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Assessment of Solid Waste Management and Sustainability Practices in District Swat, Pakistan

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Abstract:

Humans use earth resources for their benefit and later dump the waste into the earth as solid waste, wastewater, and air emissions. Without an effective management program, these wastes can have detrimental impacts on the environment. This paper aims to assess the solid waste management and sustainability practices followed at the Mingora city and Tehsil Kabal in district Swat of Khyber Pakhtunkhwa (KPK), Pakistan. District Swat is dominated by narrow valleys and mountainous terrain, which is a part of the Himalayan Mountains. The research involved the collection of background information through various journals, books, and newspapers, followed by interviews with residents of the city using a questionnaire survey for data collection. Field studies were conducted with a sample size of 90 from households and 60 samples from Kabare shops to derive information on various SWM-related problems and prospects for improvising the system. During the process of questionnaire development information was collected about the number of residents, businesses, waste collection areas, disposal site, and TMA responsible areas. It was observed that wastes from different sources have influenced the whole of the study area through accommodation developments, solid waste dumping including plastic and sewerage. Residents and especially riverside businesses of Mingora and Tehsil Kabal disseminate solid waste along the river. Results showed that 55% of the respondents strongly agree about the environmental impacts of solid waste. The majority of people (79%) wanted to recycle resources for environmental benefits. The existing solid waste management system in the city appears to be highly inefficient as the local public was not satisfied by government departments for SWM. The proper management of wastes is essential for building sustainable and liveable cities.

INTRODUCTION

Increased population and frenzy of human society for modernization and industrialization resulted in an exponential increase in waste generation. Lack of awareness regarding waste disposal and management in urban areas leads to open burning of waste or improper disposal in environmentally sensitive areas. Excessive waste dumping/ burning leads to environmental imbalance, which affects everyday life in the area causing environmental pollution (M Safar *et al.*, 2014). More than 4 billion masses live in cities around the globe, which accumulates to more than half of the world's total population of 7.4 billion. People moving from rural areas to cities would be expected to continue at the current rate. Urban areas population is expected to double its current size nearly 70% of the world population would live in cities (bank, 2019).

Improper solid waste management is an important reason for environmental degradation that produces hazards for individuals and the environment. Waste reduction or elimination strategies for waste could produce paybacks for the environment and human health as well as economic gains, which in turn could enhance the living standard. Solid waste management (SWM) problems in developing countries could be attributed to unchecked population growth (Biswas *et al.*, 2020; Ejaz and Janjua, 2012; Kumar *et al.*, 2017). In developing countries, collection, transportation, and waste dumping activities have limited concern for the environment in SWM strategies development. Therefore, irregular dumping of household waste produced health hazards and environmental disturbances, which developed widespread problems among the general public i.e. health issues and environmental degradation. Significant problems caused by these activities need reduction and sustainable attention to reduce waste and its environmental damage control (Yuan and Yabe, 2014).

Overall, there is a requirement for the improvement of sustainable and environment-friendly waste management systems including at source waste reduction solutions along with transfer to landfills, which in turn will help in decreasing the worldwide waste-related issues. Various types of green and secure waste management and contributions might be included concerning sustainable waste management (Tadesse *et al.*, 2007; Tulebayeva *et al.*, 2020).

Waste management in Pakistan generally lacks a developed structure and faced challenges like lack of financial resources, collection and transport facilities as well as earmarked disposal sites. For best solid waste management practice, both local agencies and the public must contribute towards public awareness and decision-making. Socio-cultural aspects important for devising solutions for increasing waste-related issues include the role of public in decision making, social awareness about waste problems, and environmental issues (Abdel-Shafy and Mansour, 2018; Musu-Gillette *et al.*, 2018).

A comprehensive plan for recycling on national scale or even in major cities of Pakistan does not exist. There is limited information on the activities of scavengers. No comprehensive, cost analysis exists to the recycling problem in Pakistan. Such information is vital for efficient recycling programs, not only in Swat but also for other cities in Pakistan and other developing countries. In England, household reusing reduces/reuse 16% of household waste (Onemli and Woodard, 2004).

