Socio-Economic Factors That Have Influenced the Decline of Sago Consumption in Small Islands: A Case in Rural Maluku, Indonesia

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Abstract

Even though the cost of rice tends to increase due to uncertain production, unpredictable climate change, water shortage and limited productive rice land, around 95% of Indonesian people still depend on rice as a staple food. In Maluku Province, there are around 52,000 ha of sago forest, and potentially able to produce carbohydrate of more than 268 kg/capita/year for 1.55 million of the Maluku population. Sago and other local foods were the main staple food for the local community. However, sago consumption has decreased considerably whilst rice consumption has increased significantly in the last decade. The objectives of this study were to identify the potential of sago production and socio-economic factors to influence the decline of sago consumption. Data was collected from 75 farmer households in three sago villages by using mix methods including interviews, field observation and focus group discussion. Research results show that household expenditure for sago consumption was 5.4%, 2.4% and 0.8% in selected villages, whilst rice consumption increased up to 15.8%, 20.8% and 38.6% respectively in the same villages. The decline of sago consumption relates to national rice policies and the social and cultural perception of sago. This suggests that a food security should be revitalized, otherwise dependency on imported rice will become a threat to regional food security sustainability in the small islands of Maluku.
Key words: food security, household expenditure, local food, rice, Seram

Introduction

The Indonesian population is 237 million, 95% of which consumes rice as a staple food. Therefore, rice is a political and strategic commodity where price, access and availability are controlled by the government. Rice influences on poverty because when the price of rice increases by 10% then it will reduce the purchase parity power of poor urban and rural households to around 8.6% and 2.7% respectively (ARIFIN

Received: 7 October, 2013
Accepted: 21 December, 2013

2008). Moreover, rice planter households are only 25% of total farmers in Indonesia and most of the rural population are rice consumers, thus a higher rice price will harm farmers and poor people both in rural and urban areas (McCulloch 2008). To reduce dependency and its threat to regional food security, it is pivotal to develop non-rice staple food based on local resources.

Sago palm (*Metroxylon* spp.) is one of the most important local and natural food crops in Maluku, beside tuber, root crops and peanuts. According to BPS (2012), the land area of sago in Maluku is estimated around 52,000 ha. This is about 4% of 1.3 million ha of the total sago land area in Indonesia (Table 1). The potential production that can be achieved is around 416,000 tons/year or 268 kg/capita/year for the Maluku population of 1.55 million. Trees of sago palm are environmental friendly crops and able to provide carbohydrate for an adult for a year, but they are not yet utilized optimally (Flach 1997). This means Maluku has a potential of sago food stock that might be developed as the basis for food security in the long term.

Based on its historical background in villages in Maluku, the sago palm has an important role to support cultural activities, to provide staple food for household members, to provide materials for building houses (roof, wall and ceiling) and bridges, as well as to maintain water conservation (Girsang *et al*. 2006, Bintoro *et al*. 2010). During the era of colonialism, local people called sago a 'food security during the difficult times' because dry sago starch can be kept as food stock for months in bamboo when laid down into the river.

Based on a cultural perspective in Maluku, sago palm clusters are the symbol of cultural life and social organization such as living in groups, sharing energy and leadership regeneration. Among the clusters the highest plant symbolized the leader of the group, to protect, to share existing energy and to manage younger plants to grow together. Based on a local farmer's knowledge, older plants that have stopped producing starch should be substituted by the next sago plant generation, otherwise

Table 1. The area of sago by provinces in Indonesia (sources: Bintoro 1999, Jong and Widjoyo 2007).

Region	Area of sago (ha)	Area of sago (%)
Papua	1,113,330	88.628
Maluku	52,957	4.216
Riau	36,822	2.931
North Sulawesi	22,523	1.793
South Sulawesi	12,209	0.972
Southeast Sulawesi	11,138	0.887
West Sumatera	5,000	0.398
West Kalimantan	1,576	0.125
West Java	285	0.023
Lampung	270	0.021
Jambi	72	0.006
Indonesia (total)	1,256,181	100.000

it will become the poisonous plant to the whole cluster (GIRSANG *et al*. 2006). It means that there is a time of leadership regeneration where the old leader hands over leadership to the youth otherwise the old leader will become poisonous to the other.

In general, a sago palm forest was pivotal as a staple food, an environmentally friendly crop and a cultural symbol. Nowadays, sago forests are neglected and the consumption of sago and other local food has decreased considerably in Maluku, whilst the consumption of imported rice has increased significantly. This situation is probably dealing with preference, the perceived social value of sago and sago availability (IMANUDDIN 2007). The issue of the increase of imported rice consumption over local foods is also found in small islands in the Federated State of Micronesia because rice is more delicious and simple to prepare (YAMAMOTO 2013). The choice of local people to consume more expensive rice rather than cheaper and locally available non-rice is questionable. Therefore, the objectives of this paper are to focus on identifying the potential of sago and finding out the main factors that influence the decline of sago consumption in Maluku.

