Utilization of yard land as the provision of household food in the border area of Miangas Island, North Sulawesi Province

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Abstract. Miangas Island is a maritime border region which is one of the leading islands in the Pacific Ocean, incorporated in the Nanusa Islands group Talaud Islands Regency, North Sulawesi Province as the outermost Island in Northern Indonesia, has strategic value because it borders directly with the Philippines. Based on the geographical location of these border regions, there is a potential and frequent threat of food shortages. This paper is a review, aims to analyze the performance of yard land use by the community independently to be used as a source of food in a sustainable manner through the sustainable food house program. The data used are secondary data and the results of previous studies. Data and information were analyzed descriptively qualitative. Discussing two strategic aspects, namely (1) diversity and yard land management; and (2) performance of sustainable food house area model program with optimization of yard land use. The utilization of community yards in the border areas of Miangas Island with products from the sustainable food home area model program has become a reinforcement and support for family meals. By optimizing the use of yard land, it can be used as a living warehouse, a living Pharmacy, and a living stall.

1 Introduction

Miangas Island is a marine border region included in the Talaud Islands Regency which is one of the leading islands of the Pacific Ocean and remote incorporated in the Nanusa archipelago group and is the outer island in the north of Indonesia, bordering the Philippines. Based on its geographical location in the border area has the potential and there is often a threat of food shortages because distribution to the area is constrained by transportation and weather problems.

The results of the study [1] show that the main aspects of concern in: (a) the fulfillment of human needs, especially food, clothing, and board, (b) the fulfillment of community health insurance on health services, education, and infrastructure, (c) increased public participation and accountability to development programs, and (d) local wisdom related to

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socio-cultural, geographical conditions, and community uniqueness. In this case, the agricultural sector can contribute a role in improving the fulfillment of the needs of border communities, especially related to food. With this fundamental reason so the focus of development is directed at overcoming the problem of food insecurity and poverty to improve food security.

Human resources as a natural resource manager plays a major role in determining environmental sustainability, where what is usually done by the community is not balanced with thinking about the future life of the next generation and even less based on considerations of adverse effects on the quality of his own [2,3]. Through the utilization of resources available and can be provided in the environment can be done in an effort to improve family nutrition and food security. One of these efforts is through the use of yard land managed by households [4]. The yard is a piece of land around the house that is easily cultivated with the aim of improving the fulfillment of micronutrients through improving the family menu [5].

The Ministry of Agriculture began in 2012 through the Agricultural Research and Development Agency initiated a program to use the yard as a place of production of food needed by Indonesian families. The Program was named sustainable food house area model. One of the important justifications of the program is that national food security should start from food security at the household level in rural communities.

The use of yard land for planting crops to meet the needs of the family also has the opportunity to increase household income, if properly designed and planned. The use of yard land is designed to increase the consumption of various local food sources with nutritious, balanced, and diverse principles, thus reducing rice consumption. Meanwhile, the use of yard land for agricultural commodities of high economic value has the opportunity to increase household income in rural areas.

This paper aims to analyze the performance of yard land use by communities in the border region of Miangas island independently and then analyze the optimization of yard land use as a source of household food supply.

2 Methods

This paper is a review of various study materials and documents related to the optimization of yard land in the border area of Miangas Island. The data and information used are secondary data sourced from the Ministry of Agriculture, the Central Statistics Agency, and the results of reviews from various sources (journals, proceedings, print media) and other relevant sources. The data were then analyzed qualitatively and presented descriptively.

3 Results and discussion

3.1 Performance and management of yard land on Miangas Island

Miangas island is one of the leading and remote Pacific Ocean islands belonging to the nannusa archipelago and is the outer island in northern Indonesia, bordering the Philippines. Geographically it is 050, 34’ 02” LU and 1260 34 ' 54 " BT, with an area of 3.2 Km^2, with a circumference of 6.0 km. Miangas sub-district is directly adjacent to the north of the Philippines, Northeast Pacific, South Sulawesi Sea and west of the Philippines. While the distance from the capital of the district to the province capital is 320 nautical miles, the distance from the capital of the district to the district capital is 110 nautical miles, the distance from the capital of the district to the village is 450 meters and the distance to the Philippine state border (Davao) is 48 nautical miles. Miangas island has only 1 Village,

Miangas Village and is in one special District of Miangas, Talaud Islands regency, North Sulawesi Province.

