Women and the Risks of Using Polluted River Water: A Pioneering Study on the Marginalization of Women from an Ecofeminist Perspective, a Unique Contribution to the Field of Ecofeminism

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ABSTRACT

Various studies have shown that gender-based inequality in water governance and urban development is a significant challenge for women. This is especially true because most of their tasks are related to water collection and management, yet their opinions are often ignored in water management decisions. As a result, women experience economic disadvantages due to difficulties accessing clean water and sanitation services. This survey study aims to identify the use of river water for daily needs by housewives living in three cities (Surabaya, Sidoarjo, and Kediri) located on the banks of the Brantas River, East Java, Indonesia. An ecofeminist perspective is used in this study to determine whether women can address the problem of water pollution in their environment or, conversely, whether they experience marginalization due to their low ecological knowledge. This study found that: (1) housewives living on the banks of the Brantas River do not yet have sufficient awareness and knowledge regarding the quality of polluted Brantas River water; (2) they also experience vulnerability, especially to their own health and that of their families, where this vulnerability arises due to the habits and lifestyles they lead in interacting with river water, coupled with low levels of knowledge about the dangers of polluted river water, as well as the low economic conditions and social status of communities along the Brantas River Basin; (3) these women also experience structural marginalization, where external parties who work to provide knowledge and awareness to the community do not carry out their functions and women are not encouraged to participate in improving their fate.

Keywords: Women/ Polluter River Water/ Marginalization/ Ecofeminist Perspective/ Brantas River

1. INTRODUCTION

Various studies show that river water along the East Java Province is no longer suitable for consumption. Its quality has decreased with alert status because it has been polluted continuously [1]. Previous studies found that the level of water pollution of the Brantas River, which passes through several areas of East Java Province, is mild to moderate [2]. Another study along the Brantas watershed in East Java Province also showed that river water quality is increasingly concerning due to pollution caused by household and industrial waste. In contrast, Brantas River water is the raw material for clean water managed by the Regional Drinking Water Company (PDAM) in East Java Province [3].

Polluted river water can be detrimental to the community because it not only results in a decrease in health quality [4],[5] but also in the carrying capacity of the environment [6]. Previous studies found various diseases can arise due to environmental pollution [7],[8]. On the other hand, efforts to maintain river water quality are constrained by low public awareness of maintaining ecological cleanliness along the watershed [9],[10], as well as due to weak supervision and law enforcement against people who pollute river water [11]. Women are an element of society that contributes to saving the environment. Studies conducted by Bakti et al. [12] show that women can be involved in efforts to save the environment along the Ciliwung watershed, where women who are members of local organizations, such as Majelis Ta'lim, Arisan and PKK groups, and women members of farmer group associations (Gapoktan) can be an entry point for flood prevention programs along the watershed and waste management that can pollute river water. A study conducted by Mailisa et al. [13] found that most women living around the Sani watershed, Pati Regency, Central Java, know the functions and benefits

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of the river and are willing to be involved in its management. However, their participation still needs to be increased.

Considering the declining river water quality in East Java Province and the potential of the community, especially women who are more empathetic towards environmental preservation, the objectives of this study are as follows: (1) mapping women's knowledge of Brantas River water quality and health related to the utilization of Brantas River water in the East Java Province area; (2) identifying forms of women's awareness to improve the quality of health and environmental preservation along the Brantas River watershed in the East Java Province area; (3) Analyzing women's participation in managing and preserving the environment along the Brantas River watershed in East Java Province.

Approach and State-of-the-Art

Past studies have shown that gender-based inequalities in water governance and urban development are challenging as women are primarily tasked with water collection and management. Yet, their opinions are sidelined and rarely heard in water governance. Ultimately, women suffer economic losses due to difficulties accessing water and sanitation services. Lafuente analyzed the gender gap in environmental awareness and political knowledge, where it turns out that women's preferences in industrialized countries are related to their activeness in protecting the environment for domestic purposes and their low political participation in water management. Studies have also shown that women are the most affected by health due to river water pollution and waste disposal [14]. Studies conducted in India show that women are an integral part of the movement to save the environment [15].

The perspective of ecofeminism explains how women who experience social and economic marginalization due to the destruction of nature and the environment can rise and fight to overcome the inequality they experience. Ecofeminism explains how women, in particular, have an attachment to the environment due to their traditional role as caregivers and nurturers [16]. Vandana Shiva [17] explains that women daily interact with the environment. In their subsistence economic activities, women partner with nature and become experts in holistic ecological knowledge and understanding of natural processes.

Women's awareness to save their environment certainly does not appear instantly. Women make various efforts by mobilizing existing resources, such as through grassroots organizations managed by women [18] and non-governmental organizations that simultaneously foster public awareness, including women, to preserve the environment [19]. The form or level of women's participation in protecting the environment can also be studied from the participation theory proposed by Arnstein [20],[21]. Arnstein's ladder of participation theory can be used to measure the extent to which women can participate in managing and preserving their environment. The ladder of participation introduced by Arnstein shows that if citizens have been able to participate up to the ladder of partnership to citizen control, then the community has reached the highest level of participation, called citizen power. The power of citizens, in this case women, to control their environment will also impact their ability to improve their quality of life.

