and two cities) and in 2012 it was approved by the competent ministry and adopted by the assembly of municipalities. Bajina Basta has not developed a LEAP yet.
Loznica

Loznica is a city located in western Serbia, in the Mačva District. It lies on the right bank of the Drina river. In 2011 the town had a total population of nearly 20,000 inhabitants. The administrative area has a population of around 80,000 inhabitants.

Around 70 tons of waste is collected and disposed at the landfill every day. According to estimations, additional 10-15 tons of waste is generated in rural areas of the municipality every day, and stays outside the collection system. No separate data is available on hazardous waste.

Around 60% of the population (35% of the total area) is covered by the waste collection system. Waste collection is carried out by public utility “Nas dom”, founded by the city of Loznica. The company owns 12 trucks, and 45 employees work on waste related jobs. In the urban part of the city waste is collected on a daily basis.

All waste collected in the municipality is disposed at the landfill in the proximity of the city (only 2 km from the center). The same landfill is used for disposing the waste collected in neighbouring municipalities Mali Zvornik and Ljubovija, which pay a certain fee for that. The landfill is quite well managed, but it is not a sanitary one.

Limited waste separation is present in the municipality – there are several small private companies having municipal permission for secondary raw materials collection (mostly PET and metal). No precise data is available on this, as that is a competence of Department for Urbanism. No waste incineration, no organized composting, no organized recycling, and no organized reuse. Waste/secondary raw materials pickers are present, but there is no precise information on the amount of waste they collect.

Illegal dumpsites are present in rural parts of the municipality. There is a register of the villages’ dumpsites, according to which there were 42 of them until recently. After the organized action “Clean up Serbia / Ocistimo Srbiju” initiated by the competent ministry, their number has been considerably decreased (20 of them have been cleaned up). Also, the zone of organized waste collection has been extended.

Waste collection is financed through monthly fees: per m² in the urban area both for private and legal persons. The willingness of payment is around 75%. That amount collected cannot cover the costs, so the municipality provides subsidies for the public utility every year.

Within the city’s Department of Inspection there are two units dealing with waste issues: Communal Inspection and Environmental Inspection. City also has its communal police.

Loznica has several problems with waste management. First of all, the location of the landfill is very problematic. It is located only 2 km from the city center, and there is a small river running on the very edge of the site. From time to time during high waters the river washes away some of waste the landfill waste. Furthermore bins and containers are not uniform, that complicates further waste collection.

The establishment of the planned regional landfill is expected to improve waste management in Loznica considerably. It is considered particularly important to establish a proper system for waste selection, though at the moment, the financial means for the establishment of the related facilities are not available.

The Waste Management Plan of Loznica was adopted in 2010. It is valid for 10 years, but its revision will be necessary in the period to come.
Priboj

Priboj is a town and municipality located in the Zlatibor District of Serbia. The Municipality of Priboj has around 27,000 inhabitants.

According to available data, 731 tons of waste is collected and disposed at the landfill annually. Some decades ago industrial activities in Priboj were very intensive. The local truck factory, FAP was among the biggest industrial facilities in Yugoslavia. Even though industrial activities are not intensive anymore, some amounts of hazardous waste are left behind. For instance, several containers of hazardous waste from industrial processes are still located within the yard of the FAP factory, waiting to be dealt with. Hazardous waste from “Poliester” factory was transported outside of Priboj for further adequate treatment. Within the municipality there is no separate treatment of hazardous waste.

There are two companies in Priboj which are registered operators for collecting and transporting of secondary raw materials (mostly metals, but also PET and paper). There is no organized waste incineration, no organized composting, no organized waste separation, and no organized reuse. Some Roma waste pickers are present from time to time, but there is no precise information on the amount of waste they collect.

Around 80% of the population of urban Priboj is covered by waste collection system. Waste collection is carried out by public utility “Usluga” Priboj. Work of the company is financed through a monthly waste collection fee, which is to be paid per m² both for private and legal persons. The fee covers the costs of the waste collection. Waste is collected one or two times per week.

