

Chapter 19

Disadvantaged Communities in Indonesian Semi-Arid Regions: An Investigation of Food Security Issues in Selected Subsistence Communities in West Timor



Yenny Tjoe, Paulus Adrianus Ratumakin, Moazzem Hossain,
and Peter Davey

Abstract Traditional subsistence farming is an important part of rural society, the yield is a measure of the main source of food to maintain health and livelihoods of rural households. This chapter chiefly investigated the food security issues in AtoinMeto, a subsistence community in semi-arid West Timor, Indonesia. It discusses the concept of subsistence living from the perspective of food sovereignty and food security. Data were collected in Kupang and Timor Tengah Selatan Regencies in West Timor, via mixed-methods of participant observations, and both quantitative household surveys, and in-depth key informant interviews..

This study found that local knowledge and values of AtoinMeto is founded on their existing clan regime and emotionally bonded moral values. This community maintains food sovereignty without overly using the local resources: following seasonal cycles to grow staple food (self-sufficient) and earn cash income via multiple activities within and outside the community to offset declining food stock. However, the system has weaknesses and to support their adaptation to climate change, this chapter suggests three solutions to enhance their food production, improve nutritional value of local diets and develop their ability to market produce.

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Y. Tjoe (✉) · M. Hossain
Department of International Business and Asian Studies, Griffith University,
Nathan, QLD, Australia
e-mail: y.tjoe@griffith.edu.au

P. A. Ratumakin
Faculty of Social and Political Science, Catholic University of Widya Mandira,
Kupang, Nusa Tenggara Timur, Indonesia

P. Davey
School of Environment, Griffith University, Nathan, QLD, Australia

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The findings of this study imply that, in order to attain sustainable food security for the disadvantaged subsistence community, it is vital that any solutions link to the existing community's knowledge of and values within the cycle of food production and resource use. International organisations and governments must consider this important point and answer the question: How to apply collaborations between technology and local knowledge to the development process?

Keywords Subsistence community · Semi-arid · Local knowledge · Community values · Ancestral territories · Food security · Sustainable livelihoods · AtoinMeto · Tribal community · West Timor

19.1 Introduction

In recent years, there is increasing emphasis on the climate change literature in regards to the importance of community knowledge and values for future adaptation strategies, arguing that the “purpose to adapt” differs greatly between advanced societies and low technology based communities (Berkes 2009; Comenetz and Caviedes 2002; Fraser 2003; Leonard et al. 2013; Petheram et al. 2010; Riedlinger 1999; Wolf and Mosser 2011). The question to be asked is: Why local knowledge and values are important?

Food and Agricultural Organization (2010) and the World Bank (2015a) acknowledge the role of local knowledge and values as human and social capitals which provide problem-solving and survival strategies for rural communities. It should be noted that although food is one of the main priorities for survival in disadvantaged rural areas, it is not the absolute amount of food that determines one's ability to sustain and survive; rather the capacity to produce food locally with an aim to benefit the local members without causing significant harm to the environment. This point is central to local knowledge and values in sustainable food production and is often misconceived or overlooked in the development process.

This chapter investigates the local knowledge and values of a subsistence community in West Timor, the *AtoinMeto*. Individual community members use horticultural practices to grow corn for food security. The way of life is focused on a clan system and customary laws. As part of the national development and regional poverty elimination programs, this community have had reasonable interactions with public health services, market systems and formal education. Conflicting perspective occurs where some external policy makers, practitioners and scholars view the customary laws and beliefs that govern the conduct of this community as not being conducive to development. This chapter presents a clearer portrait of this conflicting view and recommends a better solution to assist this community in securing their food needs and future survival in the era of climate change adaptation.

