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## The impact of recycling in preserving the environment

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### Abstract

Recycling is considered to be the most effective method to preserve our earth's environment secure. By simply reusing the material instead of discarding them, we can reduce the number of waste materials and also conserve future natural resources. In this way, landfill trash will be reduced to save water and air from pollution. Solid waste recycling provides adequate benefits to the environment and health, apart from generating economic benefits. The SSR program of single-stream recycling process normally recycles materials collected and deposited in a specific collection bin. Therefore, the SSR process has increased in popularity in western countries, Europe and Asia, due to its inherent waste collection abilities, specifically, the political and social pressures that have stimulated rapid progress in environmental framework legislation as per national directives. The recycling demands have compelled them to incorporate recycled materials, but it has generated risk of conflicts regarding the safety matters for food packaging. Several recycling prospects are considered, directing recycling to be implemented only at places where the environment is benefited. Further, the re-use process should not jeopardize safety and health matters concerning food packages. This is to avoid the direct contact of packages with foodstuffs, where only chemical recycling is the correct method to ensure product purity. The recycled material control behind this barrier layer puts the doubt regarding the undefined contaminant of barrier performance.

**Keywords:** Recycling, natural environment, waste material, pollution, water, air, soil, underground stream

### Introduction

Ever since the Industrial age commenced, the humanity had encountered daunting questions, to identify the sustainable means to persist in their prevailing mass production industrial activities. In a way, the product lifespan has enlarged by almost 10 years, while the human population has multiplied four times in the past one century. The big question we are facing is how to manage the overburden of overcrowded cities, extensive air, and water pollution, while meeting the food, clothing, and shelter using tremendous resources for everyone. Eventually, how to persevere the strong health of our planet (Adebola, 2006) <sup>[1]</sup>.



**Fig 1:** Positive recycling effect on environment (Compactor Management Company, 2021)

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### It's a high time, we should strive to take care of our environment

The whole world should really focus on this major subject, its consequences and applications. How the communities in each country should help the government to maintain the environment and to keep it away from pollution?

Yes, we all are concerned about our city streets, farmland soil, water, vegetation, forests, the air purity to be maintained, the cleanness of rivers, water springs, oceans, our beaches, and among so many other things, the whole wildlife around us.

They are all linked and every element and component affect each other in the most unexpected manner. It is not possible to keep all of them under observation, but one sure way each one can initiate immediate is to start the practice of recycling (Anthony, 2009) [8].

### The value of biodegradable products

Our efforts to make Eco-friendly, environmental friendly, recyclable and biodegradable products have gained momentum in the past several years, bringing public awareness. Hence, it is the initial step to generate the best use of the recycle products and materials! Otherwise, we must recognize the dangers it can create in our society.

For example, the resources of our earth are limited? The most essential entity like air and water, which appeared abundant, may eventually run out. Presently, the raw materials to make plastic products are running out, moreover, the reuse of throwing away plastic products is landing in landfills (Ado, & Muktar, 2011) [3].



Fig 2: Waste management hierarchy (Recycling, 2019).

By recycling plastic materials, indicates less use of new plastic, made out of hydrocarbons and fossil fuels. It means, by recycling plastic, one ton of raw material is saved, which is 16.8 oil barrels.

Similarly, recycling wood and paper can save forests and trees. Recycled office paper of 1 ton weight can save 7650 gallons of water, 18 trees, and oil 472 gallons. The virgin rainforest can't be replaced, hence, it is better to avoid destroying them (Adisa, & Muktar, 2011) [3].



