Journal of Social Political Sciences
JSPS
Vol. 3, No. 4, November, 2022

COMMUNITY-BASED WATER RESOURCE MANAGEMENT IN MALADUK VILLAGE KLAMONO AND KLASAFET DISTRICT, SORONG WEST PAPUA INDONESIA

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Abstract: Citizens of Maladuk village only use the water from the Klasafet's river for their daily needs. However, the river is not suitable for hygiene and health standards. As a solution and corresponding with corporate social responsibility, the CSR program from PT Pertamina EP Papua Field in collaboration with the Ministry of PUPR succeeded in improving the water quality of the Klasafet's river through the Communal Biosand Water Filter innovation. This tool helps the Maladuk community obtain water that can be used for bathing, washing, latrines, and industrial needs. With the filtering method, raw water from the river can be processed up to 59,000 liters/day to be clearer. Up to now, the beneficiaries of clean water from the Klasafe's river have reached 1,808 families or around 6,000, people.

Keywords: *Community development, institutional capacity building, biosand water filter*

Submission	:	August, 13rd 2022
Revision	:	September 24th 2022
Publication	:	November 30th 2022

INTRODUCTION

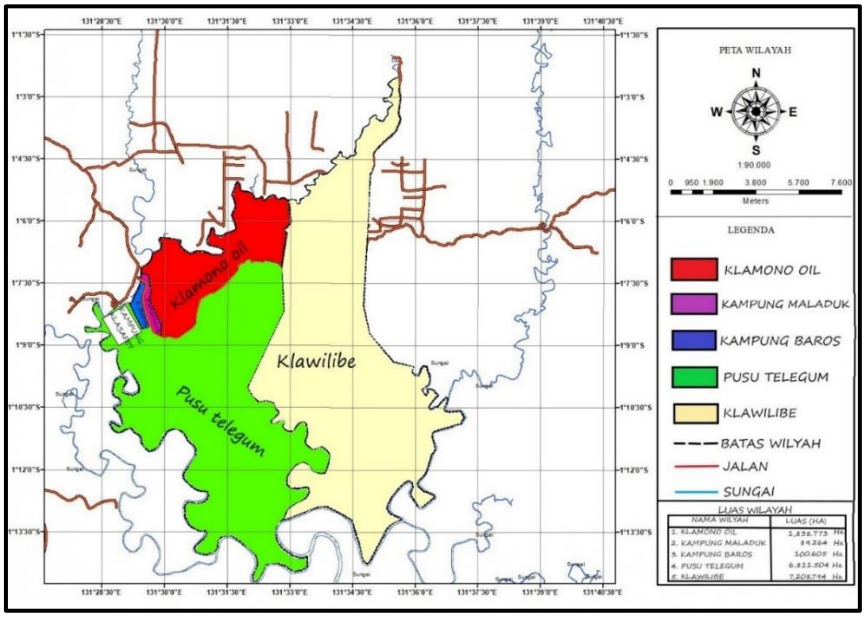
Based on Law No. 40 of 2007, every company that is a legal entity is required to carry out corporate social responsibility. PT Pertamina EP Papua Field as one of the state companies participates in carrying out social responsibility, especially for the community around the company PT Pertamina EP Papua Field has implemented social responsibility programs in the Ring I area which include infrastructure, capacity building, charity, and community empowerment.

The empowerment program is one of the efforts that can be done to overcome poverty and help improve community welfare based on the potential that exists in the community around. The social and environmental responsibility program in the field of community empowerment is quite important because the empowerment program emphasizes the active participation of the community to improve their welfare and independence. Thus, the company should participate in poverty reduction efforts through Corporate Social Responsibility (CSR) activities.

PT Pertamina EP Papua Field has proven its commitment to the implementation of CSR programs whose main base is community empowerment and environmental sustainability. One of the ongoing programs is the Community Empowerment-Based Clean Water Facility Improvement Program in the Klasafet District. This program starts in 2021 in Maladuk Village, Klasafet District. The benefits are felt by the community both economically and socially and in the environment .