Pakistan due to its rapid population growth, urbanization, lack of education, and financial resources has exacerbated the waste problem, which adds incredibly to the degree of waste being produced and lack of interest for waste minimization in the waste generation population. Moreover, lack of government and public concern have resulted in vague strategies for waste management and promoted financial losses as well as environmental degradation (Wang and Nie, 2001).

Like many developing countries around the world, Pakistan has various limitations like rapid development, urbanization, lack of administration, lack of funds, and absence of required skill level among municipal workers.

Therefore, waste management in Pakistan is deficient due to lack of awareness, public interest, and ignorance as well as low general interest among government and individuals for environmental problems (Ferronato and Torretta, 2019). Sustainable solid waste management (SSWM) could promote human wellness, economic benefits, and environmental conservation. The current study was conducted to assess the solid waste management and sustainability practices followed at the Mingora city and Tehsil Kabal in district Swat of Khyber Pakhtunkhwa (KPK), Pakistan.

MATERIALS AND METHODS

Data Collection for Solid Waste Management

This research work was conducted in Mingora city and tehsil Kabal, district Swat from September to December 2018. This study was based on previous works conducted by researchers in other parts of Pakistan. The need for this study was to accurately gauge the SWM situation in the country. Data was collected through questionnaires as well as taking interviews from the tehsil Kabal and Mingora residents. Interviews were conducted specifically from shopkeepers (Kabare shop) in district Swat to get detailed and in-depth information from the stakeholders involved in current research work. Most formal questions were asked in interviews, however, based on the pilot study researcher was required to enquire about the status of SWM. Questionnaire and interview data were summarized according to its respective sections.

Standard Questionnaires

Primary data were collected through a questionnaire and interview. Data was collected through qualitative research. Two types of questionnaires were prepared with the help of experts, one for recyclable material (junk) shops and the other for household local community so that cover all the important variables. A reasonable detail was given on various aspects of SWM in the questionnaire so that its administration in the field would not take too much time. Mingora and tehsil Kabal were visited to collect information about waste management characteristics. A questionnaire was developed based on geographical and local environmental and cultural practices. The first two sections of both were the same in which section A comprised of general information of the respondent which included seven questions and the section B comprised of Solid Waste Management Information in which eighteen questions were included. Household section C comprised 18 questions and Shops section D comprised 13 questions.

RESULTS AND DISCUSSION

Ninty (90), respondents from the household, and sixty (60) respondents from Kabare shop were interviewed by structured interview and semi-structured interview instrument for quantitative data and qualitative data.

Demographic information of respondents

Out of the 150 respondents involved in this study, 17% were household, 40% were shopkeepers, and 43% other respondents were interviewed. The majority 52% were from Mingora and 48% of respondents were interviewed from tehsil Kabal. Among the respondents interviewed, 93% were male while 7% were female. 65% of respondents were married and 35% were single. 7% of respondents belonged to the age group less than 20 years. The majority 63% of 21 to 35 age group respondents were interviewed. 25% of respondents were from the age group 36 to 50 years and 5% were from 51 to 60 years old age group. The education level of 14% respondents was graduate/post compared with matriculation 42%, respectively, primary school 32% and Illiterate 12%. When the respondents respond to the survey have been evaluated according to their job distribution it has been found that 11% of them were employed, 13% of them were unemployed, 3% were housewives, 41% were traders (Kabare), 9% were shopkeeper and 23% other respondents were interviewed (Table 1).

Table 1. General information of respondents in district Swat.