All waste collected in the municipality is disposed at the landfill “Duboki potok” located 17 km from the town center, nearby the main road, and not far away from the lake. The same landfill is also used by the town of Nova Varos. Facilities at the landfill do not exist. From time to time the private company spreads the waste evenly and compacts it on the landfill. Illegal dumpsites exist in rural areas of Priboj, but considering the fact that those areas are sparsely populated those dumpsites are very small. Some bigger dumpsites in the municipality have been cleaned up through public works.

Waste issues are under the competences of Department for urbanism, construction, communal-housing and property affairs.

The level of awareness on waste issues in Priboj is very low. Some steps have been taken in recent years to improve waste management. New containers have been purchased, and there is a plan for putting containers in the central areas of the outskirts of Priboj, in order to extend the coverage of the waste collection system.

There is a Waste Management Plan of Priboj adopted in 2011, as well as the Regional Waste Management Plan (for Priboj, Prijepolje, Nova Varos and Sjenica adopted also in 2011. Priboj had a LEAP, but it is already expired.

The construction of regional sanitary landfill in Nova Varos is expected to increase quality of waste management practices in Priboj. In addition, due to the proximity of state border, opportunities for cross border projects are considered significant.
6 Main conclusion of the status assessment at selected municipalities

On the whole household waste collection is insufficient in most of the municipalities assessed in the study. Between 35 to 90 percent of the population is covered by waste collection system in the municipalities taking part in the survey. Municipal companies that collect waste typically run outdated vehicles with poor condition and the maintenance costs of these old vehicles are substantial. Moreover most of the municipalities are in need of additional waste collection vehicles. It is quite common that apart from regular waste collection vehicles, out of necessity, also open trucks and tractors are operated for waste collection. The frequency of waste collection normally depends on population density of the area. In central parts of the seats of the municipalities waste is collected daily or 2-3 times per week; while in areas with low population density it is common that waste is collected only once a week, or that there is no waste collection at all. The generally low number of waste collection vehicles has an adverse impact on the frequency of waste collection.

In the survey only one municipality, Bajina Bašta reported to be part of a regional waste disposal system (municipal solid waste is transported to the Regional Sanitary Landfill Duboko in Užice). The rest of the municipalities dispose waste into landfills that are not sanitary and do not comply with EU standards. Most of these landfills are outdated with declining remaining waste disposal capacities; only three were reported to be in a relatively satisfactory condition. It is also common that landfills that were planned to be operating only temporarily are in reality used, out of necessity, for a longer time period, until regional waste management systems are established. The lack of proper waste infrastructure in the region leads to illegal dumping of waste.

The majority of the municipalities are in the process of joining regional waste disposal systems, though experience shows that numerous obstacles are hindering cooperation of the settlements in the region. In many cases municipalities are unable to agree on the main points of the cooperation. Such disagreements can lead to situations in which regional cooperation cannot secure prescribed a minimum number of inhabitants covered by the system, which would be required for the disbursement of the international loans supporting the investments. In such cases the entire investment process can be delayed for years.

The planned location of the regional landfills, or their distance from the municipality in question often poses serious difficulties for local waste management companies. According to the latest plans, a single large regional waste disposal system would be established in the northern part of Montenegro, covering altogether 11 municipalities. This would imply that Pljevlja, owing to its peripheral location, would need to transport municipal solid waste 100 km away across a difficult, mountainous terrain to the planned regional landfill in Berane. Bajina Bašta similarly has difficulties with accessibility to the regional landfill. The transfer of waste to the recently established Duboko landfill in Užice can pose problems in wintertime owing to the mountainous terrain and a steep summit on route.

Financing mechanisms of regional waste disposal systems should be planned carefully. There are examples of schemes where municipalities are obliged to transport guaranteed minimum amount of waste to the regional landfill that instead of encouraging municipalities from reducing waste, urge them to increase its amount.

