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Research Paper

Study of Community-Based Water Resources Management and its Spatial Distribution in Fatukoto Village, North Mollo District, South Central Timor Regency

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Abstract: East Nusa Tenggara (NTT) is one of the provinces that is vulnerable to drought threats. Even today, several villages in this archipelago still face difficulties in accessing clean water, one of which is Fatukoto Village, located in Mollo Utara Subdistrict, South Central Timor Regency. This research aims to: (1) Identify the forms of community activities in managing water resources in Fatukoto Village, Mollo Utara Subdistrict, South Central Timor Regency; (2) Describe the spatial distribution of water resources in the same area. This is a qualitative study, with data collection techniques including observation, documentation, and interviews. The results show that the availability of water resources in Fatukoto Village remains very limited, prompting the local community to take over the management of existing water resources. This includes the construction and maintenance of spring infrastructure, building water storage tanks around the springs to meet clean water needs during both the rainy and dry seasons, as well as the construction of irrigation channels to agricultural land. The community also engages in water resource conservation efforts to ensure the sustainability of water availability throughout the year.

Keywords: Management, Water Resources, Community Resources Distribution.

1. Introduction

Water is a vital resource for human life. It is used for drinking, bathing, washing, and various other purposes [1]. According to the United Nations (UN), in 2019, 2.2 billion people, or a quarter of the world's population, still lack safe drinking water. Meanwhile, 4.2 billion people lack safe sanitation services, and 3 billion lack basic handwashing facilities. According to Bappenas, water availability in most areas of Java and Bali is currently classified as scarce to critical. Meanwhile, the water situation in South Sumatra, NTB, and South Sulawesi is projected to be scarce or critical by 2045. The scarcity of clean water also applies to drinking water. According to the 2020-2024 RPJM, only 6.87% of households have access to safe drinking water [2].

East Nusa Tenggara (NTT) is one of the provinces vulnerable to the threat of drought. Even today, several villages in this archipelago still struggle to access clean water, one of which is Fatukoto Village, North Mollo District, South Central Timor Regency. Yet, clean water is a right for all people, especially children, as it significantly supports their growth and development and helps prevent stunting. The lack of access to clean water has resulted in people in East Nusa Tenggara (NTT), especially in Fatukoto Village, having to walk up to five kilometers to meet their family's water needs. This responsibility falls on girls. As a result, girls lose time for play and learning due to exhaustion. Problems such as dwindling groundwater reserves and the lack of potable water remain fundamental. This situation is exacerbated by increasing forest and other environmental damage. The clean water crisis in East Nusa Tenggara (NTT) is exacerbated by long dry seasons and low rainfall. Some areas in East Nusa Tenggara (NTT) have even experienced days without rain, categorized as extremely long, lasting more than 60 days [3].

Water is the most important compound on the Earth's surface, as nearly all aspects of life require it. Groundwater (dug wells) is groundwater found in the first impermeable layer. The presence of groundwater does not directly guarantee high water quality, as the groundwater used is shallow groundwater (wells), which is easily contaminated through seepage [4]. The main problem related to water resources is the insufficient amount of water needed by humans and the declining quality of groundwater. This is usually related to the

fact that during the dry season, the amount of surface water (wells, lakes, reservoirs) decreases drastically, often accompanied by a decline in water quality to the point where it is unsuitable for use.

2. Method

The research location is the place or object where research is conducted. The research location is Fatukoto Village, North Mollo District, South Central Timor Regency. The research was conducted within a six-month period after this proposal was presented at a seminar. Seminar results and thesis

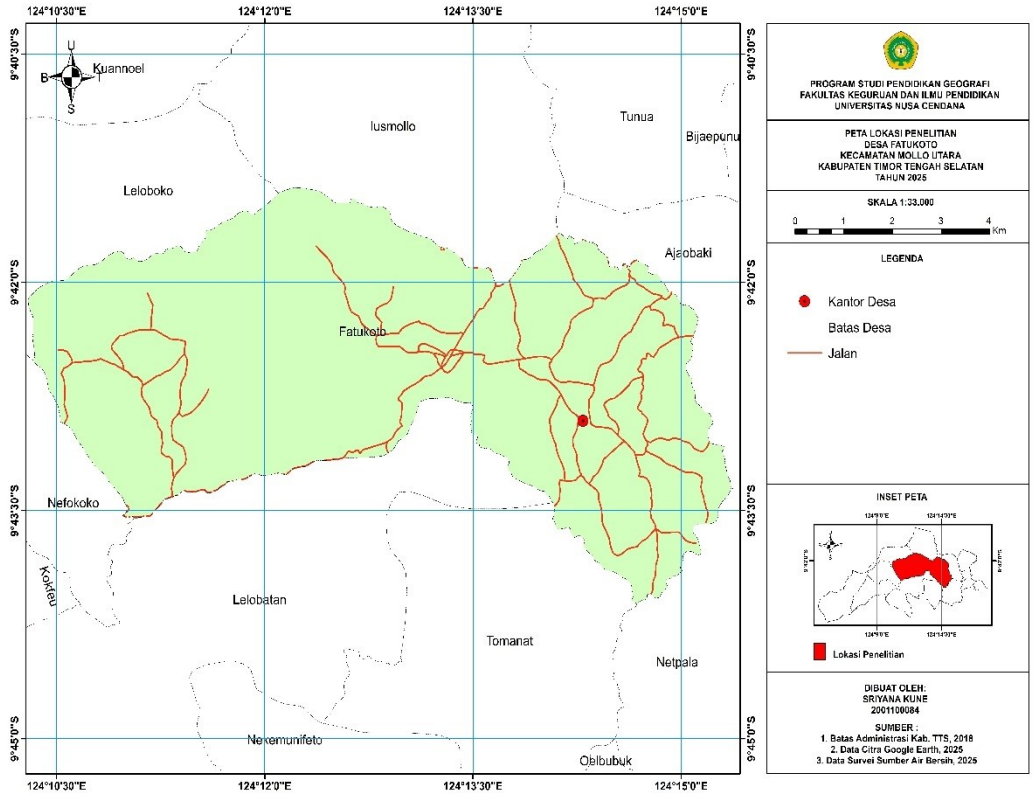

Figure 1. Research Location Map

Source: Administrative Boundaries of TTS Regency, 2018; Google Earth Imagery Data, 2025; Clean Water Source Survey Data, 2025

