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RURAL LIVELIHOOD TRANSFORMATION AS AN EFFECT OF JATIGEDE DAM DEVELOPMENT IN SUMEDANG WEST JAVA

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ABSTRACT

Jatigede dam development in Sumedang, West Java, was planned in the 1960s and facing a dynamic revolution in Indonesia's Governmental System. The political shift causes a change in the government's priority of development, and as a result, this project had been postponed for decades. In the 1980s, The Government had given land compensation to the rural householder who lives at the site plan. The long-postponed development execution makes rural people unaware to leave the site and continue living on the compensated land for generations. Then in 2012, Government decides to execute the development as a targeted Indonesian Economic Master Plan to boost economic growth. This sudden regulation causes shock and stress for rural people's livelihood since they should change their way of living in a short time since access to resources became limited by inundation. However, the Dam development unavoidably causes rural transformation that has an impact on rural people's livelihood. Rural Livelihood transformation can be seen in livelihood assets including natural, financial, physical, human, and social assets condition after the inundation. This paper aims to identify the condition of rural livelihood assets as an impact of rural transformation caused by Jatigede Dam development in Sumedang, West Java. Therefore, the study outcomes were determined as a recommendation for preventing vulnerability by implementing programs for the impacted rural household.

Keywords: *livelihood assets, livelihood strategy, rural transformation*

I. INTRODUCTION

Jatigede Dam Development is one of 49 dams that are targeted to build to support the National economy by strengthening infrastructure provision. As said in National Medium-Term Development Plant Policy (RJPMN 2011-2025), this dam will support agriculture and power plant resources that distribute to Ciayumajakuning (Cirebon-Indramayu-Majalengka-Kuningan)
Region. Nevertheless, besides its functional advantages, the dam development causes shock to people's livelihood due to land transformation in the process of development. The Dam inundation changes approximately 3.509,14 ha of productive land manifested as industrial forest, agricultural land, and rural settlement. Rural people are connected to land as a livelihood resource, and since the land is inundated the livelihood resources also disappear. A sudden transformation didn't give enough time to implement a new livelihood strategy, meanwhile, access to resources became limited, and rural people's assets became vulnerable.

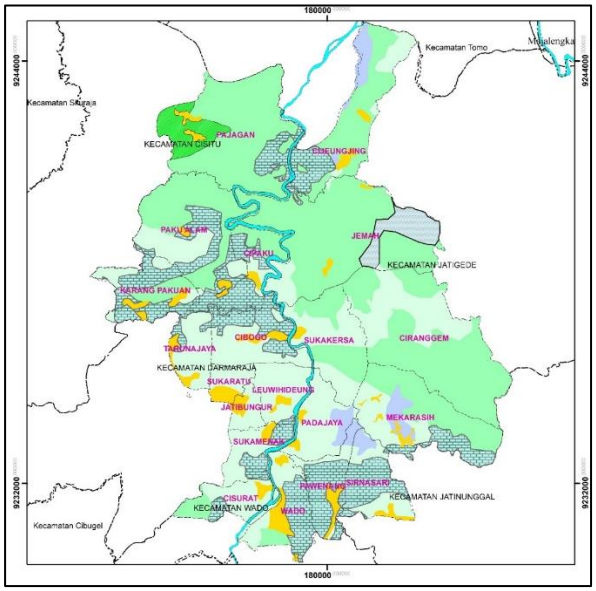

Figure 1. Landuse Pattern in Development Area of Jatigede DAM at 2011

Rural household assets need to be assessed to identify which assets are vulnerable and need intervention. Those interventions need to increase the capacity of livelihood diversification to build resiliency. Rural houses hold need to accumulate assets to increase their well-being (Ellis, 1998). Sustainable livelihood assets can be compromised towards access to natural, economic, human, and social assets (Scoones, 1998). Capability in maintaining and enhancing assets builds resiliency from shock and stress as they can improve quality of life, seek new opportunities, and enhance their capabilities and assets in the short or long term (Chambers, 1995, Chambers & Conway, 1992, Niehof and price, 2001).

