The Survival Strategy of Rice Farmers for Preventing Land Fire in Tidal Ecosystem

M. Yamin and Nurilla Elysa Putri

***Abstract*—**Almost rice farmers problem in tidal land ecosystems are limited land, low productivity, high risks, specialize on one type of commodity. This leads to being trapped in the trap of poverty, forcing them to do land clearing by burning. This study aims to identify the status of prone land fires in tidal swamps, analyzing the carrying capacity of tidal swamp ecosystems capable of providing survival for farmers, and formulating farmer's Survival Strategy. The research method used is survey method. Data analysis was done quantitatively, PRA method and SWOT Analysis. The results showed that the status is very vulnerable and prone to high. Land carrying capacity is 1.95 in Ogan Komering Ilir Regency and 2.76 in Banyuasin Regency, the meaning is still surplus. Public expectations of the government in tackling this land fires are: seedlings assistance, fire extinguishers such as hoses, and water pumps, as well as land clearing facilities.

***Keywords*—**Survival Strategy, Farmers, Land Burning, Tidal Swamps.

I. INTRODUCTION

Indonesia, poverty is a multidimensional problem and dominated in rural areas[1]. The villagers are mostly farmers who live in wetland ecosystems. The household economic, particularly rice farmers are under poverty lines. This is due to various environmental problems faced by farmers such as limited land ownership, low land productivity, high technical risk, dependence on one type of commodity, and low access of natural resource ownership. Therefore, these farmers are in the trap of poverty, thus no other choice for them to clear the land but burning.

The burning of land done by rural poor farmers triggers a variety of environmental damage. Burning biomass not only pollute environment but also poor land nutrient[2]. There is needed forest policy at local, national and international level[3]. So it requires efforts to anticipate that the environment as a place of life remains capable of providing life support, so that farmers can survive and be able to get out of the trap of poverty. This requires a survival strategy for poor farmers in the wetland ecosystem not to burn environmentally destructive land and to provide sustainable livelihood support for farmers in the tidal swamp ecosystem, particularly in South Sumatra.

M. Yamin and Nurilla Elysa Putri both are with the Sriwijaya University, Indonesia.

II. LITERATURE REVIEW

A. Land Fire

Forest fires are a frequent phenomenon in Indonesia of local and global concern (Gellert, 1998, Stolee et al, 2003; Herawati and Santoso, 2011). Forest fires are nothing new, in Kalimantan forest fires have occurred since the 17th century (Barber and Schwiehelm, 2000; Bowen et al 2001)

The risk of peat swamp fires increases with conversion from natural forests to industrial plantations, oil palm and rubber plantations. The corporations do slash, cut and burn when clearing land for industrial plantation or plantation because it is relatively cheap. One determinant of forest conversion to other uses is commodity prices. There is a close relationship between increasing CPO export prices and forest land fires in Sumatra and Papua. While rubber prices do not have a close relationship with land fires in Sumatra, Kalimantan, and Papua. In addition, the impact of changes in CPO export prices in Sumatra and Papua is relatively small against peat swamp forest fires. The extreme climate of El nino significantly affect peat swamp forest fires on the three islands (Sumatra, Kalimantan and Papua). While the economic crisis increases the forest fire of 66 thousand hectares in Sumatra and 10 thousand hectares in Papua. But the economic crisis does not significantly affect the peat fires in Kalimantan (Cahyono, 2015).

B. Survival Strategy

Defines the survival strategy as a person's ability to apply a set of ways to overcome the problems surrounding his life, this problem-solving strategy is basically the ability of all family members to manage their assets (Suharto, 2009: 29). To increase household income not only contribute from farm but also off farm activities as the alternative as the survive strategy to support household income[2]. Another opinion about survival strategies is proposed by Snel and Staring (in Setia, 2005: 6) which expresses survival strategies as a set of actions chosen by default by socially and socially impoverished individuals and households. the choice of environment and shelter is one way of survival strategy. the choice of environment and shelter is one way of survival strategy. The higher areas have advantages for certain types of plants, as well as the lower regions also have other commodity advantages. The upper stream has advantages for certain types of plants, as well as the downstream regions also has other commodity advantages [3].

