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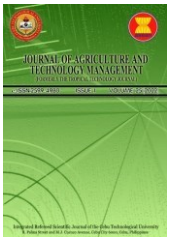

Original article

Factors and differences of standpoints between mainstream and tributary residents of Mantayupan on water quality management

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ABSTRACT

Mantayupan River in the Municipality of Barili is the major source of water for various purposes. The river was indicated medium quality, but the increasing settlements along its bank may eventually render it unfit for its purpose. Community-based programs have been proven effective since it instills ownership among community members. The study evaluates socio-demographic characteristics, media exposure and information seeking behavior as determinants of the households' standpoint in terms of knowledge, attitude and practice towards water quality management of the Mantayupan River. Villages were grouped into tributaries and mainstream using a simple random sampling. This was applied for the respondents to comprise 30% of the population at 10% margin of error. For both mainstream and tributary; female, high school graduates, native of Barili, residing 35 years and above and income below Php 15,780 per month comprised the highest percentage of respondents. For mainstream respondents, years of residence, household income, television and print media exposure positively influenced their standpoints for a community-based water management system. For tributary respondents, radio media exposure significantly was found to positive influence standpoint. Considering that radio listenership positively affects standpoints of tributary residents, "Radyo Kahimsug" of Cebu Technology University –Barili Campus will therefore have a significant role to play. Upon comparison, mainstream respondents have significantly better attitude toward water management.

KEYWORDS: *community-based program, water quality management, willingness to pay, knowledge, attitude and practices*

1 INTRODUCTION

Water is vital to mankind. Massive quantities of water are used daily to carry out household chores, agricultural and industrial processes. Despite the fact that two-thirds of the earth is composed of water, it is not always available for human use. Usable freshwater has become an increasingly limited resource. With the increasing global population and with improving living standards, the need for water is expected to increase. Efficient water management involves economic, social and intangible values. Development of a river system for different usage sometimes generates conflicts with other water usage like irrigation and domestic or household uses, industrial use against our environmental concerns.

The Mantayupan River in the Municipality of Barili, Cebu, Philippines is one of the major sources of water for domestic, agricultural, recreational and industrial purposes. Along the river's stretch channels, the well-known Mantayupan Falls which has become the municipality's main tourist attraction. A fraction of the water volume above the falls is used to operate a mini-hydro power plant to supplement the power supply in the municipality. The river supplies water also to fishponds and recreational sites. Its tail water is diverted to irrigate rice fields. However, just like most natural waterways, Mantayupan River is not spared from water quality degradation. A study on the assessment of the river's water quality indicated medium to average water quality (Neri et al., 2012). The increasing harmful effects of the river's contamination, if not addressed, will eventually become unfit for its purposes in the future. In 2012, residents living near the river complained of turbid water coming from their faucets. This was due to the sinkhole that some of the residents attributed to the quarrying operations in the river as reported by Matus (2012) of The Inquirer, and Pareja and Lebumfacil (2012) of Philippine Star.

Recognizing that people benefit from the Mantayupan River in various ways, it is rational that people will take part in the conservation activities. Initiatives by the local government and if supported by the concerned residents of Barili can be of great help to ensure optimum utility from the river without putting in jeopardy its long-term usability. It is in this context that the study was conducted. It aimed to describe the respondents' socio-demographic characteristics, its relationship to media

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exposure and information seeking behavior to their knowledge, attitudes and practices. The respondents were grouped into two categories; tributary and mainstream. A tributary is defined as a smaller branching stream channel that flows into a main stream channel according to Physical Geography. On the other hand, mainstream is operationally defined as a river having tributaries.

2 MATERIALS AND METHODS

Data Sources and Sampling

The study relied generally on primary data gathered through a self-made questionnaire adopted with modification from Udtuhan (2005) to probe the standpoints between mainstream and tributary residents of Mantayupan on water quality management. Standpoints is operationally defined as knowledge, attitude and practice of mainstream and tributary residents of Mantayupan on issues presented to them.

In order to get more or less equal representation of respondents, Tributary of the Mantayupan river was represented by three villages: Budbud, Luhod and Mayana, distributed across three main tributary rivers, while the mainstream was represented by: Campangga, Poblacion and Santa Ana (Figure 1). This followed the stratified random sampling technique (StRS) and is 50% of the total villages in the area, where the mainstream and tributary communities served as strata.