Materials and Methods

Research sites were determined and selected at three sago villages in three sub districts in the west of Seram District (Fig. 1). These villages are Luhu, Eti and Hatusua. Luhu village is called *Huamual Belakang*, meaning that the location is isolated from the center of the district city. Eti village is quite close and easy to access to the district city, whereas Hatusua village is close to the capital of Maluku Province. These sago villages were selected purposively based on the assumption

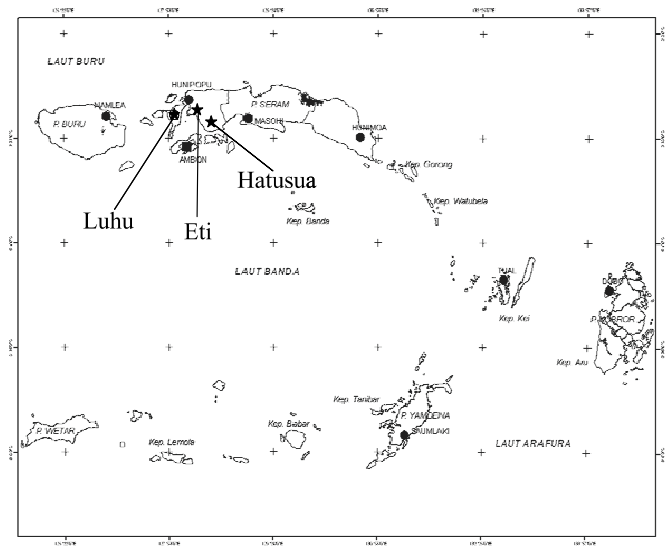

Fig. 1. Map of research sites (Luhu, Eti and Hatusua) in Western Seram, Maluku Province.

that consumption of sago in these villages was higher than that in the other non-sago villages.

The number of respondents selected was 25 households per village, or of 75 households in these three coastal villages. The population of Eti and Hatusua consists of 162 and 290 households respectively with the size of family around four members. The main work of people in both Eti and Hatusua is farming; that is 57% and 64% respectively. Luhu has around 300 households and around 72% of them work as farmers, followed by trade and services (16%) and civil servants (12%). Each household in average has five family members consisting of parents and three children. Respondents were selected randomly from the total of households in each village.

Primary data was collected from farmer households by using in-depth interview method, which is combined with participatory observation and focus group discussion. Secondary data was gathered from local government offices and relevant research documents. Data was analyzed based on household expenditure and correlation of rice and sago consumption variables.

Results and Discussions

The potential of sago palm tree is important for the future food security: Why?

The total area of sago forest and plantation in Indonesia is between 1.3-1.5 million ha and it can produce flour up to 25 tons/ha/year without the need to replant. This area of sago potential is 50% of the potential sago area in the world and 90% of Indonesia's sago area is found in Papua and West Papua (Jong and Widjoyo 2007). This suggests that Indonesia can be made as the frontier of the sago processing industry and provide the future basis for sustainable food security in Indonesia and the world (Bintoro 1999). These sago palm areas spread around 12 provinces, where 89% of the area is located in Papua and West Papua, then followed by 4% in Maluku, 3% in Riau and 2% in North Sulawesi. The rest of sago area (3%) is found in the other seven provinces (Table 1).

Most of the sago land areas in Indonesia are categorized as sago palm forest, except for Riau Province where there are at least 60 semi-mechanical sago processing industries yielding 50-300 tons/month (Jong and Widjoyo 2007). "Sago forest" refers to the natural sago forest endowment without intensive external input production and it is produced to fulfill basic food needs. Conversely, sago plantation uses external input production technology to improve soil, and fertilizer to improve productivity and industry market orientation. Besides, sago plantation uses in modern processing product technology in order to have a competitive advantage in local and national markets.

The sago area in Maluku is estimated by many researchers and institutions as 32,000 ha (Alfons and Bustaman 2005), 42,000 ha (Jong and Widjoyo 2007), 51,646 ha (BPS 2011) and up to 60,000 ha (Bintoro 2011). In average, it is estimated

Table 2. The area of sago forest and production of dry sago starch by districts in Maluku Province (source: BPS 2012).

District	Area of sago forest		Production of dry sago starch (ton/year)
	ha	%	
Eastern Seram	36,075	69.85	288,600
Western Seram	6,338	12.27	50,704
Central Maluku	5,004	9.69	40,032
Buru	1,312	2.54	10,496
South Buru	1,287	2.49	10,296
Aru	1,130	2.19	9,040
Ambon	255	0.49	2,040
Southwest Maluku	245	0.47	1,960
Total	51,646	100.00	413,168

to produce around 416,000 tons of dry sago flour or about 268 kg/capita/year for the Maluku population of 1.55 million. If carbohydrate needs are about 180 kg/capita/year, it means that carbohydrate from sago in Maluku provides around 1.5 fold higher than the per capita average carbohydrate need.

According to BPS (2011), the area of sago forest in Maluku was 51,646 ha and it spreads out in eight districts. The highest sago forest location is found in Eastern Seram (69.85%), followed by 12.27% in Western Seram and 9.69% in Central Seram (Central Maluku District), whilst the rest (8%) is found in the other five districts (Table 2). Thus, sago plantation can be developed in these three districts in Seram Island, whereas the other islands can be made as supporting regions for sago development.

There are several reasons in terms of socio-economic and environmental benefits for sago Development in Seram Island, which is the first biggest island beside Buru Island in Maluku. First, sago palm grows naturally without external input. This is a low cost of staple food production based on local natural resources. In term of staple food, local people make '*papeda*' food, a combination between sago starch, marine fish, spices and vegetables. Sago is the source of carbohydrate, whilst fish is the source of protein. The demand for local sago products increase concurrently during the marine fish season (April to October). The main problem is low competitiveness of sago products in Maluku Province (GIRSANG and PAPILAYA 2009).

