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# Women's awareness of river water quality and their vulnerability to use of Brantas River water

# Kesadaran perempuan terhadap kualitas air sungai dan kerentanannya terhadap penggunaan air Sungai Brantas

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**Abstract**
This study was motivated by river water pollution which has an impact on the health of residents who live along the Brantas River Watershed (DAS). Aim of this research is to determine the health awareness and vulnerability of women and their families who live in the Brantas Watershed. An ecofeminist perspective is used to explain women's awareness and participation in protecting the environment and river water. This research uses a descriptive method with a survey research type. The research was conducted in Surabaya City and Sidoarjo Regency. The number of respondents was 200 housewives aged 19 to over 55 years. The research results show that there are still 11.50% of women in Sidoarjo Regency, and 3.40% from Surabaya who use river water and consider it suitable for household needs. Women and their families are also vulnerable to disease, where 35.30% of children from respondents in Surabaya have experienced skin diseases, and 34.2% of children from respondents in Sidoarjo have experienced diarrhea. However, it turns out that women also care about protecting and preserving the environment. This study concludes that efforts are needed to increase women's awareness so that they can avoid behavior that is not beneficial to health, especially in their interactions with polluted river water.

**Keywords:** women's awareness; health vulnerability; environmental pollution; Brantas River

***Abstrak***
*Studi ini dilatarbelakangi oleh pencemaran air sungai yang berdampak pada kesehatan warga yang bertempat tinggal di sepanjang Daerah Aliran Sungai (DAS) Brantas. Tujuan penelitian ini adalah untuk mengetahui kesadaran dan kerentanan kesehatan perempuan dan keluarganya yang tinggal di DAS Brantas. Perspektif ekofeminis digunakan untuk menjelaskan kesadaran dan partisipasi perempuan dalam menjaga lingkungan dan air sungai. Penelitian ini menggunakan metode deskriptif dengan jenis penelitian survei. Penelitian dilakukan di Kota Surabaya dan Kabupaten Sidoarjo. Jumlah responden sebanyak 200 ibu rumah tangga yang berusia 19 hingga lebih dari 55 tahun. Hasil penelitian menunjukkan bahwa masih terdapat 11,50% perempuan di Kabupaten Sidoarjo, dan 3,40% dari Surabaya yang memanfaatkan air sungai dan menganggap layak untuk keperluan rumah tangga. Perempuan dan keluarganya juga rentan terkena penyakit, di mana 35,30% anak dari responden di Surabaya pernah mengalami penyakit kulit, dan 34,2% anak dari responden di Sidoarjo pernah mengalami diaere. Namun demikian, ternyata perempuan juga memiliki kepedulian dalam menjaga dan melestarikan lingkungan. Studi ini menyimpulkan bahwa diperlukan upaya untuk meningkatkan kesadaran perempuan agar dapat menghindari perilaku yang tidak bermanfaat bagi kesehatan terutama dalam interaksinya dengan air sungai yang tercemar.*

***kata kunci:*** *kesadaran perempuan; kerentanan kesehatan; pencemaran lingkungan; Sungai Brantas*

## Introduction

Indonesian people's awareness of respecting and caring for water, especially river water that crosses where they live, can be said to be still low. This can be demonstrated through various studies. A study conducted by Wijaya & Muchtar (2019). Along the Batang Arau River, South Padang District, Padang City, West Sumatra, shows that the condition of the river has been polluted by garbage, household waste and wrecks of fishing boats, so the river water smells, the ecosystem is damaged. This condition also causes the development of disease germs, and the shallowing of river flows. A study conducted by Wulandari & Suwanda (2019) on the ecological awareness of the people in the Brantas River basin, in Wringinanom District, Gresik Regency, shows that awareness of environmental preservation or the ecology of the people along the Brantas river basin is still low, so support from various parties is needed to overcome this. that matter. The ECOTON Foundation, which assisted the Wringinanom community, found that the local community did not have the habit of disposing of waste in the proper place and using the river as a garbage disposal site.

A study conducted by Janah (2021) in the Brantas river basin also shows the same thing, where the river is used as a garbage disposal site by the community. The local government also gave a negative response to the efforts of the ECOTON Foundation in managing environmental problems along the banks of the Brantas river. Juniarti's study (2020) in the Citarum River Basin (DAS), West Java, shows that the Citarum Watershed has various problems, both from upstream to downstream, where these problems are related to low public awareness in caring for environmental sustainability, starting from deforestation and conversion of forest functions around the watershed, to household and livestock waste being dumped into the river, causing pollution that contaminates river water.