Given the importance of this issue, there are two purposes of this chapter. First, is to provide a snapshot of the *AtoinMeto* institutional regime (i.e. the clan system and customary laws) and the local concept of sustainability. The *AtoinMeto* Clan

regime plays a key role in granting individuals access to and control of ancestral lands, while their local concept of sustainability provides moral values to individual members in their sovereignty to attain food needs and their own survival. The second purpose of this chapter is to highlight some of the actions being taken in responding to the food crisis in the region and to consider the integration between various actors. Increasing climatic hazards such as long-term droughts and high-intensity rainfall during the main corn sowing period have had a decisive impact on local food production which relies mostly on rainwater. Over the past decade, food productions in almost all districts in West Timor Island have been impacted by drought and rainfall variability (BNPB 2009; Muslimatun and Fanggidae 2009; World Food Programme Indonesia 2016). With climate change likely to exacerbate extreme weather, crop yields are expected to decline drastically and the local government has allocated budget to combat future food insecurity issues in the region (Tempo.co 2014, 2016). This chapter argues that it is vital that solutions to food security for subsistence rural communities consider established local knowledge and values. Within West Timor, many non-governmental organisations (NGOs) have been undertaking substantial fieldwork and working together with the rural communities to help improve local capacity to produce food and to remain food-independent. While there are many positive examples of infrastructure development and food relief by the national and regional governments, it is not clear that the integration of purpose and action exists among different actors in addressing priority food security issues. How this integration will be achieved is not the main focus of this chapter. However, to ensure that all people have *sufficient, safe and nutritious food* in this semi-arid region of West Timor will require integration among and between actors including multiple professions and their joint expertise.

This chapter includes an overview of the subsistence community from the perspective of food security and food sovereignty; and a discussion of the study area and the local knowledge and values of the AtoinMeto in sustaining livelihoods in West Timor. The weaknesses of the local food system in terms of nutrition and economic access and the impacts of drought and heavy rainfall anomalies on local production will be discussed, including the actions to tackle food crises by the national and regional governments and NGOs. Finally, three solutions to food security for this particular group are proposed.

19.2 Subsistence Community: Food Security or Food Sovereignty?

The term “subsistence” refers to a way of life that is led by minimalist low levels of living, less productive techniques, less input purchased, and strong influence of social-cultural considerations in decision-making processes (Wharton 1969). Pursuing subsistence goals, rather than commercial profit have been identified as the feature of rural communal societies throughout the world. From an economic

perspective, Abele and Frohberg (2003) comment that the main purpose rural communities engage in subsistence production is for self-sufficiency and social-cultural goals. The excess production in good times can be sold for additional cash money, but the production is not controlled by profit and competition, rather it is for the sustenance of individuals, families and the community (Goldsmith 1998; Seavoy 2000). This lifestyle is often found in indigenous and tribal communities that have close attachment to ancestral lands with established customary systems (FAO 2010; World Bank 2003).

Studies have found that subsistence production is effective for rural poor to prevent food insecurity (Davidova et al. 2012), to provide additional income (Larsen 2009) and to reduce households' exposure to price fluctuations (Kuokkanen 2011). By following the seasonal cycle of available resources, subsistence communities are able to produce well-adapted and diversified crops, while integrating a combination of activities (farming, hunting, fishing, gathering and other activities) to obtain nutrition and secure food; examples include crops, medicinal plants, heat, clothing and shelter (Conklin 1961; Fisk 1975; Kuokkanen 2011; Manner 1981). These features are indeed in line with the concept of food sovereignty which emphasises the capability to ensure self-sufficiency; where individuals are able to look after their food needs and survival, without being disadvantaged by climate, regulatory bodies, markets or other instruments.

In the sixth Session of the UN Forum for Indigenous Peoples (UNPFII 2007), acknowledging the Declaration of Atitlán in 2002 which defines Food Sovereignty as:

The right of Peoples to define their own policies and strategies for the sustainable production, distribution, and consumption of food, with respect for their own cultures and their own systems of managing natural resources and rural areas, and is considered to be a precondition for Food Security.

However, on the other side of the argument living conditions in these communities are far from desirable to achieve local food security. According to the Food and Agriculture Organization,¹ “food security” is achieved when all individuals have *sufficient, safe and nutritious food* at all times. This is assessed from four independent dimensions, the four pillars on food security, namely availability, access, utilisation and stability (FAO 2009). In the following sections, it will be shown in the case of *AtoinMeto*'s food sovereignty these four dimensions are not independent of each other. This community's food security is a developing process that follows the stages from availability to utilisation and economic access, while the stability of their food system is maintained by clan and its *Adat*² laws, as well as local values when using the available resources within ancestral lands and forests.