The novelty of this study is in the effort to map the forms of women's awareness and their level of participation in managing and preserving the environment related to the water resources of the Brantas River in the East Java Province. By understanding women's awareness of river water pollution and mapping their participation level in preserving the environment, women can be part of the early warning system in managing and saving river water from more severe pollution. Suppose women can participate fully in environmental management. In that case, it can also improve women's bargaining position to be equal to men in preventing various things that harm women in health, economic, and social aspects.

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Figure 1. Residential Settlement in the Brantas River Basin in the Sidoarjo Region

2. METHODOLOGY

This study was conducted in three cities in East Java, namely Surabaya, Sidoarjo, and Kediri, where the Brantas River, a large river in East Java, crosses the three towns (see Figure 2). The Brantas River is the second longest river in Java, Indonesia, after the Bengawan Solo River. The Brantas River has a vital role for the people of East Java because around 46.7% of the population of East Java lives along the Brantas River basin. This river also plays a vital role in supporting East Java's status as a national food barn [22].

Since this study aims to map women's knowledge about the quality of Brantas River water and their health related to the use of Brantas River water in East Java Province, this study was conducted using a survey method, where the respondents in this study were women, especially those who were married and lived in three cities along the Brantas River Basin. The total number of respondents was 300 housewives, and 100 housewives were taken in each town as research samples. Sampling was conducted using the quota sampling technique, where homemakers were taken as samples and were met based on their residential areas along the river. This quota sampling technique was used considering that families or households living along the Brantas River Basin are not evenly distributed but are clustered in certain areas along the river.

Data collection was conducted through interviews using a questionnaire as a research instrument. Interviews were conducted by several interviewers trained to conduct interviews using standards and procedures that the ethics team of the Faculty of Social and Political Sciences, Airlangga University, had set. The interviewers approached the homemakers selected as research respondents one by one. Before conducting the interview, the interviewers explained the purpose of the interview to the homemakers. The respondents were also free to participate or not in the research. If the respondents were willing to participate in the study, they were asked to sign a statement of willingness provided during the research. However, if the respondents were unwilling to be interviewed, the interviewer did not continue the interview process.

The data that had been collected was then processed using the SPSS data processing application. The categorical data is presented as frequency tables and analyzed descriptively based on the data category. The data in the form of an attitude scale is calculated on average and analyzed based on the attitude tendencies of each variable and research indicator.

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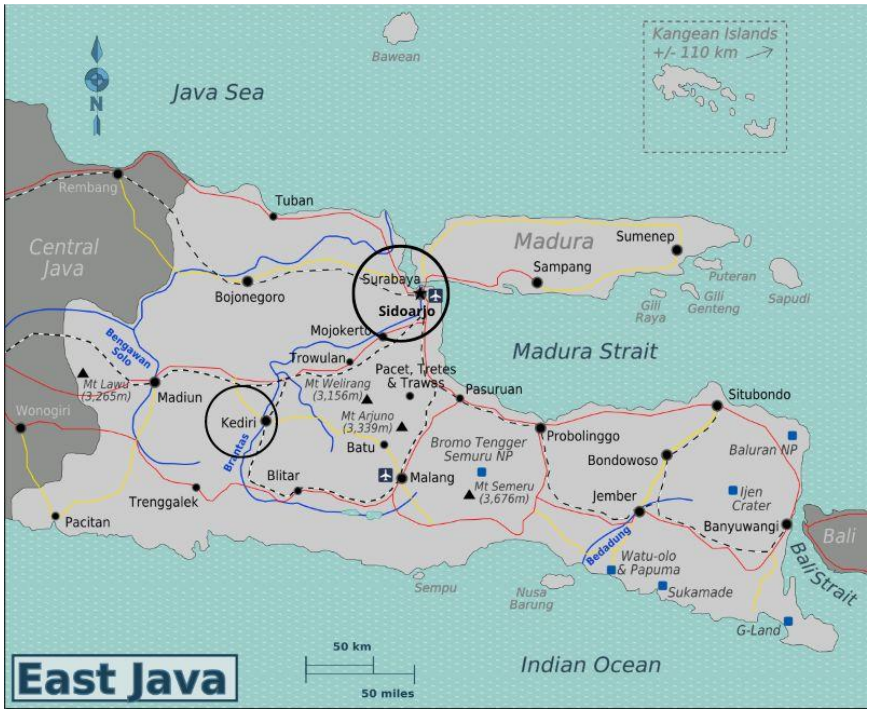

Figure 2. Map of East Java with Brantas River Flow (Source: https://id.wikipedia.org/wiki/Daftar_sungai_di_Jawa_Timur)

3. RESULTS AND DISCUSSION

The research results presented in this section consist of (1) a description of respondent characteristics; (2) housewives' habits in water use; (3) a mapping of homemakers' knowledge about the quality of Brantas River water; (4) identifying women's awareness in maintaining health and preserving the environment, and (5) analyzing women's participation in managing and preserving the environment along the river basin.