Brantas is the largest river in East Java and the second longest river on the island of Java. The Brantas River area has a catchment area of 14,103 km2 which administratively crosses 15 regencies/cities in East Java with a total river length of + 320 km. The area of the Brantas River Basin is at 0-500 m which covers almost 83 percent of the total area of East Java. Surface water potential per year averages 11.7 billion m3, but the potential that is utilized is 2.6 - 3 billion $m^3$/year. The Brantas River actually has the potential to become a natural resource that can be continuously utilized for the benefit of the community in almost all areas of East Java. However, with the poor water quality and pollution that occurs along the Berantas River, the people of East Java are losing potential natural resources from the 'wealth' of the Brantas River (Figure 1).

**Figure 1.**
Porong River, a tributary of the Brantas River, in Sidoarjo Regency
Source: Doc. Personal

The various studies mentioned above show that the perception and behavior of the Indonesian people towards rivers, including the people along the Brantas river, makes the river a dumping ground for household rubbish or industrial waste. Wrong perceptions and behavior regarding the existence of the river ultimately have a negative impact on the community itself. People cannot use river water for their welfare, because the river water has been polluted and has become shallow which can cause flooding if it rains heavily.

In an effort to increase public awareness of the importance of the function of river water for human life, the role of women becomes meaningful in efforts to preserve the environment. A study conducted by Bakti et al. (2017) shows that women, both in their context as housewives who use a lot of water for family needs in their daily lives, and women in their role as members of various social associations or organizations, such as being members of the PKK, religious study groups (Fatayat or Aisiyah), social gatherings, and so on, have a strategic role in preserving the environment, including along river watersheds. A study conducted by Mailisa et al. (2020) on the role of women in managing the Sani River, in Pati Regency, Central Java, shows that as many as 80% of women who live around the Sani River know the functions and benefits of the Sani River and are involved in its management. Forms of participation in river management include attending meetings, providing advice and planning, and donating food or energy in community service activities.

It would be an interesting study if a more in-depth study was carried out using a gender perspective to understand the awareness of women in the Brantas watershed area regarding health and environmental conservation efforts. With a gender sensitive approach, where the study is not only carried out on society in general but also on women and poor and vulnerable families, factors that cause inequality in the use of polluted river water among these communities and vulnerable groups can be identified.

Talking about health, nature conservation and ecological awareness, cannot be separated from human behavior regarding their dominant relationship with nature. When ecological awareness fades or disappears from human beings, then the damage to nature will be followed by various diseases that will occur. The damage to nature caused by human activities actually has a big impact on the existence of the health and sustainability of humans themselves, and the people who suffer the most from the damage to nature are women. Women have an important role in maintaining and caring for the health and preservation of nature, because women are very dependent on the grace of nature in meeting the needs of themselves and their families. The terms gender and ecology become a link that cannot be separated in efforts to care for health and the universe. Therefore, women are the first to be the most affected by the destruction of nature. Various studies show that when nature is damaged, women are the most vulnerable to it. Simanjuntak (2018) in his study on women and forests, shows that women are more vulnerable to experiencing injustice and oppression due to forest destruction.

This study uses an ecofeminist perspective as an umbrella of knowledge that connects health issues, the environment (ecology) and feminism. The connection between feminism and health and ecology cannot be separated from the situation and position of women and nature which are oppressed by patriarchal forces (Priyatna et al. 2017). As a social movement, ecofeminism seeks to voice injustice in relations between humans and between humans and nature which is caused by male power, hierarchical systems, the power of domination and human insensitivity to a sustainable environment. Whereas ecofeminism as a theory, views that pressure on the earth or ecology and pressure on women have a common point, namely powerlessness and unfair treatment, so that women are placed in a binary position and perspective, namely strong (men)-weak (women); rich (patriarchal hierarchical structure)-poor (women), and so on (Fahimah 2017).

By using this eco-feminist perspective, women's abilities can be traced and explored to rise to a role in maintaining the health of themselves and their families and saving their environment, in order to create a life that is environmentally friendly and also friendly to women. To be able to discover women's potential in maintaining health and saving the environment, studies that use an ecofeminism approach seek to be involved and empathize with women in their role in the

environment (Astuti 2012). Like the discourse on environmental management, arguments for the causes of environmental damage (erosion and land degradation) always place lower groups (local communities, the poor and women) as the cause of the damage (Wulan 2007). This study aims to examine the understanding and awareness of women living along the Brantas watershed regarding health and environmental conservation along the watershed.

## Research Method

The research, which was carried out in 2023, was located in two areas in East Java that are crossed by the Brantas River, namely Surabaya City (Jambangan District) and Sidoarjo Regency (Porong District). These two areas were chosen as research locations because they are densely populated cities, there are many industries located along the Brantas watershed in these two areas, and there are still quite a lot of people living along the Brantas watershed (Figure 2).


**Figure 2.**
Brantas watershed area in East Java
Source: Forum DAS Brantas Kota Batu (2012)

The type of research in this study is descriptive quantitative with survey research type, but does not aim to explain the correlation between variables. The research stages used in this study are: first, prepare a questionnaire and its indicators to understand the characteristics of the respondents and their knowledge of river water quality. The second stage, processed the data using the SPSS program. The third stage is analyzing the data using frequency tables and diagrams. Due to the absence of a sampling frame, this research is characterized by non-probability, and the research sample is determined based on the willingness of housewives to be the research sample (convenience sampling). The number of research samples in Surabaya City and Sidoarjo Regency totaled 200 housewifes who live along the Brantas watershed.