Second, the central government policy is to expand and create new wetland rice in Maluku, particularly in the Seram and Buru islands. This policy is based on the nationally low-price rice policy. In fact, the main constraint of agricultural development in small islands is the lack of water and hilly land areas, except for sago forest that conserve water in the flat land. This implies that environmental change will occur in small islands because rice needs a lot of water, i.e. around 5,000 L to produce one kg of rice (WELIRANG 2011), and releases methane into the air and uses chemical fertilizers as well as pesticides.

Third, compared to the rice crops, sago crop clusters are environmental friendly because they conserve soil and water, act as a buffer zone for flood and sea water intrusion, and have the capability of self-regeneration. Sago palm also produces around

8,000-10,000 L/ha/year of bio-ethanol, as well as reduces global warming through producing 79.52 tons/ha of O_2 and absorbing of 0.3% of CO_2 for each 1 million ha of sago forest (ISHIZAKI 1997, AWG- ADENI *et al*. 2010).

Dealing with food security in the long term, it takes 10 years to harvest sago, but because sago live in clusters without replanting, and each cluster consists of 4-5 sago trees, one tree from each cluster can be harvested every two years (FLACH 1997). One sago tree can produce around 200 kg of dry sago flour and if an adult needs around 180 kg of carbohydrate per year (YAMAMOTO 2011), then about four sago trees are enough to support the carbohydrate needs of a family of five per year. Moreover, wetland rice (paddy) needs high and expensive input production costs, is sensitive and vulnerable to pests, disease and climate change. On the contrary, sago trees need low input production costs and are not vulnerable to climate change, pests or disease. Therefore, sago is suggested as the future food security which is based on tree food plant starch (AMIEN 2011).

Household expenditure on sago and rice

The status of sago forest ownership in Maluku can be divided into three types. The first is called village or communal sago forest and is controlled by the head of the village and his/her staff. People can harvest sago in the sago forest after getting permission from village local authorities. Sago harvesters will give around 10% of their total sago starch harvest to village authorities. The second is called '*Dati*' land sago forest or family land that is given by ancestors and then owned by a family group. Each household in the family group has a right to harvest all kinds of plants, including sago, on the family group land. The third is called private sago forest land and belongs to an individual. In this case the owner of sago forest land are local people of Maluku, but most sago harvesters are not local people but Buton people who originally came from Southeast Sulawesi and have lived in Maluku for hundreds of years. There is a difference between sago farmers and sago harvesters. Sago farmers are a family who have sago forest land and harvest sago for both consumption and income improvement. Sago harvesters are a group of people (2-4 people) who do not have sago forest land and work together to buy and harvest sago palm trees. Buton people have a right to use the land, but have no right to buy and occupy village communal land, including sago forest land. Therefore, harvesters will buy each tree from the owner of sago forest land between IDR 100,000 (USD 10) and IDR 200,000 (USD 20) per tree depending on the size of the sago tree. Research results showed that the number of sago harvesters in sago villages was less than 5% of the total number of farmers. The main reason was that to harvest sago requires extra hard work, is time consuming, and the owner of a sago forest will ask a higher price for sago palm trees and the market for sago starch is uncertain. This implies that sago is an underutilized food because the potential of sago starch in the sago forest in Maluku is not used optimally.

In the past, a harvester and an owner of sago forest shared the products where the owner received 1/3 (33.3%) of each kg of harvested sago starch. In the last five

years, owners have preferred to be paid in cash where the price of a sago tree is IDR 75,000 (USD 7.5) to IDR 150,000 (USD 15). Besides the higher price of raw material (sago tree), harvesters felt that it took a lot of time, energy and hard work to cut off trees as well as to process and to transport heavy wet sago flour from the forest into the uncertain and limited local market. Generally, the age of most rural people who work as farmers is more than 40 years old. Local educated young people avoid working in agriculture and thus they prefer to work as civil servants, otherwise they choose to work as wood cutters, in wood processing, making alcohol, which is called '*sopi*' and made from fermented coconut palm, or work in non-farming sector activities such as road building or motor cycle driving, which is referred to as '*ojeg*' driving.