The tools and materials used included a laptop with ArcGIS for processing and mapping, a mobile phone for GPS/field photography, a ballpoint pen, a notebook, and documentation equipment. Geographic Information Systems (GIS) and remote sensing were utilized to map the spatial distribution of water resources in Fatukoto Village, integrating field observations with spatial data through digitization, georeferencing, and overlay processes, and producing thematic maps as visual evidence and a means of triangulation. Data were collected through observation (identification and recording of physical conditions and utilization at location points), directed interviews with residents and village officials (utilization practices, management, and challenges), and documentation (photos/archives from relevant agencies).

Primary data sources consist of observations, interviews, and direct documentation; while secondary data comes from the South Central Timor Regency government (e.g., population numbers, administrative maps) and relevant literature (books, journals, theses). The analysis uses the Miles & Huberman interactive model which includes data collection throughout the research process, data reduction through selection, codification, and grouping into meaningful categories (themes, actors, locations, practices), data presentation in concise narratives and thematic maps to reveal spatial-social patterns, and drawing conclusions/verification to answer the “what” and “how” related to water resource management and distribution, which are then tested through triangulation of sources, methods, and maps.

3. Result and Discussion

3.1 Forms of Community Activities in Fatukoto Village in Water Resources Management (SDA)

3.1.1 Water Resource Management in Fatukoto Village

Community-based water resource management is an approach that positions the community as the main actor in managing, maintaining, and distributing water resources sustainably. This approach is implemented in the Fatukoto village area, North Mollo sub-district, South Central Timor Regency, which has limited government services. Through this approach, the Fatukoto community plays a direct role in the management and conservation of existing water sources, both for domestic needs (clean water) and agricultural irrigation. This management aims to maintain the sustainability of water sources, increase access to clean water, and involve the community in decision-making and the implementation of related activities. From direct field observations at the research location, it can be seen that the Fatukoto village community utilizes water resources in the form of springs and dug wells to support all their activities (see Table 1).

Table 1. Coordinates of Clean Water Sources in Fatukoto Village

No	Coordinate		Aspects Observed	Information
	X	Y		
1	124.24465166666666E	9.71330338333338S	Water source 1	Afumtasa, RT 007, RW 004, Hamlet 2, Fatukoto Village
2	124.22264166666668E	9.7042433333333 2S	Water source 2	Nefokaenka Racecourse, RT 015, RW 008, Hamlet 4, Fatukoto Village
3	124.21565666666666E	9.7140533333333 4S		Oel'un, RT 16, RW 08, Hamlet 4, Fatukoto Village
4	124.24129999999998E	9.7009183333333 4S	well 1	Peoana Oelbubuk, RT 012, RW 006, Subdistrict 3, Fatukoto Village
5	124.24260000000001E	9.7156433333333 3S	Well 2	Tubmetan, RT 04, RW 03, Hamlet 1, Fatukoto Village
6	124.241745E	9.7176499999999 9S	Well 3	Haulasi, RT 09, RW 03, Hamlet 1, Fatukoto Village

Table 1 shows the coordinates of each clean water source in Fatukoto Village. There are six clean water sources, consisting of three springs and three dug wells. The following is a map of the clean water sources in Fatukoto Village.

