Literacy and adaptation strategy of rainfed lowland farmer on climate change risk in Takalar Regency

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Abstract. This study aims to determine the level of literacy of farmers to the risk of climate change and to analyze climate change risk adaptation strategies in rainfed rice fields. This research was carried out intentionally in areas that have relatively wider rainfed rice fields in the Districts of North Polombakeng and South Polombakeng, Takalar Regency, South Sulawesi Province. Sampling was conducted purposively on 147 farmer respondents. Data sourced from primary and secondary data. Data analysis is a qualitative and quantitative descriptive analysis. The results of this study indicate that the level of literacy of rainfed lowland rice farmers to climate change is the highest on the component of climate change impacts, while the lowest on aspects of climate change adaptation strategies. Farmers' adaptation strategies in dealing with climate change in rainfed rice farming are the most dominant, including tracking climate change information, shifting planting time, managing cropping patterns, planting spacing, and using short-lived varieties. Rainfed lowland rice farmers in strengthening household food security to face the risk of climate change are more dominant in implementing storage strategies (food reserves), diversifying income in farming and non-farming, and empowering family members to obtain additional income.

1. Introduction
The agricultural sector is one of the sectors most vulnerable to the risks and impacts of global climate change [1]. One of the most serious threats to the future of sustainable food security is the implications of climate change [2]. Since the occurrence of climate change, the chances of the emergence of extreme climate events increase. On the other hand, humans cannot control climate behavior. Therefore, what is technically and socio-economically feasible is to strengthen the ability to adapt to climate change [2].

Food needs continue to increase in line with the increase in population and the level of domestic consumption. Relying on imported food to meet national needs is considered risky and risky, both socially, economically and politically as well as in the context of food security and sovereignty, so efforts to increase food production in the country must be a major concern. Efforts to increase food crop production are influenced, even threatened by the impacts of climate change, both directly and indirectly [3].

Rice fields are the main support for land resources that are a source of livelihood for rural communities to produce food crops. Working on irrigated rice fields has a risk that tends to be lower than farming in rainfed rice fields. According to Nuringsih, et al. [4], rainfed agriculture is very vulnerable to the risk of climate change. In areas where there is no irrigation system, the availability of
water is determined by rainfall conditions. Climate change has the potential to cause a gap between the availability of water and plant water needs. Climate change encourages farmers to adapt to farming.

The extreme climate of El Nino and La Nina causes crop failure and decreasing farm production and household income. At the same time, consumption needs continue to increase, pushing prices up, making it difficult to reach low-income people. Farmer households classified as peasants (small farmers), their survival relies on subsistence / semi-subsidized agricultural production through traditional farming with limited land, education, and knowledge, without business orientation (Wolf in) [5].

According to BPS data [6], Takalar District, which is one of the regions in South Sulawesi Province, has an area of irrigated rice fields, which only reaches 35.69 percent, while most of the 64.31 percent are non-irrigated or rainfed rice fields. It is undeniable that rainfed rice fields have a high risk of global climate change. Whereas the rice field is the foundation of life for most rural communities, especially in meeting their basic needs, therefore if the threat of climate change risks is higher, it will certainly threaten the level of food security. Increasing population pressure requires that the resolution of this phenomenon becomes more urgent to determine optimal solutions that are compromised with various constraints. Rational farmers are required to always adapt to the phenomenon of global climate change so that vulnerability and food insecurity can be reduced as low as possible [7]. This study aims to determine the level of farmers' literacy on the risk of climate change and to analyze climate change risk adaptation strategies in rainfed rice fields.

2. Research methods
This research was carried out in North Polombakeng and South Polombakeng Subdistricts of Takalar Regency, South Sulawesi Province. Location determination was carried out purposively in areas that had relatively broad rainfed rice fields. The research sample was taken by a purposive sampling method, which purposely selected samples of rainfed rice farmers who were relatively more productive and had a cropping pattern of at least twice planting in a year. The total sample taken was 147 respondents. Data collection methods carried out are survey methods, structured interviews, and observations. The type of data used is primary data and secondary data. Data were analyzed with qualitative and quantitative descriptive statistical analysis.

3. Results and discussion
3.1. Literacy of rainfed lowland farmer on climate change.
Rainfed lowland farmers basically generally have the knowledge and understanding of climate change and its risks, both local and national literacy. Through this study, the level of farmers' literacy on the risk of climate change globally is measured through several criteria, including literacy on changes in rainfall patterns, extreme climate events, changes in air temperature, climate change impacts, and adaptation strategies.
3.2. Adaptation strategy of rainfed lowland farmer to climate change risks.
Rainfed lowland rice farmers' adaptation strategies in the face of climate change risk are divided into two, namely adaptation strategies in working on rainfed lowland rice fields and adaptation strategies in the aspect of farmers' household food security. To analyze adaptation strategies in farming, the parameters that are seen include the search/information search for climate change, the use of flood-resistant varieties, the use of drought-resistant varieties, the use of varieties resistant to pests and plant diseases, shifting/adjusting planting time, setting the cropping pattern, distance planting, and drainage, the use of organic fertilizers, the use of early maturing varieties (shortage), water management technology, light soil treatment, use of chemical fertilizers and pesticides, use of organic pesticides, and harvest time management.

Figure 1. Literacy of rainfed lowland farmer on climate change in Takalar District

Rainfed lowland farmers generally have high literacy on the risk of climate change in the local area. However, the most dominant thing understood by farmers is the impact of climate change that has been experienced and changes in air temperature. Relatively low literacy is on aspects of adaptation strategies to climate change risks.
The adaptation strategy to the risk of changes in farming in rainfed lowland areas that is most dominant is tracking information about climate change, regulating cropping patterns, shifting or adjusting planting time, spacing, and the use of early maturing varieties. This can be done by farmers because it is relatively easy to apply.

In order to strengthen household food security due to global climate change, rainfed lowland farmers have carried out a number of strategies including providing food stocks, reducing food frequency, diversifying or diversifying staple foods, verified farming (crops, livestock, fish), income diversification farming and outside farming (on-farm/off-farm), grain/money in farmer groups or collecting traders in the village, and empowering family members to obtain additional income.

However, rainfed lowland farmers are more dominant in the strategy of storing/supplying food stocks, diversifying farm and outside farm income (on-farm/off-farm), and empowering family members.
to obtain additional income. This fact shows that farmers have been able to adapt naturally to face the challenges of climate change risks.

4. Conclusion
The level of rainfed rice farmers' literacy on climate change is highest in the components of climate change impacts, while the lowest is on aspects of climate change adaptation strategies. Farmers' adaptation strategies in dealing with climate change on the most dominant rainfed rice farming include information tracking climate change, shifting planting time, setting cropping patterns, spacing arrangement, and the use of early maturing (short-lived) varieties. Rainfed lowland farmers in strengthening household resilience to face the risk of climate change are more dominant in the strategy of storing/supplying food stocks, diversifying farm and out-farm income (on-farm/off-farm), and empowering family members to obtain additional income.

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