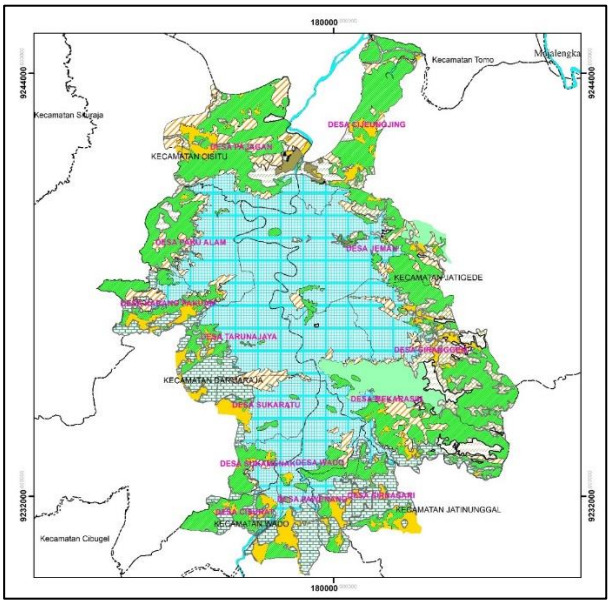

Figure 2. Landuse Transformation After Inundation of Jatigede DAM at 2015

The dam development can be a shock for the rural household since the inundation drastically restricts people's access to land as livelihood resources. Without a strategy to prevent the shock, people have limited choices to survive with livelihood diversification. Therefore, it is necessary to identify assets of rural's households as a result of rural transformation. As Carney and Asley (1999) assumed policy brief intervention into identified vulnerable assets increasing people's livelihood outcomes, such as well beingness (Scoones, 2015).

II. LITERATURE REVIEW

Rural transformation is a comprehensive change of social structure through the modernization process (Berdegué, Rosada, & Bebbington, 2014; Volgyes, Avery, & Londsdale, 1980), it alters by economic diversification and the declining dependency of rural households on agricultural sectors (Berdegué dkk., 2014). Hirsman (1959) in Volgyes et all (1980) state that rural transformation indicators have a relationship with urbanization and industrialization, it can be seen in the emergence of new sectors and infrastructure development. The rural transformation process can be slower or faster depending on the capability of rural people to cope with the transformation (Volgyes et all, 1980). The emergence of new sectors prompted land use change from agricultural to non-agricultural sectors (Liu & Yan, 2016).

Livelihoods are the capabilities, assets, and activities required for people to earn money and secure a means of living. Livelihood is primarily intended for use by policymakers, planners, and implementers of local, regional, and national government bodies interested or engaged in facilitating a more responsive, sustainable, and risk-reducing recovery process *(https://www.undp.org/india/publications/guidance-note-recovery-livelihood)*. A livelihood comprises the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers & Conway, 1992).

Shock defines as an unpredictable phenomenon that leaves traumatize people, such as wildfire, floods, and epidemics. Meanwhile, stress defines as pressure that leads to simultaneous and cumulative effects that can be predicted. An example of stress is drought, inclining population, and famine (Niehof and Price, 2001).

III. METHODOLOGY

This research was conducted in 2019 with a mixed method approach to obtain complete information to describe the observed phenomena (Creswell, 2013 Sugiyono, 2009). Primary data collection both for qualitative and quantitative data is carried out simultaneously to obtain complementary information and produce conclusions (Creswell, 2013 Sarwono, 2011).

As shown on the map in figure 1, there are 14 villages located at the side of Jatigede DAM. Among that villages, 3 villages are delineated as the study area. The study area is determined by the number of land and inhabitant depreciation considering the number of new sectors emerging in the area to identify livelihood change. Among the village, Jemah Village has higher number of land inundated by the development, with land depreciation of 943,67 ha and 181 inhabitant declining. Then, Pakualam Village chosen as the second study area with a number land depreciation is 117 ha, 428 inhabitants decline, and 3 new sectors identified (fisheries, tourism, and home industry). The last study area is Pajagan Village with 4 Ha of land depreciation and considering the emergence of tourism activity in Tanjung Duriat Spot, with a larger scale and proper management than the other villages.

Sample determinations carry out using the Slovin sampling technique, with an accuracy of 90% from the total population of about 1,913 heads of household, in conclusion, 95 samples need to collect as a minimum number. The number of samples that were collected in this study is 105 samples, with 35 households each from Pajagan, Pakulam, and Jemah villages. Whilst qualitative data were collected by interviewing 10 key informants who are representing the community from various professional backgrounds including farmers, fishermen, floating net openers, shop owners at tourist sites, breeders, and village officials.