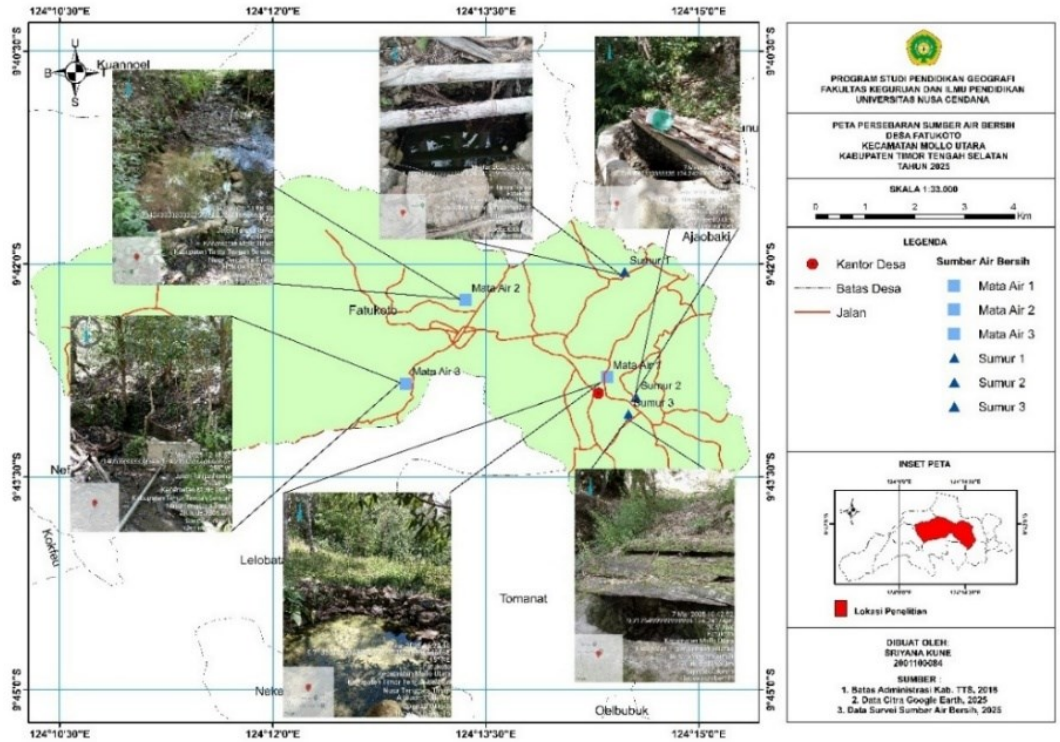

Figure 2. Map of Clean Water Sources in Fatukoto Village

3.1.2 Development and Maintenance of Water Source Infrastructure

The planning of water maintenance infrastructure in Fatukoto Village is community-based, namely by building reservoirs around water sources for clean water needs both in the rainy and dry seasons, as well as building irrigation channels that connect water sources to agricultural land to avoid water waste.

Figure 3. Reservoir at the water source

Figure 3 shows one of the water sources in Fatukoto Village, located in RT 16 RW 08, Subdistrict 4 area, which is used to support the life activities of the local community.

3.1.3 Construction of Irrigation Channels for Agricultural Needs

One of the water resource management practices carried out by the Fatukoto Village community is the construction of irrigation channels. Irrigation canal construction is crucial for water resource management, particularly to support agricultural activities. The importance of irrigation channels for agriculture is crucial in ensuring water availability. Irrigation significantly contributes to the regular flow of water to agricultural land, ensuring that crops remain hydrated even during the dry season.

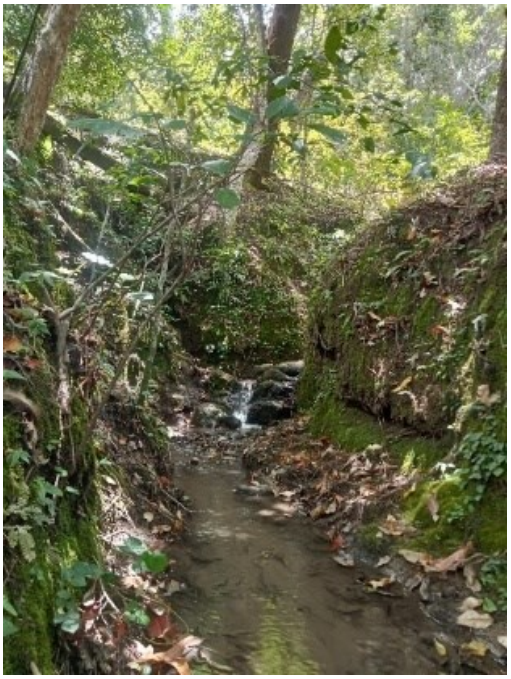

Figure 4. Irrigation channels to agricultural land

Figure 4 shows an irrigation channel from one of the springs in Fatukoto Village, located in RT 16 RW 08, Subdistrict 4, which is used to support the local community's agricultural activities. Based on the results of interviews regarding the government's role in resource management, the types of management carried out by the local community, and community participation in these activities, the following information was obtained:

> *"Yes, there is no intervention or assistance from the village government for maintenance. We, the community, have taken over to maintain the water sources here (Fatukoto Village), especially the springs. We have planted trees around the water sources, and we have also built control tanks near the springs. For dug wells, we have made walls with walls, some of which are not cemented. We have prepared a bucket for drawing water at each dug well. Community participation is very active and they are present at these activities." (Mr. Obed Loasana, Age: 39 years, works as a farmer).*

Interviews revealed that the most frequently used springs are the Oelnonon and Oelun springs. These springs persist through the dry season, although their flow decreases as the rainy season begins to dry. Conservation efforts are underway at both springs to protect and preserve the water sources.

3.1.4 Monitoring, Evaluation and Supervision of Citizens/Community

Community monitoring, evaluation, and oversight of the springs in Fatukoto Village are essential pillars of community-based management to maintain sustainable water flow and quality. Condition monitoring is conducted regularly not only on quality parameters (clarity, odor, and potential household contamination) but also on supply sustainability, specifically by recording changes in flow, the condition of buffer vegetation, erosion levels, and human activities around the spring boundaries. Residents implement simple but systematic steps, such as routine inspections of the source location, marking protected zones that limit washing and bathing activities, cleaning the inlet of sediment and garbage, and recording findings in a control book at the neighborhood/hamlet level for discussion at community meetings. Discharge measurements are conducted using a practical method using measuring buckets to calculate the volume per minute at representative flow points; results are compared between seasons to detect decreasing trends that require corrective action (e.g., replanting cover vegetation, repairing channels, or reconfiguring water intake points).