Consequently, each household has multiple occupations both from farm and non-farm activities to improve income generation. Household expenditure was also different between households in the same village and between villages. The average household expenditure (food and non-food) was around IDR 17.746 million/year (USD 1,775) in Luhu, followed by IDR 12.162 million/year in Eti, and IDR 11.672 million/year in Hatusua (Table 3). The average expenditure for food and non-food was IDR 7.989 and IDR 5.871 million/year with a standard error around IDR 3.23 million. The percentage of food expenditure in Eti and Luhu was 82.7% and 54.6% respectively of total household expenditure, whilst household expenditure in Hatusua was only 36.2% (Table 3). In general, the pattern of poor household expenditure in rural Indonesia and Maluku is that the total food expenditure is higher than that of non-food expenditure. This can be found in Eti and Luhu where household expenditure for food was higher than that of non-food expenditure. Different from Eti and Luhu, the total household expenditure in Hatusua was lower than that of Luhu and Eti. However, household expenditure for food in Hatusua was also lower than that of non-food expenditure. Moreover, household expenditure for saving in Hatusua was higher than that of the other two villages (Figs. 2&3&4). This indicated that households in Hatusua village preferred to consume less total energy which can be acquired from sago, cassava and other tubers (Table 4), and then used money for non-food expenditure. In terms of saving, most households in rural areas of Maluku do not have savings in banks because most of the banks are found in the capital of districts and some are found at the capital of sub-districts. In this case, people in Hatusua have a higher percentage of household expenditure for savings because they have better access to the banks at the capital of the sub-district. Next, the percentage of household expenditure for saving was found to be around 5.37% of the total non-food expenditure in Hatusua, as sourced from 10% of respondents who have a higher household income (Fig. 4). Most of them were civil servants. Therefore, it can be argued that the higher household expenditure for savings in Hatusua occurred also because the gap of household expenditure or income in Hatusua was higher than that of the other two villages (GIRSANG 2009). The objectives of saving in Hatusua were to provide money for future education of children as well as cultural and religious activities.

Table 4 shows that rice, sago, cassava and other tubers are the main source of

Table 3. The average of household expenditure for food and non-food in Eti, Luhu and Hatusua, 2011.

Household expenditure	Food		Non-food		Total	
	IDR/year	%	IDR/year	%	IDR/year	%
Eti	10,058,000	82.7	2,104,000	17.3	12,162,000	100
Luhu	9,689,000	54.6	8,057,000	45.4	17,746,000	100
Hatusua	4,225,000	36.2	7,447,000	63.8	11,672,000	100
Average	7,989,000	57.6	5,871,000	42.4	13,860,000	100

Table 4. Consumption of rice, sago, cassava and other tubers and estimated energy intakes in Eti, Luhu and Hatusua, 2011.

Food types	Food consumption (Kg/household/day)			Energy (Kcal/capita/day)			
	Rice	Sago	Cassava and other tubers	Rice	Sago	Cassava and other tubers	Total
Eti	1.16	0.33	0.12	1,090.4	294.5	46.2	1,431.1
Luhu	0.85	0.73	0.20	799.0	651.5	67.0	1,517.5
Hatusua	0.91	0.04	0.02	855.4	35.7	7.7	898.8
Average	0.97	0.37	0.11	914.9	327.3	40.3	1,282.5
	(66.9%)	(25.5%)	(7.6%)	(71.3%)	(25.5%)	(3.1%)	(100%)

Note: Each household consists of four people. It is assumed 376 Kcal/100 gram of rice, 357 Kcal/100 gram of sago flour and 154 Kcal/100 gram of cassava (GARDJITO *et al*. 2013).

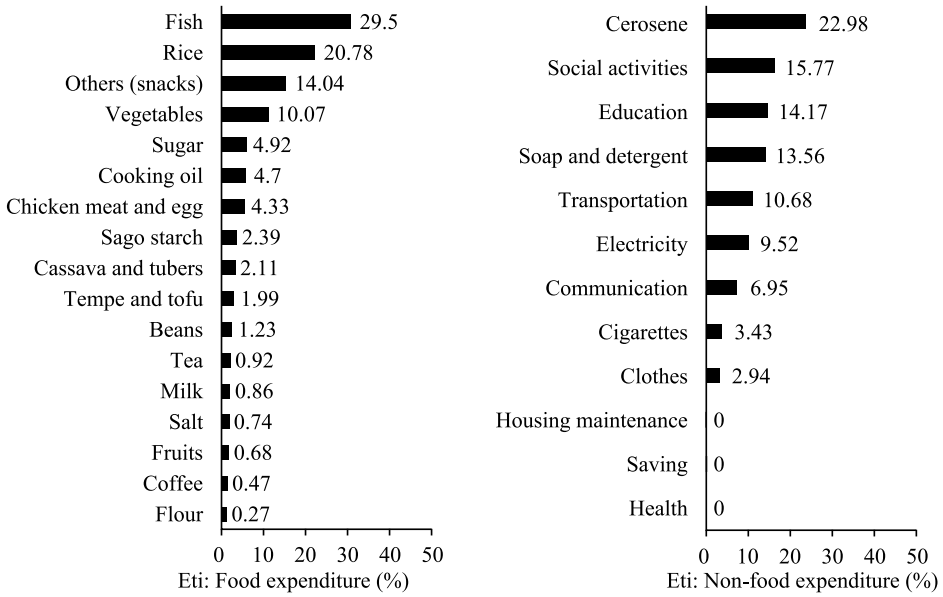

Fig. 2. Household expenditure for food and non-food in Eti.