Questions Particulars	Responses	Individual Number	Answer Percentage
Respondent type	Household	25	17%
	Shopkeeper (Kabare)	60	40%
	Other	65	43%
Residence	Mingora	78	52%
	Kabal	72	48%
	Other	-	-
Gender	Male	140	93%
	Female	10	7%
Marital status	Single	52	35%
	Married	98	65%
Age group	<20	10	7%
	20-35	95	63%
	36-50	37	25%
	51-60	8	5%
	>60	-	-
Qualification	Illiterate	18	12%
	Primary	48	32%
	Matric	63	42%
	Graduate/Post	21	14%
Occupation	Housewife	5	3%
	Employee	16	11%
	Trader (Kabare)	61	41%
	Shopkeeper	13	9%
	Unemployed	20	13%
	Other	35	23%

Solid Waste Management System Information

Table 2 shows the overall knowledge level of respondents concerning solid waste management. The knowledge level of respondents related to solid waste management was excellent. All the respondents, 100% answer questions related to solid waste management. 65% of respondents know about the impact of solid waste. A previous study showed that Macau residents owned a relatively high environmental awareness (Song *et al.*, 2016).

TMA activities in Solid Waste Management

Table 3 shows the TMA participation in solid waste management. In this section, the respondents were asked if the TMA handles solid waste or other facilities from the TMA side. The respondents answered 100% correctly about their opinion. TMA workers collect waste in the city (Khattak *et al.*, 2009).

Table 2. Questions about solid waste management information.

Solid waste questions	Answer	Number of respondents answered
Do you know about the environmental impacts of solid waste?	Yes	97
	No	27
	Don't know	26
Have you ever noticed visible waste pollution impacts in Swat?	Yes	130
	No	5
	Don't know	15
Did you ever notice solid waste clogged water bodies?	Yes	54
	No	41
	Don't know	55
Have you seen open waste burning in Swat?	Yes	127
	No	17
	Don't know	6
Did you suffer health problems due to improper solid waste disposal?	Yes	82
	No	49
	Don't know	19
Do you think information is available for solid waste, environmental impacts in Swat?	Yes	63
	No	10
	Don't know	77

Table 3. Questions related to TMA activities.

Does TMA collect solid waste from your area?	Yes	60	40%
	No	68	45%
	Don't know	22	15%
Are there any public bins/ waste collection points near your house?	Yes	77	52%
	No	62	41%
	Don't know	11	7%
Do you suspect the waste disposal technique is a trouble in your region?	Yes	107	71%
	No	24	16%
	Don't know	19	13%
Are you satisfied with the TMA waste management process?	Yes	54	36%
	No	52	35%
	Don't know	44	29%

Improvement in Solid Waste Management toward Sustainability

Table 4 shows the majority of respondents (95%) agreed that the management of solid waste is necessary for sustainable development. The averages show that people want to manage solid waste for sustaining water, land, and other natural resources. A study reported that wastes in open space are responsible for water pollution, soil pollution, biodiversity loss, bad smell, diseases, and other environmental resources degradation (Ejaz and Janjua, 2012).

Table 4. Questions about sustainable management of solid waste.

Questions	Answer	No.	%age
Recycling is important for the environment of the local area	Yes	118	79%
	No	9	6%
	Don't Know	23	15%
Waste 3R's (reduce, reuse, and recycle) process for environmental sustainability	Yes	50	34%
	No	32	21%
	Don't Know	68	45%
Farmers willing to pay for solid waste composting purposes	Yes	105	70%
	No	11	7%
	Don't Know	34	23%
Environmental problems in Swat can be decreased if solid waste is managed properly	Yes	137	91%
	No	2	2%
	Don't Know	11	7%
Solid waste management over the last five years?	Yes	70	46%
	No	34	23%
	Don't Know	46	31%
Development (businesses, tourism) has increased solid waste generation in Swat	Yes	103	69%
	No	13	8%
	Don't Know	34	23%
Residents and visitors in Swat have a responsibility towards sustainable solid waste management	Yes	130	87%
	No	8	5%
	Don't Know	12	8%
If a waste separation program was set up by TMA would you be willing to collect material into separate bags?	Yes	142	95%
	No	3	2%
	Don't Know	5	3%

Solid Waste Management Data Collected from Household

Table 5 showed the data collected from household respondents. A previous study reported that plastic and food wastes from commercial sites and houses are the main sources of solid wastes (Zhang *et al.*, 2010). Similarly, another study reported that household and commercial wastes are the primary sources of solid wastes in Malaysia (Abd Manaf *et al.*, 2009).

