HOUSEHOLD LIVELIHOOD STRATEGIES OF DAIRY CATTLE FARMERS IN KEPUHARJO VILLAGE, INDONESIA, PRE- AND POST-2010 MERAPI VOLCANO ERUPTION

EVA ALVIAWATI[1], RADEN RIJANTA[2], SRI RUM GIYARSIH[3]

ABSTRACT – The research is conducted in the village of Kepuharjo, Sleman regency, located in the north of the Yogyakarta Special Administrative Region, Indonesia. The purpose of this research is to determine the livelihood strategies, patterns and phases of activity, as well as a determinant factor in the livelihood strategies of dairy cattle farmers before and after the 2010 eruptions of Mount Merapi. This research is based on the application of a single case study method. The single case study consists of several cases of household units in the village of Kepuharjo. The instruments used for data collection are direct observation, in-depth interview and document research. Informants are dairy cattle farmers in the hamlets of Kaliadem, Jambu, and Petung in Kepuharjo Village, Cangkringan sub-district, selected through snowball sampling. The results of this study indicate that there are three household livelihood strategies of dairy cattle farmers in the pre-eruptive stage: accumulation, consolidation, and survival strategies. Base dominant strategy is livestock breeding. After the eruption, besides the three existing strategies, there is a new one, which is an option of compensation strategy. Base dominant strategy remains the same, namely dairy farming. Household activity patterns and stages of dairy cattle farmers between pre- and post-eruption have changed among other things in terms of the use of farming land, the use of water for household needs and livestock, forage utilization, return to livestock breeding activities and activities carried out in an effort to meet the needs of the household. Determinant factors in the choice of household livelihood strategies are the socio-economic situation of the household (household income and expenditure), resource utilisation (condition of the assets owned, utilisation of materials from the eruption of Merapi, employed household members of working age), and occupational diversification.

Keywords: Merapi eruption, household livelihood strategies, determinant factors

INTRODUCTION

In October and November 2010, the violent series of eruptions of Mount Merapi caused a lot of damage, loss, including loss of livelihood and public assets, and sacrifice. The emergence of losses in the economy were caused by the cessation of the production process, followed by the loss of markets and distribution outages, a production capacity which cannot take place normally and the loss of the potential revenues that have accrued to the public. This is not apart from the many sectors of the economy, located around the slopes of Merapi, for example dairy farming, fishing, natural attractions, plantations, agriculture, and sand mining.

Dairy cattle farming is one of the mainstay businesses of the livestock subsector that has a prospective chance in the agro-industry activities as one of the sub-systems of agribusiness. The livestock business development has a very positive impact on job creation and the promise of cash

[1] Lecturer, M.Sc., Geography Education Program, University of Lambung, Mangkurat, Indonesia.
[2] Researcher at the Centre for Studies on Regional Development Planning; Lecturer, Ph.D., Faculty of Geography, Gadjah Mada University, Yogyakarta, Indonesia.
E-mail: rijanta@ugm.ac.id
[3] Lecturer, Ph.D., Department of Geography and Environmental Sciences, Faculty of Geography, Gadjah Mada University, Yogyakarta, Indonesia.
E-mail: rum_ugm@yahoo.co.uk

income so as to motivate farmers to take an active role in agribusiness activities to increase family income.

According to the Head of Animal Husbandry at the Department of Agriculture, Fisheries and Marine of Sleman regency, the number of cattle that died because of the eruption of Merapi in 2010 reached 2,513 and greatly affected the productivity of dairy cattle in Sleman district today. The original production reached 18,000 litres per day, but now the production is less than half (Media Indonesia, 2011).

After the eruption of Merapi, many dairy cattle farmers who had lost their livelihood pulse raised several research issues related to livelihood strategies made by the victims of Merapi eruption. The aims of this research are the following: (1) to examine some livelihood strategies of the dairy cattle breeders affected by the impact of the 2010 eruption in meeting the household needs, (2) to review the activity patterns and phases pursued by the dairy cattle breeders affected by the volcanic eruption in the application of household livelihood strategies, and (3) to assess the determinant factors in applying a variety of different forms of household livelihood strategies.

LITERATURE REVIEW

According to Chambers and Conway (1992), *livelihood* is defined as the ability (capabilities), ownership of resources (assets), including material and social resources, and activities required for a means of living (DFID, 1999).