Quantitative data are collected by filling in questionnaires by rural households with Gutmann's indicators as assessment tools, with "yes" and "no" questions. Information from the questionnaire is then processed as statistical data on a table and graph and interpreted descriptively. On the other hand, the qualitative data from deep interviews is extracted by the determined indicators to validate and elaborate the state of each asset. The elaboration of indicators conducted in this study can be shown in Table 1.

Table 1. Elaboration of Livelihood Asset's Indicators

No.	Factors	Indicators
1.	Natural Assets	Able to have access to collecting natural products such as wood, fish, honey, grass for animal feeding,
		Able to have access to clean water resources
		Able to have access to open economic activity at the side of the Dam
2.	Financial assets	Able to have a proper income
		Able to save some income
		Able to take and manage a loan
3.	Physical Assets	Land ownership
		Building or settlement ownership
		Telecommunication tools
		Vehicle ownership
		Production tools
		Access to public transportation
		Roads are safe for accessibility
		Road in a good condition for accessibility
4.	Human Assets	Average of Education Degree in household > 9 years
		Have another skill to support livelihood diversification
		Able to use the internet
5.	Social Assets	Involved in community activity
		Involved in the structure of a community

Statical data is processed into pentagon assets to identify which assets are vulnerable and which assets are potential. Then the statistical data is confirmed by the result from qualitative data deduction. Then both data would strengthen and

validate the condition of rural household assets as a result of rural transformation from the Jatigede Dam.

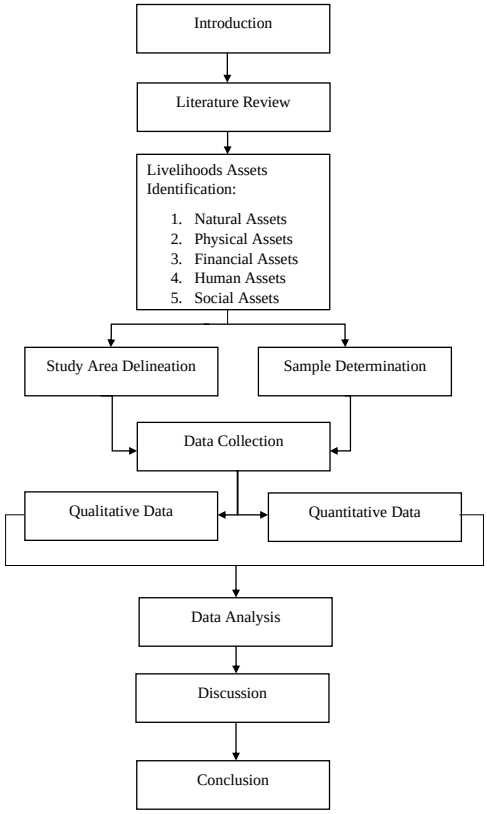

Figure 3. Research Methodology

IV. RESULT AND DISCUSSION

The result from the data analytic process showed that asset conditions of rural households in the Jatigede Dam Area are in a vulnerable state. It is an effect of land use change that causes access loss to livelihood resources. Moreover, rural people are unable to do livelihood diversification since they have not prepared an adaption strategy to cope with the *shock*, in this case, to prevent the vulnerability of Dam plan execution. As result, the asset condition is weak almost in every indicator that's shown in Figure 4 and Table 2.

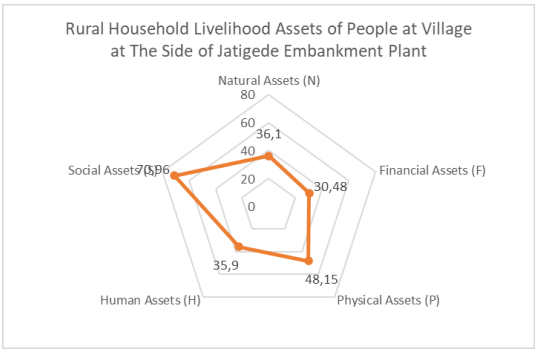

Figure 4. Pentagon Diagram of Rural Household Livelihood Assets from Village at The Side of Jatigede Dam