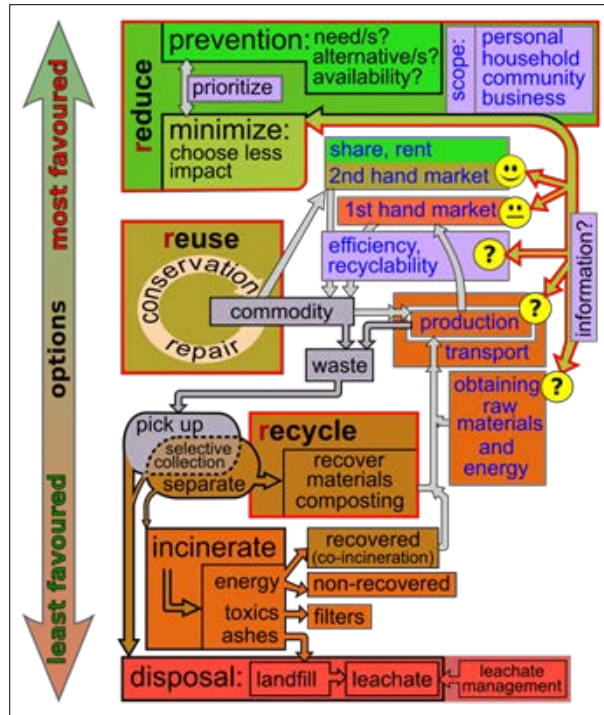
Fig 3: World Environment Day (Canon Hygiene, 2017) [11].

On this World 5<sup>th</sup> June, Environment Day, it is better necessary to emphasize the recycling impact on the environment.

With the help of numerous posters and sign boards in public places, recycling activities are promoted each day. However, it appears that people are not implementing this. It is mainly because of the thought that, in this vast world, their efforts will not make any difference. But, they should know that every effort counts and makes the difference (Canon Hygiene, 2017) [11]. Recycling can create a vast impact on the safety of the environment. Consider the following:

- Recycling can reduce the waste reaching the landfill, while 27 tonnes MSW- municipal solid waste was generated in 2013 alone;

- Recycling helps conserve natural resources, whereas, the office paper, recycled can save 27,300 liters of water, 18 trees, 2,450 liters of oil, 2.28 m<sup>3</sup> of landfill;
- Recycling helps reduce energy consumption, sufficient MSW got recycled and provided an electric supply to nearly 29 million homes, in 2014;
- Recycling helps save habitats and forests, almost 26,500,000 trees can be saved every year, in case 10% of the existing newspapers are recycled in the USA;
- Recycling helps reduce air pollution;
- Recycling of paper can reduce air pollution by almost 78%.
- Recycling helps reduce global warming, By recycling 178 metric tons of Green House Gases were reduced by recycling MSW, in 2017 (Canon Hygiene, 2017) [11].



**Fig 4:** Waste hierarchy; reducing, refusing, recycling, reusing, composting to permit waste reduction (Davidson, 2011) [14]

In industrial society, waste generation and dumping have become an intrinsic role. The domestic and commercial waste sources have increased considerably all around the world in the last ten years. The householders, commercial establishments, industries, and various small and big stores constantly contribute to the tremendous amount of waste. The waste products can be measured as millions of tons, while the population living in urban and city limits has increased 400% in the past 20 years. This enormous population growth has contributed tremendous liquid and solid waste, and it is a matter of national as well as a global concern. The waste volume is not a big problem, but the inability of individuals, society, governments, together with the disposal of waste management companies have failed to manage the task of waste reduction and environmental safety. The dirty environment affects the aesthetic sensibilities, living standards, health of human beings, implicating the quality of lives. Improper waste storage and disposal can create hazards to society through air pollution, water, and land (Ado, & Muktar, 2011) [4].



**Waste vehicle tires above 360,000,000 numbers, get accumulated in Europe annually (Alejandro Navazas, 2021) [10]**

When waste tires of vehicles are above 360,000,000 number get accumulated in Europe, it is possible to travel around the world with this quantity. These recycling tires are the main

waste challenge and they are trying to turn them into a highly valuable and sustainable resource, to make it a completely circular economy. Also, they try to prevent the release of Microplastic.