¹As detailed in the *Rome Principles for Sustainable Global Food Security*, agreed to at the FAO Declaration of the World Food Summit on Food Security, in Rome from 16 to 18 November 2009.

²In Indonesian term, *Adat* means custom of a political-social institution, in which the associated mores and laws were derived from way of life of a particular tribe in the Dutch East Indies (now Indonesia) which has been established far before the European occupation in the seventeenth century. In post-independence, following the passing of Law No. 1/ 1957, on Basic Law on Local Administration (and then replaced by Law No. 18/ 1965), *Adat* as a political-social institution at

19.3 Study Area and Methods

The study was conducted in three *AtoinMeto* communities in West Timor Island of Indonesia: one in Kupang Regency (B) and the other two in TTS Regency (A and C, see Fig. 19.1). This study was part of a doctoral research program between 2012 and 2016 at Griffith University, investigating rural livelihood sustainability and drought adaptation by the research team. Fieldwork was conducted from June to November 2013, comprised of mixed-method data collections including quantitative household surveys ($n = 627$), qualitative in-depth interviews with customary elders, community figure heads and individual households and further participant observations.

For quantitative household surveys, a series of questions were developed to reflect the five assets of Sustainable Rural Livelihoods (see Chambers and Conway 1992; DFID 1999), i.e. natural resources, human knowledge, social capital, financial



Fig. 19.1 Location of the three communities in West Timor: Regions A and C in Timor Tengah Selatan Regency, and region B in Kupang Regency. Map adopted from: Maximilian Dörrbecker (Chumwa) [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0>)], via Wikimedia Commons

hamlet and village level was gradually replaced by *Desa* (the new administrative village unit). In the modern Indonesia, *Adat* still plays an important role in governing the use of natural resources in some of the tribal communities in remote areas. These communities are recognised as ‘geographically isolated customary law communities’ (*Komunitas Adat Terpencil*). Such recognition tends to indicate the poverty and primitive aspects of this community (Duncan 2004).

sources and physical infrastructure. The quantitative method adapted the livelihood vulnerability index (LVI) measure from Hahn et al. (2009) and constructed a composite index to measure the livelihood vulnerability of dryland communities in West Timor.³ While qualitative in-depth interviews and participant observations together with aspects of local knowledge and values were explored including:

- The history of the community.
- Daily routine of a typical village family.
- Local corn growing process and corn preservation techniques.
- Things that they do when facing problems related to dryness and drought.
- Aspects of life that they perceive as important, meaningful and valuable.

Qualitative data were analysed using grounded theory coding based on the guidance of Strauss and Corbin (1990), Glaser (1978) and Flick (2009).

This research was granted approval by the East Nusa Tenggara Local Government for conducting research and data collection in the three regions under study. Throughout all interviews, the researcher was accompanied by a local translator to ensure correct interpretation of the terms and meanings. Interviews were conducted in Bahasa Indonesia, with a few combinations of *Meto* language. A digital recorder was used to record all interviews. Further to this, this survey was conducted with approval of the Griffith University Human Research Ethics Committee (HREC).

West Timor is a semi-arid island, located in East Nusa Tenggara (NTT), the third poorest⁴ province of Indonesia. The island is characterised by unfavourable climate for growing crops, limited amount of natural resources and a dry and hot climate. A region which is often described as prone to drought and food shortages. Corn is the staple food of the region. Agriculture remains an important sector in the regional economy, in 2013 it accounted for nearly 35% of NTT regional-GDP (BPS NTT 2014) and provides livelihoods for over 61% of the region's working population (BPS NTT 2015).

About two-thirds of the West Timor Island consists of the *AtoinMeto* communities (Fox 1999). The land area is 14,200 km². In 2016, the total population was over 1.8 million and the population growth rate has remained constant at 2% annually over the last three decades (see Table 19.1). The majority of the population live in the rural Kupang and TTS Regencies (19% and 25% respectively) and in the urban Kupang City (22% of total population). In Kupang and TTS Regencies, subsistence farming is commonly found where people grow corn during the rainy season (December to March) and raise animals for domestic consumption. Population growth in TTS has decreased to 0.7% annually from 1.7% in the 1980s, with a higher percentage of women (0.97 males/females) compared to Kupang (1.05 males/females) (Fig. 19.2). The less number of men in TTS may be due to the higher

