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Public awareness about water and soil pollution in the Sundarbans and neighboring area

A.K.M. Faruk-E-Azam and M.W. Zaman
Department of Agricultural Chemistry, Patuakhali Science and Technology University, Patuakhali and Department of Agricultural Chemistry, Bangladesh Agricultural University, Mymensingh-2202

Abstract: Public awareness regarding water and soil pollution in the Sundarbans mangrove forest was recorded from fifty tourists and neibouring people. The respondents were interviewed on polluting agents like wild life decrease, unauthorized industrialization, illegal timber cutting, indiscriminate use of fertilizers, excessive use of pesticides, water pollution by pesticides, insecticide use in irrigated crop fields, discharge of oil from ship, industrial wastes,. As per the public opinion, indiscriminate use of agrochemicals was the highest polluting agent in Satkhira and oil discharge from ship was in Bagerhat region. The lowest pollutant was oil discharge from ship in Satkhira and the reduction in all forms of wild life was in Bagerhat region. Public awareness building could be the best management for conservation of the Sundarbans. Disposal of industrial waste at safety places, illegal timber cutting from the Sundarbans, judicial use of fertilizer and pesticides and public awareness building about pollution are important. Respondents expect remedial measures and mass awareness to control pollution.
Key words: Mangrove forest, water and soil pollution, public awareness.

Introduction

The name Sundarbans means "beautiful forest". It is naturally furnished with bio-diversity and is a gift of the nature. In general, forests are vital for maintaining the earth's ecological balance. The accepted standard according to the experts of environmental science is that a country has at least 25 percent of its total land area covered with trees or forests (Huda and Roy, 1999). The plants of mangrove forest are taking required nutrients from the soil and water for their survival. On the other hand the animals are dependant on the plants. Deterioration of soil and water quality directly affects the whole bio-diversity of the forest. Extensive uses of forest resources reduce forest area. Once covered by dense forests, Bangladesh is now almost devoid of forested land, except in a few selected areas of the country (Giri and Shreshtha, 1996). According to the forestry Master plan (FMP) and surveys by multi- lateral donor agencies, a total of 7, 69,000 hectares or 6 percent of the country's land mass have actual tree cover (FAO, 2003). The coastal environment of the mangroves are facing water and soil pollution, leading to serious impacts on sediment quality as well as on biodiversity. The future of the Sundarbans will depend upon the management of water and soil resources. Mangrove forests are efficient barriers to upward transport of heavy metal and protect pollution in tropical coastal area (Silva *et al.*, 1990). The pollution around the coast of Bangladesh affects migratory birds, sea turtles and cetaceans such as dolphins and whales (Hannan, 2007). Very little information are available in Bangladesh on water and soil pollution of the Sundarbans mangrove forest. The causes and intensity of pollution should be detected. The possible remedial measures could also be suggested. However, public awareness build up against pollution and in favour of remediation measures are the vital point. Therefore, a study was conducted to assess the present state of awareness of the public on the afore-said topic. The major objectives of the study were the evaluation of the public awareness about water and soil pollution in the Sundarbans mangrove forest and neighboring area.

Materials and Methods

Preparation of interview schedule: For the collection of information on water and soil pollution in the Sundarbans mangrove forest, an interview schedule was prepared. Information was collected randomly from 50 tourists and neighboring people through interview schedule.

Data collection Procedure: Information was collected by personal interview with tourists and neighboring people of different age and occupations from the study area during March 2007 to November 2008. All possible efforts were made for the collection of authentic information from the respondents. The questions were self explanatory and clarified further so that the respondents could easily understand.

Data processing: The collected data were properly coded and transferred from interview schedule to a master sheet. Data conversion was done by means of suitable scoring whenever necessary. Again cross tabulation was done on the basis of categories.

Data analyses: The data analyses were performed using statistical treatment with SPSS (Statistical Package for Social Science) computer package. The statistical measures such as range, mean, standard deviation, percentage, and ranking order were used in describing the variables as and where necessary.

Measurement of variables: In accordance with the objectives, a study was carried out to evaluate the selected variables. Fifty randomly selected respondents were categorized with assigned scores from different variables.

Selected characteristics of the respondent: Age of the respondents, educational status of the respondents, occupation of the respondents, respondents perception to the selected statements regarding water and soil pollution, measures suggested by the respondents for reduction of water and soil pollution, and classification of respondents according to reduction measures for water and soil pollution in the Sundarbans areas.

Results and Discussion

The study investigated the perception and awareness of the tourists and neighboring people regarding water and soil pollution in the Sundarbans mangrove forest. In accordance with the objectives of the study, presentations of the results were made in the following sections of this chapter.

Perception of tourists and neighboring people

Selected characteristics of the respondent

Age of the respondents: The age of the respondents ranged from 20-55 years at Satkhira region and 21-54 years at Bagerhat region respectively. On the basis of age, the respondents were classified into three categories as young (up to 30 years), middle-aged (31-45 years) and old (above 45 years) are presented in Table 2.

Data presented in Table 1 indicated that in Satkhira region, the majority (48%) of the respondents was middle aged, 44 % were young and 8 % were old. The mean and standard deviation of their age were found as 34.00 and 9.28 years, respectively. In Bagerhat region, the majority (44%) of the respondents was middle aged, 36 % were young and 20 % were old. The mean and standard deviation of their age were found as 35.76 and 9.25 years, respectively.