From the residents of the Villages mentioned, respondents were randomly selected using the simple random sampling technique (SRS) comprising 30% of the population at 10% margin of error using the formula:

$$n = \frac{Nz^2pq}{Nd^2 + z^2pq}$$

Where: p = perceived value of proportion (30%)
q = 1 – p (70%)
d = margin of error (10%)
z = standard normal variate for the set level of confidence

Samples taken per household were based on the total number of households per Village as provided by the Municipal Planning and Development Office of Barili Cebu (2017) (Table 1).

Data Collection

From the identified households, a self-made interview questionnaire was distributed to gather the following essential information:

Part I. Socio-Demographic Profile
Part II. Source/s of Information
A. radio listenership;
B. television viewership;
C. printed media readership;
D. interpersonal communication; and
E. attendance to seminars and trainings
Part III. Knowledge
Part IV. Attitudes
Part V. Practices

Scores were then assigned to socio-demographic characteristics with one (1) as the lowest (years of residence of income) at an interval of one up to the highest level (e.g. below 24 years old = 1 and above 65 years old = 6). Furthermore, males were given a score of 1, while the score of 2 was given to females, non-natives were given a score of 1, and natives were given 2, for the purpose of correlation. On levels of media exposure, information-seeking behavior, knowledge, attitude, and practice, the same scoring system was applied to allow correlation and comparison of variables. The arithmetic mean was used in comparison.

Table 1. Distribution and Number of Respondents

Location	Name of Village	Total Number of Households (N)	Number of Household Respondents (n)
Tributary	Budbud	306	28
	Luhod	196	26
	Mayana	242	28
Sub-total		**744**	**82**
Mainstream	Campangga	426	30
	Poblacion	966	32
	Santa Ana	388	30
Sub-total		**1780**	**92**

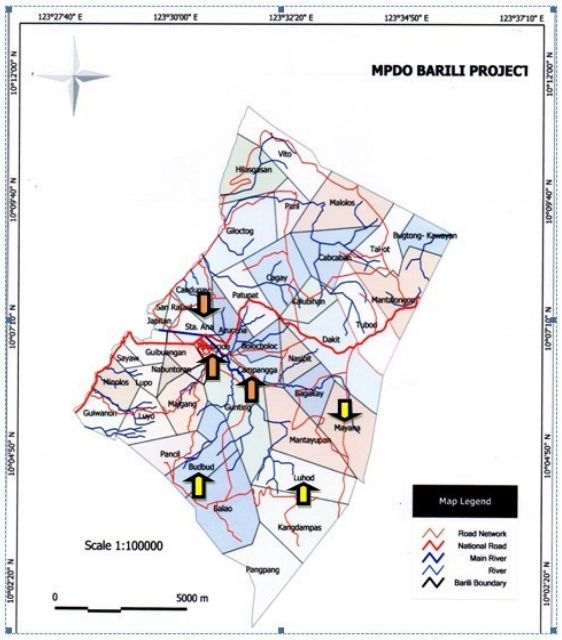

Figure 1. Distribution of Respondents from Villages near Tributaries and Mainstream

Analytical Procedures

Descriptive analysis using percentage was used to

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describe the features of the respondents as to socio-demographic characteristics. The relationship of socio-demographic characteristics, media exposure and information seeking behavior to knowledge, attitude and practice was analyzed using Pearson Coefficient of Correlation (R). Differences between knowledge, attitude and practice between residents near tributaries and mainstream were compared using t-test.

3 RESULTS AND DISCUSSION

Socio-Demographic Characteristics

Environmental degradation is the disturbance to the environment that is perceived to be undesirable (ESCWA, 2012). Pesticides in agricultural farms led to the contamination of cropped soils with leaching potential to water bodies, and with adverse effects on soil biota like earthworms. According to the study by Alburo et al., 2016, exposure assessment using the top pesticides used in the agricultural farms brought significant oxidative stress to earthworms. It shows a bio-indicator of environmental degradation.

Adams (2008) noted that it is highly impossible that goals on poverty and hunger reduction will be sustained if the environment that people rely on will continue to be degraded. Thus, it is of utmost importance that people should take care of the environment while ensuring human development and economic growth according to Laboy-Nieves et al., (2008).