Primary data collection was carried out using a research instrument in the form of a structured questionnaire. After the questionnaires were collected, the data was then processed using the SPSS version 16 program. The SPSS program used in this study was not intended to test correlation between variables, but only as a tool to calculate the percentages used to determine the tendency of respondents' answers based on the questions in the research instrument.

## Result and Discussion

The presentation of research results includes five sections. In the first section, the characteristics of the respondents are presented with the aim of understanding their social and economic status background. The second section presents data regarding respondents' awareness and knowledge of the water quality of the Brantas River. The third section describes the respondent's behavior in their interactions with river water in everyday life. The fourth section presents data regarding the vulnerability of respondents

and their families to diseases suffered due to their interaction with polluted river water. The final section presents data regarding respondents' participation in efforts to protect the environment where they live around the Brantas watershed.

### The social and economic characteristic of respondent

The following table contains data relating to the characteristics of respondents by calculating the average: age; education level; number of children; type of occupation; family income per month; and length of stay in the Brantas watershed area.

**Table 1.**
Social and economic characteristics of respondents

| Social and Economic Characteristics (average) | Surabaya | Sidoarjo |
|---|---|---|
| Age | 44 years | 36 years |
| Educational level | Junior high school | Junior high school |
| Number of children | 1-2 children | 1-2 children |
| Occupation | Housewife | Housewife |
| monthly family income | Rp 1.950.000 | Rp 1.412.500 |
| Long lived in the Brantas watershed | 12 years | 14 years |

Source: Primary data processed by the author

Looking at the data in Table 1, it can be described that the characteristics of respondents from the two regions are in the lower middle class socio-economic. Several indicators that support the socio-economic conditions of respondents are the average of: educational level of respondents, which only reaches junior high school levels and the average monthly income of respondents' family is less than the City/Regency Minimum Wage (UMK) range in 2023. The UMK in Surabaya in 2023 is IDR 4,525,479, while the UMK in Sidoarjo is IDR 4,518,581. Most respondents admitted that, the house they live in is their own with a long period of residence on the edge of the Brantas watershed, to wit more than 10 years. When observations were made, the condition of many of their houses was not permanent, and even gave the impression of being illegal houses.

Various studies on communities that live in watershed areas, especially in developing countries, such as Indonesia, show that most of them are lower class residents with low incomes, and tend to live in slum areas along the watershed. study conducted by Surya et al. (2020) regarding the condition of the watershed in the Tallo river basin, Makassar City, shows that the people who live in the watershed area are poor residents with behavior that can worsen environmental degradation in the river basin. A study conducted by Siagian et al. (2023) also shows that Indonesia is a country that is prone to hydrometeorological disasters with watershed conditions that are quite worrying. Siagian et al. (2023) compared the conditions of watersheds in Japan and in Indonesia, where Japan pays great attention to the integrated preservation of watersheds as preventive and sustainable water resources. One of the factors causing watershed land degradation is anthropogonic factors, namely humans who live in riverside areas who do not have sufficient knowledge about watershed management, as well as pollution carried out by people who live in slum areas on the edge of the watershed. Rapid population growth in Indonesia has encouraged a number of communities, especially the lower middle class, to occupy watershed areas as residential areas. So that watershed areas experience land degradation and quality decline, due to various upstream activities, such as encroachment or other economic activities.

### Women's awareness of Brantas River water quality

The focus of this section is to describe awareness – in this case it is characterized by their knowledge about: the quality of the river water; the causes of the decline in river water quality; the feasibility of river water for household consumption.

Below provides information that the majority of respondents (76,10%, Surabaya, and 84,60%, Sidoarjo) stated that the quality of the Brantas River water was polluted. However, there are still some housewives in the two research areas who say that the water in the Brantas River is still clean (Surabaya, 27.7%; Sidoarjo, 15.4%). Those who say that the river water is still clean have the perception that even though the river water looks murky brown when the river water is quite high in the rainy season, there is no visible rubbish floating in the river.