Livelihood strategies are formed by asset choice, access and activity influenced by a person or household capability to do so (Baiquni, 2007). Activities, assets, and access are strongly associated with the structures and processes that show a dynamic relationship in determining the choice of livelihood strategies.

White (1991), cited by Baiquni (2007), distinguishes three categories of farm household livelihood strategies, namely: accumulation strategies, consolidation strategies, and survival strategies. Livelihood strategies at the household level, the one which has to accommodate structural factors, are grouped into four categories, namely: accumulation strategies, consolidation strategies, compensatory strategy, and security strategy (Haan and Zoomers, 2003, citied by Rijanta, 2010).

The word *determinant* can be interpreted as the factors that determine or influence. Sajogyo, citied by Dharmawan (2007), suggested that critical determinants of the emergence of various types of strategies to make a living in rural areas are affected by socio-economic factors (such as land, capital, employment, household structure). Chambers and Conway (1992), along with scientists at the Institute of Development Studies (IDS) Sussex, consider that rural livelihood systems are influenced by the socio-ecological system dynamics of an ecosystem. In the setting of such sub-systems and sub-systems of social ecology, both strategic options are available for farmers to survive. The forms of the livelihood strategy that is built is determined based on how farmers and domestics “have played” with the combinations of livelihood resources that are available to them. There are five types of livelihood resources that can be used, namely: (1) financial capital, (2) physical capital, (3) natural capital, (4) human capital, and (5) social capital.

METHODS

This study is based on a case study using the concept of case selection (Gerring, 2007), which divides the case into some subsets. The village of Kepuharjo, located in Cangkringan sub-district, Sleman regency, Yogyakarta Special Administrative Region, Indonesia was selected as a single case study. The single case study consists of several cases of household units located in the village.

In this study, the unit of analysis was a dairy cattle farmer household and the informants were dairy cattle farmers in the hamlets of Kaliadem, Jambu, and Petung, located in the village of Kepuharjo.

In this research, data collection and information was made until a saturation point occurred, until new answers no longer emerged from the informants selected through snowball sampling.

The research was conducted by collecting both primary and secondary data. The instruments used for the collection/ retrieval of primary data were direct observation, document research and in-depth interview.

The two stages data analysis stages are:

1. Preliminary analysis. At the beginning of making a spreadsheet analysis, we used coding (coding step) and analysis of case units (within-case units): a summary of the data reduction + category = initial findings (summary of data reduction categories = key findings).

2. Advanced Analysis. In the following, the analysis was more focused on the analysis of inter-unit cases (by comparison). At the end of the inter-unit analysis, the findings of a case unit will be compared with the next case and results will be concluded. Data processing was done by using triangulation in the process of comparison between the secondary data, data from interviews and data from observations.

RESULTS AND DISCUSSION

1. Characteristics of dairy cattle farmers

Associated with the characteristics of the case unit, it results that the entire case unit since the 2010 Merapi eruption is a group of dairy cattle farmers of different age groups ranging between 20 and 70 years old.

The 31-50 years age group is more dominant than any other age group, while the population aged 51-70 are in numerical decline. Most of the dairy cattle farmers in this research are male with educational attainment ranging from elementary to high school levels. Based on these results, it can be postulated that the level of education of the case unit is medium to low.

2. Household Livelihood Strategies of Dairy Cattle Breeders Pre- and Post-2010 Merapi Eruption

The pre-eruption household livelihood strategies of dairy cattle farmers in the village of Kepuharjo consisted of three types, namely survival strategies, consolidation strategies, and accumulation strategies with different bases, but farming was the most dominant base. In addition to agriculture, there were also other non-agricultural bases such as carpentry, stone and sand mining.

Prior to the 2010 eruption, households with consolidation strategies amounted to a maximum of 15 households, followed by households with accumulation strategies (nine households) and households with survival strategies (three households). This is consistent with the hamlets of Kaliadem, Jambu, and Petung as centres of dairy farming in the village of Kepuharjo.

Changes that occurred between the pre- and post-eruption showed that the number of households with accumulation strategies decreased from nine to three households (dairy farm households). After the 2010 eruption, only one household remained persisted in pursuing an accumulation strategy.