Most of the people of Miangas Island are farmers. They depend on the produce of the sea and the garden. The side job of the community in general is Docker. The natural conditions of Miangas Island on the west side are generally lowlands and, in some places, there are mounds of coral/limestone. In this part the dominant plant is coconut with white sand beach. While on the east side of the longitudinal North-South in the form of Highlands and hills with heights between 30-200 MASL. In some places there are many swamps overgrown with similar plants Taro and sago. This natural plant is a native food of the Miangas before they knew rice and this plant is a reserve of food during bad weather. For other crops such as vegetables, some residents/communities have begun to cultivate with a very limited area of land.

To improve food security and family nutrition, one of the efforts can be made, namely the utilization of available resources that can be provided by the environment. As an important prerequisite making food security a priority in sustainable development to end hunger and malnutrition [6,7].

The area of the yard on Miangas Island is very narrow, which is 0.5 ha inhabited by 206 families [8]. The area of ownership of the yard or the area of arable land is a determining factor in the amount of production, productivity, income, and welfare of the household. More yield because it can be planted various types of plants (vegetables and fruits).

The problem of the narrow area of the yard owned by the community is the lack of availability of space for the cultivation of garden plants. This is a challenge to realize the pattern of productive yard business with creative ideas are needed for the development of yard land. [9] suggested that public attention to the use of yard land is still limited so that the development of various innovations related to yard land has not reached the target as expected. The target group community has a diverse yard area that can be grouped into large yard (> 400 m^2), medium yard (120 m^2), narrow yard (<120 m^2), and very narrow (without yard). The initial condition of the community settlement yard in the border area of Miangas Island is seen in Figure 1.

Fig. 1. Miangas island community yard land condition.

Yard land that is not empowered or managed properly will not provide anything good in meeting the food needs of the family. If managed and developed properly it can provide benefits in increasing family income [10,11]. Field facts show that there are still many yards that are not well tricked. This condition occurs because there are still many people

who do not consider the yard is a potential agricultural land to be used optimally as a provider of food needs.

3.2 Pattern of yard use

The pattern of yard utilization on Miangas Island is still odd, and still intended for the fulfillment of household food needs and not yet business oriented. Not all communities understand or realize the productive function of the yard, as a source of nutritious and safe family food, so it still looks like some yards tend to be left alone. Generally, the types of plants planted in the yard, most of them are plants that simply fill the void of yard land. Some types of commodities grown in the yard include, Gedi leaves, basil, lemongrass, chili, eggplant, tomatoes, ginger, onion stalks and celery.

The yard in the settlement of Miangas Island, generally has been fenced, but the function of the yard is only limited to being a social glue between. The yard functions as a social and cultural glue between communities as a public road between neighbors [12]. Business management by utilizing yard land required a comprehensive strategic design/development so that the potential of yard land as a provider of food diversity and nutritional sources of households and additional sources of household income can be developed. A complete yard arrangement model requires a large area of land, so it is more suitable for rural yards, but the principle can be applied to a narrower area. According to [13], careful planning and cross-sectoral support in the use of yards can be more optimal in supporting food security. The results of the study [14], reported that, yard gardening in Penang, provides social benefits for homeowners and the community, because of the element of neighborliness and togetherness.

3.3 Performance of sustainable food house area program

The concept of sustainable food house area model which has been prepared by the ministry of agriculture uses the principles of: (1) food independence of households in an area, (2) food diversification based on local resources, (3) conservation of food and feed crops including plantations, horticulture for the future, (4) welfare of farmers and communities that utilize sustainable food houses, (5) utilization of village seed gardens to ensure community needs for seeds are met, both food plant seeds, horticulture, plantations, and others, and (6) participation of climate change impacts [15]. The concept of sustainable food house area is the concept of growing and utilization of the yard to meet the food and nutrition needs of families in a diversified basis based on local resources, friendly environment, and sustainable in one area so that it is expected to improve the ability of families and communities economically and socially [16]. The concept of sustainable food house area is not just the use of yard land, but includes the concept of food independence, food diversification based on local food sources, preservation of food genetic resources and seed gardens [17].

The purpose of sustainable food house area is to meet the family's food and nutrition needs, reduce household expenses, increase family income, and improve welfare. The vast potential of yard land and land around household or community dwellings that have not been utilized as a source of family food. The fulfillment of food in every household is the main goal as well as the target of food security in Indonesia [18]. Therefore, strengthening food security can be done starting from the household level. One of the activities that are easy to do at the household level is sustainable food house. Agricultural pattern with sustainable food house model is one of the agricultural models developed on limited land to produce food products.

