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Assessing the waste recycling capacity in Armenia

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Part II - Assessment of waste recycling capacity and recommendations on the introduction of the 3R principle in selected rural communities in Armenia (Vanadzor and Dilijan municipalities).

Assessment of waste recycling capacity and recommendations on the introduction of the 3R principle in selected **rural communities** in Armenia (Vanadzor and Dilijan municipalities). The report will contain information on waste recycling capacity (separation of plastic and paper, in particular) and recommendations on the introduction of the 3R principle in 2 rural localities, part of the Vanadzor municipality and 2 rural localities, part of Dilijan municipality.

Objective

Contributing to improving environmental quality and reducing waste in rural areas by supporting the introduction of modern waste management practices and increasing environmental awareness through cross-border cooperation and cross-sectoral partnership in Georgia, Armenia, Moldova and Romania.

Specific project objectives

Increasing capacity of the selected rural communities in Georgia and Armenia by sharing and introducing European approaches and experience of the 3R principle in waste management.

Developing cross-border cooperation and cross-sectoral partnership for anti-litter protection, public awareness and environmental education in rural areas of Georgia and Armenia.

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Project activities in Armenia will be implemented in the municipalities of Vanadzor and Dilijan, where waste contamination is also relevant. Armenia is known to be facing new challenges, including waste management and the introduction of waste separation/recycling.

The general methodology of the project consisted in collecting data, observing the area, drawing conclusions and making short and long term recommendations by way of the following activities:

- study visits to collection points and other locations,
- meetings with local officials,
- studying available data, reports and previous studies,
- research for baseline data on waste quantities and composition,
- analysis and reporting.

INTRODUCTION

The rural waste management sector is poorly developed in low and middle-income countries compared to urban areas, even though a significant part of the population lives in such regions. Rural waste management issues are less discussed in the literature than those in the urban areas due to lack of adequate data.

Firstly, the proportion of the rural population is higher and has a lower standard of living and secondly, waste collection services are poorly developed, covering only some rural areas.

Waste operators avoid such areas and local authorities provide little or no financial resources to provide adequate public services. In addition, geographical constraints (mountains, hills, high plateaus, karstic regions and wetlands) make it difficult to implement adequate waste management facilities.

Direct landfilling poses a complex of environmental threats but it is often widespread in rural areas of developing countries due to the lack of formal waste management services. Illegal dumping of waste has occurred even in countries where waste management systems are better developed and cover almost the entire population as in Spain or Italy. The rural waste management sector is an emerging issue in developing and transition countries around the world.

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Reorganisation of waste collection services, closure or upgrading of non-compliant landfills, development of recycling centres are priorities for new EU members or aspiring countries. The implementation of the Landfill Directive 1999/31 is a challenge even for old EU countries such as Greece. Investments in the modernisation process of the municipal waste management sector are expensive and CEE countries rely on EU funds. Extending waste collection to less populated areas leads to a reduction of illegal landfill activities. Changes in the composition of municipal waste have varied differently between urban and rural households over the last decade, leading to different waste management options. Rural areas in Eastern Europe have been often ignored by waste management services until the implementation of the EU Landfill Directive. Recent studies pay attention to rural waste management issues in EU candidate countries with regard to illegal waste disposal practices, poor waste management facilities and future prospects for EU waste policy. Inter-municipal cooperation should be developed to address administrative and logistical inefficiencies in rural areas, which are underperforming in terms of separate collection and recycling activities. Romania needs to move onto waste management facilities in the poor rural municipalities.

The **EU approach** to waste management is based on three major principles:

- Prevention of waste generation – a factor considered to be of paramount importance in any waste management strategy, directly linked to both improving production methods and to getting consumers to change their product demand (green product orientation) and to adopt a low-waste lifestyle.
- Recycling and reuse - where waste is generated, encouraging a high level of recovery of component materials, preferably through material recycling. In this respect, several waste streams are identified for which material recycling is a priority: packaging waste, end-of-life vehicles, waste batteries, waste electrical and electronic equipment.
- Improved final waste disposal and monitoring - where waste cannot be recovered, it has to be disposed of in a safe manner both environmentally and in terms of human health with a strict monitoring programme.

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The basic objectives of current EU waste policy are to prevent waste generation and to promote re-use, recycling and recovery to ensure environmental protection.

3R – Concept, definitions

The principle of reducing waste, reusing and recycling resources and products is often referred to as the "3Rs".