The recycling process entirely relies on the type of waste materials, and some of them is unable to use directly. However, they are possible to convert to a new set of raw materials or products through the transformation process. For example, utilized papers can be recycled to make envelopes, files, greeting cards, and so on. More energy can be obtained by recycling process through: Pyrolysis process, which is waste combustion without oxygen to generate liquids, gases, and dense compounds, by incineration process of combustion with the oxygen present to develop oxidized compounds, pellet formation, gasification, anaerobic digestion, and so on. By the composting process of chemical and biological organic waste degradation in small enterprise, a large centralized basis (*Recycling, 2019*). The collective work of 3R is aimed to achieve strong management of solid waste; and, that links to several global environmental objectives to mitigation of climate change, the greenhouse gas emission, which can generate sustainable development benefits by methane (CH<sub>4</sub>) reduction, less carbon dioxide (CO<sub>2</sub>), other NMVOC- volatile non-methane organic compounds, nitrogen oxide, nitrous oxide, and carbon monoxide from landfills. Such technologies should help to eliminate or reduce greenhouse gas emissions, including organic waste composting, high-technology derived incineration, coverage of sanitation, waste-to-energy, industrial combustion, recovery of landfill gases, along with the waste-to-energy, thermal processes. For instance, in European countries, landfill spaces accumulate 68% waste materials, 18% incinerated, 6% composted, 10% recycled (*Recycling, 2019*) [20].

**Recycling**

The recycling process converts and transforms waste and discarded materials into something new objects and

materials of further use. Hence, it becomes a good alternative to any waste of “conventional” nature of disposal and it has a capacity to save from using other material and this process can help reduce emissions of greenhouse gases, as related to plastic production, for instance. The procedure of Recycling can avoid the waste going to the landfill and which has the potential as a useful product or materials and that reduces the fresh raw material consumption, thereby reduces further usage of energy, air pollution due to incineration, air and water pollution by avoiding going to landfill. Hence, the Recycling process has become the crucial waste reduction component of the modern era and turned out to be the third factor of the waste hierarchy, “Reduce, Reuse, and Recycle” (Recycling, 2019) <sup>[20]</sup>.



**Fig 5:** Waste hierarchy, “Reduce, Reuse, and Recycle” (Recycling, 2019) <sup>[20]</sup>

### Waste

Wastes are always surplus discarded and useless unusable materials. Any substance considered as waste, which is redundant after its initial use, and hence become defective, worthless, and therefore, useless. The instances involve MSW- municipal solid waste, household refuse and trash, wastewater hazardous waste, like sewage, radioactive waste, containing bodily wastes like urine, feces, surface runoff, and others (Recycling, 2019) <sup>[20]</sup>.

### Solid waste

The sludge refuse, any garbage, are considered as the solid waste coming out of the wastewater treatment factory, treatment plant of water supply, out of air pollution and control facility, also from any other useless, redundant materials that include semi-solid, liquid, solid, or contaminated gaseous materials, coming out of commercial, industrial, agricultural, mining operations (Canon Hygiene, 2017) <sup>[11]</sup>.

### Air and Water Pollution

The contaminants, chemicals, obnoxious gases enter the air, land, or water, pollution takes place, introducing these materials into the atmosphere, land, water, or natural environment to cause adverse changes. Any kind of pollution in the form of energy, waste materials, liquid, chemical substances, heat, noise, or light. Any pollution component and pollutants can come in the form of energies or foreign substances, naturally happening contaminants. They can come in the form of pollution from classic point sources of pollution from non-point sources (Canon Hygiene, 2017) <sup>[11]</sup>.

### Statement of problem

Waste materials often pose very dangerous and profound health and environmental problems. They further elevate

insects breeding like flies, mosquitoes, Feachem 1993, Cairn cross, rats, mice. They are also hazardous to cause fire, flooding, and flow of wastewater streams. When they enter the soil, they further can percolate to join the underground water streams, to develop odor problems, aquatic weeds, breeding a variety of insect nuisance, and many more. As stated by Pichtel (2005), the waste materials generate environmental impact, as they normally cluster into dangerous six groups, including photochemical and oxidant creation, global warming, enhance natural process caused due to the effect of climate change, depletion of Abiotic resource, Acidification, and Eutrophication. Such various major constituent-related related problems can further impact the recycling stages and that bring a strain on preserving the natural environment (Ahmed & Ali, 2019) <sup>[7]</sup>.