In rural communities, sustainable food house activities have actually been carried out for a long time, namely utilizing yard land by planting plants for daily needs, but these activities are still part-time to fill leisure time. This activity if managed properly will provide added value in the form of adequate nutrition and opportunities to increase household income. Development concept, each house is planted with various types of horticultural crops (vegetables, various flowers, and fruits) including biopharmaceutical plants. The model of activities carried out is training and assistance in making sustainable food houses around the house, and healthy lifestyles. The training activities are intended to provide the skills of non-working housewives to keep the environment healthy and help with household needs. A major challenge to household food security stems from the dual role of women in providing food for their families [19]. The utilization of yards in Bangladesh is beneficial for women and their families where they get vegetables all year round, can meet the needs of the family, as well as the excess production of vegetables is distributed to relatives and neighbors, and also they sell some of the excess products to the local market [20].

The objectives to be achieved from the activities of sustainable food houses are the development of the ability of families and communities economically and socially to meet the needs of food and nutrition in a sustainable manner, towards prosperous families and communities, the realization of food diversification, and the preservation of local food crops. Implementation of sustainable food house activities, will be obtained several benefits including: (1) the food and nutritional needs of families and communities are met through the optimization of sustainable use of the yard, (2) the ability of families and communities in the use of yard land increases, (3) providing seed sources to maintain sustainable use of the yard and preserve local food crops (4) developing productive economic activities of the family so as to improve family welfare and create a clean and healthy green environment independently [21].

The results of the study reported [22], in Pacitan Regency showed that the production of yards for consumption, in households participating in the sustainable food house area program gave an average contribution of 53%, while those who were non-participants gave a lower average of 43%. In participant households the results of yards sold and transferred contributed relatively the same (22%), while in non-participant households the contribution for sale (38.9%) was higher than that transferred (12.5%). This strongly supports one of the objectives of the sustainable food home area program, namely, to improve the food security of households and regions or regions. In addition, it increased food consumption and increased income tax score by 11.90-20.46%.

The model method of sustainable food house is carried out through the development of agriculture which involves the active participation of the community in the provision of production facilities in the form of parent seed gardens as suppliers of various vegetable seeds in the provision of horticultural crops. Parent seed garden has a very important role for sustainability. The model activity of sustainable food house uses the concept of family and community empowerment by involving all family members and group members. Therefore, the implementation paradigm in order to run well and smoothly in the field needs to be planned and carried out participatively, disseminated informatively and communicatively, and supported in an integrated manner.

The arrangement of plants in the yard is arranged individually or together the entire community involved in the activities of the concept of sustainable food house area with attention to the aesthetics and interests of residents. The community chooses cultivated plants that are tailored to the characteristics of the local land and the needs of the community to meet the needs of consumption or food commonly consumed and favored by the community. Proper management or arrangement of the yard can provide benefits to the beauty of the environment or yard so as to form a beautiful, comfortable, productive

environment [23]. This is the attraction of other communities to replicate or implement the concept of sustainable food house area that has been done.

3.4 Optimization of Yard use

The Ministry of Agriculture initiated the optimization of yard utilization through the concept of sustainable food house. Sustainable food house is a house of residents who strive intensively to use the yard with a variety of local resources wisely that ensure the continuity of the supply of quality and diverse household food. If a sustainable food house is developed on a large scale, based on a hamlet, village, or other area that allows the application of the principles of sustainable food house is called A sustainable food house area. In addition, the sustainable food house area also includes efforts to intensify the use of living fences, village roads, and other public facilities (schools, houses of worship, etc.), green open land, and develop processing and marketing of agricultural products.

One of the agricultural systems that have a positive impact on the fulfillment of food and nutrition, maintaining environmental quality, ecosystem services and the economy is farming in the yard. The main result of the yard is the freshness of agricultural products so that they have better quality and can be used for the fulfillment of household daily consumption or sold as additional income. Optimization of the yard carried out through the sustainable food house area model program contributed 3.03% to the increase in household income [24]. In addition, farming in the yard as well as an effort to realize the independence and food sovereignty at the household level.

Table1. Design of sustainable agriculture in Miangas Island.