3.1 Description of respondent characteristics

The characteristics of respondents in this study include age, education level, daily occupation of respondents, average family income, status, and length of residence in the riverbank area. The following table contains the average figures for each indicator of respondent characteristics.

Table 1. Characteristics of Respondents

Respondent Characteristics Indicators	Average Value		
	Surabaya	Sidoarjo	Kediri
Age	44 years	37 years	44 tahun
Education Level	Junior High School	Junior High School	Senior High School
Daily Occupation	Informal Sector	Housewife	Informal Sector
Average family Income per Month	Rp. 2,400,000	Rp. 1,750,000	Rp. 1,670,000
Status of Occupied House	Contract/Rent	One's own	One's own
Length of Residence in the Riverbank Area	16 years	18 years	17 years

Source: processed from primary research data

Based on the respondents' characteristic indicators, it can be said that, in terms of age, the housewives who were respondents in this study were, on average, 37 to 44 years old. This means that the average Housewife found in the research area was mature. In terms of education, it appears that they have not yet reached higher education because, on average, they only completed their education up to junior high and high school levels, and even quite a few respondents had elementary school education or had not graduated from elementary school. The jobs of respondents in the cities of Surabaya and Kediri were, on average, in the informal sector, such as working as small traders selling around or

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having a small industry that was carried out at home. Meanwhile, respondents in Sidoarjo were, on average, only housewives. The level of welfare of the respondents' families, when viewed from the average monthly family income and their residential status, was categorized as families with a low level of welfare, where their average income was low, below the average regional minimum wage in East Java, especially from the areas in Sidoarjo and Kediri Regencies. Meanwhile, respondents from Surabaya City can be categorized as lower-middle-income families. Meanwhile, the population status of respondents, seen from their residence status and length of stay, appears that respondents from Surabaya City are primarily immigrants, not native residents of the city because, on average, their residences are rented or contracted/non-permanent houses. In contrast, most of the respondents from Sidoarjo Regency and Kediri City are native residents in their areas.

3.2 Housewives' habits in water use

Since the respondents live along the Brantas River, it is possible that they also use river water for daily needs. The habit of using water for daily life can be distinguished for (1) bathing and brushing teeth and (2) other household needs, such as drinking, cooking, and washing. This knowledge is needed to find out the water usage habits of the respondents, most of whom have been living in the highlands of the Brantas River Basin for quite a long time. The following table contains information on water usage for both of these things.

Table 2. Water Sources Used for Bathing and Other Household Needs

Water Source	Used for Bathing			Used for Other Household Needs		
	Surabaya (%)	Sidoarjo (%)	Kediri (%)	Surabaya (%)	Sidoarjo (%)	Kediri (%)
Filtered river water	1.0	2.0	0	0	18.0	3.0
Direct river water	0	0	0	0	0	0
Well water	16.0	98.0	82.0	4.0	63.0	66.0
Subscribe to water treated by a government-owned drinking water company (PDAM)	83.0	0	17.0	54.0	0	15.0
Buying clean water from water vendors	0	0	1,0	42.0	19.0	16.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: processed from primary research data

Table 2 shows an interesting phenomenon, where respondents in each region have different habits of getting water sources. For bathing and brushing their teeth, respondents from Surabaya City mostly use PDAM water (83%), while in the other two regions, most respondents use well water (Sidoarjo 98% and Kediri 82%). However, the water sources vary for drinking, cooking, and washing. In Surabaya, half of the respondents use PDAM water (54%), but quite a lot also buy clean water from traveling water sellers (42%). While in Sidoarjo Regency, most use well water (63%) and buy clean water (19%), and in Kediri City, most use well water (66%), then some use PDAM water (15%) and buy from clean water traders (16%).

A pretty exciting phenomenon is in respondents who use river water, even though the river water used has been filtered. In Surabaya, 1% of respondents use river water for bathing and brushing their teeth, while in Sidoarjo, 2% use river water for bathing and brushing their teeth, and 18% for drinking, cooking, and washing. In Kediri, 3% of respondents use river water for drinking, cooking, and washing.

Let's look at the habits of respondents in using water for daily needs. It appears that respondents from Surabaya City take into account safety and health aspects more in choosing the use of water for bathing, brushing their teeth, drinking, cooking, and household cleaning needs because they prefer to use PDAM water, well water, and buy clean water from street vendors even though they have to pay for it. Likewise, for respondents from Kediri City, the use of well water is more dominant, in addition to using PDAM water and buying from street vendors. Meanwhile, respondents from Sidoarjo Regency,

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because of their characteristics as rural communities, use water for daily needs, relying more on well water and buying from street vendors and river water.

3.3 Mapping of housewives' knowledge about the quality of Brantas River water

In addition to being known for using water for daily needs, mapping respondents' knowledge about Brantas River water can also be measured from other indicators. In this study, there are 10 indicators to determine the level of health of respondents related to the use of river water; where these indicators are measured through perception in recognizing and interpreting sensory information related to river water along the Brantas Watershed to provide an overview and understanding of the environment around them.