The above examples show that during the economic optimization of the regional waste management systems not only the population covered would need to be taken into account but also factors concerning accessibility, such as topographical conditions and the quality of roads.
In the Drina river basin the inadequate and rudimentary waste management infrastructure leads to illegal dumping of waste. Some municipalities report many smaller waste dumps scattered mostly in the rural areas not covered by waste collection systems; some others report a handful of large illegal dumpsites. The majority of the municipalities monitor the location of the illegal dumpings or have a register of illegal dumpsites. Six municipalities indicated to have schemes for clearing these sites. In Loznica, after an organized action of the “Clean up Serbia” program the number of illegal dumpsites has been considerably reduced (20 out of the 42 registered sites were cleared) and at the same time the zone of organized waste collection has been increased. To keep illegal dumping at bay, Pljevlja municipality places the containers at existing dump sites or at areas with special territorial characteristics (holes, slopes) that are typically favoured for illegal dumping. By introducing the container system the residents already do not use these sites. Experience shows that if people are provided by containers they will use them. Municipal waste experts did not identify lack of awareness as the main reason for illegal dumping, but instead the lack of appropriate infrastructure. One cannot expect residents not to dump waste without proper waste collection system in place. Waste pickers are present in the region, but there is no precise information on the amount of waste they collect.

The region with only basic, rudimentary waste management infrastructure is struggling with moving up in the waste hierarchy. In most of the municipalities there is no organized selective collection of waste, recycling or reuse. However there are examples of some local initiatives. In Zvornik baskets are placed in the city center for the collection of PET waste that is taken by private entrepreneurs. In Kladanj municipality has recently launched a selective collection system for packaging waste (i.e. paper, glass and plastic) with two selective points in a joint effort with local producers. According to the plans within 200 meters of all public buildings a selective waste collection point will be established. In Mojkovac two “green islands” were established in order to support waste separation. Usually in municipalities several companies deal with the treatment of secondary raw materials (mostly metals, but also paper, plastic, or
electronic waste, end-of-life vehicles and used tyres. These companies typically pay a modest fee for the handover of the waste and usually transport it to big recyclers. In the majority of the municipalities there are plans to introduce organized recycling schemes. Many municipalities indicated that the establishment of the regional waste disposal systems will also help the development of proper recycling systems. There is no organized composting at municipalities, though in several cases there are plans to introduce such initiatives at public institutions. There is no data on household composting, though it does not seem to be common in the region. There is no waste incineration in the region. Only in case of Goražde there are plans to introduce waste incineration with energy recovery linked to the establishment of the regional landfill.

**Waste collection fee** in the municipalities taking part in the survey typically ranges from 2 to 3.5 EUR per household. In general households pay per m² of their property or pay a fix price (mostly in rural areas). There are only a handful of examples for systems in which households pay after bins or containers collected. In these systems payment is proportional with the volume of waste produced; therefore reduction of waste production is incentivized. Legal entities usually pay after the size of their site area. Experience shows that the percentage of payment is between 60 to 75 %. In the majority of the cases the income from waste collection fee does not cover the operational costs of the municipal public utilities; therefore it needs to be complemented by municipal subsidies. Following the establishment of the regional waste disposal systems the fees for waste collection are expected to be increased substantially. Several waste experts in the region indicated that it is problematic to arrange for an ethical collection and pricing system if the municipality is unable to provide adequate waste infrastructure.

Mostly only legal entities are fined for illegal dumping (fining of private persons is very uncommon). The sanctioning procedures usually are very slow; the amounts of the fines are very low, with a weak deterrent effect.

