RESEARCH NOTES
AWARENESS OF SOIL POLLUTION AMONG ADOLESCENTS IN BENGALURU CITY, KARNATAKA

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Introduction

Land is an integral part of the ecosystem that supports human activities. The pollution of soil has been a major concern to conservationists and environmentalists globally. Contaminated land is affecting crop production and posing threats to human health. The choice of a suitable separation technique in the removal of pollutants from affected soils depends on the kind of pollutants, concentration and location characteristics. (F. B. Elehinafe et. al., 2022)

Globally, fly ash (FA) generated in huge quantities from coal fired power plants was a problematic solid waste. Utilization of FA as an ameliorant for improving soil quality had received a great deal of attention over the past four decades, and many studies have been carried out worldwide. The silt-sized particles, low bulk density (BD), higher water holding capacity (WHC), favourable pH, and significant presence of plant nutrients in FA, made it a potential amendment for soils. Studies suggested enormous potential for the use of FA to improve cultivable, degraded/waste land, mine soil, landfills, and also to reclaim abandoned ash ponds, for agriculture and forestry. FA application improved the physical, chemical and biological qualities of soils to which it was applied. The performance of FA blending with organic and inorganic materials was better than FA alone treatments. Farm manure was found to be the most promising amendment used along with FA. While using FA in agriculture as a soil ameliorant, it was better to seek the locally available fitting blend materials for exploiting the benefits from their synergistic interaction. (Ram and Masto, 2014).

Environmental damage is still happening. The mistaken human perspective about the environment causes this damage and continues if unchecked. Only humans with environmental literacy can solve environmental problems. Environmental education is seen as the most effective way to educate people about environmental issues at all levels of

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education. Teachers are the front line in the success of education. (FebrianawatiYusup, 2021).

Materials and Methods

Therefore, this study was taken up with the following objectives:

- To assess the adolescents' awareness regarding soil pollution.
- To determine the adolescents' sources of information about soil pollution.

The study was limited to 625 adolescents, both boys and girls within 12-16 years from selected high schools in Bengaluru city, studying in 8th - 10th standards. The research design comprised of the survey method, and the questionnaire was the tool utilized. A multistage random and cluster sampling was the sampling technique used for the present study.

Results and Discussion

The socio-demographic information of the adolescents comprised of six hundred and twenty-five adolescents from selected schools from the different zones of Bengaluru city for the survey. Adolescents in the age group of 12-14 years comprised 38.2 per cent of the total sample, while those in the age group of 14-16 years were 61.8 per cent. Boys constituted about 56 per cent of the sample and girls were 44 per cent. Majority of the adolescents (73%) were from nuclear families in the city today, with a smaller per centage being from joint or extended families.

TABLE - 1: Awareness of Soil Pollution

Aspects	Adolescents	
	Number	Percentage
Aware of Soil Pollution		
Fully Aware	407	65.1
Partially Aware	218	34.9
Reason for deforestation@		
Whirl winds	231	37.0
Soil erosion	334	53.4
Heavy rain	26	4.2
Population explosion	34	5.4
Reasons for Soil pollution @		
Deforestation	123	19.7
Excessive usage of fertilizers	60	9.6
Soil erosion	64	10.2
Extensive agricultural processes	20	3.2
Usage of non-biological pesticides	125	20.0
All of the above	233	37.3

The above table reveals that 65.1percent of the adolescents were fully aware of this aspect with 34.9 percent being partially aware. Most (53.4%) adolescents stated that soil erosion was responsible for deforestation; 37percent cited whirlwinds as the cause; while 5.4percent and 4.2percent of the adolescents blamed population explosion and heavy rains for causing extensive soil pollution. Among the reasons cited by adolescents for soil pollution in Bengaluru city, 20.0 percent said usage of non-biological pesticides was the main reason. A few adolescents (19.7%) stated deforestation; 10.2 percent stated soil erosion; while 9.6 percent and 3.2 percent said excessive usage of fertilizers and extensive agricultural processes caused massive land pollution respectively. Around 37.3 percent of the adolescents stated that all the above reasons caused soil pollution in the city.