- Reduction means choosing to use items carefully to diminish the amount of waste generated;
- Reuse involves the repeated use of items or parts of items that still have usable elements;
- Recycling means using the waste itself as a resource.

Waste minimisation can be achieved effectively by focusing first and foremost on the first of the 3 Rs, that is 'reduce', followed by 'reuse' and then 'recycle'. The waste hierarchy refers to the "3Rs" namely reduce, reuse and recycle, which rank the waste management strategies according to their desirability. The 3Rs are listed as 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 minimisation strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and generate the minimum amount of waste.

The concept of minimising the impact of waste in terms of quantity or negative effects by reducing the amount of waste, reusing waste with simple treatments and recycling waste by using it as a resource to produce the same or modified products is commonly referred to as the "3Rs". Purchasing and using resources with care can reduce the rate of resource and energy consumption and connected resources continually, ultimately reducing waste many times for waste streams. When long-lived goods are reused from time to time, offsetting the collection of similar or equivalent new products. This saves fresh resource exploitation and waste generation quantity. Some waste can be used as a resource for the production of different goods or the same product, i.e. recycling the same resource.

This saves fresh resources and offsets waste generation. Thus the 3R concept individually or collectively saves the exploitation of fresh resources, adds value to already exploited resources and very significantly minimises the amount of waste and its negative effects. The

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efficiency of waste minimisation is said to be best achieved by applying the 3Rs in a hierarchical order - Reduce, Reuse and Recycle.

Waste is a resource

Traditionally, waste has been seen as worthless. In a resource-efficient economy and society, the term "waste" would refer only to those waste materials that have absolutely no potential for use and therefore no economic value. According to this definition, traditionally "worthless" waste streams can be considered as resources for a new level of the economy. They can be recovered (or prevented from being lost) through greater efficiency and management at each stage of production and consumption.

Recycling waste is not a profitable business, but the use of recycled products in industry is truly beneficial.

Even some hazardous or toxic materials can be recycled or re-refined for re-use.

Waste separation at source

Waste separation at source is of paramount importance in the 3R initiative. Municipal waste on account of its diverse sources will have mixed materials. However, recently it has been observed that recyclable materials with economic value such as waste paper, plastic, broken glass, metal etc., is not separated and is dumped on the streets by people together with household/commercial/institutional waste. By disposing of such recyclables on the streets or in a communal bin, the quality of the recyclables deteriorates as they will be soiled by wet waste which often even contains contaminated and hazardous waste.

In the absence of waste segregation, the composition of waste will not be known and the planning, the engineering and the implementation of waste management systems could not possible.

Separation is a key activity in any successful 3R initiative.

In general, waste can be separated at three levels;

- 1) household and community level,
- 2) in the collection and transportation process by municipal workers, and
- 3) at the landfill by the workers. It is also important to note that in the absence of recycling industries or buyers for separated waste, sorted waste ends up being dumped and mixed

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with unsorted waste in open spaces or at disposal sites. At least 80-90% of all waste can be recycled, which now goes to landfills or dumps in the absence of waste segregation practices at source.

The quality and efficiency of recycling facilities depend largely on the quality of the separated waste. In particular, composting of organic waste depends solely on the quality of waste separation.

A highly successful rural recycling programme can extract about 9% of the residential waste stream if items such as glass, metal containers and cardboard are recovered.

Rural areas can present unique alternatives for the use of recyclable materials. For example, waste newspaper and mixed paper can be used as a straw substitute for animal bedding. In fact, waste paper outperforms straw in absorbing animal waste and could be less expensive, according to pilot projects in some areas. Waste paper can also be used to insulate buildings and as a filler material for hydroseeding.

Potential uses for glass mix include stained glass (a mixture of glass and asphalt for paving roads), landfill cover, glass concrete (a mixture of glass and concrete), sandblasting, backfill, road surfacing material, erosion control, septic fields and as a sand substitute.

Mixed plastics can be shredded and applied with additives to unpaved vehicle parking areas.



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REPUBLIC OF ARMENIA

General information about Republic of Armenia

Geography

The Republic of Armenia is located in the western part of Asia. The country occupies 29,743 km² in the north-eastern part of the Armenian plateau - the inland waterway territory between the Kur and Araks rivers between the Caucasus and nearest Asia. In the North and East, it borders Georgia and Azerbaijan, and in the West and south Turkey and Iran. The climate is mountain continental with hot summers and cold winters. Administratively, Armenia is divided into ten provinces (marzes), while the city of Yerevan has special administrative status as the country's capital.