Household goals	commodity base	Technology
Strata 1 (< 100 $m^{2)}$	Vegetables: chili, tomato, eggplant, mustard, spinach, *pak choi*	Pot, polybag, vertical farming
	Medicinal plants: ginger, turmeric, basil, onion stalks, chives	
Strata 2 (100 – 300 $m^{2)}$	Vegetables: chili, tomato, eggplant, mustard, spinach, *pak choi*, *petsai*	Pot, polybag
	Medicinal plants: ginger, turmeric, basil, onion stalks, chives	Bed
Strata 3 (> 300 $m^{2)}$	Vegetables: chili, tomato, eggplant, mustard, spinach, *pak choi*, *petsai* and others who have market share	Polybags, beds, side of the yard boundary
	Medicinal plants: ginger, turmeric, basil, onion stalks	
Nursery	Vegetable seeds and medicinal plants	Multi strata Beds, shelves

The implementation of the sustainable food house area system on Miangas Island has been carried out and can be accepted by the local community. The application of vegetable cultivation systems, medicines, simple hydroponics, seedling gardens in the yard of the house can be a solution to make the yard more productive even though it is still on a small scale. For medicinal plants the application of cultivation has been developed by the community such as turmeric, *temulawak*, celery and moringa leaves. Generally, people use turmeric to overcome stomach pain problems (diarrhea, mag, menstrual pain). According to [25] that the benefits of turmeric proven empirically and clinically able to overcome pain. Further stated by [26] that turmeric can overcome diarrhea caused by bacterial infections

due to the content of curcumin. *Temulawak* plant according to [27] can be utilized to maintain liver function and increase stamina. As for celery and moringa leaves are generally used to treat gout, cholesterol, diabetes, and hypertension. [28], reported that moringa leaves have high nutritional content such as carbohydrates, proteins, vitamins, and minerals that are good for the health of the body, in addition it also has millions of properties including as an antidote to free radicals such as cancer, diabetes, antibacterial, anti-inflammatory and antioxidant.

Design of yard land use by planting various food crops, vegetables, diversification of local food, preservation of food crops, and village seed gardens. Sustainable food house design and nursery activities in Miangas Island (Table 1,2).

Table 2. Planning of village nursery in Miangas Island.

Commodities	Technology
Vegetables: chili, tomato, eggplant, mustard, spinach, Chinese cabbage	Pot, polybag, vertical farming
Medicinal plants: ginger, white turmeric, basil, onion stalks	
Medicinal plants: ginger, turmeric, white turmeric, basil, onion stalks, lemongrass	Pot, polybag, Vertical farming, bed
Banana and papaya	Overlay/landscape
Vegetable seeds, root seeds, medicinal plants	Multi strata

Miangas Island by carrying out several activities, among others, namely the use of narrow yard land with vegetable crops (Figure 2), the mother seedling garden (Figure 3), and hydroponic plants (Figure 4). The success of the sustainable food home area model program is determined by the identification of potential yard land resources, human resource capacity, farmers as yard land managers, site-specific technology, yard land, and management institutions in optimizing yard land use.

Fig. 2. Utilization of a narrow yard.

The main nursery building is ideally made to produce various seedlings with a light steel design as a frame, so that its use can last a long time. The existence of a village nursery is very important for sustainability because the procurement of seeds is very helpful in the continuity of agriculture in the yard for the community on Miangas Island.

Fig. 3. Village nursery (left) and hydroponic plants (right).

The hydroponic plant installation is assembled and placed in the village office. After the assembly, socialization and demonstration of hydroponic plant cultivation technology innovation were carried out. Socialization and demonstration activities consist of making nutritional feed and its application, how to harvest seeds, how to plant and maintain plants, how to handle pests and diseases and how to care for installations.

The implementation of the yard land use program is not entirely running as expected. The implementation of the program is faced with several obstacles so that the sustainability of the program becomes difficult to materialize. Yard use activities are considered as odd jobs and not as the main source of household income. This has implications for the outpouring of family time available to maintain plants is relatively small. The concept of yard land development can pay attention to the combination of production cycles such as the yard plan initiated by [29]. This concept will be able to answer the four dimensions of farming systems on yard land. Some of which should be key in the improvement of the yard Land Use program in the future. Another effort to move the community to try to farm in the yard land well and sustainably is that since the beginning of this program has been directed to generate income in addition to meeting household needs.