> *"Yes, we measure the water discharge using a 5-liter bucket/jerrycan to determine how many liters of water discharge in one minute. The spring water source with a water discharge of 2-5 liters/second which occurs in the dry season, while 15-70 liters/second in the rainy season is produced from the Oelnonon and Oel un springs. The groundwater source is in the form of dug wells with a discharge of 1-2 liters/second in the dry season and 15-60 liters/second which occurs in the rainy season is produced from the Haulasi, Tubmetan and Peoana/Oelbubuk dug wells." (Mr. Nitron Bay, age: 49 years, works as a farmer and is also a village official, position as head of RT 12).*

Based on interviews, informants confirmed that spring water sources that remain in use year-round are generally those with good vegetation cover, protected from grazing and direct domestic activities, and equipped with well-maintained drainage channels. To ensure availability during the dry season, communities employ a combination of strategies: assigning water collection schedules per hamlet/family (rotation shifts) to ensure equitable distribution, temporary storage in communal reservoirs and household tanks, regular maintenance of the pipe network to reduce leaks, enforcing regulations prohibiting potentially polluting activities within the spring radius, and conservation efforts such as replanting vegetation in catchment areas and constructing simple infiltration ditches. In emergencies, residents also utilize rainwater reservoirs and previously mapped alternative sources nearby, while coordinating with the village government for technical support for minor infrastructure repairs. This integrated approach of routine monitoring, documented discharge measurements, enforcement of local regulations, and conservation interventions makes spring water management in Fatukoto more adaptable to seasonal fluctuations while maintaining the quality of water services for all residents [5].

3.1.5 Utilization of Water Resources (Springs and Dug Wells) by the Fatukoto Village Community

Water resources are water resources that are useful or potentially useful to humans. Water uses include agriculture, households, recreation, and environmental activities. Community utilization of water resources is crucial in supporting various activities, particularly in agriculture, livestock, and daily needs. In the agricultural sector, water is used for dryland and wetland farming. Meanwhile, in the livestock sector, it is used to meet livestock drinking needs and maintain the cleanliness of pens. Furthermore, water is also used in daily activities such as cooking, washing, bathing, and cleaning the environment. Therefore, wise management of water resources is essential to maintain its availability and ensure sustainable use [6].

Based on the results of the interview with Mr. Abdis S. Kasse (Head of Fatukoto Hamlet) regarding (1) What are the uses of water sources used by the local community? and direct observations in the field at the research location of Fatukoto Village, it can be seen that the people of Fatukoto Village utilize water resources in the form of springs and dug wells to support all their activities, including the following: the people of Fatukoto Village utilize water resources in the form of Springs and Dug Wells as the main water sources to support their agricultural activities. Agricultural activities in Fatokoto Village are in the form of dryland farming which includes plantations, namely the type of plantation managed or carried out by the people of Fatukoto Village, namely food crop plantations such as corn, tubers, nuts, vegetables and fruits such as oranges, bananas and papaya where the main water source used is springs and during the rainy season, the community also utilizes dug wells and rainwater to support the water needs of their agricultural activities. The following data on the coordinate points of dryland farming in Fatukoto Village is presented in table form.

Table 2. Coordinates of dry land farming points in Fatukoto Village

No	Coordinate		Aspect	Information
	X	Y		
			Agriculture	
1	124.24480833333334E	9.700168333333332S	agricultural land 1	Ajaopukan RT 12 RW 06 Hamlet 3, Fatukoto Village
2	124.239355E	9.713648333333333S	agricultural land 2	Afumtasa, RT 07, RW 04, Hamlet 2, Fatukoto Village
			Farm	
1	124.22631666666666E	9.70242333333333S	Farm 1	Pacuan RT 15 RW 08, Hamlet 4, Fatukoto Village
2	124.24471333333334E	9.698565S	Farm 2	Ajaopukan RT 12 RW 06 Subdistrict 3 Teoknono
			Daily needs	
1	124.21641166666669E	9.71428S	daily necessities 1	Oel'un RT 16 RW 08, Subdistrict 4, Fatukoto Village
2	124.24415666666667E	9.698289999999998S	daily needs 2	Ajaopukan, RT 12 RW 06 Hamlet 3, Fatukoto Village

The following map presents dryland agriculture in Fatukoto village. There are two plantation samples: the first is located in Ajaopukan, RT 12, RW 06, Subdistrict 3, Teoknono, and the second is located in Afumtasa, RT 07, RW 04, Subdistrict 2, Fatukoto village. Figure 5 shows a map of the distribution of clean water use for agriculture in Fatukoto village. Two examples of locations are dryland farming locations: the first is located in Ajaopukan, RT 12, RW 06, Subdistrict 3, Teoknono. The second is located in Afumtasa, RT 07, RW 04, Subdistrict 2, Fatukoto Village. The people of Fatukoto village utilize springs and dug wells to support their dryland farming activities [7].

Water sources in the form of dug wells and springs are utilized by the people of Fatukoto Village as one of the supporting needs for water for their livestock, where the livestock raised by the people of Fatukoto Village are varied, including cows, horses, pigs, chickens. In carrying out livestock activities, the people of Fatuokoto Village utilize dug wells and springs as the main source of water for drinking their livestock. Based on Table 2, then made in the form of a map, the livestock in Fatukoto Village. There are two samples, the first is located in Pacuan Nefokaenka RT 015 RW 008 and the second is located in Ajaopukan RT

12 RW 06 Subdistrict 3 Teoknono Fatukoto Village. The following is a map of clean water utilization for agricultural needs in Fatukoto Village [8].