METHOD

The method of the study uses the Semi Participatory Rural Appraisal (PRA) approach, wherein the implementation of the program most of the emphasis is on community involvement. The study of the impact program using a qualitative approach, through FGDs and in-depth interviews, also observation in the field, and desk study on secondary data (Iswanto, 2021). The location of the research are in Klamono and Klasafet Districts, Sorong, West Papua Province, as seen below.



Source: Klamono District Government Data (2020)

The map above is the boundaries of the villages in the Klasafet District. Maladuk Village has an area of 89.264 hectares, with a population of 158 people and 45 families.

RESULT AND DISCUSSION

West Papua Province is one of the concerns by the Central Government in efforts to achieve 100% clean water (Usman, 2018). This is in line with the 2019 West Papua Province in Figures book which states that the population is spread out in every district with physiography ranging from coastal to mountainous areas show that they do not have access to clean water, which one is the Klasafet District. Therefore, the majority of Klasafet District people still use groundwater such as dug well water, during the rainy

season they use rainwater storage and consume it and during the dry season, people buy clean water for Rp. 3,240,000/Year (Usman, 2018).

The Klasafet River is one of the water resources for the people of the Klasafet District, so it greatly affects the lives of the people of the Maladuk village. The Klasafet river water is used directly by the community for daily needs such as washing clothes, bathing, and washing toilets even consumed. Based on a study from PT Sky Pacific Indonesia in 2022, following the quality standard of PP No. 22 of 2021, regarding the implementation of environmental protection and management, the Klasafet river has a total suspended solids parameter (TSS) of 14 mg/L with a quality standard of 100 mg/L. This indicates that the Klasafet's river has a low level of turbidity factor so the TSS value is still below the quality standard and the Klasafet river has tidal currents every 6 hours.

With this level of turbidity, the community continues to use the Klasafet river water directly so that many people in Maladuk Village are affected by diseases such as diarrhea, skin diseases, and intestinal worms.

To overcome these problems, PT Pertamina EP Papua Field collaborates with the Ministry of Public Works for People's Works (PUPR) to improve clean water facilities based on community empowerment, trying to meet the needs of clean and healthy water. Creating an innovation that was first implemented in Sorong Regency, West Papua Province in the form of a Communal Biosand Water Filter (Kartitiani, 2021). The tool was created to answer the needs and overcome the problems of the people of the Klasafet District, namely the availability of clean water that is suitable for use by being able to manage raw water as much as 59,000 liters/day. In this program, there is a Core Competency or knowledge transfer from the Company through the Reliability, Availability, and Maintenance (RAM) function in applying a filtering method that utilizes river water that is more environmentally friendly with the Communal Biosand Water Filter.

Purpose and Program objectives include:

(1) improving public health levels in the Klasafet District, (2) increasing clean water services in the Klasafet District, (3) fulfill the needs of clean water, (4) making a pilot for clean water independence in the Klasafet District, (5) obtain a license to operate from the ring 1 company community.

Program Strategy

to realize this, the following strategies are needed in program implementation:

The Program Strategic Plan

2020 Initiation	2021 Development	2022 Stabilization	2023 Reinforcement	2024 Autonomy
• Social mapping & Need Assessment • Socialization of Community-Based Development Program • Institutional formation • Survey of watershed points to be used as raw water sources	• Accompaniment • Institutional capacity building • Making clean water treatment facilities with the innovation of communal bio-sand water filters	• Raw water capacity • Creating a water distribution system	• Expansion of the water distribution system • Replication of activities in other districts	• Exit program: 100% of the people of Klasafet District have access to clean water

Program Execution and Implementation are:

Foccus Group Discussion	Joint Survey of Watershed Points	Facilities and Infrastructure	Institutional and Training	Inovation
• Socialization of the clean water program work plan in the Klasafet District • Preparation of 5-year Strategic Plan and Annual Plan together with Klasafet District and Maladuk Village	• Determination of watershed points that will be used as raw water sources in the Klasafet River. • Determination the location of the processing equipment for raw water sources into clean water within 12 meters from the watershed point	• Preparation of clean water treatment facilities in the form of 2 units of raw water storage tanks, 6 bio-sand water filters, 1 unit of clean water storage tanks, and 1 clean water distribution tank. • Installation of Distribution Networks to 1,770 households • Create the workflows for	• Establishment of a Clean Water Management Institution. a total of 10 people • Establishment of a Village-owned Business Entity (Bumkam) as a forum for the Village Business Unit. A total of 21 people • Training about Clean Water Treatment and Equipment Maintenance which was attended by 10 people	• The design of Communal Biosand Water Filter tube design is made of FRP (Fiberglass Reinforced Platic) with a diameter of 10 inches, with a length of 1.25 meters. The composition of the filter media consists of 25 cm thick Manganese, 25 cm thick charcoal, 15

Foccus Group Discussion	Joint Survey of Watershed Points	Facilities and Infrastructure	Institutional and Training	Inovation
		the processing and distribution of clean water	• Training on measuring acid levels in the water which was attended by 10 people	cm thick sand, and 10 cm thick gravel stone. A total of 6 units can manage 59,000 liters of raw water/per day

DISCUSSION

The results and impacts occured during program implementation are divided into 4 points including:

- Impacts on the environment: (1) Controlling the use of groundwater by 64,605 m2 in 2021, (2) Reducing water pollution by 51,586 m3/year, (3) Changes in water pH from 8.9 to 8.1 and turbidity by 410 mg/year L to 104 mg/L.
- Economic Impact: (1) Cost savings (efficiency) in purchasing clean water by Rp. 3,240,000/year to Rp. 600,000/year, (2) An increase in the income of the people of Klasafet District by Rp. 31,000,000/year to Rp. 37,800. 000/year, (3) Bumdes income from Rp. 5,960,000/year to Rp. 11,920,000.
- Impacts on community welfare: (1) Changes in people's behavior that previously did not care about clean rivers, now understand the importance of protecting rivers as raw sources, (2) Reducing unemployment by 5 people, (3) Forming community groups managing clean water under Bumdes Klasafet with 5 members.
- Impact on the social life of the community: (1) Bundes members who manage clean water have increased from 3 to 5 people, (2) Beneficiaries are 50 families, (3) IKM with an index value of 3.3 in the very good category, (3) The first to use a communal water filter system in Sorong Regency, (4) SRoI with a value of 12.64. The financial value of the program outcome is IDR 5,567,657,163 and the financial value of the income program is IDR 440,400,000.

The Elements of Novelty and Uniqueness (Innovation) of the Program are:

The novelty element in this innovation is: This is the the only innovation on river water management by applying the river water filtering method with the Communal bio-sand water filter system (Redesign System)(Malik, 2021). The application of this system has changed the way river water is used by filtering it in an environmentally friendly manner with the reduction of water pollution. The clean water treatment system using a communal bio-sand water filter is a modification in overcoming water quality problems.

From this innovation, the people of Maladuk Village, Klasafet District, depend on river water directly which has a cloudy color, now it can be filtered with this device so that it becomes clearer and fit for consumption (Bakri et al., 2020). One communal bio-sand water filter device is capable of processing 59,000 liters of raw water/day that is not suitable for consumption to be filtered to be suitable for consumption, then the water is channeled into a holding tank with a capacity of 168,000 m3 before being distributed and this tool can reduce the level of pH, pH river before being filtered by 8.9 to 8.1.