The households with consolidation strategies experienced an increase from 15 to 18 households. This change is due to the movement/displacement of accumulation to consolidation strategies, as well as from consolidation to another strategy, namely to the compensation strategy of consolidation and consolidation strategy of survival. The consolidation strategy was mostly adopted by farm-based households, followed by agriculture-based households and households based on stone and sand mining, carpentry, tourism, etc.

There are three households with the same survival strategies, but one household moved to compensation strategies (case unit 9) and one household moved from agriculture-based consolidation strategy to social capital-based survival strategy.

After the 2010 eruption, there was one more additional type of strategy – compensation strategy – which had not been there before the eruption. Thus, three households (case units 1, 7 and 9) chose to adopt compensatory strategies.

Table 1. *Change in the movement of livelihoods strategy pre- and post-2010 Merapi eruption*

		Strategy			
		Accumulation	Consolidation	Survival	Compensation
BASIS	Sand and rock mining		7	19	
	Agriculture		25		
	Dairy farming	4 17 20 27 18 13 8 15 26	5 3 2 10 11 21 22 12 1 16 24 23	6	
	Guild		14		
	Tourism				
	Other type of non-agriculture			9	
	Social capital				

Legend: ° : options of livelihood strategies before the 2010 eruption
° : options of livelihood strategies after the 2010 eruption
→ : direction of movement

3. Activity Patterns and Stages in Implementing Household Livelihood Strategies

The patterns of land ownership in Kepuharjo village are dry land, fields and yards. The agricultural land in the study area is still dominated by traditional agricultural patterns. The unplanned land cultivation pattern does not prioritize one particular plant species and not all farmers use pesticides and pharmaceuticals. Agricultural diversification expected in case of crop failure on a particular commodity can be still supported by the results of other commodities. Planting perennials is also intended for long-term investment as a source of revenue.

The number of farmers in this village also increased, especially in Kaliadem, Jambu and Petung, which are the centres of dairy farming. Income from milk products normally used to meet daily needs, while the results of the calves and other animals were used as savings that could be sold at any time in case of urgent needs.

Land conditions changed after 2010, when the eruption affected residents who generally had activity patterns based on the physical conditions of the natural environment. The changes occurred in the physical condition of the natural environment affected the activity patterns of dairy cattle farmers, as in the following:

a. Farming Land Use

Before the 2010 eruption, almost all dairy cattle farmers in the study sites had cowsheds in their yards. After the eruption, most dairy cattle farmers in the study sites claimed it difficult to use the land for farming.

b. Utilization of Water for Livestock

Pre-eruption water needs for livestock and household purposes in the research area were supplied from a spring, Bebeng, which could provide water both in the dry season and in the rainy season. During the eruption, the water drains from the spring were destroyed by the piles of volcanic materials. Therefore, the domestic water needs of the dairy cattle farmers living in shelters were supplied by dug wells. In order to meet the livestock water needs, farmers collect rainwater during the rainy season by using a reservoir while in the dry season they have to buy clean water in water tanks.

c. Utilization For Livestock Feed

It is not enough for animals to eat grass only; they also need be fed with particular concentrates in order to produce a lot of milk. Usually, the necessary concentrates are obtained through cooperative groups of dairy cattle farmers, payments being directly deducted from the sale of milk to the cooperative groups.

In the pre-eruption stage, the needs of grass and forage (HMT) to feed livestock were usually met by the grass they planted on the sidelines of the annual crops, as well as by looking for grass at the top of the slopes of Mount Merapi. In the dry season, dairy cattle farmers usually came from remote distances to graze their cattle on the upper slopes of Mount Merapi. In addition, they also bought livestock forage feed (HMT) from outside the area. The HMT usually purchased was corn tree (*Tebon*).

After the eruption of Merapi in 2010, dairy cattle farmers claimed that the availability of grass was by far not enough. But for the concentrates needs, besides buying concentrates in the cooperative groups of dairy cattle farmers, some others were doing "*nempil*"[4] with other breeders.

d. Options for Immediately Back to Work as a Dairy Famer

Conditions at the location of shelters do not allow the farmer to make the cowsheds because the land they received is very narrow, the distance from the grazing location is also relatively far, which requires tools and transportation costs. This condition caused that not all dairy cattle farmers in the village of Kepuharjo could immediately get back to work after the eruption of 2010. Nevertheless, almost all dairy cattle farmers in the research area still have the desire to develop their dairy farm business further, as one of the informants stated: "[...] For people in the village, the most suitable job is farming, because farming does not require people to go to the town to find work, remembering that there is a small number of employment in the village [...]" (case unit 7, 2012).

e. Activities to Meet the Household Needs

This study describes the patterns and related activities carried out to meet the household needs in the pre- and post-eruption of Merapi in 2010.