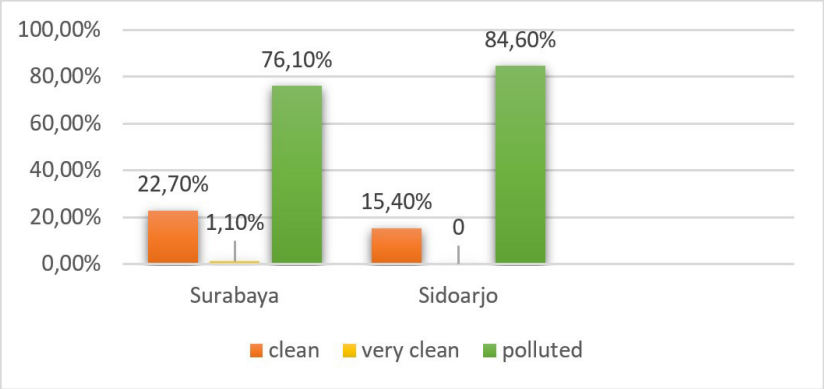


**Figure 3.**
Knowledge about Brantas River water quality
Source: Primary data processed by the author

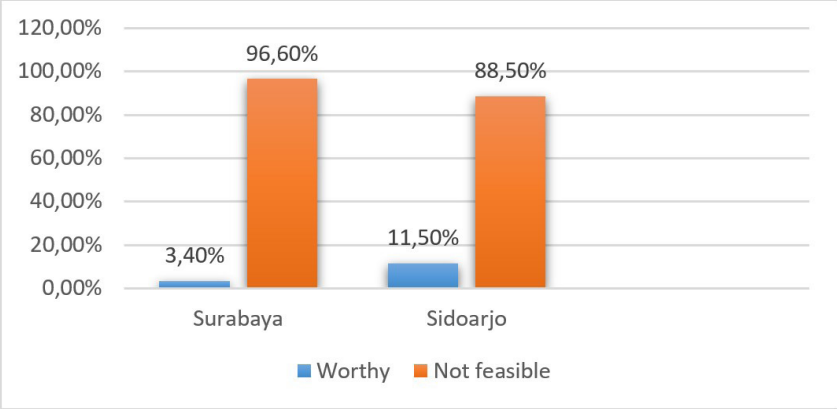


**Figure 4.**
Knowledge of the feasibility of Brantas River water for consumption
Source: Primary data processed by the author

Information obtained from Figure 4 shows that, the majority of respondents from the City of Surabaya know that the Brantas river water is not suitable for consumption (96.6%), although in Figure 4, it can be seen that a small number of respondents from the City of Surabaya say that the Brantas river water is still considered clean. Meanwhile, 88.5% of respondents from Sidoarjo Regency stated that the Brants river water was not suitable for consumption, this was in line with the statement of 84.6 respondents who said that the Brantas river water was polluted (see Figure 3). However, there are still respondents in Sidoarjo Regency (11,50%) and respondents from Surabaya (3,40%) who consider the Brantas River water to be still worthy for consumption. When conducting in-depth interviews to find out what is meant by river water that is still suitable for consumption, respondents who still use river water for daily life gave the argument that river water can be used for: bathing, washing clothes and household furniture, watering plants and give water to livestock.

Respondents' awareness of the quality of Brantas river water can be confirmed by their knowledge of the causes of river water pollution. The following table explains what respondents know about the causes of Brantas river water pollution.

Looking at the data in Table 2, it appears that each region does have different characteristics based on the respondents' knowledge of the types of waste in the Brantas river. In Surabaya, the majority of respondents (67%) know that river water is polluted by household waste (liquid and solid, including diapers) and factory waste (30%). Unlike the case with respondents from Sidoarjo Regency. Because the research area in Sidoarjo Regency is in a suburban area or transition between urban and rural areas, the knowledge possessed by the respondents about the causes of contamination of Brantas river water, apart from liquid and household waste (46%) and factory waste (17%), is also caused by agricultural pesticides (19%) and livestock manure (17%). One thing that is interesting, there are several respondents who know that the Brantas river in their area is also used to dispose of some of the Lapindo mud (1%).

**Table 2.**
Knowledge of the causes of polluted Brantas River water

| Knowledge about the causes of river water pollution | Surabaya ( %) | Sidoarjo ( %) |
|---|---|---|
| Liquid household waste | 36 | 23 |
| Solid household waste (including pampers) | 31 | 23 |
| Plant waste | 30 | 17 |
| Agricultural pesticides | 1 | 19 |
| Livestock manure waste | 1 | 17 |
| Water hyacinth | 1 | 0 |
| Lapindo mud that flows into the river | 0 | 1 |
| Total | 100 | 100 |

Source: Primary data processed by the author

The data presented above shows an interesting and worrying phenomenon. Based on the awareness and knowledge of housewives about the quality of Brantas river water, in boths area it shows that they know and realize that river water is polluted and is not suitable for consumption. Most respondents in both area also know that the cause of river water pollution is trash and waste, both household waste and factory waste. Even some housewives in Sidoarjo Regency know that agricultural pesticides, waste from livestock and Lapindo mud whose water is dumped into the Brantas river, are also causes of river water pollution. What is worrying is that there are some respondents who think that the Brantas river water is still clean and this indicates the possibility of them using the river water for household purposes.