Measuring respondents' perceptions of river water quality or pollution levels, this study uses a Likert scale of 1 to 5, where a score of 1 indicates that respondents strongly agree with the quality of river water that can be used for daily needs. In contrast, a score of 5 indicates that respondents strongly disagree with using river water for daily needs. Thus, if most respondents provide answers to each statement indicating that the quality of river water is very poor, then the average value will tend to be high, which means that respondents perceive Brantas river water as unsuitable for human life. Suppose most respondents agree that river water can be used for human needs; the average value will tend to be low, which means that respondents perceive Brantas River water still benefits their lives.

The ten indicators used to map housewives' knowledge of river water quality include perceptions about (1) the level of river water quality along the respondent's residence, (2) the suitability of using river water for bathing and brushing the teeth, (3) the suitability of using river water for drinking and cooking; (4) the suitability of river water for washing, cleaning the house and other household needs; (5) the suitability of river water for drinking for livestock and watering plants; (6) the suitability of consuming fish from river water; (7) the level of river water quality compared to well water; (8) the level of river water quality compared to PDAM water; (9) the level of river water pollution by waste; (10) the level of river water pollution for fish along the Brantas River.

Table 3. Mapping of Women's Knowledge about Brantas River Water Quality for the Lives of the Surrounding Community

Women's Perception/Knowledge Variables on Brantas River Water Quality		Mean		
		Surabaya	Sidoarjo	Kediri
Average Knowledge of River Water Quality and Its Utilization (combination of 10 indicators)		3.25	3.12	2.77
Respondents' perceptions with a range: 1 (strongly agree); 2 (agree); 3 (less agree); 4 (disagree); 5 (strongly disagree)				
(1)	The quality of river water where I live is clean/good.	3.36	3.59	2.72
(2)	The river water along my residence suits bathing and brushing my teeth.	3.57	4.06	3.44
(3)	The river water along where I live is suitable for drinking and cooking	3.90	4.24	3.62
(4)	The river water along my residence is suitable for washing clothes, household items, mopping floors, and other household needs.	3.53	3.55	3.10
(5)	The river water along my residence suits livestock and watering plants.	2.75	2.26	2.32
(6)	The fish caught from the river where I live are suitable for cooking or consuming for the family.	2.80	2.40	2.42
(7)	The river water quality along my residence is as good as the well water at my house.	2.12	4.30	3.57
(8)	The river water quality along my residence is as good as my area's PDAM/tap/piped water.	3.98	4.00	3.47
(9)	The river along my residence has been polluted by household and factory waste/garbage.	3.43	3.85	3.06
(10)	The fish in the river where I live have been polluted by household and factory waste and are unfit for consumption.	3.10	3.56	2.68

Source: processed from primary research data

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Based on Table 3, if we look at the average score for the 10 indicators, it can be seen that the range of scores in the three regions is at an average value of 3.25 to 2.77. This means that the respondents' perception or knowledge of the quality of the Brantas River water shows a tendency or assumption that the Brantas River water is beneficial for their lives, even though they know that the quality of the Brantas River water is no longer good/clean (Surabaya, average 3.36; Sidoarjo average 3.59; Kediri average 2.77). Specifically, two indicators show a tendency that river water has benefits; in this case, it is helpful for (1) drinking livestock and watering plants (Surabaya, average 2.75; Sidoarjo, average 2.26; Kediri average 2.32); and (2) the fish are taken and are suitable for cooking and consumption as their daily food menu (Surabaya, average 2.80; Sidoarjo, average 2.40; Kediri, average 2.42).

The indicators that further strengthen that the Brantas River water is still considered good and can be used in their lives are: (1) the quality of the Brantas River water is comparable to well water (for respondents from Surabaya City, with an average of 2.12); (2) the water quality is still clean or good (for respondents from Kediri City, with an average of 2.72); (3) the fish in the Brantas River have not been or are not polluted by waste (for respondents from Kediri City with an average of 2.68).

Based on the community's habit of using clean water for daily life, it can be concluded that respondents from Surabaya City never use Brantas River water to meet their basic needs (bathing, drinking, cooking, and so on). Meanwhile, for respondents from Kediri City, the use of well water is more dominant, in addition to using PDAM water and buying from traveling water vendors. For respondents from Sidoarjo Regency, because their characteristics are rural communities, water use for daily needs relies more on well water, buying from traveling water vendors, and river water.

Interestingly, a few housewives still use river water to meet their basic needs, such as processing food, drinking, bathing, brushing their teeth, etc. Those still using river water for daily needs also know that Brantas river water is no longer good/clean. However, from the perspective of their perception or knowledge about the quality of Brantas river water, respondents tend to agree that Brantas river water can still be used for daily life, especially for giving livestock water, watering plants, and taking fish to be cooked and consumed, as a daily food menu for their families.

3.4 Identifying women's awareness in maintaining health and preserving the environment

This section presents the research results that map women's awareness of maintaining their family's health. In addition, the results of this study also highlight the ecological awareness of housewives in maintaining cleanliness and sustainability of environmental preservation along the Brantas River Basin.