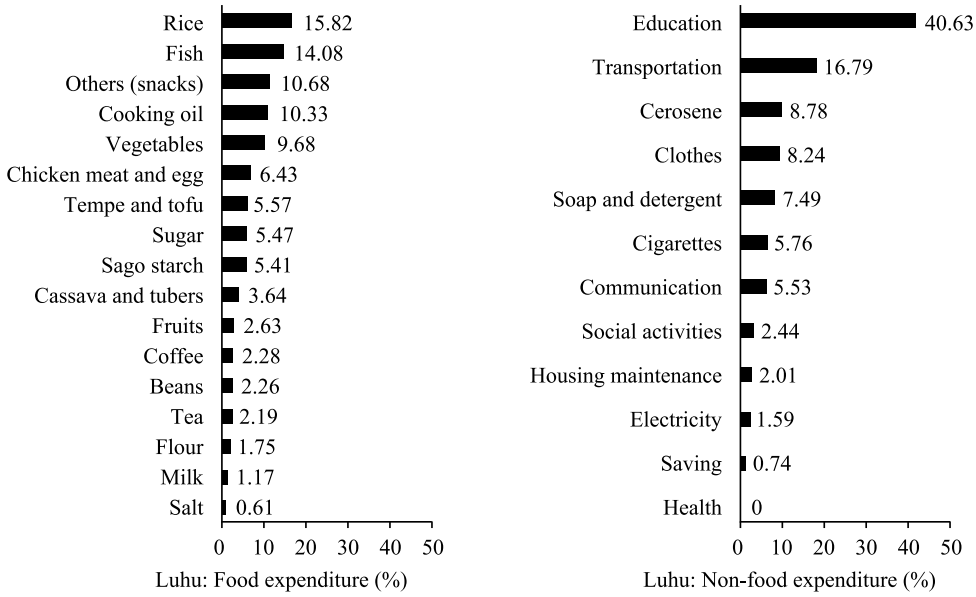

Fig. 3. Household expenditure for food and non-food in Luhu.

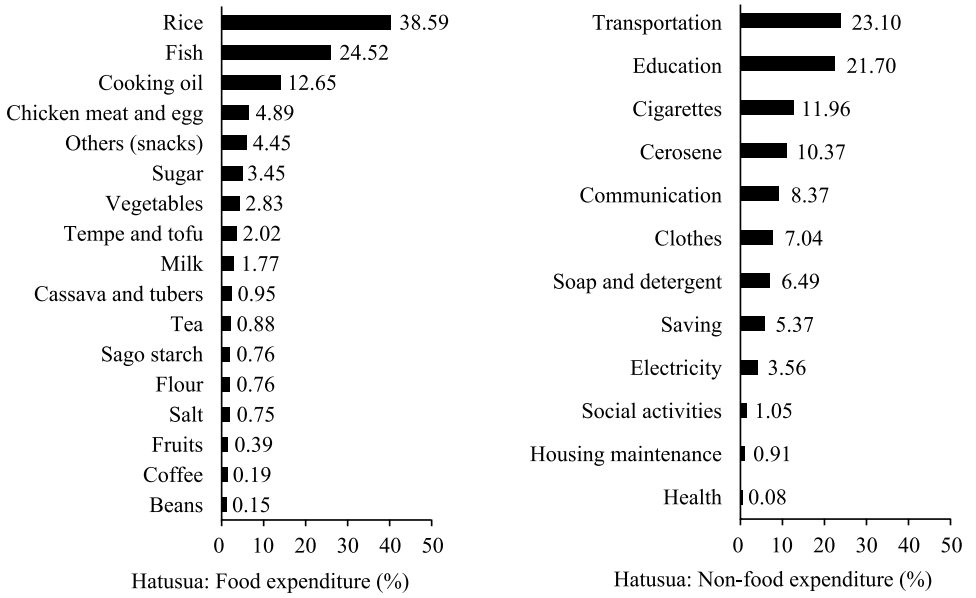

Fig. 4. Household expenditure for food and non-food in Hatusua.

energy. It can be argued that rice has become the main staple food of the household. The range of rice consumption (kg/household/day) was 1.16 in Eti, 0.85 in Luhu and 0.91 in Hatusua. Besides, the range of sago consumption (kg/household/day) was between 0.04 in Hatusua, then 0.33 in Eti, and then up to 0.73 in Luhu. This means that rice consumption was 3.52 times higher than that of sago consumption in Eti, 1.16 times higher in Luhu, but it was almost 22.75 times higher than that of sago consumption in Hatusua. The standard calorie content of rice is calculated about 367 Kcal/100 gram of rice, whilst the calorie of sago and cassava is 357 Kcal/100 gram of sago starch and 154 Kcal/100 gram of cassava flour respectively (Gardjito *et al*. 2013). Thus, the total consumption of calories (Kcal/cap/day) in each village was 1431.1 in Eti, 1517.5 in Luhu and 898.8 in Hatusua. On average, 71.34% of the energy source was taken from rice and the rest was obtained from sago (25.52%) and cassava (3.14%).

In fact, the potential of sago starch in the sago forest is abundant as the source of staple food in Maluku. However, household expenditure for sago consumption was low among sago villages, from 0.8% of total food consumption value in Hatusua, followed by 2.4% in Eti, and up to 5.4% in Luhu village. On the contrary, the percentage of household expenditure for rice was higher than that of sago consumption with a range between 16% in Luhu and 30% in Eti.

Food price was a critical point for household when deciding the type of food to consume. In this case, most rural people consume rice because its price is subsidized by the central government. The normal price of good rice in the market was around IDR 10,000/kg (USD 1/kg), but the central government subsidized the price of rice up to 80% so that its cost for the households was around IDR 2,000/kg. In fact, rice subsidy was allocated by village leaders to all rural households and failed to address the poor target groups. Therefore, each household receives around 5 kg/month. This amount of rice is too small to fulfill nutritional needs of four household members, although rice consumption has changed the local food habit pattern with rice being the preferred food because of its market price.