Numerous outdated, non-sanitary landfills in the close proximity of Drina severely jeopardize the ecosystem of the river basin, as well as large number of illegal dumpsites at the riverbanks of Drina and its tributaries. The unique natural resources of the area have come under threat of many unregulated dumps of untreated or inadequately treated waste. Approximately 30% of all flooding waste ends up in the riverbed. According to a study of the Lim river, the largest tributary of the Drina river, every year more than 100,000 m³ of organic and PVC waste ends up in the river without any treatment. The disposal of waste from communities, livestock, hospitals and industry – as well as hazardous waste from town dumps – every day presents risks to the ecosystems of the river. The floating debris is not only an aesthetic problem, as it disrupts the engines of ships and machines in the river causing significant costs for repairs and cleaning. Accumulation of debris blocks hydropower dams reducing energy production. The influence of discharged waste is significant when looking at the total contamination of the Drina river.

At Bajina Bašta waste is dumped illegally into the hydropower reservoir on Drina river. The waste dumped at settlements upstream on river Lim and Drina accumulate at the dam of the Bajina Bašta reservoir. Though this is an inter-state problem, Bajina Bašta municipality needs to provide the means to solve it.

To solve the waste problem of Drina sustainably, it is necessary to synchronize efforts at national and inter-state level because of the trans-boundary nature of the river basin and the importance of its ecosystems.

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7 Evaluation of relevant municipal documents

The majority of municipal strategic documents reviewed include general objectives related to selective collection of waste and recycling. The larger part of those documents contain measures related to specific infrastructure aiming at selective collection and recycling of waste (e.g. waste selection facilities, recycling yards, transfer stations, selective waste collection points, containers). In some cases the exact number of selective waste collection points is specified. In addition to infrastructural aspects, some of the documents appoint certain legal entities to carry out the prescribed plans and actions related to selective waste collection and recycling. Some of the analyzed documents mention the specific waste streams to be collected separately and recycled. Also, there are municipal documents setting a target year for establishing recycling schemes in households and companies. Many of the documents assessed identify lack of infrastructure facilities as one of the main hindering factors to making progress regarding selective collection and recycling of waste. Only one document specifies a specific quantitative target for recycling.

Only a handful of municipal documents deal with composting. In some cases composting is mentioned as a measure (e.g. organizing composting in households and on municipal level). Other documents analyzed mention infrastructural aspects of composting among goals (e.g. construction of municipal and even inter-municipal composting facility), and there is only one document specifying some targets for composting (specifying the number of settlements to be covered by organized composting and the targeted year for the realization of the scheme).

There is only one document dealing with incineration. It mentions establishing a public-private partnership in this field among long term goals.

General waste collection issues are present in many of the documents assessed. The low number of vehicles which are in most cases outdated and in bad condition is mostly stated as a problem leading to a low percentage of coverage of the municipal’s territory by waste collection system. Increasing the percentage of inhabitants and territory covered by waste collection system is commonly mentioned as a goal that could be achieved through purchasing of new equipment. Several of the documents reviewed provide waste collection targets, predominantly in the form of percentage of population covered by the collection system by a target year.

All of the municipalities included in this study are dedicated to the regional approach to waste management. In all the municipal documents analyzed, construction of a regional sanitary landfill is mentioned as a goal. Existing landfills are mostly in inadequate condition and not in compliance with standards. Therefore improving their condition is frequently listed among measures.

Very limited number of municipal documents assessed deal with pricing, mostly stressing that the fee paid for waste collection does not cover the real costs of waste management.

Finally, all the documents analyzed deal with the issue of illegal dumping, which is identified as a considerable problem in all the municipalities. Removing waste from illegal dumpsites and the recultivation of those locations are commonly listed among measures.
8 Recommendations

The status assessment of this study showed that in general municipal waste collection is insufficient in most municipalities in the region, waste facilities are mostly outdated and not complying with EU standards, considerable quantities of waste is being dumped illegally. The region with only basic, rudimentary waste management infrastructure is struggling with moving up in the waste hierarchy.

Seeing that the study deals with local, municipal waste management practices, and that there is a lack of advanced waste management approaches and systems the focus of the recommendations is on low-cost measures that can be implemented by local authorities regardless of larger national and regional programmes or systems.