A higher percentage of younger respondents (25 - 34 years old) were observed among the Mainstream residents (28.3%) than those residing at the Tributaries, in which most (32.9%) fell between the ages of 35 - 44 years old. On the gender, educational attainment, place of origin, years of residency, and household income, results show that female, high school graduate, native of Barili and a household income below Php 15,780.00 comprised the highest percentage for both Tributary and Mainstream respondents. This indicates that for both areas, respondents have generally low education attainment (Table 2) but have lived in their village for a relatively long time. It is also noteworthy that generally, their household income is relatively low (Figure 3). Jambiya and Sosovele (2004) implied that low education attainment would make people do low pay jobs, which may have a profound impact on the environment, particularly water resources.

Information Seeking Behaviors of Tributaries and Mainstream Residents

Radio listenership was high for both Mainstream and Tributary residents at a weighted mean of 3.32. This means that respondents listen to their radio more than three times in a week. This emphasizes the value of the radio station based at Cebu Technological University - Barili Campus the "Radyo Kahimsug". Television viewership and attendance to seminars were both higher for tributary residents than their mainstream counterpart at a weighted mean of 3.72 and 1.78, respectively. On the other hand, print media readership was higher for mainstream residents. Residents in this area read print media up to two times a week (Table 3).

Table 2. Socio-Demographic Characteristics of Respondents from Tributaries and Mainstream of Mantayupan River.

Parameters	Mainstream (N=92)		Tributaries (N=82)	
	∫	%	∫	%
Age				
Below 24 years old	11	12.0	14	17.1
25-34 years old	26	28.3	14	17.1
35-44 years old	18	19.6	27	32.9
45-54 years old	10	10.9	12	14.6
55-64 years old	20	21.7	5	6.1
Above 65 years old	7	7.6	10	12.2
Gender				
Female	65	70.7	60	73.2
Male	27	29.3	22	26.8
Educational Attainment				
Non-Formal Education	0	0	1	1.2
Elementary Level	19	20.7	18	22
Elementary Graduate	14	15.2	12	14.6
High School Level	12	13.0	20	24.4
High School Graduate	21	22.8	21	25.6
College Level	16	17.4	6	7.3
College Graduate	9	9.8	4	4.9
Post Graduate	1	1.1	0	0
Place of Birth				
Native of the Village	71	77.2	64	78
Non-Native of the Village	21	22.8	18	22
Number of Years Residing in the Village				
Below 4 years	8	8.7	4	4.9
5 to 14 years	13	14.1	10	12.2
15 to 24 years	10	10.9	11	14.7
25 to 34 years	20	21.7	11	13.4
Above 35 years	41	44.6	45	54.9
Household Monthly Income (Php)				
Below 7,890	70	76.1	74	90.2
7,890 – 15,780	17	18.5	7	8.5
15,780 – 31,560	4	4.3	1	12
31,561 – 78,900	1	1.1	0	0
Above 78,900	0	0	0	0

Table 3. Information Seeking Behaviors of Respondents from Tributaries and Mainstream of the Mantayupan River.

Information Seeking Behavior	Mainstream (N=92)		Tributaries (N=82)	
	∫	%	∫	%
Radio Listenership				
Yes	50	54.30	43	52.40
No	42	45.70	39	47.60
Weighted Mean on Radio Listenership (1-Once a Week, 2-Twice a Week, 3-Thrice a Week and 4-Daily)	3.32		3.32	
Television Viewership				
Yes	79	85.90	68	82.90
No	13	14.10	14	17.10
Weighted Mean on Television Viewership (1-Once a Week, 2-Twice a Week, 3-Thrice a Week and 4-Daily)	3.54		3.72	
Print Media Readership				
Yes	58	63	32	39
No	34	37	52	61
Weighted Mean on Print Media Readership (1-Once a Week, 2-Twice a Week, 3-Thrice a Week and 4-Daily)	2.32		1.50	
Attendance to Seminar				
Yes	12	13	14	17.10
No	80	87	68	82.90
Weighted Mean on Attendance to Seminar (1- Once a Year, 2-Twice a Year and 3-Monthly)	1.41		1.78	

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Comparison of Tributaries and Mainstream Residents

Upon comparison of Mainstream and Tributary residents, attitude towards maintaining or reviving water quality, benefits that can be taken from the river and the contribution of residents to the water quality of Mantayupan River, are all significantly higher in Mainstream residents than those in Tributaries (Table 4).