3.4.1 Women's Awareness in Maintaining Family Health

This sub-chapter attempts to present data on the level of awareness of women in the Brantas River Basin area in maintaining their family's health, along with various health risks due to river water pollution from various industrial and household waste. To assess the extent of women's awareness of health concerning river water, it is measured from seven indicators which include the level of understanding of (1) diarrhea experienced in the last 12 months; (2) stagnant water which causes dengue fever cases; (3) typhoid due to lack of food and environmental hygiene; (4) level of understanding of the condition and nature of river water which can cause skin diseases/itching; (5) level of understanding of pollutants in river water on fetal growth in the womb; (6) dental health to the use of polluted water; and (7) oral health to the use of polluted water.

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Table 4. Women's Awareness in the Brantas River Basin Regarding Family Health

Variable of health awareness	Mean		
	Surabaya	Sidoarjo	Kediri
Average score of Respondents' Awareness level regarding various diseases in relation to Brantas River Water Respondent awareness range: 1 (strongly agree); 2 (agree); 3 (less agree); 4 (disagree); 5 (strongly disagree)	3.00	3.23	2.92
Contaminated drinking water cannot cause diarrhea	4.42	4.46	4.32
Stagnant water does not cause dengue fever	3.25	4.02	3.57
River water contaminated with hazardous waste does not cause typhoid fever	3.20	3.70	2.96
River water does not cause skin pain/itching	2.95	3.62	3.44
Pollutants in river water do not affect fetal growth.	3.07	3.44	3.03
Dental health is not caused by polluted water	2.37	2.70	2.41
Oral health is not caused by contaminated water	2.30	2.69	2.36

Source: processed from primary research data

Based on Table 4, if we look at the average score for the 7 indicators, it can be seen that the range of scores in the three regions is at an average value of 2.92 to 3.23. This means that, in general, respondents are unaware of the various diseases that can be caused by polluted river water. The relatively low awareness of respondents about the various diseases that can be caused by polluted river water also seems to be due to the lack of exposure to information provided by health educators or parties who are competent in this matter. The following data shows the low exposure to health information from health educators.

Table 5. Intensity of Health Workers Providing Counseling to the Community

The intensity of health workers in providing counseling	Percentage (%)		
	Surabaya	Sidoarjo	Kediri
Never	57.0	82.0	86.0
Rarely	17.0	17.0	6.0
Sometimes	9.0	1.0	5.0
Often	13.0	0	2.0
Always	4.0	0	1.0
Total	100.0	100.0	100.0

Source: processed from primary research data

The data in Table 5 proves that it is true that health workers or counselors never or rarely provide health counseling to mothers along the banks of the Brantas River Basin. In Surabaya, more than half of the respondents admitted that health workers or counselors had never visited them (57%), as well as in the other two areas, the majority admitted that they had never received information about health from health counselors (Sidoarjo, 82%; Kediri, 86%).

3.4.2 Ecological awareness of women in maintaining cleanliness and sustainability of Brantas Watershed

Ecological or environmental awareness is also important for the community, especially those who live on riverbanks. Dirty or polluted rivers can be caused by the community's neglect in protecting river water from all waste. The community's habit of throwing away garbage or the slum environment along the Brantas River Basin is also an indicator of the low ecological awareness of the community towards preserving the river basin. The following are indicators used to measure the level of ecological awareness of respondents in maintaining the cleanliness and sustainability of the Brantas River Basin. These indicators measure awareness of (1) the dangers of household waste in the form of plastic waste

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that can pollute the river; (2) the dangers of factory waste containing chemicals and dangerous metal particles that are dumped into the river; (3) river water is not suitable for use for household purposes; (4) preferring to buy mineral water/PDAM for drinking rather than using sedimented river water; (5) fish in the river have been polluted and are dangerous to health so they are not suitable for consumption; (6) not throwing household waste into the river because it can pollute the environment.

Figure 3. Garbage on the Edge of the Brantas River Basin in Surabaya

Figure 4. Garbage on the Edge of the Brantas River Basin in Kediri

The two figures above show that residents in the research area still ignore environmental cleanliness and health. It has been proven that they still throw garbage in the wrong place and do not manage it properly, so garbage is seen piling up on the riverbank.

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Table 6. Women's Ecological Awareness in Maintaining the Cleanliness and Sustainability of the Brantas Watershed

Respondents' Ecological Awareness Level Variable	Mean		
	Surabaya	Sidoarjo	Kediri
Average score of respondents' ecological awareness level in the Brantas watershed area	3.82	3.94	3.79
Respondent awareness range: 1 (strongly disagree); 2 (disagree); 3 (less agree); 4 (agree); 5 (strongly agree)			
(1) Household plastic waste thrown into rivers is difficult to decompose and causes pollution that is dangerous to health.	4.13	4.11	4.17
(2) Factory waste in rivers contains chemicals and metal particles that are dangerous to health.	3.53	3.67	3.56
(3) Although river water can be filtered, it cannot be used for household purposes.	3.34	3.97	3.43
(4) I prefer to buy mineral water/well water/PDAM water for drinking, cooking, and washing rather than using sedimented river water.	4.44	4.37	4.41
(5) Fish along the river are not suitable for consumption because they have been contaminated with waste/materials that are hazardous to health.	3.11	3.18	2.89
(6) Household waste should not be thrown into rivers because it can pollute river water.	4.41	4.38	4.29

Source: processed from primary research data

The data in Table 6 shows that the respondents' overall ecological awareness score is 3.79 to 3.82. This means that the respondents do not yet have good enough environmental awareness. This is because not all indicators have an average score of 4 or more (which means they agree that the Brantas River water has been polluted and is hazardous to health).

