IMPACT OF CHANGES IN AGRICULTURAL SPATIAL USE ON SUBAK SUSTAINABILITY

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ABSTRACT

Every year there has been a change in the spatial use of agricultural land to non-agriculture, this has an impact on the sustainability of subak in Bali. The main purpose ofthis study is to analyze the impact of changes in the use of agricultural land on the sustainability of farmers' activities in the Subak area. This research was carried out in the Subak Belumbang area, Tabanan Bali. The study used a qualitative descriptive approach, with a sample of all farmers who experienced a change in the function of subak space utilization for non-agricultural activities and several key informants such as the head of subak and subak administrators. The results of the study found that changes in the use of subak spatial planning for non-agricultural activities had an impact on, the implementation of the subak concept based on the *Tri Hita Karana* could not work well, and changes in the function of irrigation network channels. To stop the change in the use of agricultural land spatial planning to non-agricultural use, regulations on the utilization of the Regional Spatial Plan and provide strict sanctions for violators. So this research is very important for the sustainability of Subak in the future.

Keywords: subak, farmers, spatial planning, sustainability, environment

INTRODUCTION

Subak as an irrigation system is a physical system and social system that is closely related to irrigation such as water sources and irrigation facilities in the form of *empelan*, *dams*, water channels, and buildings for and including the rice field ecosystem even implicitly includes a technological system while the social system is a social organization that manages the physical system and its organizational rules (Windia, 2015). It can be said that subak is a customary law community that has socio-agrarian-religious characteristics which is an association of farmers who manage irrigation water, irrigation systems, rice fields, sacred places and social organizations.

Subak as an irrigation system which in addition to having a physical system also has a social system which is essentially an implementation of the *Tri Hita Karana*. This concept animates every component of the subak itself, starting from the organization, to the members of the subak. If grouped by section, the *Parahyangan* is reflected in the cultural subsystem and mindset, concept *pawongan* found in the social subsystem, and the *Palemahan is* manifested in the technical or material subsystem, including the physical and natural environment (Windia, 2015 Adisasmita, 2010),). From the conceptof subak and space, it can be seen that

the concept of *palemahan* is a physical form of subak that forms the area.

Kerambitan District, which is one of the sub-districts in Tabanan Regency, is also experiencing the phenomenon of land conversion. The total area of conversion of agricultural land that occurred in the Kerambitan District from 2013-2017 ranged from 18 hectares (BPS Kab Tabanan, 2017). Kerambitan sub-district has a total of 23 subaks of rice fields spread over 13 villages, according to sources from the results of digitizing and verifying field data in 2017, the area of subak that still survives is 2,241.12 hectares).

Subak Belumbang is a subak that has the largest area in Kerambitan District, which is 174.07 Ha in 2017 (Agriculture Department, 2017 and PUPRPKP Office 2017). The location of this subak is precisely in the village of Belumbang. The Central Bureau of Statistics of Tabanan Regency shows that from 2013 to 2017 there was a change in the use of agricultural land in Subak yet to about 2 (two) hectares.

Changes in the use of subak space are sometimes not clearly visible due to a lack of understanding of the conditions that occur, without realizing it will eventually be known when the subak is has become extinct because there are no more rice fields visible to the eye. Before the above conditions occur, it is necessary to study the condition of the subak space so that it can be seen clearly about the condition of the subak space and the changes that occur. An understanding of changes in the function of the subak space is important for the environment and humans themselves in an effort to protect the agricultural area from extinction or maintain its sustainability. According to Surata (2013), changes in the function of the subak space or land will result in the disconnection of waterways and closed water sources so that the land is dry and cannot be planted with rice, resulting in unproductive land. Unproductive land will reduce the subak which can even destroy it. This condition will provide losses both for the environment where the ecosystem lives as well as forhumans in meeting the need for food.