8.1 Application of a strategic planning approach in integrated waste management

A number of factors can contribute to the effective introduction of integrated solid waste management and the application of the 3R concept on local level. The application of a strategic planning approach that is analytical in nature ("finding the dots") but also involves synthesis ("connecting the dots") can lead to the development of more efficient and advanced waste management systems. Successful strategic planning approach requires among others the following preconditions:

- A clear leadership coupled with a good understanding of the problems related to solid waste management.
- A systematic analysis (i.e. data collection and the elaboration of a status report) of waste stream volume and composition and of the activities related to waste management that can provide a solid basis for strategic decision making.
- Application of a participatory stakeholder process. Relevant stakeholders, after they have been provided with relevant data and the status report, working under a strategy working group can be directly involved in identification of problems and setting priority objectives. Experience shows that stakeholder involvement brings credibility and gives stakeholders a sense of ownership of the strategy. Among others the following stakeholders can be invited to join the working group: the municipality council; the environmental inspectorate; waste management companies, environmental specialists from local industrial plants, local civil society organizations, construction companies, waste processing experts, etc.
- Identification of problems related to waste management with the involvement of stakeholders.
- Problems identified transformed into priority objectives. As a part of priority setting, a number of prioritisation criteria can be set and their weighing can be determined.
- Alternative scenarios can be developed based on priority objectives. These scenarios can reflect various development stages of the waste management system.
- A thorough economic assessment of the alternative scenarios in order to determine which one is the most cost-effective and affordable option. The assessment can typically take into account investment and operational costs, revenues, cash flow, net present value, potential founding sources, debt repayment and financing.
- A platform for the exchange of information with other municipalities.
8.2 Reducing waste

Pricing of waste collection services

The survey has shown that, in the majority of the municipalities, households pay per size ($m^2$) of their property for waste management services or pay a flat rate (mostly in villages). There are only a handful of examples for systems in which households pay after bins or containers collected. In these systems payment is proportional with the volume of waste produced; therefore reduction of waste production is incentivized.

The introduction of pay-as-you-throw (PAYT), also called unit pricing can effectively encourage waste minimization. In a unit-pricing or pay-as-you-throw program, waste generators pay for waste collection on the basis of the amount of waste they create.

There are several types of PAYT programs:

- **Full-unit pricing**: residents pay for all the waste collected in advance by purchasing a custom bag, bin or selected size container.
- **Partial-unit pricing**: the local authority decides on a maximum number of bags or containers of waste the collection of which is covered by taxes. Should the user exceed the permitted amount additional bags or containers are available for purchase.
- **Variable-rate pricing**: residents can choose to rent bins or containers of varying sizes with the price corresponding to the amount of waste generated. The advantage of these programs is that householders ration their waste generation to fit the size of container they rent and they are motivated to rent the smallest container.

The partial unit-pricing systems can provide a transition to full-unit pricing. These schemes provide a more predictable revenue base, at the same time they sensitize residents to current waste generation practices, and provide an increased incentive to reduce and divert waste. Since a certain fix level of service is provided on the tax base, this approach maintains a basic municipal service concept, with charges applying only to excessive wastes.24

In the system of differentiated unit price residents can request bags of varying volume from the service provider – separately for recyclable and separately for the leftover, non-recyclable waste. In case of the non-recyclable waste the price of the bags varies according to volume. The price of the bags offered for the recyclable waste is significantly lower than those provided for non-recyclable waste. This system can be combined with an addition a basic fee for the services.

Under a pay-as-you-throw scheme, some or all of the costs of waste management can be removed from property tax bills, and waste management services are then treated like other utilities such as water or electricity that are charged by unit of consumption. These programs are an effective tool in increasing waste separation and recycling and also in encouraging waste minimization. Waste collections costs are distributed more fairly among the population, and in proportion to the amount of waste each user generates. Generally residents with higher income generate more waste, consequently pay a higher fee.

