

# The Adaptation Strategies Of Production And Food Consumption Of Mountain Society In Sinjai Regency, South Sulawesi Province

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**Abstract:** This study aimed to analyze the adaptation strategy of mountain society in west Sinjai sub-district, Sinjai regency from food production aspects, food availability aspects, food accessibility aspects, and food utilization aspects. Using case study tradition with data collection techniques were in-depth interviews, full observation, documentation, and triangulation. The target group was determined based on identification of field condition and preliminary information which had been obtained from key informants. The result of this study showed that the availability of food was maintained from the results of production by storing in a special storage that was called "pa'ra". Implementation of multiple livelihood strategies namely in agricultural and non-agricultural sectors, as an effort to maintain conditions of availability and level of their food accessibility. Development of food consumption adaptation model had carried out by utilizing local food based on knowledge, behaviour and attitudes towards food, such as "pallapi lappo" method to create sustainable food consumption.

**Index Terms:** adaptation, production, consumption, mountain.

## 1. INTRODUCTION

The adaptation concept has been resurfaced in the scientific literature which is caused by climate change [1] ; [2]. In general, adaptation is intended as the ability of a society or system to adapt climate change and its variability which is to reduce damage potential, benefit from or mitigate the effects of climate change [3]. The function of adaptation is included in the framework of inter-society relations as social system, with behavioural organism [4]. This includes directing and adjusting between basic human needs and the surrounding conditions which include economic and technology [5]. At the present, many adaptation is focused on describing the process of society adaptation in agricultural sector in general to the effects of climate change [6] [7]). Many studies have examined about strategy of society adaptation especially small farmers in anticipating climate change and society's social-economy [2]. For example, study about adaptation governance [8] [9], capacity and social capital of society adaptation [10][11], risk and adaptation management [12] [13] [14] as well as livelihood and vulnerabilities [15] [16] [17] [5] [18]. The study confirmed that the urgency value in adapting to the environment.

The level of society's vulnerabilities to ecological, social and economy changes differs from one region to another, even in a country [19]. The level of vulnerabilities is influenced by condition and climate exposure, society sensitivity and their ability to adapt [2]. The adaptation strategy is framed as a management solution based on the contribution of knowledge and local culture so that it is able to adapt locally to the regions [2] [20]. Society adaptation is different in each ecosystem area [21]. Societies in each ecosystem tend to

utilize their potential and natural resources [22] in defending to shocks (ecology, social and economy) [23]. Included in using their natural results, knowledge and local culture in fulfilling their food needs [4]. Coastal agrosystem for example Individual capital and Financial capital are the main factors in the provision of food for society [24]. While, mountain agroecosystem are more influenced by social capital factors [25][26]. Several studies have been conducted with the aim This study was focused in the mountain areas. Many previous studies had only focused on the strategy of providing societies' food to climate change. However, there had been no study describing adaptation strategies in food supply and food utilize specifically in the mountain area. Another reason is the fact that there was an awareness of food insecurity at the regional level in the mountainous area of west Sinjai sub district, Sinjai regency, based on the report results of the Food Endurance Office in Sinjai regency, South Sulawesi province in 2017. Food problems, it is known that most villages in the region have food vulnerability level due to an increase in population (661 people) from 2015 to 2016, degradation and land conversion causes a decrease in production (such as rice commodities, in 2012-2016 which is 16,021 tons, 15,623 tons, 15,638 tons, 18,484 tons and 11,034 tons (BPS Sinjai regency, 2017) and disaster-prone areas are potential harvest failures [4]. In this regard, the focus of this study aimed to reviewing the adaptation strategies of mountain society in west Sinjai sub district, Sinjai regency, from food production aspects, food availability aspects, food accessibility aspects and food utilization aspects.