Even though the price of rice has tended to increase in the past decade, it seems that people prefer to buy and consume rice rather than sago and other local foods. The same pattern occurs also for fish as the main source of protein. Besides food expenditure, household expenditure is allocated for non-foods such as education, transportation, communication, social cultural activities, and cigarettes. The cost of education is more expensive at senior high school and university. Other non-food expenditures were kerosene, electricity, clothes as well as soap and detergent. Health was pivotal, but it was the last priority for household expenditure as they have limited access and ability to cover the cost of health services (Figs. 2&3&4).

Sago starch potential in Maluku is estimated around 268 kg/capita/year with 2,621 Kcal/capita/day for 1,550,000 people in Maluku. In fact, the average sago consumption among households in sago villages was around 1,282.5 Kcal/capita/day or 48.93%. The rest is around 1,338.8 Kcal/capita/day (51.07%). It can be argued that 51.07% of sago

starch in the sago forests in Maluku is unexploited. In Indonesia, sago exploitation is lower that is estimated and up to 2.85% of its total potential (BINTORO 1999). This implies that sago starch is still an underutilized food and needs to be used optimally as the base of local food security in small islands in the future. Based on field observation, sago consumption is higher among people who live in remote areas such as Luhu and Eti than sago consumption among people who live in regions that have easy access to transportation and communication like Hatusua. Different from Luhu and Eti where sago forests are nearby the village, sago forests around Hatusua have been cut and sold to the Javanese for resettlement. Therefore, the sago forest location is further from Hatusua. In Hatusua, it is easier for people to buy rice with a subsidy as a staple food than for people in Luhu and Eti. Besides, the youth prefer to consume rice rather than sago food products because they perceived that rice is more prestigious, easier to cook and a nutritious food. In addition, harvesting sago by using traditional technology is time consuming and ineffective.

Factors influencing sago consumption

The important relationships that explain sago consumption are household expenditure for rice and sago, household income, and sago production. Household expenditure for rice in Hatusua, Eti and Luhu was 39%, 21% and 16% respectively, whilst household expenditure for sago consumption in the same village was almost 1% in Hatusua and followed by 2% in Eti and 5% in Luhu. This indicated that the increase of rice consumption was followed by the decrease of sago consumption.

It can be argued that the reason for the decline of sago consumption is the "rice bias policy" and unclear sago forest responsibility at national and local levels. Based on historical perspective, food security in the new order government of Indonesia was the key factor to create social and political stability. Therefore, the central government has developed a green revolution since the 1960s in order to achieve a paddy production target and self-sufficiency in food in the 1980s. Social political stability can be achieved through creating low price rice and low wage labor. In Maluku, the rice policy was integrated in part of the national transmigration program in 1954/1955, and continued between the 1970s and 1990s. In the national transmigration program in Maluku, sago and wetland rice was a trade-off decision between central and local government. In fact, around 16,500 ha of sago forest was changed for irrigated rice crops in the Seram and Buru islands.

This rice policy was continued by the central government through the "rice for the poor" policy from the 2000s. At this moment, the lowest price of rice in the local market was IDR 8,000/kg. If the central government stated that the price of "rice for the poor" was determined IDR 1,800/kg, therefore the government rice subsidy for rice was probably around IDR 6,200/kg. This means that government rice subsidy caused an easier access to all rural and urban people to consume low price rice. The average world rice consumption was 65 kg/capita/year, whilst consumption of rice in Indonesia has increased to 110 kg/capita/year (NATIONAL FOOD SECURITY BOARD

2011). The other data showed that rice consumption has increased to 139 kg/capita/year in 2011 (SUSWONO 2011). In Maluku, particularly, the local government stated that rice consumption should be maintained at around 80 kg/capita/year. In fact, rice consumption in Maluku has increased from 150,000 tons in 2011 to 155,000 tons in 2012 or 100-110 kg/capita/year. This indicated that rice consumption tends to increase in Maluku. Different from Maluku, rice consumption has decreased gradually at the same time both at national and world levels (Fig. 5).

To anticipate the high demand of rice consumption, the central government policy has a target to achieve 10 million tons of rice surplus in 2014. At the same time, the government reduces rice consumption by 1.5%/year, intensifies rice cultivation, selects high yield rice varieties, as well as extending and creating new wetland rice fields. The other central government policy was based on presidential Regulation No 22/2009 about the acceleration of diversification and consumption of local food. Based on the last perspective, the central government solution to food security is a trade-off between wetland rice and local food.

Based on land availability and suitability, there are 2.3 million ha of agricultural land in Maluku that consist of 57% of plantation crops, 34% of dry land food crops (774,211 ha) and 57,120 ha (3%) for wetland paddy crops (BPS 2012). However, to support the 10 million tons of rice surplus in 2014, the Maluku Provincial Agriculture Agency and Ministry of Agriculture planned to extend and create around 10,000 ha of new irrigated rice fields in 2011/2012 in Seram Island. This ambitious target failed, not because of limited budget but the problem of land availability, availability of semi-skilled and skilled labor, sago forest land conversion, and communal land status. The other problems are that flat land for the wetland rice is very limited, local skilled labor is limited, and there are water availability and land status issues. In this case, it was