Table 4. Differences in Knowledge, Attitude and Practice of Tributary and Mainstream Residents of the Mantayupan River

Item	Location of Households		Significance (t-test) %?
	Mainstream	Tributary	
Knowledge			
Awareness of any management programs on maintaining or restoring river quality	2.30	2.08	0.151
Attitude			
Item 1. Hope in maintaining or reviving river water quality	2.57	2.67	0.320
Item 2. Desire to have programs on river water quality management	2.90	2.56	0.000**
Item 3. Benefit for Mantayupan river	2.41	1.92	0.001**
Item 4. Contribution to the condition of the river quality	2.15	1.48	0.000**
Item 5. Desire to protect the quality of the Mantayupan river	2.87	2.90	0.717
Item 6. Willingness to be part of programs for the management of Mantayupan river	2.75	2.87	0.096
Practice			
Item 1. Throwing garbage at the river	1.60	1.84	0.002**
Item 2. Doing laundry in the river	1.79	1.89	0.059
Item 3. Disposal of kitchen waste in the river	1.87	1.97	0.011*
Item 4. Urinating and defecating in the river	1.84	1.92	0.090
Item 5. Applying inorganic fertilizers and pesticides near the river	1.42	1.71	0.104
Item 6. Allowing animal waste to go/drain to the river	1.83	1.84	0.989

* - significant (0.05)
** - highly significant (0.01)

On the other hand, practices of not throwing garbage and kitchen waste on the Mantayupan river favor Tributary respondents. In a study on KAP related to climate change, Pascual (2012) reported that households of selected urban and rural areas across the three main geographical divisions in the country showed significant differences toward climate change. Urban residents have better knowledge, attitude, and practice towards proper waste management. This may be because there is more waste produced in urban areas compared to rural areas in relation to climate change.

When asked for ideas on the quality of the Mantayupan river, most residents from the Tributary answered that the river water should be clean and clear, while some pointed out the importance of the river for human and animal consumption; thus, the river should not be polluted by throwing garbage. On the other hand, residents living in the Mainstream were mostly in agreement that the river was already contaminated and was not as clean and beautiful as before. When asked why they are willing to have river quality management programs, residents from the Mainstream and Tributaries answered that they want the river to be clean because it is a tourist attraction. They feel that it is also their responsibility to take care of it. In a study by Basallo (2018), it was noted that residents have a neutral perception of the socio-economic impacts of tourism in Barili. Residents from Mainstream and the Tributary benefited from the river by using it mainly as a source of irrigation, washing the laundry, watering the plants, and for some who keep farm animals use it as "lunangan"/pool for draft carabao.

Determinants of Knowledge, Attitude and Practice

For residents at the Tributaries, those natives of Barili tend not to mind using pesticides and fertilizers on their crops planted near the river. In striving to supplement their meager incomes, people are compelled to practice activities that are detrimental to the water sources and the environment. Thus, overall farm performance affects the farmers' attitude toward preserving the farms' ecosystem. According to Lincoln and Ardoin (2016), sense of place and environmental values indexes correlate to each sustainability category using independent linear regressions and multivariate regression. Overall, a sense of place explained a larger share of the overall farm performance. Pesticide and fertilizer runoff are considered significant contributors to the degradation of the quality of water in rivers. Eutrophication is one detrimental effect of fertilizer runoff. This leads to an algal bloom that can produce toxins that can have ecological and human health impacts, such as reduced seafood production and the presence of phytoplankton toxins in drinking water and seafood (Shaw et al., 2003). Animal fecal matter run-offs like the poultry waste can also lead to eutrophication (Satller and Lipscomb, 2002). Furthermore, print media readership and frequency of readership negatively influence the resident's outlook on actively participating in community-based water quality management programs and their hope of maintaining water quality in the Mantayupan River.

Most environmental scientists and engineers recognize that media coverage can alternately be a blessing and a bane to their programs and policies and that how they respond to a reporter's call can have far-reaching ramifications. There is evidence that the media play a significant role in influencing public opinion about environmental issues and that public views have generated policy attention (Neuzil and Kovarik, 1996; Sachsman, 1996). On the positive side, listenership to radio programs tends to improve respondents' attitudes towards participating in water quality community-based programs. Also, attendance to seminars positively influence attitude, specifically on the benefits derived from the River (Table 5).

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Table 5. Socio-Demographic Characteristics and Information Seeking Behavior Influencing Knowledge, Attitude and Practices of Mainstream Residents.