In PAYT schemes units can be identified using different types of bags or containers. Services for waste diversion, like recycling and composting, are often provided free of charge within PAYT systems.

There are certain concerns that unit pricing could sometimes result in illegal dumping (fly tipping). Nevertheless this concern often turns out to be more a perceived barrier than a real problem. Most communities with pay-as-you-throw schemes have found that illegal diversion has proven to be less of a

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concern than anticipated and that there are steps that can be taken to minimize its occurrence. Typically, communities report that illegal diversion can be an issue regardless of the systems in which residents are paying for solid waste management.\textsuperscript{25}

Municipalities in the Drina river basin could introduce systems using unit pricing similar to the one applied in Bajina Bašta, where households pay for waste collection per bin. Such schemes can be introduced parallel with the establishment of regional waste disposal systems. When recycling and composting programs have already been launched in municipalities, selected recyclable waste can be collected free of charge or for a significantly lower price. At the same time this can enable the increase of the unit price charged for non-recyclable waste.

**Awareness raising activities**

Experience shows that the implementation of an effective awareness raising strategy aiming at waste minimization, sustainable purchasing habits and rational material use can significantly contribute to achieving waste reduction targets.

A variety of publicity tools can be employed as elements of an awareness raising strategy, such as:

- a letter from the mayor or county commissioner to residents and businesses
- campaigns organized at public spaces
- special events such as games and contests
- printed materials
- mass media announcements
- personal outreach at public events
- direct communication with individual residents
- presentations or displays at schools, fairs, and community events
- demonstration programs, demonstration sites
- messages mailed with utility bills
- prizes, awards
- websites.

Environmental education programs can be initiated by municipalities at schools assisting children to acquire a basic comprehension of the problems related to waste and also to acquire the skills needed to solve environmental problems.

**Other initiatives aiming at waste reduction**

No-advertisement stickers can be made available for the mailboxes of residents by which they can choose not to receive unaddressed advertisements and/or free newspapers. The sticker can receive legal backing through a municipal decree, which entitles individuals to file a complaint if they receive unwanted advertising and/or newspapers in their mailbox despite having placed the sticker.

A product-service system (PSS) is a business model that is aimed at providing sustainability of both consumption and production shifting focus from selling products to selling utility or service. As an example of such a system municipalities can endorse business services that endorse renting or leasing of special tools for refurbishing of buildings.

Expired food products that are still appropriate for consumption and leftover food from events can be offered for charity purposes, although certain standardization measures could hinder such initiatives.

\textsuperscript{25} http://www.epa.gov/waste/conserve/tools/payt/top8.htm
8.3 Reusing waste

Reuse centers

Reuse centers facilitate the transaction and redistribution of unwanted, yet perfectly usable, materials and equipment. Businesses, nonprofits, schools, community groups, and individuals can benefit from either side of this service as donors, sellers, recipients, or buyers. Items would be accepted free of charge and would be purchased by interested individuals and organizations for a moderate, symbolic fee. Some forms of reuse centers maintain a physical space, while others act as a matching service (a virtual exchange).

The advantages of establishment of a reuse center in municipality are the following:

- promoting the benefits of reuse,
- diverting waste from landfill,
- providing usable items to organization and individuals for affordable prices.

Due to the specific characteristics of construction and demolition waste (i.e. it represents 30-50% of all waste materials) the establishment of a building material reuse center can have numerous benefits:

- cost savings,
- conserves natural resources,
- reduces energy consumption and losses,
- stimulates local economies,
- supports vulnerable members of communities (building material available for low income citizens as well),
- conserves space for landfilling.

Municipalities can provide assistance to shops dealing with purchase and marketing of used items (e.g. offering space for their operation, or providing favourable renting conditions for them). Local authorities can also support the organization Electronic Equipment Exchanges, events that enable the exchange of used electronic items.