A study conducted by Akpan et al. (2020) on the reuse of polluted river water in Ogun State, Nigeria, shows that the reuse of waste water has become part of the daily lives of people who use river water as a resource life. However, most people are willing to use waste water as long as it has been scientifically tested by experts that the water is suitable for consumption. Thus, public awareness of using polluted river water must be accompanied by increased knowledge about efforts to obtain clean water, even though the water has been purified from polluted water sources or waste water.

### Brantas River water utilization behavior

In the awareness section about the quality of Brantas river water, most of the respondents in the two research areas stated that the river water was polluted and unfit for consumption. In this section, the respondents' awareness will be confirmed by their behavior in utilizing Brantas river water. Even though the level of awareness of respondents regarding the quality of the Brantas river water is quite good (saying that the river water is not suitable for consumption and is polluted), Table 3 shows that the behavior of some respondents seems inconsistent with the level of awareness of those who think that the Brantas river water is polluted and unsuitable to consume. As seen in Table 3, only 64% of respondents from Surabaya City and 40% of respondents from Sidoarjo Regency do not use Brantas river water for household needs. What is quite interesting is that there are still respondents in both areas who use Brantas river water for various household needs (bathing, drinking, cooking, washing clothes

and washing household furniture). Likewise, respondents from Sidoarjo Regency, there are still quite a lot of housewives who use Brantas river water for bathing (17%) and washing clothes (19%), even around 10% use it for drinking and cooking.

**Table 3.**
Brantas River water use behavior in daily life

| Brantas River water utilization behavior | Surabaya (%) | Sidoarjo (%) |
|---|---|---|
| Do not use river water for household purposes | 64 | 40 |
| For bathing | 11 | 17 |
| Drink & cook | 5,2 | 10 |
| Washing dishes & cleaning the house | 6,8 | 14 |
| Washing clothes | 13 | 19 |
| Total | 100 | 100 |

Source: Primary data processed by the author

When they were asked further, how do they treat the Brantas river water to meet household needs, respondents from the city of Surabaya explained that they filter the river water into reservoirs, and provide medicine or purifying materials so that the river water can be used for their needs daily (36%). Meanwhile, respondents from Sidoarjo Regency, apart from purifying the Brantas river water with purifying agents, some of them (22%) apparently only put the river water into a reservoir and settled it within a few days without using purifying agents (see Table 4).

**Table 4.**
Behavior of purifying Brantas River water

| Brantas River cleaning behavior | Surabaya (%) | Sidoarjo (%) |
|---|---|---|
| Do not use river water for household purposes | 64 | 40 |
| Cleanse with clarifying agents | 36 | 38 |
| Precipitated without the use of clarification materials | 0 | 22 |
| Total | 100 | 100 |

Source: Primary data processed by the author

A study conducted by T. Sindane & Modley (2023) regarding the impact of poor water quality in four township areas in Emfuleni Municipality, shows that the local municipal government has failed to manage polluted river water and waste water, and this has been going on for years. The results of their research show that the community has awareness and concerns about the impact of polluted water and waste water that they face every day, but they cannot do anything about it. This study also shows that infrastructure problems which result in water quality problems, have caused social and economic stress and poor health among local residents.

The ironic condition experienced by residents along the banks or the Brantas watershed can be caused by several factors. A study conducted by Suryadi et al. (2016), shows that the factors that influence people's behavior in using river water for daily needs are due to community customs that have been carried out for generations. Apart from that, it is also due to the low social and economic status of the community. These findings are also in line with the results of this study, where the majority of respondents were of lower middle socio-economic status, and their length of stay was also quite long, some even lived along the Brantas watershed for more than 10 years.

People living on river banks generally have the perception that river water is a source of life, so they try to use it for their daily needs. A study conducted by Rismawati et al. (2020) which was conducted on a number of respondents along the Martapura River, showed that the majority of respondents in

their research had a bad perception of river water pollution, but they still used it for their daily needs. Rismawati's findings received justification support from this study. Even though most of the housewives who were respondents in this study were aware that the Brantas river water had been polluted, there were still some of them who used it for their daily needs.

A study conducted by Husain (2014) regarding community perceptions of the use of river water along the Jagir River in Surabaya City, shows that even though the river water is perceived as not clear, they think that the river water can still be used. Husain identified four patterns of river water use by the community, namely: to clean up and flush dirt resulting from human activities; to purify or perform ablution in the context of the Islamic religion; for cleaning, such as for bathing and washing; and as a place for recreation and earning a living. With a cognitive map based on community knowledge and habits as identified by Husain, this condition is relevant to the results of this research, where respondents who live along the Brantas watershed do not feel guilty and are "fine" when they use river water for their daily needs.

A study conducted by Denga et al. (2023) which examined poor communities on the banks of the Kafue River, in the Kitwi Region, Zambia, showed that poor residents living on river banks are very dependent for their livelihoods on water ecosystems and river banks. They developed the practice of cultivating crops on riverbanks because this can improve the livelihoods of poor communities, even though riverbanks can be considered the most threatened ecosystem globally and continue to experience degradation due to crop cultivation.