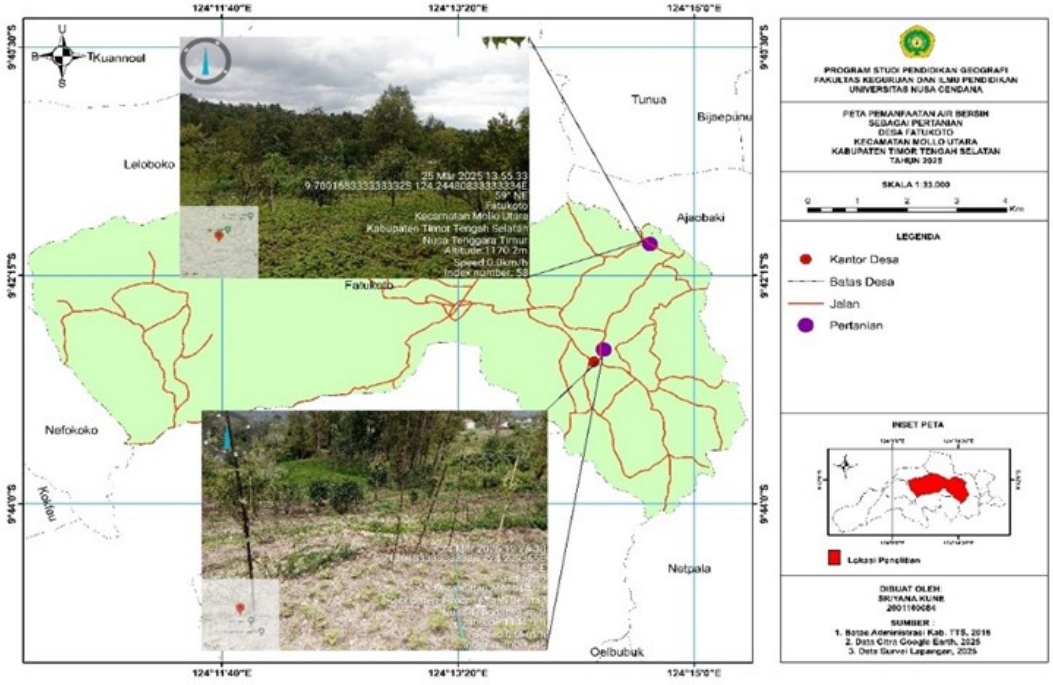

Figure 5. Map of Clean Water Utilization for Agriculture in Fatukoto Village

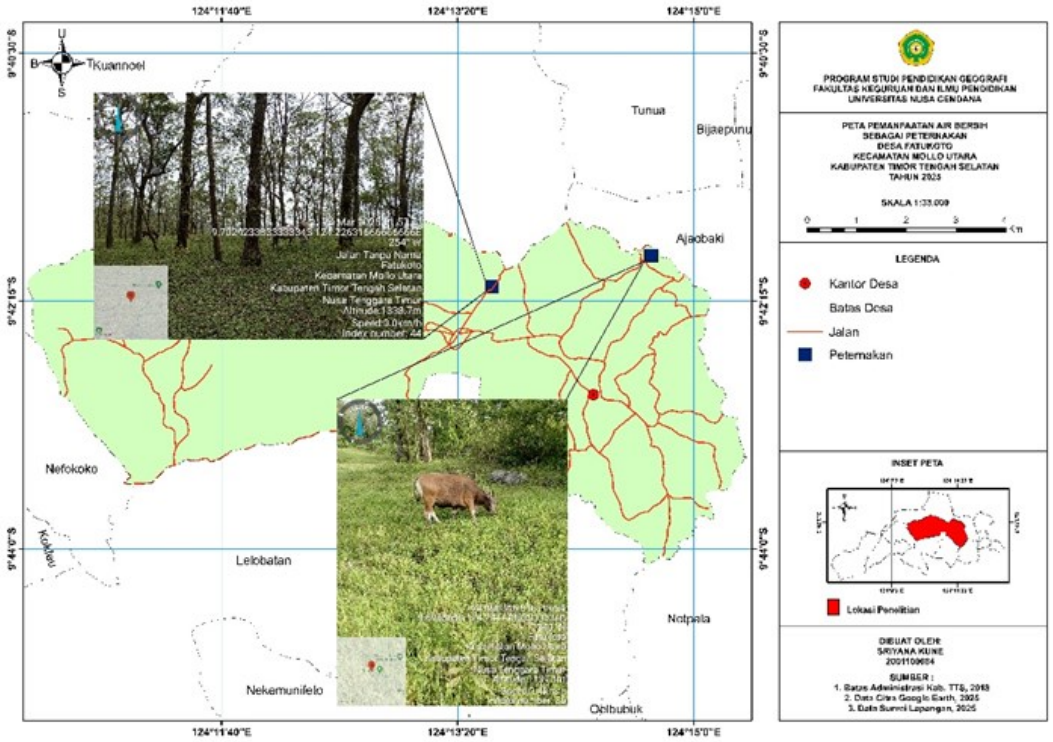

Figure 6 Map of Clean Water Utilization for Agriculture

Source: Administrative Boundaries of TTS Regency, 2018; Google Earth Imagery Data, 2025; Field Survey Data, 2025

Figure 6 is a map of the distribution of clean water utilization for livestock in Fatukoto village. There are two example locations, the first point is located in Pacuan RT 15 RW 08 Hamlet 4 Fatukoto Village. The second point is located in Ajaopukan RT 12 RW 06 Hamlet 3 Teoknono. The types of livestock managed by the Fatukoto village community are large animal husbandry, small animal husbandry, and poultry farming. The large animal livestock raised by the Fatukoto village community are cattle and horses. The small animal livestock

raised by the Fatukoto village community are pigs and dogs. Furthermore, the poultry raised by the Fatukoto village community includes chickens. These types of livestock are carried out by the Fatukoto village community to support their economic life by utilizing water resources from springs and dug wells and the surrounding land [9].