Pramudiana's research, (2018) found that land use change or commonly referred to as land conversion is a change in the function of a part or all of the land area from its original function (as planned) to another function that is a problem for the environment and the potential of the land itself. Land use change is defined as a process of change from the previous land use to other uses which can be permanent or temporaryand is a logical consequence of the growth and transformation of changes in the socio-economic structure of adeveloping community for both commercial and industrial purposes. Ifthe use of land for rice fields is changed to residential or industrial, the change in land use is permanent and irreversible, but if it is converted to plantations, it is usually temporary. Research by Siregar, Tarsilohadi and Oktaviana, (2021) revealed that more than 50 percent of provinces in Indonesia including Bali still rely on the agricultural sector so the conversion of agricultural land must be stopped

Research by Fattah and Purnomo,

(2018), land conversion for non-agricultural activities such as industrial development and housing due to the lack of control and supervision by the government. Septiani's research (2019), land use change is due to the number of family dependents and the size of the farmer's land. Furthermore, the results of research by Arnawa et al., (2021), found the dominant factors as the cause of the transfer of agricultural land were the need for housing, ignorance of thecommunity about the function of the land, there was no land as an alternative to building housing, and the government lacked socialization about land functions according to the land use plan. area space.

The analysis of impact of changes in the use of agricultural land to non-agricultural land use on the sustainability of Subak, namely the implementation of the *Tri Hita Karana* concept and irrigation canal networks as the main component for farmers in carrying out agricultural activities in the Subak area

This study aims to clearly describe the phenomenon of changes in the use of the Subak Belumbang, both the causal factors and the impact on the sustainability of the Subak Belumbang. The study was conducted in the Subak Belumbang area, Kerambitan District, Tabanan Regency.

The population in this study is the head of the land owner's family in the village of yet to do land conversion. Selection of samples by the census*, ie* all samples that have relevance and relevance to changes in the use of the Subak Belumbang area or research problems. So that the sample of this research is the subak farmers, subak administrators and subak members who experience changes in land use.

To develop research so that it finds relevant and accurate data, the *snowball method is also implemented, namely* other informants relevant to the research problem. The informants interviewed previously continued until there was no other information

Data Analysis

The data obtained from interviews, observations and documentation were then compiled. The initial process of compilation is done by examining the data in the form of data reduction to select the data needed and reducing the data that is not needed to answer the research problem. Code generation is done on the data so that it is easier to group it and then it is neatly organized or tabulated.

All data that are valid and able to provide answers to research problems after being neatly arranged are analyzed by qualitative descriptive data analysis where observational data in the form of field photos, sketches and information from interviews will be interpreted sothat a conclusion can be drawn on the impact of changes in the use of space in the Subak area, on the sustainability of Subak in Future

RESULTS AND DISCUSSION

The Impact of Spatial Change on the Sustainability of the Subak Area

The development of time which resulted in a lot of agricultural land being converted into land with other

functions in the Subak Belumbang area turned out to have an impact on subak members and various supporting components of the area. Increased economic growth requires a transformation in economic activities so as to encourage increased conversion of paddy fields to non-agricultural lands. Research conducted by Lia, Satmoko and Prayoga, (2021), a development program has beneficial social impacts for the community such as ease of access to daily needs. Affan, (2014) whofound that changes in land use for settlements and industry occur a lot and reduce the area of agricultural landbecause land is the only asset for building houses or industries.Furthermore, research by He, Huang andWang, (2014) in North China during the last 50 years, there was a conversion of forest and grassland land into agricultural land to increase land productivity. Furthermore, Abdullah and Nakagoshi, (2007) research in Selangor Malaysia to increase land productivity was carried out by converting forest land into oil palm plantations. Purwanto and Hindrayani's research, (2020) that the conversion of forest land to intensive agricultural land has an impact on the efficiency of nitrogen fertilizer use.