- *Pre-eruption activity* - Dairy cattle farming activities for the residents in the village of Kepuharjo started around 1990, with the flow of water from the Bebeng spring. Once they begun to raise dairy cattle, the welfare of the community began to grow and the farmers were able to build a house and buy a motor vehicle. Some efforts made to meet the household needs of the majority of dairy cattle farmers prior to the eruption included the use of milk products to meet their daily needs. The crops they had in the fields and gardens, especially annual plants, were used for savings that can be sold at any time in case of great need, such as the one to pay the school. There were also households that, in addition to income from dairy cattle raising, had also income from sand mining sector, tourism activities (for instance, they opened stalls for tourism purposes in Kaliadem area), working as masons and tailors.

[4] *Nempil* (Java) means buying something from a place of business that does not normally sell that item.

- *Post-eruption activity* - Post-eruption period had three stages, namely: evacuation period, the period of temporary housing (shelter) and pre-permanent housing period (*Huntap*[5]).
  - ✓ *Displacement period.* At the time, many residents of Kepuharjo lost their livelihood as dairy cattle farmers because the majority of the existing livestock died from the heat clouds glide. The majority of the displaced villagers became unemployed, their activities were mostly related only to the concern for the former condition of the house to which they intended to return when the situation allowed. It was postulated that the majority of people could not have an income. After a few days to evacuate, residents who remained to work in government and private agencies started to work or even left and went back to the refugee camps. Several other residents chose to use the time to participate in various social activities. Most of the other residents were trying to find a job by following labour-intensive projects that they follow in order to obtain cash even though their livelihood was lost during the eruption.
  - ✓ *Shelter period.* Their activities were dominated by cultivating land, especially the land covered by volcanic deposits of average thickness. This was a household sideline activity of the residents working in non-agricultural sectors (e.g. masons and carpenters).
  - ✓ *Pre-permanent housing period (Huntap).* Some permanent residences in the hamlet of Jambu are already complete so that some informants were found in their permanent residence area. The activities of residents in Jambu during this third stage were mostly *focused on the project of building new permanent housing.* The implementation of this project implied hiring workers, but people who did not have jobs chose to get involved in the construction of their own permanent housing in order to get the payment. The current stage for people who live in the hamlets of Petung and Kaliadem is the process of measurement and allocation of land plots for housing construction from the village treasury land of Pager Jurang hamlet. Measurement and distribution of land plots is a communal affair.

4. Determinant Factors in the Choice of Household Livelihood Strategies

4.1 Household Socio-Economic Circumstances

Household socio-economic circumstances include:

a. Household monthly income

In the pre-eruption period, the income of households with survival strategies was less than one million rupiah per month; in the case of households with consolidation strategies, the monthly income ranged between Rp. 1,000,000 and Rp.1,999,999, while households with accumulation strategies had an average monthly income of more than two million rupiah.

After the eruption of Merapi in 2010, the income of almost all dairy cattle farmers decreased because of the loss of their livelihood. There are many households with consolidation strategies with an income of less than one million rupiah per month. Households with compensatory strategies can still maintain their income so that, although their income is decreasing, they still have an ability to raise the household income.

b. Household expenditure per month (all expenses used for household needs)

Prior to the 2010 eruption, the expenditure of households with survival strategies was less than one million rupiah per month. The dominant expenditure of households with consolidation strategies ranged between Rp. 1,000,000 and Rp. 1,999,999 per month. In some cases, the expenditure of households with accumulation strategies was more than two million rupiah per month, while others had a monthly expenditure between Rp. 1,000,000 and Rp. 1,999,999.

After the eruption of Merapi in 2010, almost all households, whether with accumulation, consolidation or survival strategies have changed their expenditure pattern. It was only case unit 26 that had an expenditure of more than two million per month.

[5] *Huntap* is an acronym of *Hunian Tetap* or permanent housing.