Administrative distribution

The basis of the administrative division of the Republic of Armenia (RA) is the RA Law on Administration and Territorial Division of the RA (4 December 1995). The territory of the RA is divided into 10 provinces. The capital Yerevan has the status of a community with 12 administrative districts.

Currently there are 49 cities (including the city of Yerevan) and 952 rural settlements.

Population

Armenia had a total population of 2,965,300 in 2019. There are 49 cities in the country and 955 villages, and although a total of 64% of the population lives in urban areas, this is primarily due to the fact that Yerevan accounts for over a third of the population.

With a population of 105,000 inhabitants, Vanadzor is the third largest city in Armenia and the capital of Lori Marz (province).

Armenia has long struggled with unsustainable solid waste management practices such as uncontrolled landfills and inefficient waste collection, resulting in negative environmental and health impacts and poor resource management.

Now, the new Armenian government aims to achieve EU engagement within this framework of the EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA) and contribute to Armenia's Commitment to the Sustainable Development Goals (SDGs) under

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the 2030 Agenda. This includes long-term and sustainable strategic waste management and some large sanitary landfill infrastructure and capacity development projects are underway. The need for more reliable data on the quality and quantity of waste in Armenia to support the development of a policy and roadmap on solid waste management based on the principles of the circular economy, as well as information for potential investors in waste collection, recycling and energy recovery was acknowledged.

In Armenia every programme that is carried out with the aim of changing the existing solid waste collection, transport and processing system is justified. The current system of solid waste management is imperfect, poses many risks, especially in terms of factors affecting human health.

The population in all areas of the territory, all ages and risk groups (children, elderly, adults, pregnant women, people with low immunity, patients, etc.) are affected by the aforementioned factors throughout their life span.

Armenia is in the process of major waste management reforms. To help the country move forward, it will be essential for the country to have access to information, evaluation of global practices and innovations.

Waste management reforms are also on the Armenian government's reform agenda in relation to its goal of achieving harmonisation with the EU under the EU-Armenia Partnership Agreement (CEPA) to contribute to Armenia's commitment to the Sustainable Development Goals (SDGs). In both strategic commitments, proper resource and waste management are high-level priorities.

However, adopting new approaches often comes with its own challenges. The challenges are many but include the development of policies that are cross-cutting, requiring a continued basis of cooperation across multiple government agencies. Another challenge is identifying realistic and practical programmes and investments for local communities where there is often a lack of experience and know-how in modern waste management practices.

Improving solid waste management in Armenia should be done with the following principles at its core:

1. Protection and preservation of human health
2. Protection, preservation and improvement of the environment

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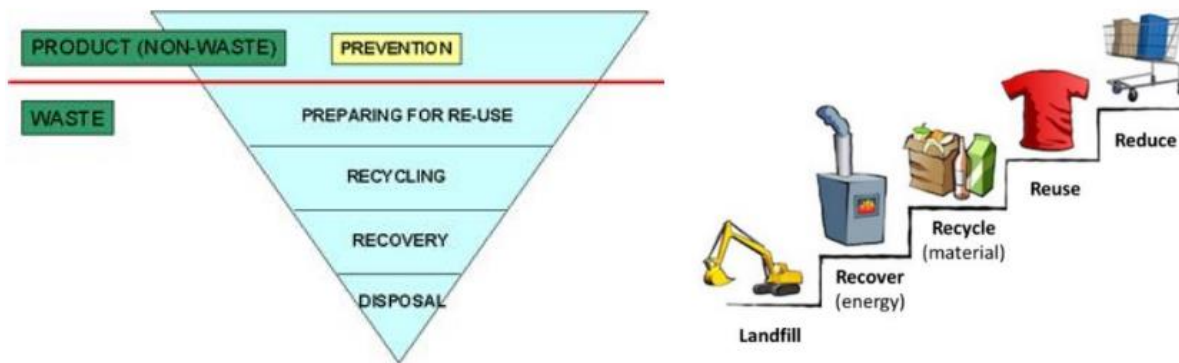
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3. Reasonable and efficient use of natural resources
4. Adoption of the principles of the circular economy
5. Application of the waste hierarchy (Directive 2008/98/EC)
6. Increasing energy efficiency
7. Reducing Armenia's reliance on imported resources

Some of the basic concepts are the "polluter pays principle" and "extended producer responsibility", which basically dictates that any entity that risks polluting the environment directly or indirectly from waste generated by its business or activities must take responsibility and pay for the safe handling. All EU member countries must adopt the so-called waste hierarchy in their respective legal frameworks, where priority is given to waste minimisation and then reuse, recycling, energy recovery and landfill according to this order. For Armenia, most waste falls still under the least preferred option and here are recommendations to start climbing the ladder to a more sustainable system.