III. Research Methods

This research was conducted in 2 locations in South Sumatera province which are tidal swamp ecosystem which susceptible to burning land such as Banyuasin Regency and Ogan Komering Ilir Regency. The sampling method used is a purposive sampling method to the key informan which is considered representative of the household population of farmers, as well as the community that is able to provide opinions on the study conducted.

Analysis of Carrying Capacity

Simply to calculate the carrying capacity of a region can be used mathematical formula as follows

$$CCR = \frac{Ai \ x \ ri}{H \ x \ h \ xFi}$$

Where :

CCR = Carrying Capacity (Carrying Capacity)

A = Total area that can be used for agricultural activities (i)

r = Frequency of harvest per hectare per year (commodity i)

H = Number of Household (Household)

h = Percentage of population living

F = Size of average farmland owned by farmers

Furthermore, to formulate the survival strategy using SWOT analysis.

IV. Result And Discussion

A. Identify the Tragedy of Land Burning on Tidal Swamp Ecosystems

If we look at the types of ecosystems in South Sumatra, that as a large area of vulnerability with high distribution to very high spread in the peat ecosystem. This is possible because the combustible material is peat especially during the dry season. This condition is encouraged by the culture and the view of the community with the pattern of land clearing that still relies on slash-burn during dry season for the preparation of agricultural land in the rainy season. Distribution that is in East region of South Sumatera Province is mangrove and peat ecosystem. Especially at a particularly vulnerable level is a region with thick and flammable peat during the dry season.

This identification can identify the background of forest fires on farmland in the tidal swamp ecosystem. So as to provide an overview of the actual conditions that resulted in the tragedy of farm fires and provide input for the strategy to overcome the tragedy of forest fires.

Tabuan Asri village is one of the villages affected by land fires. The village is located not far from the capital District Rimau Island. Geographically the location of the village that is not far from the sub-district center should be the impact of land fires can be anticipated. Conditions on the ground indicate that some of the farmers in this village are experiencing land fires. In addition to farming land, fires also occur on the land of sleep. According to the community, this land is more vulnerable to be a source of hotspots, because if the garden is usually always cleaned of weeds and weeds, while the land is actually there are many shrubs and weeds that quickly burned during drought and exposed to the hot sun.

The village of Simpang Tiga Sakti is one of the villages experiencing land fires in Ogan Komering Ilir Regency. This village is located on the edge of the river so that the musi has ups and downs and peatland typology, this causes the community farming land in this village susceptible to land fires.

B. Identify the Tragedy of Land Burning on Tidal Swamp Ecosystems

This identification step is carried out to determine the background of forest fires on farmland in the tidal swamp ecosystem. So the results of this identification can provide an overview of the actual conditions that resulted in the tragedy of farm fires and provide input for the strategy of coping the forest fire tragedy.

i. Land Fires in Tabuan Asri Village, Rimau Island Sub-District, Banyuasin Regency

The types of crops cultivated by farmers are oil palm, Acacia mangium, teak and sengon. The area of burned land in this village is about 38-40 Ha. This landfire was experienced in 2010 and again in 2015. This condition is caused by: long drought, the emergence of fire from neighboring villages that spread the research village, the source of fire is not known, and the peatlands are mudag burning. New people know after the fire is enlarged

Efforts that have been made by the community during the occurrence of this landfire, among others:

- Try to extinguish the fire by watering together or gotong royong by doing soil excavation to make the limiting channel near the land. Below the bottom of the peat there is water, so in the hoe just straight out of the water. This has led to the community memeproleh water sources when applying fire fighting.
- The community becomes more frequent in the dry season during the dry season, and patrols alternately to supervise the garden so that the fire does not spread to the community garden.
- Conducting grass and weeds clearance on palm land per block, so fire can not propagate.
- Create gutters per block to block fires from spreading on palm land.

Community losses experienced by land fires, among others:

- Many plants die, especially young ones (1 year old and below), although some are still alive but they are few in number.
- Old plants for palm oil do not die but experience stress so that for one year can not bear fruit.
- Having a thick haze of smoke, visibility only 10 meters, so it is very disturbing community activities.
- People suffer from shortness of breath and contracted ARI
- Decrease in income, because palm can not bear fruit so it can only wait for the plant is not stress and return to bear fruit with 1 year recovery period.