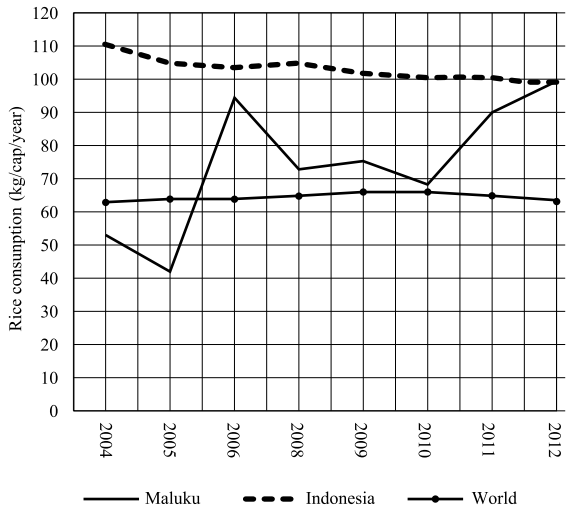

Fig. 5. Rice consumption in Maluku, Indonesia, and World, 2004-2012.

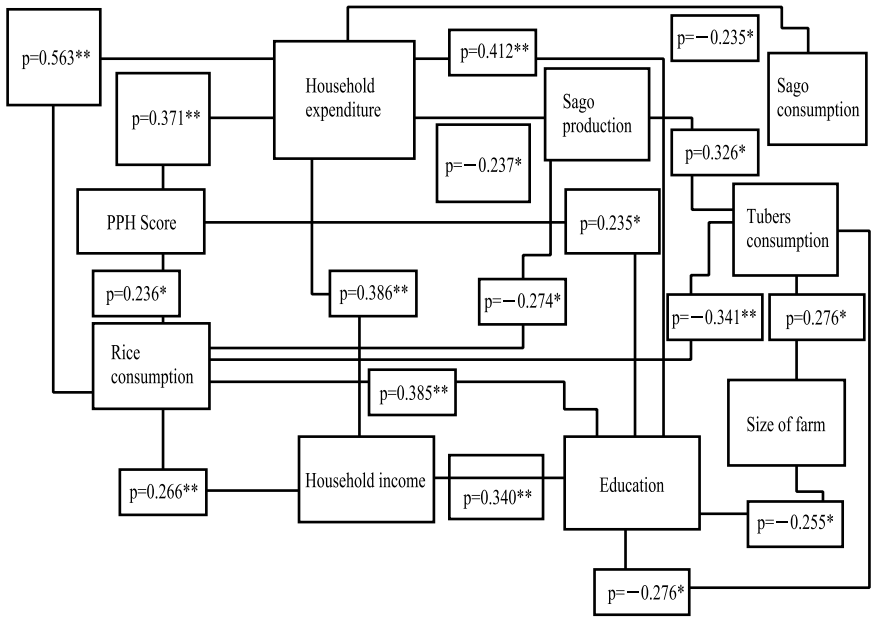

Fig. 6. Correlation between household expenditure and income, sago production and consumption, tuber consumption, education and rice consumption (**Correlation is significant at the 0.01 level [2-tailed]; *Correlation is significant at the 0.05 level [2-tailed]).

questioned why the central government preferred to extend, create and develop wetland paddy crops rather than local dry land food crops and sago forest, which are more available and suitable in Maluku Province.

The second reason for the decline of sago consumption is due to a government policy on sago industry development in Maluku. Government intervention on sago has been varried, such as surveys, seminars, symposia and provincial government rules. Local government has formed the Sago Research and Development Agency, and Sago Pilot Project in Tawiri and Tulehu villages. In 2009, the local government promoted the Governor Regulation on Sago Palm in Maluku. Then, the Food Security Agency developed the concept of sago cluster industry in Maluku. The main problem was the lack of an integrated concept and action plan from the government, the owners of sago forest, sago harvester groups, sago traders, as well as sago home industries. This problem becomes more complex when dealing with the ambiguousness of land status. On one side, sago land status belongs to the Plantation and Forestry Agency, but on the other side sago starch belongs to the Food Crops Agency. Therefore, there is uncertain responsibility of sago forest among Provincial Agricultural Agencies, particularly between forestry, plantation and food crops agencies. To some extent, sago forest land conversion into resettlements, wetland rice and horticulture, roads, housing and office building are the threat to sago forest sustainability.

At the household level, the decline of sago consumption can be explained based on some evidence from simple partial correlation analysis. In general, household

expenditure (household income) has a positive correlation with rice consumption, but negative correlation with sago consumption (Fig. 6). On the other side, household expenditure has positive correlation with education, food diversification and rice consumption. In addition, education correlated negatively with the size of farm. It means that educated rural people, especially the youth, do not like to work on agricultural activities and prefer to work on non-farm activities such as civil servants, drivers for motor cycles, canoes and cars, as well as temporary laborers at supermarkets. Therefore, most farmers in rural areas are old men and have lower education.

Overall, better household income and education will reduce sago consumption and production, but it will enhance rice consumption and food diversification. Sago production also correlated positively with tuber consumption. Thus, sago and tuber are not a substitute, but complementary with each other, particularly among lower income households. To some extent, households sold sago and tubers to buy rice. Based on field experiences, local people generally refer to cassava and other tubers as '*makanan tanah*' (soil food) because they were taken from the soil. This depicts the perception of local people as local food consumers where local foods have lower social status compared with rice.