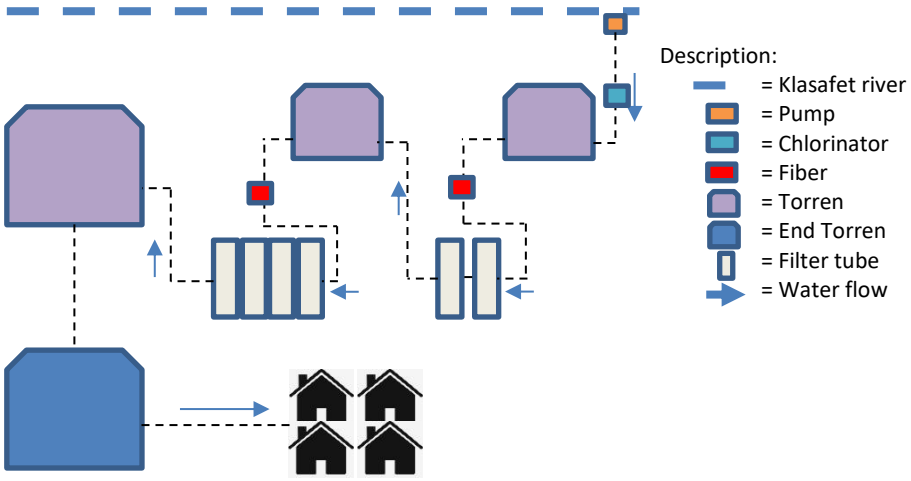


Figure 1 Mechanism of Clean Water Flow

The design of the river water filter tube is made of FRP (Fiberglass Reinforced Plastic) with a diameter of 10 inches and a length of 1.25 meters. The composition of the filter media consists of; (1) Manganese 25cm thick, (2) Activated Carbon 25cm thick, (3) Silica Sand 15cm thick, and (4) Gravel Stone 10cm thick.

Village Owned Enterprises (BUMDES) Klasafet

The Clean Water Facility Improvement Program has a community empowerment base, the manager of this program is the Klasafet BUMDES which has been legalized by the Klasafet District Head under Law No. 23 of 2004 on Regional Government. The members include;

Chairman	: Markus Kondologit
Exchequer	: Spenyer Momot
Members	: Dodi
	: Yuliana Kowa
	: Yohannes

The achievement of the Sustainability Development Goals (SDGs) from the Empowered Peri Program is 2 points, namely;

1. Point 6 (Clean Water and Adequate Sanitation): ensure the availability and sustainable management of clean water and sanitation for all.
2. Point 11 (Sustainable Cities and Human Settlements): build inclusive, safe, resilient, and sustainable settlements.

Existence of Springs and Origin of Water Sources for Drinking, Bathing, and Washing by Village/Output in Klasafet District, 2019

Villages	Water springs Existence	Source	
		For drink	For Bath/Wash
Maladuk	No	Rainwater	Draw well
Klamono Olie	No	Rainwater	Drilling Well/Pump
Baros	Yes, Not Managed	Rainwater	Draw well
Tiligum	No	Rainwater	Draw well
Kwawlibe	No	Rainwater	Draw well

Source: BPS Sorong Regency

Klasafet District Geographical Location and Boundary, 2019

- North : Distrik Klamono
- South : Distrik Bangun
- East : Distrik Sayosa, Konhir dan Bangun
- West : Distrik Malabotom

Source: BPS Sorong Regency

Regional Topography by Village/Kelurahan in Klasafet District, 2019

Villages	Topografi Wilayah		
	Downhill	Top	Plain
Maladuk	-	-	●
Klamono Olie	-	-	●
Baros	-	-	●
Tiligum	-	-	●
Kwawlibe	-	-	●

Source: BPS Sorong Regency

PT Pertamina Papua Field in carrying out community empowerment obligations through the *Peri Berdaya* program (improvement of clean water facilities based on community empowerment) in Klamono District and Klasafet District (Malik, 2021). This program utilizes raw water sources from the Klasafet River watershed (DAS), with management using a water treatment plant system which was initiated in 2018. The *Peri Berdaya* Program is currently showing significant development with an increase in the number of beneficiaries and BUMKAM income. In addition, a new institution was formed, namely the banana and guava farmer group. In the program to improve clean water facilities based on community empowerment in the Klamono District and Klasafet District, there are 5 indicators, such as environmental, and social problems, the number of beneficiaries, the amount of increased income, and the number of new institutions formed (Wahyudin, 2004).

PT Pertamina EP Papua Field innovated in the Peri Berdaya program by providing public access to clean water through the application of river water filtering methods with BITERNAL innovation (communal biosand water filter and sedimentation tank (Redesign System)) (Brata, 2021). The application of this system has changed the way river water is used with a filtering process that aims to improve water quality. The clean water treatment system using a sedimentation tank and a communal bio-sand water filter is the first and only modification to overcome water quality problems (Evidence attached) in Sorong Regency, West Papua.