### Women's and family health vulnerabilities

This study is also seeks to map the comunnity health vulnerability along the Brantas watershed. To find out the community's health vulnerability, the respondents in this study were asked to explain what diseases their children and husbands had. Based on the data in Figure 5 and Figure 6, it appears that diarrhea and skin diseases are the two types of diseases most commonly suffered by mothers, fathers and children in the two research areas, where in the Sidoarjo Regency area, the number or percentage of the incidence of these two diseases higher compared to Surabaya.

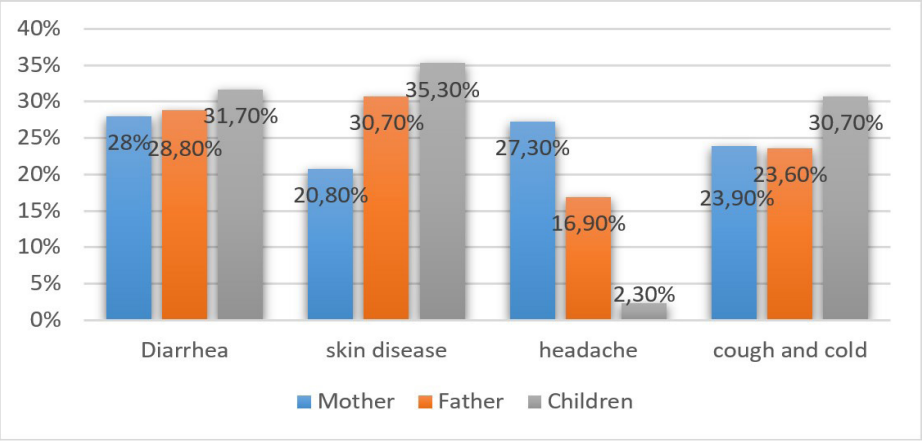


**Figure 5.**
Diseases frequently suffered by families in the Brantas-Surabaya watershed area
Source: Primary data processed by the author

The behavior of using Brantas river water and the daily cleaning methods carried out by housewives seem to have an impact on their health vulnerability. It can be seen that the illnesses suffered by children living around the Brantas watershed are diarrhea, coughs and colds and skin diseases, although this study did not directly measure the correlation between river water use and health. Whereas for parents (father and mother), most of them are skin diseases (itching or the like). A study conducted by Firmansyah et al. (2021) states that one of the causes of disease suffered by people living along rivers is thought to be basic sanitation that does not meet the requirements and characteristics of individuals who still use low quality river water as a source of clean water.

Purwaningsih (2021) in his study on the correlation between the incidence of skin disease and the use of polluted river water shows that there is a significant correlation between the use of polluted water and the incidence of skin disease. Purwaningsih further also found that personal hygiene also influences the incidence 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 suffer from skin diseases. Other studies related to river water pollution and its impact on public health have also been carried out by Ritiau (2021). The results of his research show that when river water or well water has been contaminated by household and factory waste, the disease that is often found is diarrhea. This is because the water that has been polluted and consumed by humans contains many microbes and has a negative impact on human digestion.

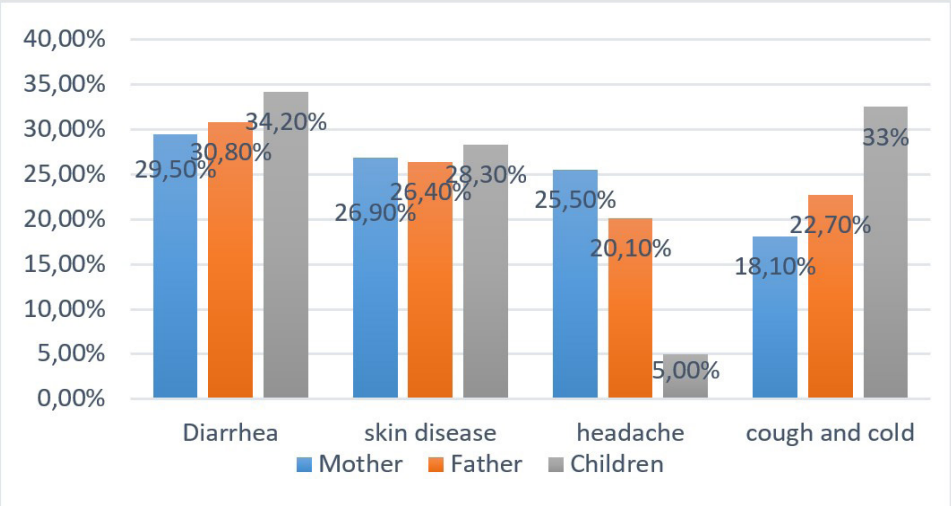


**Figure 6.**
Diseases frequently suffered by families in the Brantas-Sidoarjo watershed area
Source: Primary data processed by the author