The conversion of rice fields can have a negative impact on food availability and food security of the population, Yoga Prasada1, Tia Alfina Rosa (2018). It was also written that subak is a form of implementation of the *Tri Hita Karana* which is interrelated with one another, the impact of the change will be felt by all these components including:

Impact on the *Tri Hita Karana* Subak

Conditions in the Subak Belumbang area changes in land use that occur with there is a change in function in the north or ulu and in the south or downstream of subak which is the function of housing cultivation, resulting in a change in the placement of the *subak parayangan* that can be movedsuch as *subak pengulun pelinggih* which was moved to the Bedugul subak Belumbang temple which is located in the middle of the subak subak area. Itcan be said that changes in land use from agricultural functions to housingfunctions and others resulted in changes in the layout of the *component*, *Tri Hita Karana* the *pawongan* that manifested in the subak organization in the form of subak membership. Changes in the use of agricultural land into housing and other things that occur in Subak Subak, the owner sells or rents out the land so that the owner does not become a farmer, even though there are farmerswho work on the land, it is no longer needed because the function of the land is not agriculture. This of course results in the absence of subak membership from land owners or smallholders, which certainly reduces the membership of the subak institution. In other words, the change in the use of agricultural landinto residential land or other non- agricultural functions resulted in *pawongan* manifested in the membership of the subak organization.components. The weakening of subak is directly proportional to changes in agricultural land use. The form of *palemahan* in

subak is the area of agricultural land and irrigation networks, so it can be seen directly that if the land decreases, of course, *palemahan* of subak also decreases. In the Subak area, the change in *palemahan* changes from the north, middle and also the south side of thearea along with the decrease in agricultural land.

Changes in Irrigation Network Function

Changes in the use of subak land also have an impact on changes in subak supporting components, namelyirrigation networks because rice fields have a relationship with the irrigation network. In the case of subak Belumbang, agricultural land was used for housing and industry. The construction of the house that is carried out does not have its own sewerage where the dirty water flow is directed to the water channel that is close to the house, namely the subak water channel.

Subsequent developments resulted in the irrigation canal which initially functioned as a channel for irrigation water for subaks to also have another function, namely as a channel for housing dirty water. Based on observations made by several waterinfrastructure facilities in the form of *main pond / secondary canals* and even *cenik telabah / tertiary canals* functioned as a sewerage channel in addition to its main function as a rice field irrigation channel, as shown in Figure 1

Figure 1 Residential Waste Disposal to Subak Irrigation

Addition of irrigation channel functions This results in pollution of irrigation water which will reduce the fertility of agricultural land and disrupt the growth of rice plants so that land productivity decreases in line with the production of land processors which also decreases from the agricultural sector. If this happens continuously, it will certainly be one of the triggers for increasing land use changes.

Changes in Dimensions and Components of Irrigation Networks

In some conditions, the construction of villas and industries as well as housing in addition to rice fields do not take into account the existing channels where the construction actually covers part of the irrigation water channels resulting in the dimensions of the irrigation network being reduced and some even where the irrigation network is covered. This condition can cause the narrow channel to be easily clogged with garbage which can later block the flow of irrigation water to rice fields. Lack of water will reduce the productivity of these agricultural lands and trigger dry land and sustainable changes in function.

The condition of the closed irrigation channel by housing is shown in Figure 2 and Figure 3

Figure 2 Irrigation channel damaged due to housing development

Figure 3 Irrigation channel lost due to housing construction

In the conditions in the southern part of the Subak area or the downstream side of Subak, *Land Consolidation* (LC) occurs whichchanges the function of the land agriculture into villas, housing, industry and plots, for this means closing agricultural land including closing the subak component, namely some irrigation water channels that flow from the subak area in the middle. Reducing the subak component certainly reduces the water flow received by the subakland downstream of the land that hasbecome the LC.

Based on information from Mr. I Made Sila, one of the former land owners in the *Dusun Belong* area which is a downstream area of the Subak Belumbang where there is a *Land Consolidation*(LC) development with the widening of road construction and other infrastructure. fulfilled which of course reduces the fertility of paddy fields in *the Downstream*. Conditions without water are certainly difficult to cultivate rice fields, so the land becomes unproductive and does not produce and may be forced to be sold by the owner.