The people of Fatukoto Village utilize springs and dug wells to support their daily water needs. In addition to using these springs and dug wells for water for their agriculture and livestock, the people of Fatukoto Village also utilize them for their daily needs such as cooking, drinking, bathing and washing. The following map presents daily needs in Fatukoto Village. There are two samples: the first is located in Oel'un, RT 016, RW 008, Hamlet 4, and the second is located in Ajaopukan, RT 12, RW 06, Hamlet 3, Teoknono, Fatukoto Village. The following is a map of clean water utilization for agricultural needs in Fatukoto Village.

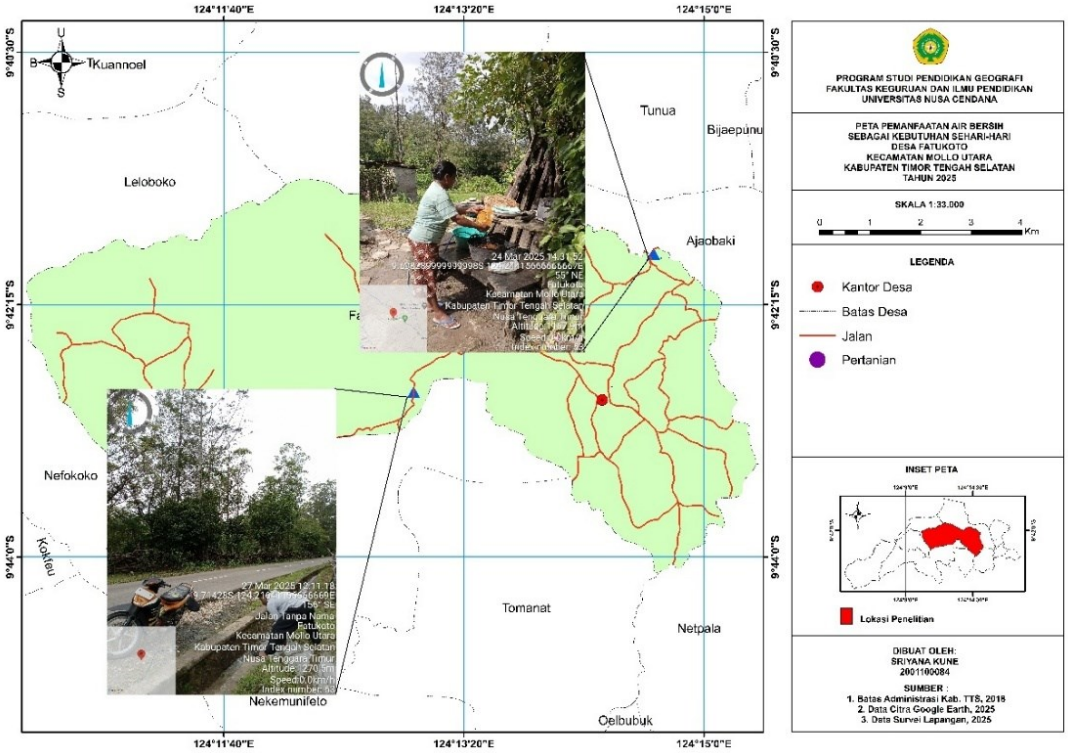

Figure 7. Map of Clean Water Utilization for Daily Needs Fatukoto Village

Figure 7 is a map of the distribution of clean water utilization for daily needs in Fatukoto village. There are two examples of location points, the first point is located in Oel'un RT 16 RW 08 Subdistrict 4 Fatukoto Village. The second point is located in Ajaopukan RT 12 RW 06 Subdistrict 3 Teoknono Fatukoto Village. Springs and dug wells are utilized by the people of Fatukoto Village to support their daily water needs where springs and dug wells are utilized as water needs for their agriculture and livestock, the people of Fatukoto Village also utilize them for their daily needs such as cooking, washing, bathing and drinking. Utilization of springs and dug wells as the main water sources in supporting the need for clean water in their daily needs [10].

3.1.6 Distribution of Water Resources (Springs & Dug Wells) in Fatukoto Village

Water resource distribution refers to the distribution of water, water sources, and water resources across various regions. Water resources in Fatukoto Village are unevenly distributed. Water resources in Fatukoto Village range from 500m to 1km, with some located 5-7km away. Water sources in Fatukoto Village consist of dug wells and springs (Fgure 8).

3.2 Discussion

3.2.1 Forms of Community Activities in Fatukoto Village in Water Resources Management (SDA)

Water resource management in Fatukoto Village is implemented as an integrated package of interventions that integrates upstream protection, downstream distribution

efficiency, community-based monitoring, and cultural legitimacy. At the source, residents construct and maintain reservoirs and control tanks to isolate the spring from direct contact, stabilize volume/pressure, and facilitate pre-filtration and water quality sampling—practices recommended by rural water design manuals and recent WHO guidelines for small-scale water supply [11]. Research findings and technical guidelines indicate that spring boxes/inspection chambers reduce sediment loads on pipe networks, expedite repair responses, and support consistent operational monitoring—results consistent with Fatukoto's field experience (IRC, 1980; Oxfam, 2012; UNICEF, 2003). Downstream, residents construct irrigation canals to equitably allocate agricultural water and reduce exclusive dependence on rainfall. This pattern aligns with evidence in Indonesia—from subak systems to community irrigation management studies—that local institutional arrangements and collective maintenance of canals improve water distribution efficiency, reduce flow losses, and reduce potential conflicts over use [12].