Tabuan Asri villagers hope to the government in the fire prevention of land are:

- Assistance of seeds for replanting of burned land, so that the farming can be continued again.
- Help fire extinguishers that can be used for spraying when there is fire on farmland. So the blackout attempt does not manually search for water first. Because the fire range is usually very close.
- Help the hose and water pump to extinguish the fire on the farmland.
- Formed a group of fire guards and carried out guidance on how to handle land fires.

ii. **Land Fires in Simpang Tiga Sakti Village, Tulug Selapan District, Ogan Komering Ilir Regency**

The village of Simpang Tiga Sakti is one of the villages experiencing land fires in Ogan Komering Ilir Regency. This village is located on the edge of the river so that the musi has ups and downs and peatland typology, this causes the community farming land in this village susceptible to land fires. Types of usahatni land that burns in the area ie rice fields, teak garden, and land sleep. The most widespread land on fire is wetland that is being eaten, it also causes the fire continues to spread due to the condition of the land that was finished harvested so that people let alone the fire on the land. Considering there is no loss if the land is burned because it has harvested, it adds soil fertility, whereas the typology of peat causes the fire to spread anywhere. As for the community gardens are always trying to not burn, for fear of losing the rubber. Burnt rubber field in this area in 2015 about 10 ha. And rice fields around 2000 Ha.

The condition of land fires in this village, due to various causes, among others:
- Disposal of cigarette butts arbitrarily when crossing farm land
- Many rogue elements who do the burning
- Deliberately burn the land with the aim of opening the production path to farming land due to shrinking
- Burn to open the garden
- Long dry

The result of the identification of the causes of fires in this area actually shows that public awareness about land fires in this area is very low. Action and purpose of land clearing done still rely on the way of burning.

Efforts that have been made by the community in tackling land fires, among others:
- People do watering if they see fire in rubber plantation
- Conducting grass and weeds in rubber plantations, 3 meters between neighbors, so the fire is difficult to spread
- Maintain each garden to prevent fire
- Anticipate that fire does not step into other gardens.
- The fire in the field is left alone because it occurs after the harvest and the land is being consumed.

Losses of the community that are experienced by the occurrence of land fires, namely:
- Much of the loss of rubber yields should be obtained per two weeks.

Loss of income due to declining crops is not even there due to land fires
- Anxiety if the fire spread to other gardens so it must compensate
- Experiencing smog that interferes with the activity, and health

When the land fires claimed that there was no government assistance in the fire fighting, the community claimed to have received 5 water pumps from the government, but until now did not know where the aid was. Public expectations of the government, among others:
- Given an understanding of public awareness about the prevention of land fires, not just extinguishing but how to anticipate not burning land.
- Assistance of seeds for the planting of vacant land, because many of the land owned by the community is not able to be planted because they do not have the capital. Because if the land is cultivated then people try not to burn, whereas if the land to sleep when burned the community also do nothing.

C. Capacity Support of Tidal Swamp Ecosystems in South Sumatra capable of providing survival for Rural Poor Farmers

In this study, the calculation of the carrying capacity of the main resources is tidal rice field and palm oil plantation. Given the main commodities and the majority as the focus of livelihoods in the area of ebb tide is tidal paddy rice and oil palm plantations, so that the carrying capacity of land becomes the main resource.

TABLE I
RESULTS OF TIDAL LANDS CCR

Village	A X r	H X h X F	CCR
Simpang Tiga Sakti	2000	1.021,16	1,95
Tabuan Asri	825	298,70	2,76

Result Calculation of land carrying capacity in both study location villages showed CCR> 1, 1.95 in Simpang Tiga Sakti Village of Ogan Komering Ilir Regency and 2.76 In Tabuan Asri Village of Banyuasin Regency, which means that the carrying capacity of agricultural land in these two villages still surplus.