### Aim and Objectives

The Aim is to ascertain and establish the recycling impact in environment preservation.

### Objectives

- i) To discover the additional recycling impact and help in the environment preservation;
- ii) To ascertain the impact of solid waste supervision and management practices around the world;
- iii) To assess the government role in waste management;
- iv) To investigate the advantages of solid waste management on the environment;
- v) To explore the link between environmental pollution and solid waste management (Ahmed & Ali, 2019) <sup>[7]</sup>.

### Hypothesis

The following study hypotheses were devised for the completion of this work;

- H0: Recycling waste does not generate a considerable impact to preserve the environment.  
 H1: Recycling of waste does generate a substantial impact to preserve the environment;  
 H02: No relationship exists between environmental pollution and solid waste management;  
 H03: A definite relationship exists between environmental pollution and solid waste management (Environment, 2020) <sup>[15]</sup>.

### Study Significance

It is considered that the study results will provide a significant value and scope of the federal environment ministry, in dealing with and deliver the recycling challenges as a way of solid waste management in the country. The findings will further provide sufficient database and information to the environmental management system and the agency, because the acquired results will help them prepare a strong structure to design a model to monitor and organize to command solid waste system of management, using systematic recycling process. This framework of the study will of value to researchers and academicians who wish to continue further with identical studies, as they will add more value to their body of knowledge (Recycling, 2019) <sup>[20]</sup>.

### Scope and limitation of the study

The study scope covers the waste recycling impact on environmental preservation. However, we observed that during the study, the researchers may encounter certain

constraints and that will limit the study scope. Certain constraints are:

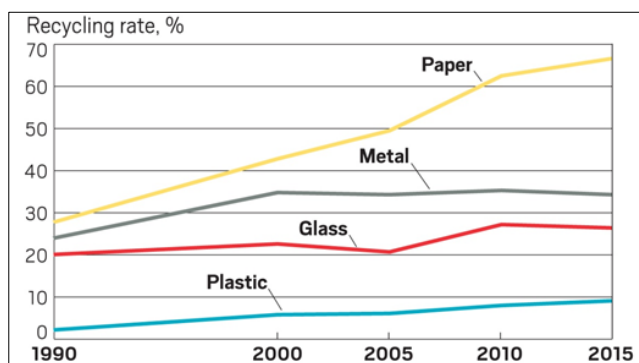
- (a) **Research material and source availability:** The availability of research material is not sufficient, due to which, there are study limitations.
- (b) **Finance:** The research work finance availability does not permit a lengthy resource coverage and due to these limitations and the researchers have different academic bills to include, there are restricted research performed.
- (c) **Time:** Time is the main constraint, and the allocated time frame for such studies cannot improve bigger research coverage to connect other academic functions to evaluate the study (Recycling, 2019) <sup>[20]</sup>.

## Recycling Benefits to the Environment

### Recycling Positive Effects

#### It basically helps Conserve Resources

The Global Foundation of Recycling, in 2017, reported that people should make the utmost use of natural resources in merely 8 months. They made new products by raw material extraction by cutting trees and mining. Therefore, they understood that the recycling process helps conserve the most essential raw materials to be used in the future (Environment, 2020) <sup>[15]</sup>.



**Fig 6:** Recycling Benefits to the Environment

Less is always more organization revealed that there is a positive recycling impact to conserve natural resources, the format is as follows: (Environment, 2020) <sup>[15]</sup>.

1. The recycled 1 ton of plastic can save 16.8 oil barrels;
2. By recycling 1 ton office papers can save 18 trees, can reduce oil 474 gallons, and save water of 7,400 gallons;
3. 1 ton steel can be recycled to save 1.78 oil barrels and avoid the landfill space of 4 cubic yards.