Waste hierarchy under two formats



Notably, the individual components of the waste hierarchy, i.e. waste prevention, waste reduction and waste recovery, have since been present in Armenian legislation and strategies, however, they have not been adequately prioritised. The waste hierarchy should



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become an umbrella concept and a fundamental principle when developing waste governance policies.

Poor implementation of the "polluter pays" principle leads to low levels of responsibility among citizens and organisations, incomplete cost recovery, including costs associated with the negative impact of waste. It is essential to establish full cost recovery mechanisms in line with the polluter pays principle and the principle of extended producer responsibility.

Reducing the amount of waste in landfills is of paramount importance for the preservation of the environment and the protection of human health, as well as for the proper treatment of hazardous waste and the recycling of economically valuable waste according to the waste hierarchy approach. Given the number and conditions of uncontrolled landfills in the country, it is essential to address this issue in a nationwide programme.

In order to increase waste recovery rates in the country, it will be necessary to assess the existing capacities and needs, as well as the real potential for recovering materials, energy and nutrients from solid waste in the country. Many recycling companies in Armenia are misreporting input material and need economic resources and financial incentives to improve their operations. It will be necessary to provide financial incentives for waste recovery and treatment facilities, while strengthening environmental control over their operations.

There is a need for capacity building at local level for sustainable solid waste management, including waste management and landfill operation and management planning.

It is important to engage both local authorities and communities in the planning process.

In order to ensure the availability and reliability of data, it is necessary to develop and introduce a compliant reporting system that will include all phases of waste management - prevention, reduction, generation, separation, collection, recycling, landfilling or disposal. In order to achieve the targets that have been set and to accelerate the transition to a circular economy, comprehensive coordination should be developed between the different economic sectors of the country through the exchange of information and best practices.

In order to ensure high quality, reliability and compatibility of data, it is necessary to improve the combination of a system of national statistics and statistical methodologies and also introduce a system of data evaluation.

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The collection of reliable waste management data is essential for both policy development and implementation, as well as for proper infrastructure planning.

It is required to establish a system for regular review of the quantity and composition of solid waste in Armenia, including a regulatory basis, financial mechanisms and a national standard for methodology, which will ensure reliability and compatibility of data with EU standards.

In terms of solid waste management (SWM), Vanadzor is particularly facing problems with its existing garbage as well as its waste collection system. Therefore the city is pursuing the goal of establishing an environmentally friendly Integrated Solid Waste Management (ISWM) system with a particular focus on identifying and building a new modern sanitary landfill. This way, both environmental pollution and health risks are to be reduced and at the same time sustainable growth of the whole region would be encouraged. In the project not only the Municipality of Vanadzor but also the surrounding villages will be taken into account.

Within the framework of the Armenian-German financial agreement ERM - IU - ATMS Consulting Consortium Cooperation, with ERM as the lead company, it was contracted to support the Municipality of Vanadzor in its efforts to implement an ISWM system.

The city of Dilijan is located in the western part of the Aghstev river valley, 96 km from Yerevan. The town is located at an altitude of 1250-1500m above the sea level. The main industrial sector is processing industry with a major role of food and mineral water production.

The area of the town is covered with deep and woody canyons, steep cliffs and forests. The town area with its surroundings forms the Dilijan National Park.

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The land is mainly used for agricultural purposes - orchards, vineyards, vegetables, arable land, pastures. From the perspective of agricultural production classification, the soil belongs to the brown forest group and the washed silvosteppe rocky clay group. The soil cover of the area is of forest and washed silvosteppe rocky clay type.

Due to the geographical position of the region, the unevenness of the relief, the different locations of the slopes, the interaction between the floristic regions, it is known for its rich

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landscape and biodiversity. To preserve this diversity, Dilijan State Park was established as a special nature protection area.

The results of all the research and analysis carried out will be made available to the Government of Armenia.

The need to develop and implement the following:

- A comprehensive solid waste governance and management policy based on the principles of circular economy.
- A roadmap for improving solid waste management.
- Solid waste management/recycling and disposal strategies and economic mechanisms.
- Providing information needed by potential investors in waste collection, recycling and energy recovery.