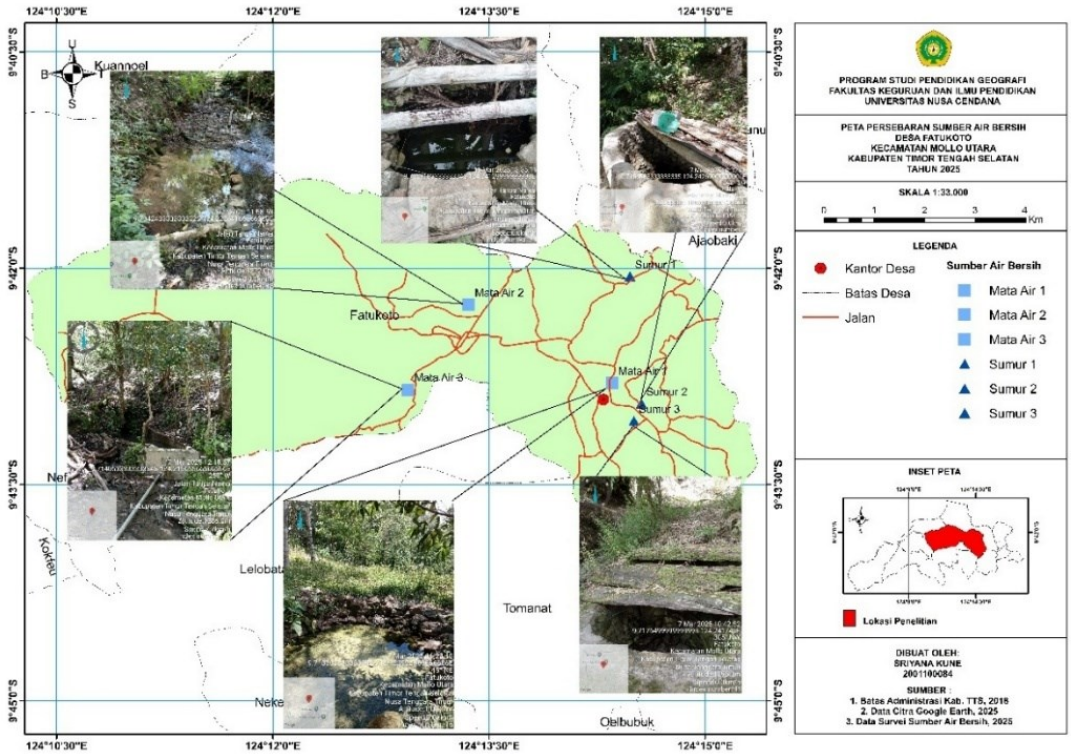

Figure 8. Map of Clean Water Distribution in Fatukoto Village

The participatory monitoring and evaluation component serves as the link between these technical instruments. Residents observe water clarity, odor, and indications of contamination; assess the surrounding ecological conditions; and measure discharge using a simple volumetric method (bucket/stopwatch) periodically, more intensively during critical periods, and then follow up on the data in village meetings. The literature confirms that community-based monitoring—even using simple tools—is effective when consistent, documented, and linked to corrective actions (cleaning inlets, repairing channels, planting buffer vegetation) [13]. The bucket/stopwatch method itself is recommended for small discharges at water sources/springs because it is inexpensive, fast, and accurate if the procedure is correct [14].

Fatukoto's technical performance is also enhanced by biophysical conservation practices—particularly tree planting in catchment areas/small streams—which have been shown to reduce erosion, improve water quality, and support baseflow during dry seasons. Evidence from Bali (Yeh Penet Watershed) shows that riparian vegetation diversity is strongly correlated with reductions in BOD, ammonia, and total coliform; these results are consistent with international studies on the role of riparian forests in filtering nutrients and improving water quality [15]. Thus, while reservoirs/control basins address operational and microbiological safety issues at the source, buffer vegetation addresses the root causes of hydrological and quality issues at the watershed level—a combination recommended by the WHO's "multiple-barrier" framework (WHO, 2011, 2017, 2024).

Finally, local wisdom—for example, prohibitions against bringing cooking utensils into spring areas—serves as a normative hedge that mitigates risky practices and the costs of formal oversight. Comparative evidence from community-based management systems suggests that local norms and institutions increase compliance, strengthen ownership, and lower transaction costs of resource management [15]. Overall, Fatukoto's experience aligns with the research consensus: systems that integrate appropriate infrastructure, disciplined community monitoring, buffer vegetation conservation, and legitimate local institutions tend to be more resilient, equitable, and sustainable across seasons.

3.2.2 Water resource conservation activities carried out by the Fatukoto Village community

Complementing biophysical interventions and control basins at the source, the Fatukoto Village community developed a simple irrigation canal network designed to follow the contours of the land to ensure even flow, minimize water loss, and reduce exclusive dependence on rainfall during the dry season. This practice aligns with evidence of community-based irrigation management in Indonesia, where collective canal maintenance, established allocation schedules, and a clear separation between the core spring zone and the agricultural use zone improve distribution efficiency while maintaining upstream water quality [16]. Thus, downstream irrigation infrastructure complements the function of the upstream control basin—which stabilizes pressure and facilitates pre-filtration—thus improving supply continuity and distribution equity across seasons (IRC, 1980; Oxfam, 2012).

The governance dimension is strengthened through participatory monitoring, evaluation, and oversight. Residents regularly observe water clarity, odor, and indications of contamination; assess boundary conditions (erosion, domestic activity); and measure discharge using a volumetric bucket-stopwatch method at regular intervals and during fluctuations. Although simple, consistent and documented monitoring practices have been shown to be effective in detecting declining discharge and quality trends early, allowing timely corrective actions—inlet cleaning, channel repair, and buffer vegetation planting—to be implemented [17]. The WHO-recommended “multiple-barrier” framework positions these measures as tiered layers of protection from upstream to downstream: source protection, treatment/preclarification, operational monitoring, and evidence-based corrective action in the field (WHO, 2011, 2017, 2024). Fatukoto’s experience replicates this pattern at the village scale, with control basins as sampling points, discharge records as performance indicators, and community deliberations as decision-making mechanisms.