Several indicators that show respondents' relatively low ecological awareness regarding pollution and environmental preservation of the Brantas River Basin are found in the indicator regarding the quality of fish along the river that has been polluted by waste/materials hazardous to health. On average, respondents in the three research areas disagreed with this statement (score range between 2.89 to 3.11). This data is consistent with the respondents' knowledge about river water quality in Table 3, where the average respondent considered it suitable to consume fish from the Brantas River water.

Another indicator that shows respondents' relatively low level of ecological awareness is seen from the statement related to the unsuitability of river water for household purposes. The average respondent from the three research areas disagreed with the statement (scores ranging from 3.34 to 3.97). The third indicator that shows respondents' low ecological awareness is that "factory waste in the river contains chemicals and metal particles that are harmful to health". The average score ranges from 3.53 to 3.67, meaning respondents disagree with the statement.

The factors causing respondents' relatively low ecological awareness regarding pollution and conservation in the Brantas Watershed environment can be seen from the absence of parties competent to provide counseling or socialization about the environment.

Table 7. Parties Who Have Provided Environmental Counseling to Residents

Parties who have provided counseling	Surabaya (%)	Sidoarjo (%)	Kediri (%)
Never given counseling about the environment	42.0	89.0	72.0
Family Welfare Empowerment (PKK)	18.0	6.0	8.0
Mothers' relegious study groups	7.0	2.0	2.0
Community of mothers who care about the environment	1.0	0	0
Neighborhood Association/Citizens Association (RT/RW)	2.0	0	2.0
village government	16.0	2.0	7.0
sub-district government	1.0	0	0
Environmental Service	6.0	0	4.0
Non-Governmental Organization	7.0	1.0	5.0
Total	100.0	100.0	100.0

Source: processed from primary research data

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The data in Table 7 shows quite concerning empirical facts, because most respondents, especially in Sidoarjo Regency (89 percent) and Kediri City (72 percent), have never received counseling on river water pollution and environmental preservation along the Brantas Watershed. According to respondents' confessions, the parties who have provided counseling on river water pollution and environmental preservation are PKK or religious study groups, village or sub-district officials, environmental services, and non-governmental organizations. The data in Table 7 is consistent with the data presented in Table 4 regarding the low awareness of the emergence of various diseases caused by polluted river water. The relatively low awareness of respondents about the various diseases that can be caused by polluted river water is caused by the limited exposure to information provided by health counselors or competent parties in this matter to the community. Likewise, with the respondents' awareness of river water pollution and environmental preservation along the Brantas Watershed, on average, they do not have sufficient ecological awareness. The absence of competent parties in the environmental field in the lives of communities along the Brantas River Basin can also cause respondents to have relatively low ecological awareness. This can be shown by the confession of most respondents who have not or have never been visited by environmental extension officers.

3.5 Analyzing women's participation in managing and preserving the environment along the river basin.

The final discussion on the findings of this research data is about the participation of women who live along the Brantas River Basin in maintaining the environment and family health. Participation is a form of community awareness to participate in activities that can improve their welfare. Participation is important in realizing a just and prosperous society [23]. Through participation, programs to improve the quality of life and community welfare can be carried out more efficiently and effectively and encourage the community to have a shared responsibility in realizing the welfare of the community or their community. The following is data on women's participation in three areas along the Brantas River Basin.

Table 8. Women's Participation in Brantas Watershed in Protecting the Environment and Health

Women's Participation Variable	Mean		
	Surabaya	Sidoarjo	Kediri
Average score of Women's Participation rate	1.44	1.17	1.22
Respondent participation range: 1 (never); 2 (rarely); 3 (sometimes); 4 (often); 5 (always)			
(1) Mothers' involvement in village deliberation activities to address river water and environmental pollution issues	1.46	1.21	1.11
(2) Mothers' involvement in village deliberation activities to address community health problems	1.76	1.25	1.32
(3) Mothers' involvement in decision-making at village meetings to address river and environmental pollution issues	1.42	1.17	1.04
(4) Involvement in decision-making at village meetings to address community health issues	1.68	1.08	1.10
(5) Involvement of mothers in community groups/citizens/organizations to address water pollution and environmental damage problems	1.31	1.07	1.16
(6) Involvement in monitoring water pollution and environmental damage	1.24	1.07	1.08
(7) Involvement of mothers in organizations/community groups that play a role in handling community health/integrated service posts	1.57	1.45	1.82
(8) Involvement of mothers in monitoring community health	1.10	1.03	1.15