## 2 METHODOLOGY

### 2.1 Site of Research

Sinjai District is one of 24 regencies / cities within the province of South Sulawesi which lies east coast of the southern part of South Sulawesi province located more than 233 km from Makassar (South Sulawesi provincial capital). Sinjai regency is geographically located between 502'56" to 5021'16" south latitude and between 119056'30" up to 120025'33" east longitude. Sinjai which has an area of 819.96 km<sup>2</sup> consists of 9 definitive districts with 67 villages and 13 developed villages. this study focused on the West Sinjai district considering that

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41.13% of the territory is situated 1000 meters above sea level. The characteristics of West Sinjai district are as follow. West Sinjai district is located 48 km from the district capital with an area of 135.53 km<sup>2</sup> Sinjai comprising 7 definitive village and two developed villages. This district is affected by alternating two seasons: the rainy season and dry season, but it is more influenced by the rainy season. Potential rainfall occurs from January to April, Between May and June there was the dry mid session, while on July recur high rainfall. From August to October it experiences dry season, and in November, December to April the dry season occurred until April onwards.

## 2.2 Data Analysis

This study used a case study method to find out social reality deeply of the adaptation strategies of mountain society. Field data collection techniques had done convergent, in-depth interviews, observation, documentation, and triangulation [27]. In addition, this study was accompanied by FGD (Focus Group Discussion) discussions and field observations to understand the real condition that occurred. There were two data sources, namely primary data and secondary data [28]. Primary data was obtained from the society and the government at the village and sub-district level. The study unit was the mountain society. The target group was determined based on the identification of field conditions and initial information that had been obtained from key informants.

## 2 RESULTS AND DISCUSSION

### 3.1 Food Production Aspect

Food availability is a condition of providing adequate food, food and beverages derived from plants, livestock and fish as well as derivatives for residents of a region in a certain period of time. Food availability in the study area was generally sourced from the production itself and purchases. The society's strategy in providing food with its own production, in general found more than one commodity, namely rice (*Oryza sativa*) in rice fields and potatoes (*Solanum tuberosum*); taro (*Caladium*); cassava (*Manihot utilissima*) on dry land. Rice commodities, harvested twice a year and has been become staple food for mountain society. While other foods such as potatoes, cassava, taro are only sought once a year. In general, the society has a habit of storing rice (grain) in preparation for consumption to fulfill their needs before the harvest time. The grain storage area is called para, the society saves as much as needed (usually 40% of production) and the rest is for sale (60%) in preparation for fulfilling the costs of the next planting season and other needs. One of culture of the society in the study location is may not sell grain that has been stored in para, even though harvest results are available in the next planting season, but the grain that has been stored in para is only for consumption. Societies with a "little" production level are low, the strategy to fulfill basic food needs is to store all grain produced by themselves and / or produce as harvest workers, and from other sources such as planting commodities on dry land (potatoes, yams and taro). Meanwhile, the societies' strategy to fulfill protein needs as rice companion food is done in several ways namely first: buying fresh fish and dried fish on the market which are available twice a week; second: cultivating freshwater fish such as carp (*Cyprinus carpio*) in their yard or with mina paddy cultivation. The description shows that differences in the level of food

availability for each society are due to the different ownership of resources (natural, human and social) and food production [29]. Food availability illustrates that there are three main components that build food security into a system, namely food availability and stability, food accessibility, and food utilization [30]. The pattern of ecological adaptation is the response or response of the organism to the environment in the framework of its existence to sustain itself sustainably. The development of adaptation has been carried out in maintaining food availability is highly dependent on food production [31][32].