Table 5. Questions about solid waste management in Swat.

Questions	Answer	No.	%age
What type of solid waste comes out of your household/ business?	Paper and carton	17	11%
	Plastic	53	35%
	Organic waste	70	46%
	Glass	7	5%

	Other	5	3%
In what type of container do you collect waste?	Carton	3	3
	Wastebasket	47	52%
	Plastic bags	35	39%
	Other	5	6%
How often is the waste container emptied?	One day	26	29
	After two days	33	37%
	After four days	4	4%
	Once a week	16	18%
	Other	11	12%
Where do you generally position away gathered waste?	In public bin	8	9%
	Open space	13	14%
	In river	10	11%
	Dheeran	59	66%
How do you estimate the state of solid waste collection in your area?	Good	15	17%
	Fair	32	35%
	Not good	43	48%
What is it made of? (Could tick/ fill more than one)	Plastic	49	30%
	Metal	16	10%
	Wood	16	10%
	Organic	74	46%
	Other	7	4%
Who takes the waste from your private home, store, and stall for disposal?	Me	60	67%
	Housekeeper	15	17%
	TMA	6	6%
	Other	9	10%
Do you find any environmental change in your area?	Soil pollution	40	35%
	Water pollution	41	36%
	Air pollution	8	7%
	Health hazard	25	22%
If any of the above questions is yes, in what way it is damaged?	Waterlogging	24	26%
	Groundwater contamination	29	32%
	Other	39	42%
Have you been aware of the damaging effects of single-use plastic and other hazardous waste in the environment?	Yes	42	47%
	May be	29	32%
	No	10	11%
	Not sure	9	10%
If you answered yes/ maybe to question 11. In what way	Soil pollution	56	37%
	Water pollution	56	37%
	Air pollution	17	11%
	Health hazard	23	15%

Recommended Solutions for Solid Waste Management Problems

The semi-organized meeting instrument respondents were approached to give their suggestions for Swat TMA to determine SWM issues. The Majority (86%) of respondents stated that it is fundamental to cooperate with the TMA. The location of the dust-bin, solid waste disposal container was the issue; people suggested that the TMA should put a container close to each location i.e. suitable distance because the TMA collection/ gathering focus is away from where some people residences or workplaces in Mingora. These results are similar to another study carried in another developing country (Mukisa, 2009). However, the source of uncertainty in our estimates results from the relatively few measurements (160 respondents)

of residents. To gain a better understanding and develop a feasible plan for the implementation of SWM in district Swat, detailed studies need to be carried out for waste generation, characterization, collection, and disposal, especially outside of Mingora.

Reduced Generation of Solid Waste

The results demonstrated that the majority (81%) of the respondents during this research couldn't think of a way to reduce waste generation. This demonstrated the need for public education on sustainable waste management which involves refuse, reduce, reuse and recycle. The government needs to start a campaign for public awareness on the sustainable management of waste. Public response during the interview was that there is a lack of alternative for refusing to use plastic given by some of the 19% of the respondents. Like using reusing cloth bags instead of disposable plastic bags and using washable utensils instead of disposable plastics. This could drastically cut down on plastic waste that is clogging natural water bodies and creating environmental pollution problems. Similar concerns were reported during several recent studies in developing regions (Willis *et al.*, 2018).

Mingora and Tehsil Kabal Solid Waste Management Problems

The main issue is that the TMA postponements take the waste, making it an issue since waste begins to decay and the entire condition begins to stink. The TMA ought to motivate a vehicle to gather squander notwithstanding for individuals who don't have cash or they should charge a moderately less expensive expense since individuals gain minimal expenditure. The TMA needs to gather squander more regularly in any event day by day, even at a relatively cost for individuals to deliver a ton of waste and they are happy to pay. The TMA should gather squander from us for nothing out of pocket by vehicle.