Table 2. Rural Household's Assets Condition at The Side of Jatigede Dam Area

No.	Factors	Indicators	Score (%)
1.	Natural assets	Able to have access to collecting natural products such as wood, fish, honey, grass for animal feeding,	13,33
		Able to have access to clean water resources	87,61
		Able to have access to open economic activity at the side of the Dam	7,35
The average score of natural assets (N)			36,10
2.	Financial assets	Able to have a proper income	21,90
		Able to save some income	42,86
		Able to take and manage a loan	26,67
The average score of financial assets (F)			30,48
3.	Physical Assets	Land ownership	20,00
		Building or settlement ownership	73,33
		Telecommunication tools	87,61
		Vehicle ownership	73,33
		Production tools	40,95
		Access to public transportation	23,81
		Roads are safe for accessibility	35,24
		Road in a good condition for accessibility	30,95
The average score of physical assets (P)			48,15
4.	Human assets (H)	Average of Education Degree in household > 9 years	49,62
		Have another skill to support livelihood diversification	37,14
		Able to use the internet	20,95
The average score of human assets (H)			35.90
5.	Social Assets (S)	Involved in community activity	96,19
		Involved in the structure of a community	45,72
The average score of social assets (S)			70.96

1. Natural Asset Condition (N)

The average score of natural assets is quite low, at 36,10%. This is ironic since most rural households are dependent on land agriculture as their main income resource. Even if the rural monographic is being transformed from the undeveloped area into more developed areas by infrastructure development, this urbanization sign doesn't change people's way of life. They are still dependent on natural resources for agricultural, collecting, and hunting activity. As an example, some households still depend on natural commodities such as honey, palm sap, firewood, and grass. That commodity is scarce by the Forrest inundation and getting hard to hunted or collected. Where rural households used to have an access to village agricultural land dan forest before the inundation. As a result, they are unable to improve their livelihood with the harvest or natural resources. Agriculture harvest is no longer the main commodity in the village economy and became subsistence agriculture that tentatively supports household food stocks. They even experience a food shortage in 2015, a year after they were relocated to the new settlement as told by Pakualam Head Village.

Figure 5. Floating Cage for Fisherries Activities Illegaly Build on Jatigede Dam, 2019.

Before the inundation, a honey bee-hunter can be collecting 75 liters of honey in a month with Rp. 150.000,- worth per litter. Now they only collect a maximum of 4,5 liters of honey within a month. The access for hunting became tough and far, they should walk 10 Km farther than the usual route before inundation. Whereas the harvest result would divide into 4-6 members in each hunting group.

Besides it, firewood and grass to feed animals also being scarce and hard to collect. It is because the access to the nearest forest is inundated, and as result, most rural households are giving up to raise livestock. The rest farmers need to drive or sail to the nearest village in different municipalities to fill their feeding stock. It can be 30 minutes to an hour driving by car or motorcycle, and at least 30 minutes sailing by boat. The extra commuting distance simultaneously adds extra transportation fees.

Besides access to land agriculture and natural resources collecting, rural households' access to open economic activity at the side of the Dam is also limited. Since the Dam is still under construction, it's dangerous and illegal to open a local business in the area. Nevertheless, some households still open up a business in the area such as opening up floating cages for fisheries, utilizing Dam buffer areas for subsistence agriculture and opening illegal fishing spots, and stalls at the side of The Dam. Meanwhile, fishery activity is illegal due to the operation of the hydroelectric power (PLTA) of the Jatigede Dam. Besides the legality, the land in the buffer area where the activity is held is also a hazard zone, where the tide of water level rise would change at any time without a proper warning system. The water level rise depends on rainfall intensity and water distribution for agriculture needs. Another hazard faced by the people is wild animal attacks on the farming area. Where the animal comes from the forest area that inundates by the Dam. Hence, rural households still held the activity to survive from rural transformation and the limited access to livelihood diversification.

Figure 6. Farm Corp At The Dam Hazard Zone, 2019.

Among the indicators of natural assets, rural households' access to clean water resources is in a good condition. Data show that 87,61% of respondents use the nearest spring water to provide for their daily activity and agriculture need. Moreover, The settlement relocation for the affected household in Cisema Kampong, Pakualam Village, provides their water provision by on-site piping system distribution. The relocation area builds in an emergency when the land was inundated but people didn't have any shelter to live in.

Figure 7. On-site System for Clean Water Distribution System at Housing Relocation Site, 2019.