Socio-Demography and Information Seeking Behavior	Knowledge	Attitude						Practice					
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
Socio-Demographic Characteristics													
Age	-.064	-.049	.184	-.080	.028	.099	.067	.051	.077	.147	.128	.028	.006
Gender	.039	-.071	.045	.074	-.075	**.218***	.051	.001	**-.245***	-.090	.059	-.032	.105
Educational Attainment	-.078	-.026	-.159	-.079	-.054	.075	-.074	.065	.165	.096	-.020	.063	.090
Place of Birth	-.018	-.052	.031	.062	.051	-.032	-.077	.120	-.125	.199	.130	-.052	-.049
Years of Residence	.091	-.087	.111	-.078	.046	.033	-.017	.016	-.052	**.239***	.202	.008	**.523****
Household Income	-.071	-.172	**.247***	-.004	.110	.146	.037	.088	.147	-.036	.013	-.171	.262
Information Seeking Behavior													
Radio Listenership	.007	.009	.105	.178	.086	-.001	.077	-.024	-.099	-.136	-.145	.104	-.061
Frequency of Listenership	.039	.001	.262	.122	-.198	-.004	.125	-.167	.176	-.081	-.041	.312	-.056
Television Viewership	.087	.147	.034	-.118	.013	-.042	.069	.013	**.209***	.043	.002	**-.335***	-.048
Frequency of Viewership	.076	.010	.182	.002	-.085	-.093	-.039	.188	-.064	.044	.154	.057	.005
Print Media Readership	.094	.061	-.113	.121	.077	.051	.017	-.073	.042	.065	-.074	-.075	-.075
Frequency of Readership	.089	.060	-.122	.055	.022	.180	.216	-.044	.127	.142	.165	-.286	.258
Attendance to Seminar	**.252***	.016	-.044	-.044	.128	-.044	-.146	.096	-.065	-.056	.074	-.088	.078
Frequency of Attendance	.165	-.427	-.344	.155	.317	.165	.301	**-.697***	.317	-.344	.165	.632	.316

* - significant
** - highly significant

Media channels such as radio and print media are important venues to deliver information regarding community-based water quality management programs for Tributary residents even though, in this instance, both have contradicting effects on the standpoints of residents. But definitely, this is just a matter of using the correct channel. Nonetheless, this exemplifies the value of "Radyo Kahimsog" radio station at CTU-Barili Campus.

'Science is an encoded form of knowledge that requires translation in order to be understood'; there is a requirement for scientific findings to be translated to the public (Ungar, 2000). This is the very principle of the influence of the media on people's standpoint. For residents in the Mainstream, the print media positively influence residents' willingness to pay for a water quality management system. On the other hand, television exposure positively influences residents' practice of not doing laundry at the river. Data on water conservation suggest a relationship between media coverage and public perception of water use in Albuquerque. The number of articles devoted to the various user categories, the content, and language used in those articles, and the page placement all correlate well with public perceptions about Albuquerque's water customers (Cockerill, 2002).

Participation of residents is vital for any government program to succeed. As part of the USAID project on Sustainable Agriculture and Natural Resources Management, the Philippine Water Watch (PWW) capacitated local farmers in understanding and performing water quality monitoring focused on drinking water quality and its impact on public health (World Bank, 2003). The local government of the Province of Sarangani initiated a similar water quality monitoring program in their region. Moreover, the PWW data were used by the Philippine Institute for Development Studies to advise Congress on the value of community-based water monitoring (Pascual, 2013). Consulting and involving the community members from planning to implementation will sustain the program as this will provide them with what they want rather than what is perceived as their needs (Sivachithappa and D'Silva, 2014).

4 CONCLUSION AND RECOMMENDATIONS

Print media and radio are the best channels to influence the standpoints of residents at the Tributaries. For Mainstream residents, television and print add media are the preferred communication channel to advocate the community-based water quality management system of the Mantayupan river. Moreover, mainstream residents have a more positive attitude toward preserving the river through a community-based project, resulting in a higher willingness to pay. On the other hand, a practice toward preserving water quality is higher among Tributary residents. Moreover, household income, listenership, and attendance to seminars all positively influence the residents' standpoints on managing water quality in Mantayupan River. Programs pertaining to water quality

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management should be channeled through various mass media channels such as print, television, and radio. Developmental activities such as seminars and training should be done to improve the livelihood of farmers as development positively affects their standpoints in water quality and overall environmental management.

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