Local authorities can endorse online portals promoting the exchange of waste products. The exchanged materials can include among others construction materials, wooden pallets, electronic equipment, paper, cardboard, plastic and furniture.

Disposable nappies can make up 50% of the waste from a family with just one baby; therefore families can cut their waste significantly by using washable reusable nappies. Local authorities can organize actions for promoting the reuse of diapers (e.g. promoting their use; making them available at local hospitals).

Repair

Repair facilities (including clothing repair), repair centers can contribute significantly to reuse and waste minimization. Municipalities can offer space for the operation of such services, or provide for them favourable renting conditions.

It is an option for local authorities to organize ‘days for repair’ when residents can benefit from repair services for free or for lower costs and when the municipality makes booklets with a contact list of local repair services available.
Formalization of informal waste market

There are examples of initiatives aiming at the formalization of informal waste collection in Europe. Such schemes typically focus on used item markets offering a range of product groups including used ICT equipment, furniture and construction materials. Under such programs advocacy associations for used item collectors can be established and training programs on the proper ways of collection can be run for the bulky waste collectors. These activities can be combined with programs supporting retooling and refurbishing used items.

8.4 Recycling waste

Recycling systems

Implementing a local recycling program offers several economic benefits. Recycling can reduce solid waste collection, transportation, and disposal costs; generate revenues from the sale of recyclable materials; create jobs; provide eligibility for funds. In addition, recycling helps to preserve environmental quality: saves landfill space, preserves resources, conserves energy, reduces air pollution and saves water.

A lot of different wastes can be recycled, therefore worth collecting separately. However the most feasible ones are: paper; plastics (mainly PET), aluminium cans and glass. Different hazardous wastes (batteries; electronic waste; ash, tiers, toners and cartridges etc.) can also be easily collected.

Until regional recycling systems are not established recycling could be organized at local/municipal level. For this the following should be analysed:

- Current Waste Streams: the amount of currently disposed solid waste should be determined and analysed in order to figure out what is the amount of various types of recyclable materials and how much of the waste could be recycled.
- Market for the materials: this has a key importance, as a local recycling initiative should be self-sustaining. Therefore the availability of potential markets for recyclable materials should be analysed, which will determine the waste categories where recycling is feasible. Market most probably can be found for waste paper, plastic, scrap metal and glass.
- Collection method: here the main question is finding the most feasible option for the municipality. Drop-off centers / selective collection points or a curbside recycling\footnote{Drop-off systems are commonly used in areas where individual household collection is impractical and cost savings are important. Advantages of Drop-off centers / selective collection points are their low capital costs, ease in collecting more categories of materials than is practical with curbside collection, lack of need for staffing, and round-the-clock accessibility. However, drop-off centers are less convenient than curbside pickup, and as a result a lower volume of materials is usually recovered. Also, recyclables can be contaminated with unacceptable items; they are vulnerable to theft, vandalism, and litter. The convenience of curbside collection results in a higher recovery rate than can be achieved with drop-off centers, and collection can be consolidated with solid waste pickup. However, curbside collection involves higher equipment and operating costs, it is labor intensive, and it is a more complex process to manage.} or a combination of the two is also possible. It can be different even for different type of wastes.

The best collection method could be selected based on factors like, financial conditions, required equipment, and staff resources and housing density. Several good practices exist across Europe that can provide guidance for the decision.
Local recycling systems can also be expanded to regional level as a bottom-up initiative. Neighbouring municipalities may join forces which could have several benefits, like greater volumes and marketing leverage, lower equipment, labour and administrative costs.

The local recycling system could have very important synergies with other waste management and waste prevention goals. As recycling raise the awareness of the citizens they will be more open for other solutions, like reduction of waste at its source, reuse of waste materials, composting. Recycling has clear synergies with PAYT systems.

There are examples of recycling programs in the region that are developed on a municipal scale (e.g. in Kladanj and Zvornik). Baskets are placed in the city center of Zvornik for separation of PET waste that is taken by a private entrepreneur. In case there is a potential market for local recyclable materials similar municipal programs can be developed in the region.