Solid Waste Management Problems for Respondents

The stream Swat begins from Mahodand and Gabral at a rise of around 3,000 meters and goes through the valley of Swat and Malakand Agency. Ushu, Utror, Mankial, Ghurnai, Kedam, Daral, Beshigram, Pia, and Shin are the fundamental tributaries, which join the waterway Swat at different focus. The water of the stream is utilized for water system, drinking, and power age. The waterway fills in as the life blood of the economy of the KP because of the way that ripe agribusiness fields of Malakand Agency, Swabi, Mardan, and the vast majority of Charsadda are flooded through the upper and lower Swat trench framework. Waterway Swat additionally gives natural surroundings to different fish, particularly the upper achievers where trout angle have been acquainted which contribute to the economy of the region by making business openings and an ideal eating routine for local people and visitors. Sadly, the water of the waterway Swat is defiled by various sources because of a botch of catchment zone, impromptu development of structures, dumping and tossing of strong/civil waste, and release of sewerage water and modern effluents. Amid the past, no appropriate consideration was given to the natural debasement of stream Swat because of which the water has been sullied seriously.

All respondents at Mingora and tehsil Kabal said that solid waste disposed of in the riverside effect the river swat. This study observed that arranges all solid waste in the river which is not suitable for river swat because people use the water and the main point is that which also effect on the native fishes of swat so the water polluted due to leaching which can be harmful to the health of water handlers.

The encompassing network has been continually whining about the unsavory conditions they are looking for by being close to this dump. Furthermore, uncontrolled rough dumping may result in the discharge of ozone harming substances, for example, methane and carbon dioxide, which seriously affect climatic change.

Inefficient Retrieval of Recyclable Material

In the interview, the researcher asked the question from respondents what kind of waste is

reusable but you haven't used it. The majority of respondents said that the oil pocket, which is reusable for water storage, is used for the wastebasket and many other purposes but we don't reuse that.

Recycled material collection

Information on practices for waste reduction in district Swat was collected from recycled shops. Figure 1 shows that 43% of responders said they recycle approximately >200 kg solid waste per week while 28% replied 200 kg, 17% said 150 kg and only 12% replied, 100 kg of solid waste they recycled in a week. This shows that >200 kg waste material, mostly recycled in a week.

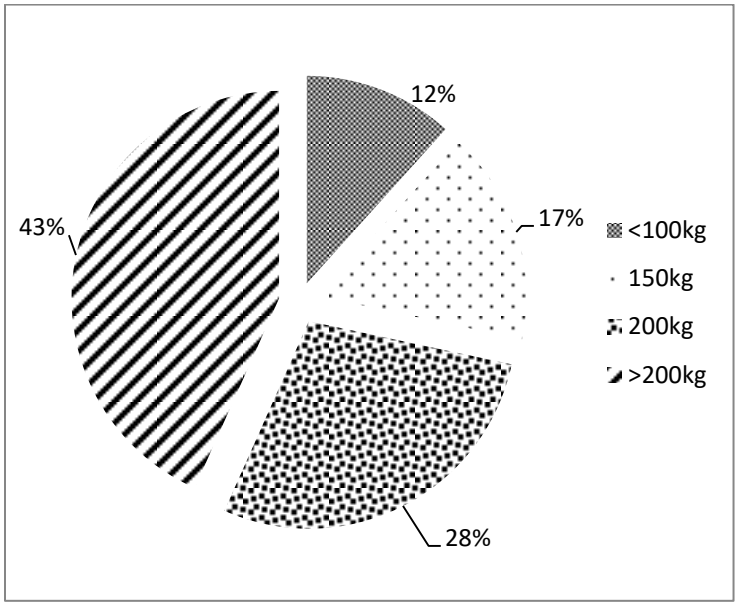

Fig. 1. Recycled material (approx.) collects on a weekly basis.