The sustainability of its operations is supported by local wisdom, which serves as a normative barrier. Prohibiting cooking utensils from entering the spring area—culturally perceived as "losing" the water—ecologically prevents risky practices (direct contact, disposal of residues) in the core zone. Socio-ecological literature shows that customary norms and local institutions reduce the costs of formal oversight, increase compliance, and strengthen a sense of ownership of shared resources—factors that directly contribute to the reliability of community-based systems [18]. When these norms are integrated into village regulations (determining core/buffer/utilization zones), the role of women as household water managers and youth as drivers of community service creates synergy between technical instruments (control tanks, irrigation channels, monitoring protocols) and social instruments (social sanctions, allocation schedules, deliberations). The result is an integrated management model that is consistent with previous research findings: the combination of vegetation protection, appropriate infrastructure, participatory monitoring, and cultural legitimacy results in a more stable, secure, and adaptive supply to climate variability [19].

3.2.3 The Role of the Fatukoto Village Community in Water Resource Conservation

The protection and utilization of springs and dug wells in Fatukoto Village are primarily driven by community self-reliance, grounded in traditional knowledge and a spirit of mutual cooperation. Residents are actively involved from the planning stage through to the implementation of conservation activities, from tree planting in the catchment area, clearing boundaries, repairing small channels, to strengthening local regulations that limit risky activities in the core spring zone. This pattern aligns with findings from community-based water management studies that emphasize that meaningful participation, social ownership

of resources, and deliberation mechanisms with social sanctions are determinants of conservation performance at the village scale [20]. In Fatukoto, mutual cooperation is not only a means of mobilizing labor but also a social learning mechanism—residents share field practices (e.g., planting, pruning, and maintaining control tanks) while enforcing ecological norms, reducing the costs of formal monitoring.

Operationally, communities maintain the sustainability of conservation activities through routine maintenance and simple but consistent monitoring. Tree planting around springs is aimed at increasing infiltration, preventing erosion, and stabilizing discharge, while control tanks serve as quality checkpoints, pre-filtration, and pressure regulation points before distribution. This experience aligns with recommendations from small-scale water system guidelines and empirical findings in various rural areas, which demonstrate that a combination of biophysical and infrastructure interventions is effective in improving service reliability while reducing network maintenance costs (Meuli & Wehrle, 2001; WHO, 2011, 2024; IRC, 1980). The key to effectiveness lies not in sophisticated equipment, but in continuity of maintenance and disciplined recording—a point also emphasized in the literature on citizen-based monitoring [21].

In their utilization, springs and dug wells meet three main needs: dryland agriculture, livestock, and daily domestic needs. In agriculture, water is used to support the cultivation of food crops (corn, tubers, legumes) and horticulture (vegetables and fruits), which are relatively tolerant of seasonal water availability. This practice is consistent with the dryland agroecology of eastern Indonesia, where adaptive strategies—from rainwater harvesting and limited irrigation schedules to mulch and buffer vegetation maintenance—are key to stable production [22]. Agricultural water distribution is managed through simple channels and rotation agreements, a pattern widely reported to increase allocative efficiency, reduce water loss, and mitigate conflict—findings that parallel studies of community irrigation in Indonesia [23].

In the livestock subsector, the availability of water from springs and dug wells supports the maintenance of large livestock (e.g., cattle, horses), small livestock (e.g., pigs), and poultry (chickens) for drinking, pen cleaning, and basic sanitation. The literature shows that stable clean water services are directly related to livestock productivity and health, as they reduce the risk of water-related diseases and improve feed-water efficiency [24]. In Fatukoto, the integration of agricultural and livestock water management also strengthens local biomass cycles (e.g., the utilization of organic waste as compost), which in turn increases the soil's water-holding capacity. For domestic needs, water from springs and dug wells is used for drinking, cooking, bathing, washing, and sanitation. The practice of protecting core zones and the use of control tanks aligns with the WHO's "multiple barrier" approach, which prioritizes source protection, pre-treatment, and operational oversight as tiered layers to ensure microbiological and chemical quality (WHO, 2011, 2024; UNICEF & WHO, 2023). When these technical practices are supported by customary norms—for example, restrictions on certain domestic activities around springs—the level of compliance and orderly use tends to be higher [25].

4. Conclusions

Based on the description of the results and discussion in the research related to "Study of Community-Based Water Resources Management and Its Spatial Distribution in Fatukoto Village" it is known that the management of water resources carried out by the Fatukoto Village community is the Construction and Maintenance of Spring Infrastructure. The planning of water maintenance infrastructure in Fatukoto Village is community-based, namely by building reservoirs around springs for clean water needs both in the rainy season and the dry season, as well as the construction of irrigation channels that connect water sources to agricultural land to avoid water waste, as well as community monitoring, evaluation and supervision of springs and monitoring the condition of springs. One of the supervisions carried out by the Fatukoto village community is monitoring the condition of springs. The water sources in Fatukoto Village are springs and dug wells, located 300-500m apart, and some are 2-7km away. The community relies on dug wells and springs as their primary source of water. There are several locations where these water resources are located, including dug wells and springs. Dug wells are used only during the rainy season, while springs are more supportive from the rainy season through the dry season.

5. Acknowledgement

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6. References

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