Source: processed from primary research data

Information obtained from Table 8 shows that respondents in Surabaya, Sidoarjo, and Kediri almost always or rarely participate in various activities related to efforts to maintain environmental sustainability and health at the village deliberation level or other community organizations. This can

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be proven by the average score from the three regions being 1.17 to 1.44. The low participation of women in village forums that men or fathers structurally dominate shows that women are considered to have no role in managing their environment. Therefore, their voices are not heard, or their opportunity to express their opinions is not given space at the macro level (village deliberation). Although almost all women in this study were not or rarely involved in village deliberation activities related to environmental and health conservation issues, at a more micro level, some respondents were involved or were part of efforts to improve the community's welfare in their area. Their participation includes being members or cadres of PKK and integrated service for children under five years old (*Posyandu Balita*), becoming mosquito larvae monitors (*Jumantik*), participating in waste management socialization activities in their area, and participating in community service activities to clean up their residential environment. The following data relates to respondents' participation at the micro level in their efforts to maintain environmental sustainability and residents' health.

Table 9. Respondents' Participation at the Micro Level in Protecting the Environment and Health of Residents

Respondent Participation at the Micro Level	Surabaya (%)	Sidoarjo (%)	Kediri (%)
Not participating	66.0	90.0	88.0
Member/Cadre of PKK and Posyandu for Toddlers & Elderly	17.0	2.0	8.0
Mosquito Larvae Monitoring Officer (*Jumantik*)	3.0	1.0	0
Participate in managing waste and monitoring river pollution	6.0	1.0	0
Participate in community service to clean the environment	8.0	6.0	4.0
Total	100.0	100.0	100.0

Source: processed from primary research data

Based on the data in Table 9, it can be seen that most respondents were not involved or participated in environmental conservation and health maintenance activities at the micro level. This can be seen in the three research areas, where as many as 66 percent of mothers in Surabaya City did not participate, 88 percent of mothers from Kediri did not participate, and most mothers from Sidoarjo (90 percent) were not involved in environmental conservation and health maintenance activities in their environment.

Meanwhile, the number of respondents who participated in environmental conservation and health maintenance activities in their homes was relatively small: in Surabaya, 34 percent; in Sidoarjo, 10 percent; and in Kediri, 12 percent. The experience of mothers in Surabaya City who participated in environmental conservation and health maintenance activities at the micro level was handling matters related to toddler nutrition and stunting, managing waste and establishing waste banks anticipating river water pollution due to waste, making herbal medicine (from medicinal plants planted along the river basin), counseling on family toilets so that residents do not defecate in the river, participating in clean green competitions organized by the Surabaya City Government.

Meanwhile, the experience of mothers in Sidoarjo Regency who participated in environmental conservation and health maintenance activities at the micro level was to handle matters related to toddler nutrition and stunting, counseling on family toilets so that residents do not defecate in rivers, counseling on preventing diseases such as Dengue Fever (DBD), Diabetes, and Hypertension, as well as skin diseases. Mothers in Kediri City who participated in environmental conservation and health maintenance activities at the micro level were to handle matters related to toddler nutrition, counseling on preventing hypertension and diabetes, and distributing social assistance funds.

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3.6 Discussion: Analysis of data findings

The data presented above shows an interesting and worrying phenomenon. Based on the awareness and knowledge of housewives regarding the quality of Brantas River water in Surabaya City, Sidoarjo Regency, and Kediri City shows that they know and realize that the river water has been polluted and is not suitable for consumption. Most respondents in the three regions also know that the cause of river water pollution is household and factory waste. However, ironically, although most respondents know about Brantas River water pollution, there are still some housewives in Surabaya City, Sidoarjo Regency, and Kediri City who still use Brantas River water to meet their daily needs, such as for bathing, drinking, cooking, washing clothes, and washing household items, even taking fish from the Brantas River to be used as side dishes for their daily meals.

Several factors can cause the irony experienced by residents along the banks or Brantas Watershed. Research conducted by Suryadi et al [24] shows that the factors that influence people's behavior in using river water for daily needs are caused by community habits that have been carried out for generations. In addition, it is also caused by the community's low social and economic status. The findings are also in line with the results of this study, where the majority of respondents have a lower to middle socioeconomic status, and their length of residence in the Brantas Watershed area is also quite long; some even live on the banks of the Brantas Watershed for more than 20 years.

People living on riverbanks generally perceive river water as a source of life, so they try to use it for their daily needs. Research conducted by Rismawati, et al. [25] on several respondents along the Martapura River showed that most respondents in their study had a bad perception of river water pollution. However, they still use it for their daily needs. Rismawati's findings are in line with this study. Although most of the respondents' housewives knew that the Brantas River water was polluted, some still used it for their daily needs.