The background of this innovation is that the people of the Klamono District and the Klasafet District, which rely heavily on river water which is muddy and has poor content, but now be filtered with this innovation so that it becomes clearer (Evidence attached), so based on the lab test it is feasible to use this innovation. consumed. One communal bio-sand water filter device can process 14,400 liters of raw water/hour that is not suitable for consumption to be filtered to suitable for consumption, then the water is channeled into a storage tank with a capacity of 64,400 liters before being distributed to the people of Klamono District and Klasafet District with a total number of beneficiaries. as many as 1,808 families or about 6,000 people.

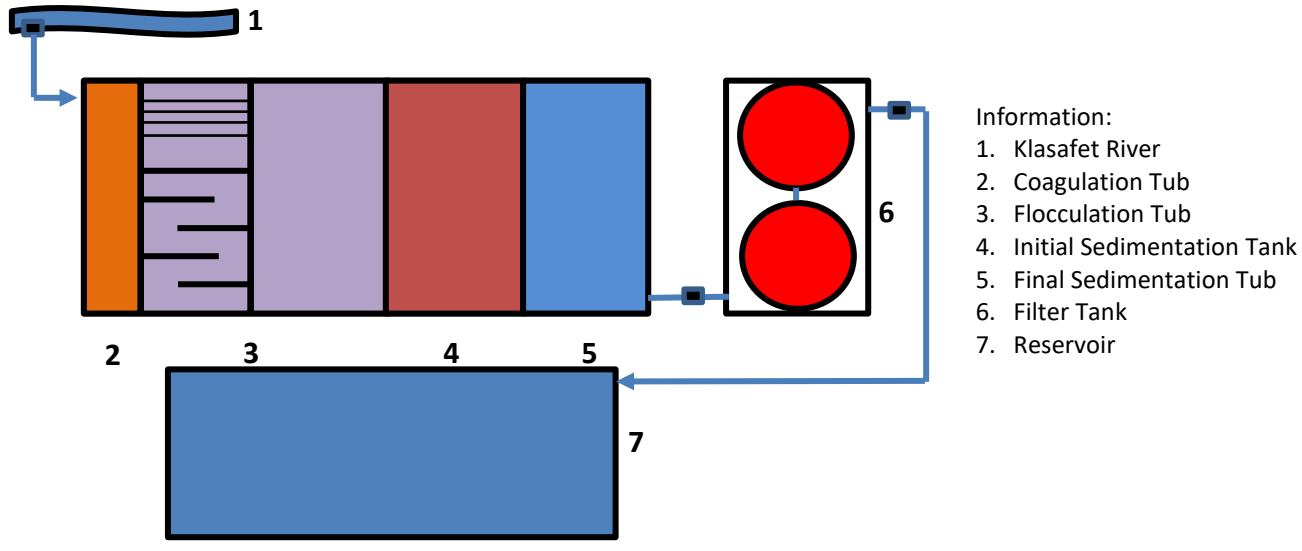
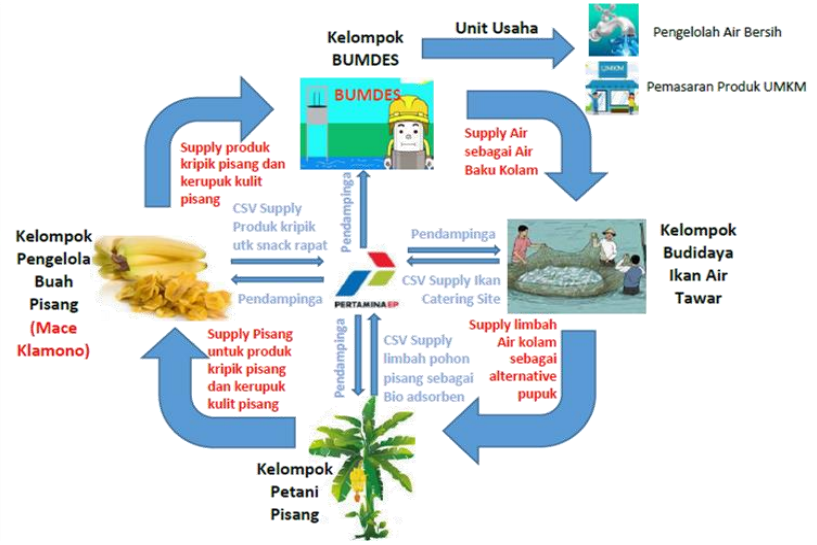