Collecting waste material for recycling

The solid waste material constitutes paper, cardboard, durable plastic, thin plastic, ferrous metal, copper, aluminum, bottles, broken glass, bones, textile, rubber, leather, food waste, wood, etc. The majority of respondents answer that they collect plastic, rubber, metal, and paper for recycling. Because of the uses of these materials in large amount in the houses, industries, hospital and other areas. People throw away the material on different sites and we collect it for recycling purposes. Now a day the plastic produces in large amounts in different shapes, for example, plastic bottles, plastic toys, plastic tubs, plastic chairs, others, etc. We recycle it and make other materials for use.

The question is, approximate weight (Kg) of recycled material collected per week? Figure 2 shows that 64% of responders said that the first high-weighted recycled material is plastic goods. After plastic, the second-highest rate waste material is paper, i.e. 18%, while 11%, 3%, 2%, and 2% weight was observed for, iron, Rubber, glass, and steel respectively. It means the major waste material is paper, which is recycled per week. These findings are supported by various studies (Bajpai, 2015; Gupta *et al.*, 1998; Metin *et al.*, 2003).

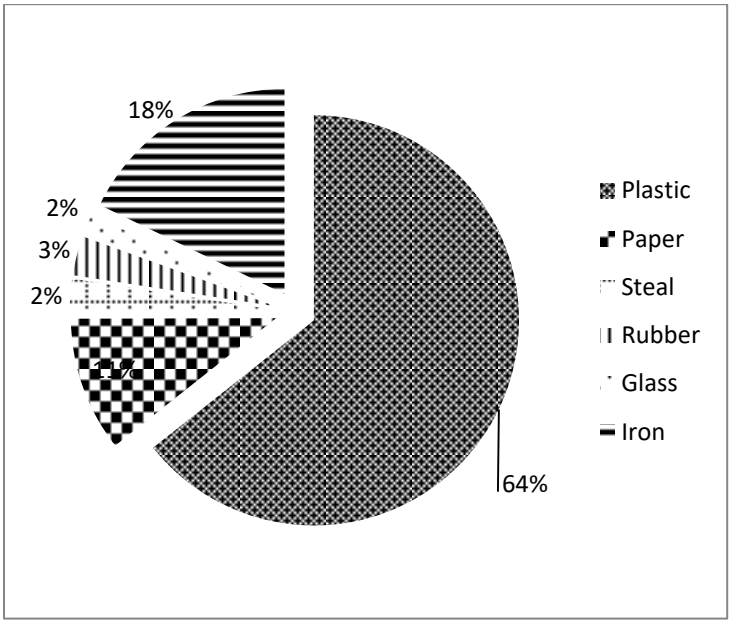

Fig. 2. Approximate weight (Kg) of recycled material collected per week.

Collecting, Storing, Transportation Cost, Monthly Income of Recyclable Workers

The question was asked of the respondents about the cost of solid waste collection, storing, transportation, monthly income about the solid waste management, and how many workers involve in the solid waste management process. All the respondents answer carefully about their point of view. The main commercial center of Swat is Mingora, which is an urban area where the main shop of Kabare is present, and the tehsil Kabal, which is a rural area where the small shop of Kabare is present.

The Mingora respondents responded that they collect, store, transport and recycle the solid waste in which above 10 worker work. The cost of that process is above 10,000 and the monthly income is above 100,000. The response of the tehsil Kabal respondents was that 1 to 5 workers work in collecting, storing, transport and recycling of solid waste. The cost of tehsil Kabal shop 500 to 1000 and their monthly income is 5000 to 20000. The children who collect the waste from the street, they purchase it in the main and a small Kabare shop. They work together for collecting solid waste in which 1 to 7 children work. Their cost is 50 to 300 and monthly income of these children is 5000 to 10,000.