### 3.2 Food Accessibility

Food access is a way of getting food to fulfill daily needs. Food access is influenced by the location of residence, and income level [4]. The location of the farmers and the ease of obtaining information, transportation roads, markets and production facilities such as seeds and fertilizers are very important. The mountainous region is far apart from the market, so society must rely solely on what can be obtained in their respective places. Often the food available is not enough to fulfill needs. The variety of types of food needed is not easy to obtain. This condition does not become a barrier for society living in mountainous areas to get adequate food and prevent malnutrition. The aspect of food access in terms of the adaptation strategy of the mountain society can be seen from two factors, including the location of residence, and the level of income. Location of residence, location of residence and ease of access to markets is very important. In far areas and apart from the market must rely on only what is obtained in the environment where they live, so that it will affect diet and eating habits. In west Sinjai sub district, Sinjai regency, there are only three public markets, namely in the Tassililu village, Arabica village and Bonto Salama village, each of which is open only twice a week. While the other six villages (Balakia sub-district, Gunung Perak village, Bonto Lempangan village, Turungan Baji and Terasa village) are classified as far (> 5 km) from the market. The condition of the far location of the residence of the society requires them to develop adaptation strategies to maintain food availability. The adaptation developed by the mountain society where the place of residence is far from the market is by planting various types of plants that can be used as food around their yard or garden such as vegetables, fruits and tubers. This cropping pattern is also used by some society to increase their income by selling existing crop products. In general, the society also prepares long-lasting instant food such as indomie and eggs as well as preserves food ingredients (dried fish) in an effort to maintain food availability in their families. Another component, which is included in food access in terms of adaptation, is the level of income. Income, income is greatly influences the level of food availability of the mountain society. The difference in income level is strongly influenced by the type of the population work both from agricultural products and from the results outside of agriculture. This is supported by the results of research conducted by [33], that there is a tendency for the broader ownership of land, the greater the level of income. Development of adaptation to income is an effort made so that the income earned is able to fulfill their food consumption needs. According to [34], sustainability indicates that the society is able to minimize the condition of food shortages and can quickly provide food. Efforts to maintain the status of society food availability are carried out by setting aside a

portion of money from agricultural products and from outside agricultural products to be saved and most of them only save at home. In addition, another effort is to find out other sources of income than agricultural business. The narrower the cultivated agricultural land, the more it encourages the society to try to increase income outside the agricultural sector, it can also be said that the narrower the land cultivated by the contribution of non-agricultural income, the more important it is. This condition illustrates that some people in the study area tend to implement a dual livelihood strategy, namely in the agricultural and non-agricultural sectors in an effort to maintain the condition of their food availability.

### 3.3 Food Consumption Aspect

The aspect of food utilization is food consumption related to food behavior. Society adaptation in aspects of food utilization includes food consumption and level of behavior towards food. Food Consumption, Food consumption can be interpreted as the amount of both single and diverse food, which is eaten by a person or group of people with the aim of fulfilling physiological, psychological and sociological needs. Food consumption has 3 objectives, namely: 1) physiological to fulfill hunger or desire to obtain nutrients needed by the body, 2) psychological goals, is a substance related to the need to meet emotional satisfaction or one's tastes (individuals) and, 3) sociological goals related to efforts to maintain relationships between humans and small groups (families) and larger groups [35]. In this study, it was found that one of the patterns of consumption adaptation developed by local societies showed that people consumed potatoes (carbohydrate sources) instead of rice as their breakfast in October and November. This was done because of the large number of potato harvests at the local location and in anticipation of a lack of rice supply while waiting for the rice harvest in December. Other foodstuffs, obtained from the garden, such as taro and cassava are also materials for diversifying the food of the people. If the food is obtained in excessive amounts, then it is usually given to other families / relatives or sold to obtain other food ingredients. Development of adaptation models to maintain the food availability of mountain societies depending on conditions in the local area by utilizing local food. Adaptation which is developed by local societies in addition to utilize dry land / gardens / home yards to grow vegetables, fruits or raising animals, is also utilized to cultivate other food items that can be sold if the availability is excessive. Food behavior, behavior towards food is a person's response to food as a vital need for life. Food availability is closely related to attitudes and behavior towards food, while the behavior towards food at the regional level is greatly influenced by the knowledge of food and nutrition of the society, especially housewife (wife), one of the factors that influence the society's food behavior is the culture that develops in a society. The mountain society in Sinjai regency showed how the culture influences people's consumption behavior. "Pallapi Lappo" (pile upholstery / coating of food supplies) was a way for people to change their breakfast to other food items besides rice. This had done in order to the supply of rice did not run out until the next harvest.

## 4 DISCUSSION

The level of food availability for mountain societies in Sinjai regency is also determined by the society's adaptation strategy to the environment. Food availability is always

maintained from production by storing it in a special storage area called "para". Local societies also use resources (natural, human and social) they have. The varied conditions of the resources have become a benchmark for societies' food accessibility by implementing a dual livelihood strategy, namely in the agricultural and non-agricultural sectors, in an effort to maintain their food availability conditions. The development of a model of food consumption adaptation cannot be separated from the use of local food based on knowledge, behavior, and attitudes towards food, such as the way "pallapi lappo". which is conducted in order to create sustainable food consumption.

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