As a result, households prefer to provide guests with rice rather than local food such sago, cassava and other tubers because they perceive that rice is a more nutritious and prestigious food. Sago and tubers are perceived by rural people as inferior food, whilst rice is perceived as superior food. This indicates that the threat to food security is not only the decline of local food consumption but also household consumption dependency on rice import.

The other key factor of the decline of sago consumption was the sanitation of sago starch processing. Traditional sago harvester used to use unclean river water from the forest to extract sago starch. Then the wet sago starch was placed into small baskets made from sago leaves. These are called '*sago tumang*' and weighed between 15 kg (small size) and 25 kg (big size). Generally, '*sago tumang*' are brought to the muddy traditional market. In this market, '*sago tumang*' seems "unclean" because it is sold on the muddy ground. Therefore, this is another reason why people do not like to consume sago because they perceive that the sago food processing and marketing place is unhygienic.

Sago starch can be made into many forms and types of local food, particularly dry sago starch, '*sago lempeng*' or '*papeda*'. The problem is that local food competitiveness is low because there is no sago product development for these conventional sago products. Moreover, people usually never consume sago alone but it is always accompanied by marine fish soup, tubers, peanuts and vegetables. Thus, consuming sago food products will become more complex and expensive than that of rice when the price of fish and tubers increase.

Conclusions

Sago and other local food consumption have decreased significantly while rice consumption has increased considerably up to 100-110 kg/capita/year or 30% higher from the provincial government standard. The decline of the consumption of sago relates to the rice bias policy, socio-cultural perceptions about sago as an inferior food, household income and expenditure, education level, rice consumption, and the budget of consumers. There is a shifting trend in consumption from local food to imported rice in Maluku, which is influenced by improved household income and low preference and competitiveness towards local food products. One conclusion of the Seminar on Food Security for Indonesia 2020 and Beyond was that the rise of per capita income will shift consumption patterns from local food such as cassava, corn and sago to rice, and then to wheat, which is characterized by more diversified food products (see www.seadiproject.com). This trend and the improvement of rural household income program will probably be a threat to local food producers who are still poor. However, the threat can be an opportunity if local government has the political will and takes action to diversify local food products and enhance its competitiveness by creating and promoting pro-local food policy and social capital. The core of social capital is a social movement to persuade Maluku people about the historical, cultural and environmental values of local food. The main purpose is to restore local food status as the icon of local staple food as well as to increase the preference of local food consumption and to reduce gradually the dependency of people on imported rice and wheat.

As the World Food Summit of 1996 defined food security as all people at all times having access to sufficient, safe, nutritious food as well as their preferences for maintaining a healthy and active life, food security should be based on local resources and culture in order to avoid dependency on rice imports in the future. This suggests that the food security policy which is based on sago starch should be focused on integrated and accelerated local food revitalization policies from down-stream to up-stream sub-systems by linking local food resources, socio-economic and business, processing technology improvements as well as institutional development and environmental factors to enhance sago producer household income and prosperity.

Besides, differentiation of sago products and market guarantees, technical assistance and organizational development to local farmers, as well as improving competitiveness of sago and other local food into "modern food" like sago instant noodles (PURWANI 2006) and other value added products such as fermentable sugar, enzyme, compost for mushroom and animal feed (AWG-ADENI *et al*. 2010), should be the prime key success factors for sago revitalization in small islands in Maluku. Then, sago products should develop into "food for low income households" to gradually substitute the "rice for the poor" program. This is pivotal as Maluku staple food should not be based on imported rice, but on non-rice food such as sago, cassava and other tubers. As sago is known as an environmental friendly crop, low external input and

functional food, local government and people of Maluku should be proud to make the pro-sago food policy a pivotal part and icon of local cultural identity.

Once sago food products are produced continually for a sustainable local food security by small scale industries, surplus of sago palm starch can be developed as a raw material for industry development including sugar and bio-fuel. Otherwise, as the third poorest province in Indonesia, food insecurity in Maluku Province will be an unsolved problem because most households will be more dependent on imported rice that is more expensive and difficult to access and links with an uncertain production, climate change and limited sea transportation and communication for small islands. Therefore, local government needs to cooperate with relevant stakeholders such as universities, private businesses and farmer organizations to develop a sustainable cluster of regional food security based on local resources and culture which is rooted in this principle: to grow what we eat, and to eat what we grow (WELIRANG 2011). This is probably a holistic affirmative action approach to revitalize the decline of sago production and consumption in small islands of Maluku.

Acknowledgment

I would like to thank Ministry of Agriculture for the funding support of this project through Partnership Cooperation Program between Agricultural Research Agency and University (KK3PT), Agricultural Agency for Research and Development, Ministry of Agriculture of Republic of Indonesia, Jakarta. My sincerely thanks also to my colleagues, Leonard Kakisina and G.Helena Augustyn, for your involvement and invaluable assistance including my students, Ira and Desy Manuputty, who helped me to collect data in the field. Based on this research I have proposed and accepted research fund to continue study on sago preference, sago product development and marketing that was supported by Master Plan of Economic Development Acceleration of Indonesia program, Directorate General of Research and Services, Ministry of Education and Culture, Republic of Indonesia. Finally thank to Sota Yamamoto for your help and support to motivate me the way to write and finalize the article.

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