2. Financial Assets

After the inundation, most rural households have no access to land and natural resources as the main livelihood choice. Hence, village economic activity also transformed from agriculture-based to non-agriculture-based. On the contrary, people have no strategy to face the transformation and have no stable economic activity as their main income. As result, they use the left saving and funds to survive. The average score of financial assets hit the lower point among other assets at 30,48%, whereas 79,10% of respondents have income under the regional minimum income of Sumedang Municipalities, which is mean under

Rp. 2.800.000,- per month. Moreover, 34% of them have income below Rp.700.000,- per month. The low-income condition cause inability of a rural household to increase their quality of life and livelihood diversification.

The vulnerable condition of financial assets is connected to rural economic change. There is 3.509,14 ha of productive land transformed into a waterbody area, which means the loose of the village's economic chain. The leading sector is gone, and the tourist activity as the replacement leading sector is not developing yet. This is worsened since household spending on basic daily need keep increasing due to the inability to provide their food stock by farming because they have no access to land.

The vulnerable conditions of financial assets are also caused by the unprevented strategy of rural households in facing the development of the Jatigede Dam. They assumed that the Dam would be postponed for an uncertain time, then suddenly the land was executed and they need to leave the site as soon as possible. The compensation for the land and building is received by the generation decades before, then they just accept compensation to quickly build a shelter. Without a proper strategy, they can't manage the left assets and compensation, since they had no livelihood diversification strategy after the inundations, most of them became jobless and depended on the left assets to survive.

3. Physical Assets

As it is connected to land inundation, the score of physical assets is low at 48,15%, whereas just 20% of respondents have land ownership. The low score is associated with the shock to financial assets and infrastructure inundations. The Dam not only inundates land but also the infrastructure that supported economic activity in the past. After relocating to the new area, they face the lack of infrastructure provision to utilize their daily activity such as safe roadways, public transportation, and other infrastructure to support local economic activity.

As 80% of the respondent has no land ownership, they utilize land in the buffer zone for farming. The settlement in the relocation area is also owned by Government with a building permit. The condition of roadways in the area is not safe due to the potholes, and some of them are unpaved. This condition causes the tourist sector as the new leading sector of the village economy to be suppressed from development. Where Pakualam and Pajagan roadways have the most dangerous potholes roadways. The roadways condition also makes an impact on local people's mobility and utility. As a result, the lack of physical assets makes rural households are hard to do livelihood diversification.

Figure 8. Unsafe and Bad Condition of Roadway as Rural People Transportation Access in Pajagan Village, 2019.

Figure 9. Unpaved Roadway Access to Relocated Village at Cisema Kampong at Pakualam Village, 2019.

4. Human Asset

The human assets average score is 35,90% but it is embedded and formed in the condition before the inundation. 49,62% of respondents graduated at the minimum year of school (9 years), and 37,14% have another skill besides their main job. The lack of academic background and skill makes it harder to seek another job after inundation. They can't diversify their livelihood besides being a farmer for generations. The low human development aspect is also associated with vulnerability in financial assets which people can't substitute the asset for education or skill improvement.

5. Social Asset

The social asset score is higher than other assets at 70,96%. As a lead asset owned by the community, it helps rural households survive the *shock* within limitations to do livelihood diversification. They are collectively building a new economic chain with sector diversification such as tourism, fishery, and home industry. Even

market demand for these new sectors is not massif enough as a leading sector in the village economy. Moreover, during the food shortage that happen in 2015, community bonding is helpful to provide food supplies for the needs.

Figure 10. Household Organic Farming to Solve Famine and Food Shortage Phenomenon in 2015, a Program Initiated by Academics From Padjajaran University

V. CONCLUSION

Jatigede Dam in Sumedang West Java causes a shock to rural people's livelihood by transforming land-use diminishing access to livelihood resources. The lack of strategy to prevent the event cause people hard to manage their assets for livelihood diversification as an adaptation. As result, their livelihood assets are in a vulnerable state after the inundation, and hard to depend on new sectors since both supply and demand are low. They still depend on the agricultural sector to provide basic needs, even though it is still hard to get an end meets since natural asset condition remained are limited. Vulnerability is an outcome of unmaintained social effects of the Dam development. There's a need for intervention that optimizes new sectors to develop. The land-use transformation caused by the development unavoidably pushes urbanization in the area, without proper assets, rural people can't cope with the change and hard to adapt. External intervention programs in infrastructure provision, developing new sectors, and increasing the human development index (HDI) are needed to increase well beingness.

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