Research conducted by Husain [26] on community perceptions of using river water along the Jagir River in Surabaya City showed that although it was perceived as unclear, they thought it could still be used. Husain identified four patterns of river water use by the community, namely: (1) to flush and flush dirt from human activities; (2) to purify or perform ablution in the context of Islam; (3) to clean, for example, bathing and washing; (4) and as a place of recreation and to earn a living. With a cognitive map based on the knowledge and habits of the community identified by Husain, this condition is relevant to the results of this study, where respondents who live along the Brantas River Basin do not feel guilty and are "okay" if they use river water for their daily needs.

The behavior of housewives utilizing Brantas River water daily apparently impacts their neglect of health. It seems that many respondents do not know that several diseases can be caused by their interaction with the use of river water. Diarrhea, skin diseases, and DHF are some diseases that can be caused by river water pollution. Research conducted by Firmansyah, et al. [27] stated that the cause of diseases suffered by people living on riverbanks is suspected to be due to basic sanitation that does not meet the requirements and individual characteristics that still use low-quality river water as a water source. Purwaningsih [28], in her research on the correlation between the incidence of skin diseases and the use of polluted river water, showed a significant relationship between the use of polluted water and the incidence of skin diseases. Furthermore, Purwaningsih also found that personal hygiene also affects the emergence of skin diseases. If a person's level of personal hygiene is relatively low, coupled with the use of water for personal hygiene that does not meet quality standards or exceeds the pollution threshold, then more and more people will suffer from skin diseases. Other research related to river water pollution and its impact on public health has also been conducted by Ritiau [29]. The results of his research show that river water or well water has been contaminated by household and factory waste; the disease often found is diarrhea. This is because water that has been polluted and consumed by humans contains many microbes and has a bad impact on human digestion.

Considering the interaction and behavior of female housewives towards using Brantas river water in this study, it can be said that women have a weak bargaining position in obtaining resources, in this case, good quality, clean, and suitable water for their lives. In addition, women in this study also

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experienced structural marginalization, where external parties responsible for raising public awareness of river water pollution, health, and environmental preservation were not present in front of the community. Women, including polluted river water, are vulnerable in their interactions with the environment. A study conducted by Situmeang & Aflaha [30] showed that women and children are the most vulnerable to poor environmental ecology, including water and air pollution, which can also be linked to climate change. In their daily lives, women are the ones who have to directly struggle to maintain the survival and needs of their households. The limitations or vulnerabilities of women, especially those from low-income communities, mean that they do not receive adequate protection and rights to obtain clean water and health services from the government and stakeholders, most of whom come from the dominant class of society. In such situations and conditions, women can rally defenses for environmental sustainability and a better ecosystem for human life. Still, they must be supported and given adequate space and facilities to voice their interests. In such situations and conditions, women can rally defenses for environmental sustainability and a better ecosystem for human life. Still, they must be supported and given adequate space and facilities to voice their interests.

The study conducted by Situmeang & Aflaha shows that the bargaining position of women who are vulnerable and marginalized due to pollution and climate and ecological change can be weakened or strengthened when women can mobilize their capital and social networks. From an ecofeminist perspective, women's abilities are needed and must continue to be developed. Women can overcome ecological injustice when they have sufficient capital (human, financial, natural, social, and physical). The study conducted by Situmeang & Aflaha seems to align with this study's results, where women do not have sufficient capital, support, and knowledge to be the driving force in maintaining and preserving the environment along the Brantas River Basin.

4. CONCLUSIONS

Considering the data description and discussion above, the conclusion that can be drawn is that women do not have sufficient awareness and knowledge regarding the quality of polluted Brantas River water. This is a matter of concern and is detrimental to them because they are part of the ecosystem and ecology of the environment along the Brantas River Basin. Women also experience vulnerability, especially to their health and that of their families, where this vulnerability arises because of the lifestyle habits they lead in their interaction with river water. The habit of using unhygienic river water, coupled with low knowledge about the dangers of polluted river water, as well as the low economic conditions and social status of the community along the Brantas River Basin, can be factors causing the weak position of women in obtaining clean and adequate water services. This condition then impacts the health status of women and their families. The vulnerability of women living along the Brantas River Basin is also exacerbated by structural marginalization, where external parties who work to provide knowledge and awareness to the community along the Brantas River Basin do not carry out their functions, and women are not given the opportunity and encouragement to participate in village deliberation institutions to improve their fate. Women's participation in protecting and preserving the environment is social capital that can be developed and relied on to achieve a quality life even though they live along the Brantas River basin.

Suggestions and Recommendations

The results of this study have implications that women do not yet have strong enough bargaining power to save themselves and their families from various dangers of pollution and changes in the environmental ecosystem, in this case, polluted river water. This bargaining power can continue to be developed, institutionalized, and strengthened through social capital owned by housewives who know the importance of saving the Brantas River water from all forms of pollution. Therefore, this study also recommends that related parties routinely and intensively provide awareness to the community to change their lifestyle and habits that depend on river water for their needs. In addition, support for women as a group vulnerable to water pollution must continue to be improved, both through

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socialization, education, advocacy, and collaboration from various stakeholders to synergistically and simultaneously equip women with various skills and knowledge that can strengthen their bargaining position as citizens who are vulnerable to the impacts of damaged river water ecology.

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