In response to the question, what do you do with the waste (waste which does not reduce, reuse and recycle)? 53% of junk shop dealers said they mostly burn the waste material which not be able to pass through the 4Rs while 27%, 13%, and 7% of junk or scrap dealer's response was open space, thrown into the river, and other respectively (Figure 3). These findings are supported by several investigations (Annepu, 2012; Kofoworola, 2007; Rouse, 2006; Sajid *et al.*, 2019; Wilson *et al.*, 2006).

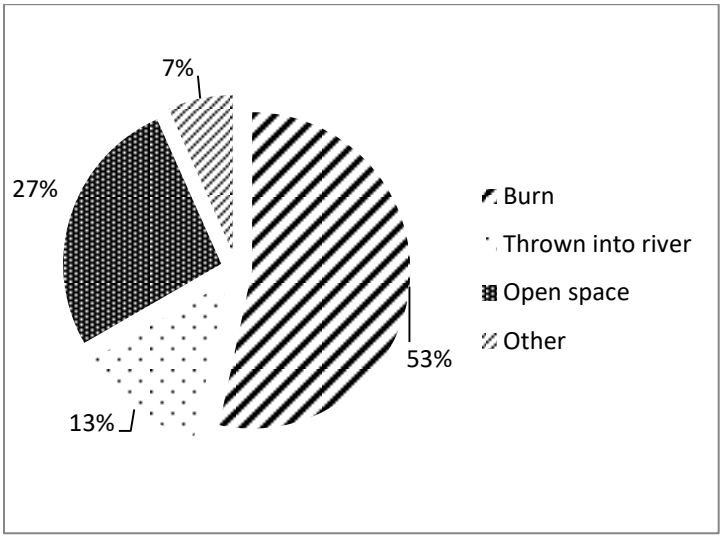

Fig. 3. Waste which do not reduce, reuse, and recycle.

Data about the question what is the recycled component with the highest weight? Figure 4 shows the answer to this question in such a way that 63% of responders said that the first recycled component with the highest weight is plastic. After plastic, the second-highest rate waste material is paper, i.e. 18%, while 10%, 7%, and 2% weight was observed in, iron, Rubber, and glass respectively. This shows that the recycled component with the highest weight is paper. Various studies reported the incidence of plastic in greater amounts among recyclable components of the solid waste (Ashori and Nourbakhsh, 2009; Aziz *et al.*, 2011; Subramanian, 2000; Vinodh *et al.*, 2014). The largest recyclable component of the solid waste generated in Canada is paper as reported in a previous study (Krigstin and Sain, 2006).

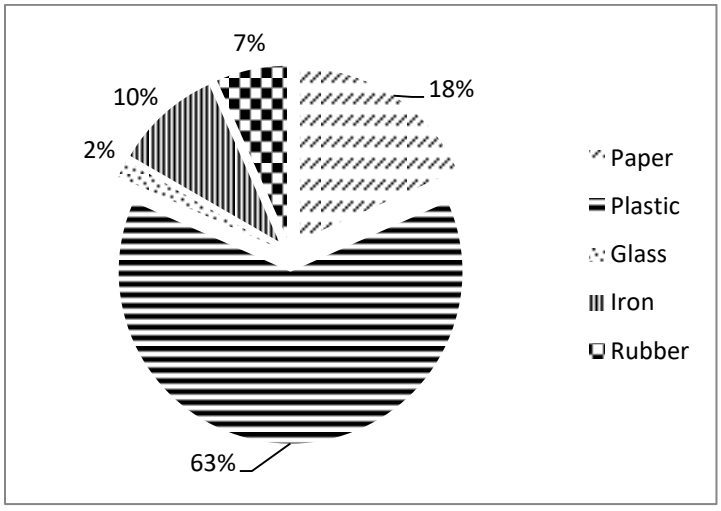

Fig. 4. Recycled component with the highest weight.