A study conducted by Whyte et al. (2020) on the perception and effects of air pollution in Rivers State, Nigeria, shows that various pollution causes increased morbidity and even death globally. Polluted river water is then consumed by community members, including children, which can also cause stunting. The study conducted by Oginawati et al. (2023) regarding river water contaminated with heavy metals which has a serious impact on children. The results of their study show that heavy metals that pollute water, and are then consumed by children, can cause stunting or failure in the growth and development of children under five. The study they conducted in Bandung Regency, by analyzing the relationship between environmental factors, especially water media and the incidence of stunting, showed that the factors that have significance in the risk of stunting are the low level of education and income of parents, where both of these factors have implications for them, especially on knowledge about health and on the use of polluted water for household consumption.

### Women's participation in managing the Brantas watershed environment

This section is a descriptive explanation of the initiatives that have been carried out by women along the Brantas watershed to protect and manage the environment which is part of their daily lives. Through this data, it can also be an indication of their concern for efforts to maintain the health of their family and the environment.

Looking at Table 5, it appears that respondents from the city of Surabaya show a tendency to care more about the surrounding environment, so their level of participation is also high enough to keep the environment clean and healthy. This can be shown by their concern for reminding local residents to dispose of their rubbish in proper rubbish dumps, not throw it in the river (64%), planting land along

the watershed with vegetable crops to be used for family consumption (10%), and build a waste bank and recycle waste (4%). On the other hand, respondents from Sidoarjo Regency, it appears that their level of participation is relatively lower in protecting the environment, cleanliness and health along the Brantas watershed when compared to respondents from Surabaya City, although relatively many respondents said that they had also done community service to clean up the environment around the Brantas watershed (37%).

**Table 5.**
Women's participation in managing the Brantas watershed environment

| Types of Participation | Surabaya (%) | Sidoarjo (%) |
|---|---|---|
| Remind residents not to throw garbage into the river | 64 | 5 |
| Community service cleaning the environment | 20 | 37 |
| Planting land along the watershed with vegetable crops to be used for family consumption | 10 | 2 |
| Build a waste bank and recycle waste | 4 | 1 |
| Making the watershed area a tourist destination | 2 | 0 |
| Don't know | 0 | 55 |
| Total | 100 | 100 |

Source: Primary data processed by the author

If we pay attention to women's participation in managing the environment along the Brantas watershed as illustrated by the results of this research, it seems that women who have resilience in protecting the environment are those who are mature enough and have sufficient knowledge about the vulnerability of river water environmental conditions. This is shown from the data in Table 5, where respondents from the city of Surabaya care more about and participate in protecting their environment. A study conducted by Bekele et al. (2023) regarding Community participation in managing the river basin in Dandi Lake, Ethiopia, shows that the role of Community participation in watershed management is influenced by their initiative to be involved in all stages and processes of watershed management. Most communities are only involved in the implementation stage and are not involved in the planning process or all stages of environmental management. The study revealed that community participation in watershed management is hampered by lack of resources, interest and previous experience, as well as pressure from peer groups. The results of the study by Bekele et al. (2023) confirm the results of this research, that, to foster community participation in efforts to preserve the environment around the watershed, it is necessary to involve parties who have authority, in this case the regional government, to continuously socialize and invite the community to manage the environment better.

Vazhayil et al. (2023) studied the participation of community members, including women, in preserving the environment around river banks. Their study explores how river culture and the ability to manage the river ecosystem in communities along river banks have enabled them to live side by side with the river for many years. River culture, in this case in the form of habits of living with the river and community identification in their daily lives with the river, can encourage communities to proactively carry out community-based river conservation actions.

A study conducted by Ravula et al. (2023) on the political participation of community members in an integrated watershed development program in Bundelkhand, India, shows that the participation of women and people from vulnerable social groups is still neglected in the program. Their study findings show that men from broader land-owning community groups are more likely to participate in managing watersheds at the village level and benefit from the program. In contrast, the role of women who use watersheds for practical needs, such as fetching water, feeding animals, and collecting firewood for cooking, is ignored when watershed development planning programs are carried out. Therefore, Ravula suggests that when watershed development programs and environmental conservation around them are carried out, women must be involved, so that inclusive participation, fairer distribution of resources and better regional governance can be achieved.

From an ecofeminist perspective, the role of women is actually very significant in efforts to preserve the environment and prevent river water pollution. However, in reality, women tend to experience oppression in efforts to save the environment from ecosystem damage. A study conducted by Suoth et al. (2020) regarding environmental conservation efforts in the water catchment area of Lake Tondano, Minahasa, shows that the lake water has been polluted and this has caused anxiety for women, while the perpetrators of environmental destruction are dominated by men. Likewise in the case of Brantas River water pollution, where river water pollution is mostly carried out by factories around the Brantas watershed area, where the factory controllers are mostly men who have power over controlling factory waste.