Looking at other conditions, and changes in space utilization where rice fields are converted into housing, of course, components of rice fields must also be eliminated. One of the things that is missing due to these changes isthe smallest component of the subak irrigation channel in the form of a channel that directly drains water intothe rice fields, namely *the kunda rope.* Based on observations for the construction of buildings in the rice fields previously, it is necessary to close the flow of water to the rice fields and fill the rice fields so that there are no puddles of water. This closure andbackfill cause the *rope* to be closed. Thisillustrates that development results in changing or decreasing irrigation water channels which of course also has a negative impact on rice fields that

depend on these irrigation channels. If this happens continuously and on a large scale, it will certainly have a comprehensive impact on the subak because lands that depend on closed irrigation canals can be damaged due to lack of water.

Garbage accumulation in irrigation networks

Changes in land use into housing will lead to a population of people who carry out various activities and have various kinds of behaviour. One of the behaviours or activities that have a negative impact on rice fields is the construction of indiscriminate waste.

In the case of the Subak Belumbang area where in the *upstream* or north side of the subak area there is housing where there are some negative activities from some of the people who throw garbage into the *telabah gede irrigation canal.* This causes the discarded waste to flow following the flow of water and towards *my meeting place*. The existence of a large volume of waste and with large enough dimensions will not be able to flow past *the empelan* or Temuku. The amount of clogged garbage will hinder the flow of water to the rice fields. This if left unchecked can cause drought and damage to rice because it does not receive water evenly. Lack of water also makes the land very difficult to cultivatebecause it is dry. The difficulty of processing, the lack of fertile land and the damage to rice growth will gradually reduce land productivity. According to research by Ustriyana *et al.*, (2021) land conversion has an impact on the destruction of several irrigationchannels, sustainable agriculturalsystems must be supported by strong irrigation system management reduced productivity of agricultural products for land owners will lead to the desire of the land owner to change the function of theland to be more productive which in the end will trigger a sustainable change in the use of agricultural land into otherfunctions, not the sustainability of agricultural land or subak itself. The condition of garbage accumulation in thesubak irrigation canal is shown in Figure4

Figure 4. The irrigation canal is filled with household waste.

Based on the theory of the sustainability of the subak area, which is for economic development, social development and environmental protection. When compared with the physical impacts caused by changes in space use in the Subak Belumbang area, it can be described where the impact of changes in use that weakens the *Parahyangan* in the ceremony system and the *Pawongan* with reduced subak members will actually be inconsistent with the social development policy of sustainable development. The impact of changes in spatial use that weakens the concept *weakening* form of reduced agricultural land will certainly reduce

agricultural productivity which will weaken the farmer's economy where this condition is certainly not in accordance with economic development policies on sustainable development.

The impact of changes in spatial use that result in damage and blockage of irrigation channels will result in dry land and trigger a reduction in agricultural land and a decrease in agricultural productivity. This is not in accordance with the economic development policy in sustainable development.

Other conditions caused bychanges in space utilization are theaddition of the function of the irrigation canal into a drainage channel and theaccumulation of garbage in the subak irrigation channel which causes water to be polluted and kills the ecosystem in it. This is certainly not in accordance with the environmental protection policy of the sustainable development of a subak area.

CONCLUSION

Based on the results of researchand discussion, it can be concluded that changes in the use of space in the Subak area have a negative impact on the sustainability of Subak because the change in utilization has an impact on decreasing the implementation of the *Tri Hita Karana*, agricultural activities in the Subak area cannot be carried out properly, in the long term. Subak is not sustainable, as is the damage toirrigation networks. In order for subak to be sustainable, it is necessary to stipulate regulations in the regulation of subak spatial use and provide strict sanctions for people who violate them. It is necessary to do research on the factors causing the violation of spatial use of agricultural land to non-agriculture

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