The condition of land carrying capacity which is still surplus proves that there are still many land that has not been cultivated into agricultural area, so it is still in the form of forest of shrub and is peat land. Peat ecosystem in the form of sleeping land is very flammable in the dry season. Since the land is still in the form of a grove for peat fires, the surrounding community feels that there is no need to make countermeasures and fire suppression because it is not an agricultural land and the community assumes no harm to them.

D. Survival Strategy of Rural Poor Farmers in Tidal Swamps in South Sumatra

Formulation of Survival Farmer strategy in this study aims to provide recommendations for survival efforts that can be done by poor farmers who experience land fires so they can survive after a landfire and mmapu anticipate the re-occurrence of landfire tragedy in the area of this study.

i. Analysis of SWOT

SWOT analysis conducted in this research is identification Strenght (strength), Weakness (weakness), Opportunities

(opportunities) and Treath (threat) to the condition of land fires in the study area. This result is expected to provide recommendation of survival strategy policy for poor farmer in tidal area that experienced land fires. This SWOT identification activity was conducted through Focus Group Discussion (FGD) held at farmers in study area experiencing land fires.

Strenght

Strengths identified in the field include:
- Gotong royong when doing watering together, is a strength that is in the community to fight land fires.
- Access roads surrounded by canals around the garden, so even though drought water sources remain available.
- There is a strong desire from the community to form a group of fire guards.
- This area is surrounded by many plasma companies that can work with communities in anticipating land fires.
- The public has been aware of the losses that will arise from land fires.
- The public tried to extinguish the fire by using the company's machine, and the blackout process could be half a month.

Weakness

Weaknesses identified in the study area, among others:
- Unavailability of facilities and infrastructure for fire suppression
- The number of poor people due to participate in plasma, so that alternative to open other land.
- Condition of combustible peatland
- This area has not been the government's attention to the effort to overcome land fires
- PNPB just arrived after the disaster, there is no preventive assistance from the government

Opportunities

Opportunities identified, among other things:
- The presence of companies around the village that can contribute to prevention of land fires with the community.
- Synergy between companies, government and society.
- The Company's socialization of Karhutla
- The formation of the Fire Concern Society by the Company
- The desire of the community to make efforts to anticipate land fires

Threat

Identified threats include:
-Beds are often burned by themselves, and the time is long due to peatlands
-Other ecosystems outside the village
Low public awareness
-The habit of burning land for the purposes of clearing land, making roads and more
-Savings on land clearing and clearance costs
-Have not received socialization from the government regarding forest and land.

ii. **Survival Strategy**

The formulation of survival strategy is done through SWOT analysis, which includes SO, WO, ST and WT strategies. The resulting stratehi is expected to provide survival strategy recommendations for poor farmers in tidal areas experiencing land fires in the study sites.

External Opportunity Factors

Strength Opportunities

Cooperation with companies is encouraged by the active participation of the community in dealing with land fires with prevention efforts through the establishment of fire-fighting groups, with support from the government.

Weakness Opportunities

Synergy between company, government and society.

Internal threat factors

Strenght Threats

Socialization of the government on forest and land fires and prevention efforts so that the community is able to overcome fire and land fire and its prevention efforts.

Weakness Threats

Provision of facilities and infrastructure for fire fighting and changing the habit of burning land by land clearing, government and company synergy on land clearing facilities is required.

Capacity Support of Tidal Swamp Ecosystems in South Sumatra capable of providing survival for Rural Poor Farmers

V. Conclusion

The conclusions obtained at this research stage are:

1. The tragedy of land fires in South Sumatra is caused by two factors, namely the unconsciousness of the dangers of land fires in the community so that it still burns the land for various purposes in the farming activities and the spread of fire from the soil.
2. There have been efforts made by the community in tackling and preventing land fires, namely making drainage channels in the garden, weeding weeds and weeds with a distance of 3 meters between land, doing watering in mutual help during landfires, patrolled in a garden alternately.
3. Public expectations of the government in tackling this land fires include; seedlings for replanting, fire suppression equipment such as spray equipment, hoses and water pumps, and land clearing facilities

VI. Suggestion

Suggestions that can be given up to this stage are the need to provide community control on fire hazard, and to extend the range of fire prevention. BNPB efforts are directed to prevention of land fires not only against mitigation after land fires.