4 Conclusion

Food availability is a mandatory condition of achieving the status of food security for the community. To obtain sufficient food availability, it is necessary to use all existing land resources in a good and planned manner, including yard land. In the border region of Miangas Island, the use of yard land to meet the needs of families has been going on for a long time. The characteristics of the use of yard land are generally still part-time or fill leisure time and intended for the fulfillment of household food needs. To optimize the role of yard land, especially as a provider of food and household nutrition and a source of additional household income as well as in maintaining business sustainability in yard land, it is necessary to design a more comprehensive use of the yard. the use of yard land with the sustainable food house area model is one of the solutions to realize and strengthen household food security for the community in the border area of Miangas Island.

The application of the concept of sustainable food house area can increase knowledge and skill in the management and utilization of the yard, empower households and communities in providing food and nutrition resources through the use of the yard and increase awareness, role, and community participation in realizing diverse food consumption patterns that can reduce spending on family or community food consumption. The yard area if used optimally can act as a residence, stalls, and pharmacies. The impact of the sustainable food house area program is to increase the diversity of food consumption, reduce household spending, especially vegetables and increase household income and there

is a paradigm shift in society where the land around the house that used to look arid now looks more beautiful.

To encourage the implementation of the sustainable food home area model, the need for commitment and facility supports from local government policymakers in large movements in their work areas to be implemented consistently is important that determines faster adoption and sustainability.

References

1. Bappenas. Lap. Akhir. Bappenas (2006)
2. Sasaoka, M, and Y. Laumonier. ES 17(4): **6**.(2012)
3. Sandifer, P. A, Sutton-Grier A E, Ward B P. ES **12**:1–15 (2015)
4. Handewi, P. S. (KIPNAS), Jakarta, 8-10 November (2011)
5. Yulida, R. (IJAE),3 (2),132-154 (2012)
6. FAO UN System Task Team on The Post-2015 UNDevelopment (2012)
7. Grebmer, K, Towey, O, Sonntag, A. dan Waal. Global Hunger Index (KIPNAS), Jakarta, 8-10 November (2011)
8. Badan Pusat Statistik. Kecamatan Miangas dalam Angka Tahun 2017 (2017)
9. Mardiharini, M. MKRPL. Warta **33**(6): (2011)
10. Ijinu TP, Anish N, Shiju H, George V, Pushpangadan. Indian J.TK. **Vol. 10** (3), July, pp. 413-428 (2011)
11. Adenkule OO. JAS; **Vol. 5**, No. 10. Published by CCSE (2013)
12. Arifin HS, Munandar A, Schultin KG, Kaswanto RL. IJ.Agri Science. **2**(10): 896–914 (2012)
13. Ashari, Saptana, Tri, B. P. FPAE. Vol. 30 (1). 13-30 pp (2012)
14. Ghazali S. 2013. IJSSH, Vol. **3**, No. 2, March, 171-175(2013)
15. Badan Litbang Pertanian. Kementerian Pertanian (2013)
16. Faqih, A, Abdimas Galuh. Vol. **2** (1). 1-11pp (2020)
17. Werdhany, W. I, dan Gunawan. JIlP, 1 **6** (2), 76-83 (2012)
18. Saliem H.P. Balitbangtan, Jakarta (2011)
19. Yamasaki C. Edith CIRHRA. University of San Francisco SLIHRC (2012)
20. Shaheb MR, Nazrul MI, Sarker A. Veg.Pr. and FTM *in Bangladesh*. J. Bangladesh Agril. Univ. **12**(2): 377– 387 (2014).
21. Badan Litbang Pertanian. Badan Litbang Pertanian. Kemeterian Pertanian (2014)
22. Saptana, Sunarsih, Friyatno S. FPAE. Vol. **3**1 (1) : 67-87 (2013)
23. Cristianingrum, Gigih, I. P. Ikraith-Abdimas.**Vol. 3**. No. 1. 89-94 (2020)
24. Ade Kusuma Akbar, Abdul Hamid A. Yusra, Yohana S. Kusuma Dewi. JSEA, **Vol. 7**, Nomor 1, April (2018)
25. Sahebkar A, Henrotin Y. Pain Medicine. 2015:**17**; 1192–1202 (2015)
26. Sasidharan NK, Sreekala SR, Jacob J, Nambisan B. BRI. 2014; e561456 (2014)
27. Devaraj S, Ismail S, Ramanathan S, Yam MF. SWJ 2014;e 353128 (2014)
28. Chukwuebuka E. *Moringa oleifera*; IJNFS. 2015:**4**(6); 624-630 (2015)
29. Mulyanto D. J. Komunitas. 3(1):19-28 (2011)