#### It helps provide Importance to People

- The landfill space gets filled quickly, and within some years, there will be no additional space to dump the waste materials. Recycling is the best method to control and manage the waste generated.
- Producing the fresh and new products require the use of natural resources in sizeable quantities. Hence, recycling can curtail the raw material need and helps reduce the consumption of energy. Also, recycling helps preserve natural resources that will help our future generations.
- The manufacturing cost of fresh products is prohibitive. However, when the recycling method is used to make products, the product cost will be less. Hence, the

process of recycling will reduce the financial burden and help economy by investing in various other schemes (Environment, 2020) <sup>[15]</sup>.

## Reuse and Recycling Activities in 2018

	Total Gross value	Economic Balance and Share
Jobs availability	Reported 693,000 jobs	The U.S. economy by 0.49%
Wages	Developed USD 38.6 billion in the form of wages	The U.S. economy by 0.59%
Taxes	Generated tax revenues, USD 5.65 billion	The U.S. economy by 0.78%

On average, based on the natural basis, around 1.26 jobs, USD 654,830 wages, and \$9,625 tax revenues are involved, while for every recyclable collection of 1,100 (US) tons are recycled (CIA, 2019) <sup>[12]</sup>.

## Benefits of Recycling

### 1) It Saves Energy

By using recycled materials for manufacturing applications, the quantity of energy utilized is very less. In case the below mentioned recycled materials are used, a significant quantity of energy can be saved:

- In the case of Paper recycled: 62% reduced, energy can be consumed;
- In the case of Aluminum recycled: 94% reduced, energy can be consumed;
- In the case of Cardboard recycled: 27% reduced, energy can be consumed;
- In the case of Plastic and glass recycled: 37% reduced, energy can be consumed (Environment, 2020) <sup>[15]</sup>.

### 2) Recycling can help Protect our Environment

To produce new products, there is a need to extract raw materials. Thereafter, they should be refined, cultured, and processed. The process creates water and air pollution to generate greenhouse gases, which are emitted during all these manufacturing processes, to cause global warming and environmental problems. In such cases, recycling can decrease the raw material needs, thus decreasing pollution. Moreover, it saves energy, while reducing the release of greenhouse gases, to help tackle climate change.

### 3) Helps Reduce Landfill

The EPA- Environmental Protection Agency projects that recycling 37% of created waste, will decrease the landfill space by 65%. This is because, by using the recycling method, a reduced quantity of waste reaches the landfill (Agunwamba, 2018) <sup>[6]</sup>.

## Conclusion

The waste amount we generate is increasing due to the following reasons;

- Increase of global population;
- Increase of buying potential and capacity of people;
- Innovative and fresh products with modern packaging are developed using non-environmentally-friendly materials;
- Changes in technology and Lifestyle (Environment, 2020) <sup>[15]</sup>.

### Environmental Value and Importance

- Deforestation is happening on a large scale because of destroying forests and trees, which act like raw materials provided by the natural habitat. That is the main reason cause the adverse effects of global warming. Recycling helps reduce the raw material needs and therefore, preserves our rainforests.
- Greenhouse harmful gasses and chemicals are emitted from landfill waste, affecting the environment. Recycling reduces this kind of pollution generated because of harmful gasses and waste.

When new products are created out of raw materials, a large amount of energy is utilized. Recycling reduces energy consumption to help preserve our natural resources (Adeyemi, *et al.*, 2019)<sup>[2]</sup>.

1. Recycling helps reduce energy consumption;
2. Recycling helps decrease landfill size;
3. Recycling Helps reduce Pollution;
4. Recycling helps improve the Soil condition;
5. Recycling helps conserve Natural Resources;
6. Recycling also Saves our Money;
7. Recycling generates new Green Jobs;
8. Recycling helps get rid of Greenhouse dangerous Gas Emissions;
9. Recycling avoids Loss of Biodiversity;
10. Recycling Cause Communities to come Together (Schluep *et al.*, 2012)<sup>[21]</sup>.

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