Bins and containers for selective collection in Kladanj


Composting

Composting is a form of waste disposal where organic waste decomposes naturally under oxygen-rich conditions. It can be performed on a regional or municipality scale that involves the collection of organic waste from households and businesses and its transportation to a compost facility. Composting can also occur on a small scale by individuals mostly in backyards.

Municipal composting programs

Municipal compost systems generally manage the full spectrum of organic wastes collected from local communities. These wastes include landscape debris, pre- and post-consumer food waste, animal manure and organic materials resulting from the treatment of sewage sludge. Municipal systems can be private or public operations or managed through a private-public contract.

Even if local institutions do not have the financial means to establish a municipal composting program with its collection system and the necessary facilities, smaller composting sites can still be installed at municipal institutions. Such municipal demonstration sites can support the promotion of household composting.
Schools can be identified as a priority target group for municipal composting schemes. Schools have the space and gardens to undertake composting activities. It is also considered as an educational activity which might influence the children’s attitudes and behaviour towards waste in general and bio-waste more in particular. Children can be trained in improved bio-waste handling and composting.

For residents trainings on composting can be organized by municipalities. Those who completed the course can transfer their knowledge to their friends and neighbours.

In case a municipal composting system is already operational then certain restrictions can be applied regarding collection (e.g. it is an option not to collect green waste as it is either composted by the households or it can be brought for free to a nearby recycling center).

*Supporting household composting*

Home composting promotion is considered as one of the actions with the highest potential for waste minimisation.

Local authorities can actively support household composting by organizing trainings for residents on composting practices. These courses can provide guidance on how to build cheap composting bins from scarp wood. Those who complete the course can transfer their knowledge to their friends and neighbours. Volunteers can be appointed as composing advisors, who will advise people on composting issues and help promote the need for waste reduction. Collaboration with national networks can reduce the costs of creating own websites and provides the assurance for municipalities that, when recommending these links the information offered is reliable.

*Wooden-pallet holding unit for composting*


As a financial incentive for households to start home composting, subsidized compost bins can be made available to residents. Citizens switching to home composting can be granted a discount from the waste collection fee.
8.5 Cooperation among municipalities in the Drina river basin

Apart from providing recommendations for measures and actions integrating the concept of “3R” into waste management practices the study also aimed at supporting transnational and inter-municipal cooperation for improving waste management services in the Drina river basin.

Some of the fields where municipalities can typically cooperate in the region include among others:

- Joint and effective action to address the deficiencies of the waste management system (outdated non-sanitary landfills, illegal dumping, etc.) and its negative consequences (e.g. floating waste), significantly endangering the ecosystem of the watershed.
- A transnational cooperation of municipalities can result in a better access to international funds supporting advanced waste management.
- In a joint effort municipalities can approach more efficiently national governments or local authorities of larger cities in Europe requesting the donation of used vehicles that would otherwise be scrapped.
- A platform can be established for transnational and inter-municipal experience exchange in the region with the support of the Drina River Committee (DRC).

8.6 Some other relevant considerations

Numerous example from across Europe indicates that the lowest cost solutions are not always most effective. The investment into waste processing facilities pays off by saving space in the landfill site. It is also important to look at other external costs and benefits.

The establishment of landfills and waste incineration facilities can provide obstacles for waste reduction initiatives. In case the incineration capacity was realized, operators have an economic interest to ensure a certain amount of waste required for the operation of the facilities.

Fines for illegal dumping can be increased only when proper waste management infrastructure is already in place and operational and at the same time residents have become familiar with the system.

Recently, the focus has shifted from fining those who do not recycle enough to encouraging more people to recycle through rewarding the practice.

Experience shows that if containers are placed at existing dump sites or at areas with special territorial characteristics that are typically favoured for illegal dumping then residents will prefer to use the container as opposed to illegal dumping.
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