TABLE - 2: Causes of Soil Pollution

N=625

No.	Causes of Soil Pollution	Adolescents	
		Number	Percentage
1	Industrial wastes	532	85.1
2	Throwing garbage on roads	516	82.6
3	Nuclear wastes	474	75.8
4	Demolition of buildings and disposing off their debris along the roadsides	413	66.1
5	Deforestation	507	81.1
6	Human waste	394	63.0
7	Increased usage of machinery	333	53.3
8	Unethical medical waste disposal	488	78.1

@ Multiple Response

It is evident from Table 2 that majority of the adolescents (85.1%) cited that industrial wastes were the major cause of soil pollution in Bengaluru city; with 82.6 percent and 81.1 percent stating that throwing garbage on roads and deforestation being the main causes for soil pollution respectively. Similarly, majority (78.1%) of adolescents felt that unethical medical waste disposal also caused soil pollution; 75.8percent stated that nuclear wastes was a major issue; with 66.1percent, 63 percent and 53.3 percent quoting demolition of buildings and disposing off their debris along the roadsides; human waste; and increased usage of machinery induced soil pollution respectively.

TABLE - 3: Measures to Prevent Soil Pollution

N=625

Aspects @	Adolescents	
	Number	Percentage
Reasons for growing forests:		
Remove silt caused by floods	47	7.5
Enhance cultivation	111	17.8
Prevent soil erosion	401	64.2
Prevent forest fires	66	10.6
Afforestation means:		
Cutting of forests	144	23.0
Planting of trees in an area where there were no trees earlier	416	66.6
Clearing of lands for cultivation	32	5.1
Barren lands	33	5.3
Prevention of soil pollution:		
Crop rotation in agricultural lands	131	21.0
Careful usage of pesticides	153	24.5
Ensuring that trees are not cut down unnecessarily	211	33.8
Providing adequate green cover in and around the city	130	20.8

@ Multiple Response

Adolescents stated diverse reasons for growing and saving forests in table 3. Based on multiple responses, 64.2 percent felt that soil erosion should be prevented to save forests; 17.8 percent stated to enhance cultivation; 10.6 percent to prevent forest fires while 7.5 percent felt that forests were necessary to remove the silt caused by floods. Hayhoe(2013) authenticated that the world's soils were under increased pressure on many fronts such as unprecedented threats from erosion, deforestation, desertification, salinization, sealing (paving over) and contamination, loss of biodiversity and climate change. The study confirmed the adolescents' perceptionthat tree cutting, soil erosion and prevention of forest fires were critical measures to prevent further soil pollution. Most (66.6%) of the adolescents knew that afforestation meant planting of trees in an area where there were no trees earlier while 33.4 percent were unaware of this aspect. Regarding the measures to prevent further soil pollution, 33.8 percent of adolescents agreed that trees should not be cut down unnecessarily; 24.5 percent suggested that pesticides should be utilized carefully; with 21 percent and 20.8 percent suggesting crop rotation in the agricultural lands and providing adequate green cover in and around Bengaluru city respectively.

TABLE - 4: Sources of Information on Soil Pollution

N=625

No.	Source of Information @	Adolescents	
		Number	Percentage
1	School syllabus and text books	533	85.3
2	Radio and television	480	76.8
3	Newspaper/Magazines	538	86.1
4	Siblings	317	50.7
5	Friends	306	49.0
6	From the Internet/Other reference books	498	79.7

@ Multiple Response

Results of table 4 indicates that majority of the adolescents conveyed that their primary source of information regarding environmental pollution was from newspaper and magazine articles (86.1%), as well as from the school syllabi and textbooks respectively (85.3%). A smaller percentage stated their information source being from the internet and reference sources (79.7%), radio and television (76.8%), and 50.7 percent and 49.0 percent from siblings and friends respectively.

Conclusion

- Most adolescents were fully aware of soil pollution with most of them stating that soil erosion was responsible for deforestation.
- Majority of the adolescents cited that industrial wastes were the major cause of soil pollution in Bengaluru city along with the dumping of garbage on roads.
- Most adolescents' perceptionwas that tree cutting, soil erosion and prevention of forest fires were critical measures to prevent further soil pollution. Also, they stressed upon the solution being that trees should not be cut down unnecessarily in the city.
- Majority of the adolescents conveyed that their primary source of information regarding environmental pollution was from newspaper and magazine articles, as well as from the school syllabi and online sources.

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