Figure: Communal Filter Process Schematic

Environmental Impact *indirect impacts such as reducing ground water use, reducing the rate of groundwater subsidence, attachments in the form of scientific journals or research (not lab test results)

Value Added Scheme for Communal Biosand Water Filter Technology Innovation



Addition of Service Quality The product resulting from the use of the Communal Biosand Water Filter, as a river water filter is to reduce water pollution from the amount of household waste (liquid) making the Klamono river raw water quality in the category of suitable for use. In addition, pond waste water from freshwater fish farming is also used as an environmentally friendly liquid organic fertilizer.

Communal biosand water filters have been utilized by beneficiaries in Klamono District and Klasafet District. The use of this technology has the effect of reducing costs (efficiency) incurred by the community to buy water. The cost for the community to buy water has decreased to Rp/year. Previously, each family had to spend an average of Rp. 270,000/month or equivalent to Rp. 98,550,000,-/year to obtain clean water.

Behavior changed in the community. The formation of awareness of the importance of clean water for health. This makes people start to stop using and consuming river water directly and start to use water from a filtered bio-sand water filter (Day, 2009). It can also indirectly improve public health, especially children, and can reduce the number of diseases such as diarrhea and vomiting. The production of *UMKM* marketed by BUMKAM also benefits from the Communal Biosand Water Filter technology by getting the water that is suitable for use and reducing the cost of water use (Fonataba et al., 2018) .

No	Program	Indicator	Indicator Description	Unit	2018	2019	2020	2021	2022 (August)
1	Community Empowerment-Based Clean Water Facilities Improvement Program in Klamono District Budget (2018-2022) = Rp.833.200.000,-	Environmental problems that can be solved	Reducing Groundwater Use	Meter ^{3}	50.433 m^3	53.874 m^3	59.292 m^3	64.605 m^3	69.918 m^3
		Social problems that can be solved	Reducing Limited Public Access to Clean Water	Number of Houses		-	-	-	-
		Number of Beneficiaries	Clean Water Beneficiaries	Number of Family card	1.380	1.476	1.620	1.770	1.808
		Total Income Increase	BUMKAM Revenue	Rupiah Per Month	7.45 Juta	8.94 Juta	10.43 Juta	11.92 Juta	13.41 Juta
		Number of New Institutions Formed	Group	Total Groups	-	1	1	1	1 (Crystal Guava Group)
		Budget			100.000.000	150.000.000	72.000.000	58.400.000	452.800.000

CONCLUSION

There is a change in the value chain. The integration of community empowerment programs carried out by companies that have a positive impact, thus creating linkages between programs. The BUMKAM group has a clean water treatment business unit and marketing of *UMKM* products. The activities of the BUMKAM group in terms of water treatment, apart from being used as a source of clean water for the community, are also used as raw water for freshwater fish cultivation and *UMKM* production activities. Freshwater fish farming activities carried out by the Freshwater Fish Group in addition to producing fish harvests also produce pond waste water which is routinely disposed of at 5%-10% of the total water every day. Furthermore, the wastewater is used as additional nutrients for liquid fertilizer by a group of banana farmers in Klamono Olie Village. The banana farmer group produces bananas which are used as raw materials for

processing banana chips and banana peel crackers by the Mace Klamono group in Klamono Olie Village. The results of the Mace Klamono group in the form of banana chips and banana peel crackers were supplied to the BUMKAM group to be marketed. This innovation forms a zero-waste and low-budget program.

ACKNOWLEDGEMENT

This community empowerment program was initiated by PT Pertamina EP Papua Field through the CSR program. We thank the community leaders and the local government Klamono and Klasafet Districts, West Papua Province for providing the necessary sources of information.

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