Educational status of the respondents: The scores on the basis of education the respondents ranged from 1-5. The respondents were classified into five categories as illiterate, primary, secondary, HSC and higher degree.

Table 1. Classification of respondents according to age (N= 25+25=50)

	regions	Ranged		Categories	Respondent		Mean	SD
		Possible	Observed		No.	%		
Variable	Satkhira	-	20-55	Young(≤30)	11	44	34.00	9.278
				Middle aged (31-45)	12	48		
				Old(>45)	2	8		
	Bagerhat	-	21-54	Young(≤30)	9	36	35.76	9.248
				Middle aged (31-45)	11	44		
				Old(>45)	5	20		

Table 2. The categories of the respondents according to educational qualification (N=25+25=50)

	Locations	Range		Respondent			Mean	SD
		Possible	Observed	Categories	No.	%		
Variable	Satkhira	1-5	1-5	Illiterate	5	20	-	-
				Primary	4	16		
				Secondary	8	32		
				HSC	6	24		
				Higher degree	2	8		
	Bagerhat	1-5	1-5	Illiterate	4	16	-	-
				Primary	5	20		
				Secondary	7	28		
				HSC	5	20		
				Higher degree	4	16		

It was evident from the results shown in Table 2 that in Satkhira region, the majority (32%) of the respondents were secondary educated and the minority (8%) were higher degree. In Bagerhat region the majority (28%) of the respondents were secondary and the minority (16%) were both higher degree and illiterate (Table 2).

Occupation of the respondents: In case of occupation, the respondents were classified into five categories like fishing, business, service, student and farming. In both Satkhira and Bagerhat regions the majority respondents were found business man and their percentages were 28 and 32 respectively and the minority in both Satkhira and Bagerhat were found student and their percentages were 16 and 12 respectively. The minority level in Satkhira was found as service holder (Table 3).

Table 3. The categories of respondents according to their occupation (N=25+25=50)

Occupations	Satkhira		Bagerhat	
	No.	%	No.	%
1. Fishing	5	20	6	24
2. Business	7	28	8	32
3. Service	4	16	4	16
4. Student	4	16	3	12
5. Farmer	5	20	4	16
	25	100	25	100

According to the opinions of the respondents, the highest polluting agent was indiscriminate use of agro chemicals (71) in Satkhira region and oil from ship (68) in Bagerhat region. The lowest was oil from ship (30) in Satkhira region and decrease in all forms of wild life (25) in Bagerhat region (Table 4).

Possible measures for reduction of pollution: The respondents were divided into two categories: 'Yes' and 'No' and their percentages were 100 and 0. Almost all the respondents believed that pollution can take place due to the described causes in both Satkhira and Bagerhat regions (Table 5).

Table 4. Respondents perception to the following selected statements regarding pollution of water and soil (N=25+25=50)

Statements	Location			
	Satkhira		Bagerhat	
	Total score	Rank	Total score	Rank
Illegal cutting of plants and trees from forest	44	6	61	4
Decrease in all forms of wild life	51	4	25	10
Unplanned industrialization and urbanization	33	8	47	8
Non judicial use of chemical fertilizers being washed down to water bodies	63	2	67	2
Excessive use of pesticides	60	3	63	3
Pesticides applied in crop fields being washed out to ponds, canals and rivers	36	7	53	7
Application of toxic insecticides in irrigated crop fields	32	9	54	6
Oil from ship may cause water and soil pollution	30	10	68	1
Agro-chemicals industrial waste	51	5	55	5
Indiscriminate use of agro-chemicals	71	1	39	9

Table 5. Distribution of respondents according to reduction measures for water and soil pollution in the Sundarbans areas (N = 25+25=50)

	Location	Range		Respondents			Mean	SD
		Possible	Observed	Categories	No.	%		
Variable	Satkhira	0-8	8-8	Yes (1-8)	25	100	8.00	.000
				No (0)	0	0		
	Bagerhat	0-8	8-8	Yes (1-8)	25	100	8.00	.000
				No (0)	0	0		

Table 6. Possible measures suggested by the respondents for reduction of water and soil pollution (N=25+25=50)

Measures for reduction of pollution	Locations			
	Satkhira		Bagerhat	
	Agree	Disagree	Agree	Disagree
To remove industrial waste in safety places	25	0	25	0
Reduction of wood cutting from the Sundarbans and other forests.	25	0	25	0
Safety use of fertilizer and pesticides	25	0	25	0
Controlled industrialization.	25	0	25	0
Conceptualism of awareness about pollution.	25	0	25	0
Plantation of more trees inside and outside of the Sundarbans	25	0	25	0

To eliminate water and soil pollution almost all respondents agreed upon the causes shown in Table 6.

According to public opinion the highest water and soil polluting agent was thought to be indiscriminate use of agro chemicals and the lowest was oil from ship in Satkhira region. In Bagerhat region, the highest polluting agent was oil from ship and the lowest was the reduction in all forms of wild life. For the conservation of the Sundarbans protection regulations from the government law should be applied. Public awareness perception build up should be raised at very high level so that best utilization and management of the Sundarbans can be assured. Industrial wastes should be disposed at safety/distant places, wood cutting from the Sundarbans should be discouraged, fertilizer and pesticides to be

applied judiciously, awareness perception to be build up about pollution and plantation of more trees inside and out side the Sundarbans to be executed. Respondents expect remedial measures and mass awareness to control pollution. Both government and non-government organizations should take proper steps enforcing laws in favour of providing sound forest environment to maintain public health.

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