The new Armenian national government has a clear focus on recycling and modern waste management to minimise pollution but also to use waste as a material resource or fuel. More reliable data on the quality and quantity of waste is needed to make informed and strategic decisions.

Taking into account the points mentioned above, we suggest some priority guidelines for further policy and strategy dialogue process:

- Adoption of the waste hierarchy
- Promotion of Extended Polluter Responsibility (EPR) and Polluter Pays as full cost recovery instruments
- Development of the National Landfill Programme
- Development of local waste management plans
- Promotion of sorted waste collection
- Development of economic instruments
- Improving hazardous waste handling/disposal infrastructure
- Improving the regulatory framework
- Improving the institutional framework
- Exploiting the energy and nutrient potential of bio-waste
- Involvement in the solid waste policy dialogue process

Recommendations

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Institutional recommendations

- National legislation should be fully harmonised with the requirements of EU directives on landfill management
- The waste law should be amended based on the provisions governing waste reduction, sorting and recycling processes.

Human health recommendations

Establishing a monitoring system to study the negative effects of landfills on human health and the environment

- Improved conditions of solid waste landfills, especially in rural areas, which threaten human health and spread diseases, should be a priority in the implementation of the WMP.

Socio-economic recommendations

-Subsidies/reductions of waste collection fees for the population in the rural border communities (waste collection exceptionally carried out based on the community budget) and other disadvantaged communities (e.g. socially insecure families, considering areas with high unemployment rates).

-Promoting the development of waste recycling skills, i.e. composting skills among the local population, production and use of organic waste can also contribute to solving socio-economic problems and improving compost production, developing relevant projects and providing compost to the local rural population. Compost production can also lead to savings in agricultural production, improved land management from a sanitary point of view (by removing harmful bacteria from the compost management site).

- Raising public awareness about the rules for neutralising household waste, unusable appliances, light bulbs and the usefulness of separate waste collection and resource management practices.

- Information and data collection on waste management should be carried out and made available to waste management/collection companies and other relevant stakeholders. Introduction of relevant provisions (on reporting) in the Waste Management Plan so that monitoring data should be published.

Prevention of waste generation should be preferred to recycling and secondary use of waste

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-Using reusable packaging materials (bags and sacks), promoting green procurement and packaging.

The recommendations have been made in a step-by-step approach. Regardless of the availability or accuracy of the data, there are plenty of steps that can be taken and some immediate ones without major cost implications.

- Improving waste collection through better maintenance of vehicles and refuse containers, greater capacity to avoid littering by blocking bins, closing all gutters and introducing alternative collection methods such as large containers, especially in rural areas. This would make collection quicker, safer for both residents and for collection staff as well as cheaper.

- Separate collection of bulky waste, including construction and demolition waste, and avoiding collecting it in regular bins. This would make the collection of MSW safer and more efficient, it improves the functionality and extends the life of both collection vehicles and landfills.

- Improving general awareness of hazardous waste and providing separate collection systems for this type of waste, including electrical and electronic waste (WEEE).

- Focusing more on implementation, monitoring and enforcement of existing regulations than on studies of future technologies to invest in.

- Improving landfill operations, even if unauthorised. Improving the access roads, enforcing control at the landfill gate, checking vehicles and recording waste volumes, organising separate storage of different types of waste, including hazardous waste, training both collection and site staff for safe operation.

- Co-operation with the private sector within the provinces, with the academia, the NGOs and other organisations pools resources for investment and operation of waste treatment facilities or systems as well as for public awareness campaigns and exchange of information and experience.

- Promoting capacity building of municipal staff in the field of waste treatment technology, but also in terms of the management, procurement and monitoring of private contractors.

- Finding economic incentives for businesses or public participation, e.g. for source separation of waste or reuse or improved tax collection.

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Recommendations for local communities

- Continuous follow-up by a designated team of all calls and programmes in order to access funds for compliant waste management.
- Increasing the number of spaces for separate collection of recyclable waste.
- Implementation of source separation programmes.
- Initiation of programmes to educate the population and promote selective collection with an emphasis on the advantages for improving the quality of life .
- Introduction of a fee in the contracts of the sanitation operator in a fee/person/month set by the local authorities.
- Placing vending machines/collection centres for plastic, metal or glass cans in large shops and supermarkets.
- Continuous monitoring of the collectors/recyclers market and of the bids to take back recyclable waste.