A study conducted by Suresh (2021) which examines the relationship between gender and the environment in the context of sustainable development in India using an ecofeminist perspective, shows that without the inclusion of feminist issues and gender equality in sustainable development, including environmental preservation in watersheds, the public policy approach regarding the environment will not would work well, because it tends to marginalize women. Suresh's statement is based on his research in the Nilgiris district, Tamil Nadu, India, which shows that when gender equality is not achieved because it is confined by Patriarchy, women's participation in local organizations does not receive good appreciation, even though they are successful in carrying out their mission of environmental conservation and women's financial inclusion.

The destruction of the Brantas river water ecosystem has caused poor groups living along the riverbanks, especially women, to experience injustice and unequal quality of life when compared to community groups who can enjoy clean water. Husein et al. (2021) reminded again that from an ecofeminist perspective, women, as the main support for household survival, must have the ability to survive, where destruction of nature and the environment, including exploitation of nature, occurs on a large scale. It is women who then bear the burden of pollution that they did not make, but that pollution occurred because of the actions of capitalists, in this case environmental polluting companies.

A study conducted by Fonjong et al. (2023) in a rural area in Cameroon, shows that women in the family have control over family welfare, including their role in using water for food production, household management and child care. Fonjong stated that polluted water sources, including climate change which causes the loss of water sources and a decrease in water volume or flow, greatly hampers and disrupts women's productivity, as well as increasing women's burden in caring for and managing the home.

Taking into account the interactions and behavior of women housewives towards the use of Brantas river water in this study, it shows that women have a weak bargaining position in obtaining resources, in this case water that is of good quality, clean and adequate for their lives. A study conducted by Situmeang & Aflaha (2022) shows that it is women and children who are the most vulnerable in facing a bad ecological environment, including water and air pollution, all of which can also be linked to the phenomenon of climate change. In their daily lives, women are the ones who directly have to fight to maintain the survival and needs of their household. The limitations or vulnerabilities that women have, especially those from groups of people with lower economic status, cause them to not get adequate protection and their rights to get clean water and health services from the government and stakeholders, most of whom come from the dominant class society. In such situations and conditions, women are actually able to mobilize defenses for better environmental and ecosystem sustainability for human life. In the perspective of ecofeminism, women's abilities are necessary and must be continuously developed. Women can rise above ecological injustice when they have adequate capital (human, financial, natural, social and physical).

The study conducted by Situmeang & Aflaha (2022) seems to be in line with the results of this research, where social capital is the driving force for housewives to protect and preserve the environment along the Brantas watershed. In the city of Surabaya, the women who were respondents to this research had a high level of concern for environmental conservation efforts. For example, the housewives who were

respondents preferred to remind residents not to throw rubbish into the river and this was followed by efforts by some of them to plant land along the Brantas watershed with plants that were useful and could be consumed by the family, such as plants. vegetables or medicinal plants for the family.

In line with the studies mentioned above, a study conducted by Hendrastiti et al. (2023) which examined narratives of women's resilience in facing disasters, climate change, including pollution in watershed areas, shows that women actually have resilience in facing disasters. An important finding from their research is that women—through their daily lives—have the ability to respond to environmental disasters, this is because they have local ecological awareness and are able to adapt to change.

## Conclusion

Taking into account the results of the research above, the conclusion of this study is that women have sufficient awareness and knowledge regarding the quality of the contaminated Brantas river water, where they are part of the ecosystem and ecology of the Brantas river. However, women also experience vulnerability, especially regarding the health of themselves and their families, where this vulnerability arises because of the living habits they live in their interaction with river water. The habit of using unhygienic river water can be a contributing factor to women's weak position in obtaining clean water services. This condition then has an impact on the health status of women and their families. However, the women who live along the Brantas watershed also have the initiative and are able to participate in protecting the environment around the Brantas watershed due to the behavior of local residents throwing rubbish into the river. Women's participation in protecting and preserving the environment is actually social capital that can be developed to be able to achieve a quality life.

The novelty of this research lies in the analysis of women's interactions with river water and women's involvement in environmental conservation from an ecofeminist perspective. Even though ecofeminist theory shows that women should have the ability to control their environment because of their role as mothers for nature conservation, from the results of this research, women still experience marginalization in dealing with river water pollution. The results of this research also show that women do not have strong enough bargaining power to save themselves and their families from various dangers of pollution and changes in the environmental ecosystem. This bargaining power can continue to be grown, institutionalized and strengthened through the social capital possessed by housewives who are aware of the importance of saving the Brantas river water from all forms of pollution. Therefore, this research also recommends to related parties to intensively provide awareness to the public to change lifestyle patterns and habits that can endanger health due to interactions with polluted river water. In addition, support for women as a group vulnerable to water pollution must continue to be improved so that women have the skills and knowledge that can strengthen their bargaining position.

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