Interview and Observation

Different interview questions were asked from the Kabare shops related to solid waste they all answered. The interview question was that which waste material loses its value after some time and why? The respondents said that when a paper gets soaked with water, the paper loses its value because it absorbs water. The second interview question was where you supply the waste which you collected and for what purposes they used? The 15% of respondents replied that they dispose of the solid waste by selling them to the nearby shop in Mingora city the solid waste is then taken to another place for recycling. 30% of respondents collect solid waste from the streets and dispose of it by selling it to shops in the village. 55% of people who are shopkeepers in the Mingora city replied that they would transport waste to the bigger city like Peshawar, Lahore, and Rawalpindi and recycle it there. Our daily-used products come from this recycled waste. The third interview question was that what is the difference between TMA and your work of waste collection? The respondents answer that the TMA collect the solid waste from the houses and the street and dump it into the swat river and other areas which are selected for solid waste dumping. However, the shopkeepers (Kabare) which collect the solid waste and recycle it back. This helps in reducing pollution and keeps our environment clean. According to researcher observation, some people burn public litter, solid waste in open spaces that cause pollution and bring negative effects to the green zone part of the environment. People collect solid waste by removing plastic products from them it and then use the solid waste for agriculture as the solid waste acts as good manure. Similar findings are reported in other studies (Hemmat *et al.*, 2010; Iqbal, 2018; John *et al.*, 2013; Westerman and Bicudo, 2005).

CONCLUSION

SWM is a serious problem that is further worsening the pristine mountainous region environment and related health problems in Mingora and tehsil Kabal of Swat district. The factors which affect solid waste management were identified during the study were;

Lack of general public interest, obliviousness among people, inaccessibility of SWM resources, Swat mountainous territory and lack of workforce, population development, increased tourism activities, landfill issues, and lack of government priority.

Waste dumps littered with plastics and unsightly waste strewn around could be found around the study area in water bodies and open spaces which decreased the attraction and beauty of Swat valley.

Plastics are major contributors to the solid waste of houses. This further demonstrated the need for public education on sustainable waste management.

The majority of people wanted to remove unpleasant solid waste dumps in and around the Swat river and surface water tributaries and were not satisfied with government efforts to reduce solid waste.

Collected SW from houses and the street also end up near Swat river and other areas which are selected for solid waste landfill.

Recyclable businesses (Kabares) informally collect or buy the recyclable solid waste from the general public and sell collected material to recycled factories in big cities thus helping in reducing landfill-bound waste.

People collect organic waste of fruits, vegetables, tree cutting, crop waste, etc., and remove non-biodegradable plastic products from waste and compost it for fertilizer purposes in agriculture. This provided cheap alternatives to commercial fertilizer as compost is rich in nutrients.

The public was generally unaware of 4rs practices, government could promote sustainable SWM by creating awareness among the general masses.

RECOMMENDATIONS

SWM system hinge on all stakeholder interests including government and private sectors as well as the general public as better environment and resource management for us and future generation require all parties' involvement. The following measures are recommended for effective waste management from research finding

Awareness should be provided to people through seminars, radio, and television programs to reduce the generation of solid waste and to know about the problems created from solid waste to cooperate with the government.

Government should provide resources for waste collection, storage separation, and compression to reduce the size along with proper disposal site allocations and techniques.

Government servants involved with TMA and other SWM officials should perform their designated tasks regularly and honestly.

Government and community should not dump waste, but efforts and awareness need to be provided for efficient resources recovery for other purposes.

Recycling could further be incentivized and generate more profit for the stakeholder if the government organized workshops and awareness campaigns for the public.

If recycled material processing industrial units could be set up near district Swat this could help the industry grow by leap and bounds.

Further detailed large-scale studies need to be carried out for factors involved in waste generation, characterization, collection, and disposal, and their potential impacts on Swat tourism potential to encompass the whole of Swat and other adjacent areas.

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CONFLICT OF INTEREST

There is no conflict of interest.

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