In general, household expenditure of dairy cattle farmers decreased for social spending after the eruption of 2010. Besides the spending for food, the spending that dominated was for transportation and, in the case of households with school-age children and young children, household expenditures for children pocket money dominated. Each of these households tends to adjust expenditures with the income they earn by way of savings. Once they make savings, but their income has not been sufficient to meet household needs, they take advantage of the money savings and the compensation fund for dead livestock. But there are also households that are forced to rely on a helping hand with finding a loan in order to be able to fulfil their household-related needs.

4.2. Resource Utilisation

a. Condition of the assets owned

Prior to the eruption of Merapi, the households with accumulation strategies generally had between 5 and 10 dairy cows; others had more than 10 dairy cows. The land they owned was generally more than 10,000 m². All households had motorcycles, some even more than one unit, and most of them had a car. In addition, they owned branded electronic goods. The households with consolidation strategies had less than 5 dairy cows (in 10 case units) while, in 6 case units, there were 5 to10 dairy cows. The land they owned had an area of less than 5,000 m² in 9 case units and more than 5,000 m² in 4 case units. Almost all households had a motorcycle and one case unit had more than one. The electronic goods they had were generally of superior Indonesian brand. The households with survival strategies had less than 5 dairy cows; the land they owned was generally less than 1,000 m²; they owned a motorcycle of less than 5 million rupiah and cheap branded electronics.

After the eruption, almost all households, no matter the type of the livelihood strategy adopted, had less than 5 cows. It was only case unit 26 that had more than 6 dairy cows. The land they had generally remained the same, although there are some cases in which it increased, namely in the case units with consolidation strategies and in the case units with accumulation strategies; households had no car and the like; however, households with dominant accumulation and consolidation strategies had new household electronic goods.

b. Utilization of materials from the eruption of Merapi

Before the eruption, no matter the type of the livelihood strategy adopted, households were using materials from previous eruptions in the form of sand and stones.

After the eruption, there was no household with accumulation strategy involved in sand mining activities. Some of the households with consolidation and survival strategies had already started mining activities, but the traditional sand miners received the payment only when the sand lorry arrived with the heavy equipment especially during the day off.

c. Hiring household members in the working age

In the pre-eruption stage, the majority of employed household members were involved in farming activities, especially wives, who helped with taking care of dairy cows, farming and gardening. In addition, there were also wives who worked in non-agricultural activities such as trade, sewing, working on a golf course, working "*srabutan*" (randomly), or as civil servants. However, there was no child employed in household labour.

In the period after the eruption, not all of the dairy cattle farmers began farming again, the majority of working wives helped cultivating the farmland. There were also farmers that did not hire their wives for some reasons, for example, in case they had little babies at home or children suffering from chronic pain. In addition, child labour in household increased, mostly because the young in the house did not go to college after graduating high school because of economic reasons.

4.3. Job Diversification

Before the 2010 eruption, the farmers in the households with accumulation strategies also worked as temporary employees, private sector workers and sand miners, as side jobs. In general, the dairy cattle farmers were involved in more than two jobs. The farmers in households with accumulation strategy were usually private sector workers. In the case of households with consolidation strategies, in addition to raising dairy cows, the dominant jobs were sand miner and

farmer. Residents of households with a less widespread land ownership chose employment outside the agricultural sector, in addition to raising dairy cattle, working as bricklayers, sand miners or, especially women, on the golf course,

After the eruption, not all households returned to dairy cattle raising. Residents engaged to work as bricklayers, as well as carpenters, private workers, sand miners and civil servants. The households with consolidation strategies had the highest number of private workers.

CONCLUSION

1. In the pre-eruption stage, the household livelihood strategies of dairy cattle farmers consisted of three livelihood strategies, namely accumulation, consolidation, and survival strategies. Base dominant strategy was livestock breeding. After the eruption, besides the three existing strategies, there was a new one, which is an option of compensation strategy. Base dominant strategy remains the same, namely farming.

2. Household activity patterns and stages of dairy cattle farmers between pre- and post-eruption changed among other things in terms of farming land use, utilization of water for livestock and household needs, forage utilization, the option to return immediately to raising cattle and activities carried out in an effort to meet the household needs.

3. Determinant factors in the choice of household livelihood strategies are the socio-economic situation of the household (consisting of household income and expenditure), resource utilisation (condition of the assets owned, utilisation of materials from the eruption of Merapi, employed household members in the working age), and job diversification.

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