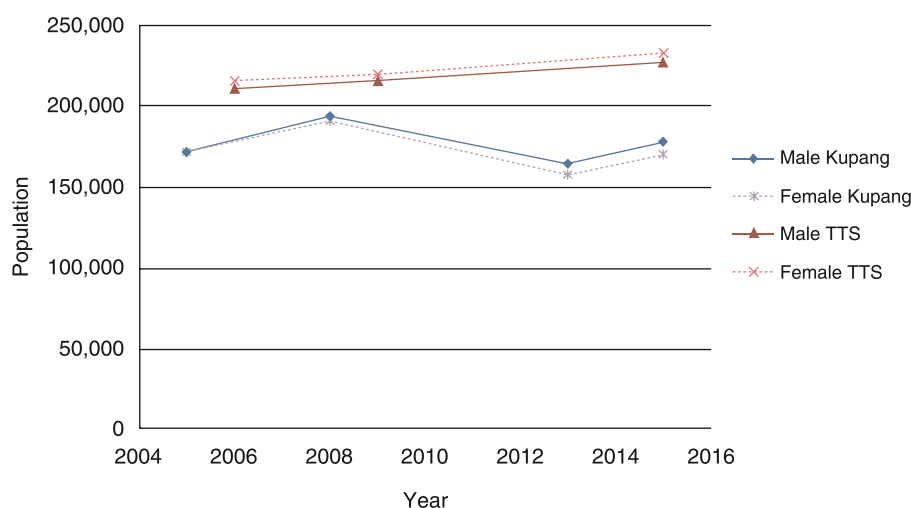
³The methods and results of the LVI for the three *AtoinMeto* communities in West Timor have been published (see Tjoe 2016a).

⁴In 2016, NTT is ranked the third poorest province in the country, with 22% of its population living on less than Rp 11,550 a day, an amount equivalent to AUD1.15 (BPS Indonesia 2016). Besides West Timor Island, NTT Province has three other major islands, namely Flores, Sumba, and Alor.

Table 19.1 Total population and population growth rate (%), 1980–2016, West Timor Island, Kupang and TTS Regencies

Year	West Timor Island	Kupang	TTS
1980	1,007,987	403,167	289,655
1990	1,250,123 (2.0)	522,944 (2.4)	348,067 (1.7)
2000 ^a	1,542,850 (1.9)	444,800 (−1.5)	404,700 (1.4)
2010 ^a	1,664,042 (0.7)	304,548 (−3.4)	441,155 (0.8)
2016	1,865,105 (1.6)	360,228 (2.4)	461,681 (0.7)

BPS NTT (2017)

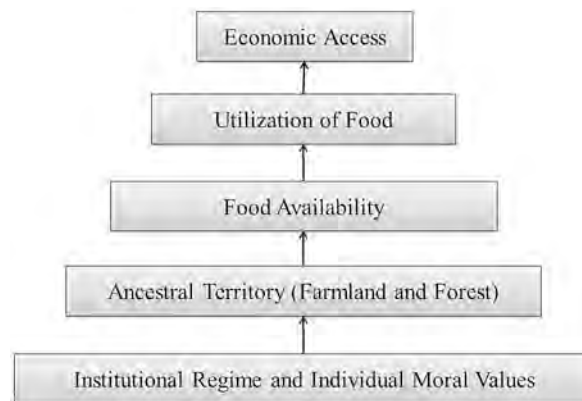
^aSecession of new regencies/city from Kupang Regency in post-decentralisation since 1999**Fig. 19.2** Population by gender in Kupang and TTS Regencies, 2005–2015. Source: BPS NTT 2017

male fetal or infant mortality and the gradual out-migration of the adult males. This concludes that there is a lack of male labour to work the land for food production.

19.4 *AtoinMeto* Food System: A Bottom-Up Approach to Food Security

Traditionally, *AtoinMeto* People cope with droughts through a range of strategies that ultimately aim to secure the availability of corn (stored under their kitchen roof) and water within their ancestral territories. This study found that clan regime and local value play a key role in preserving these local assets (land, forests and water) for the members to cultivate and gather food, water and other resources for their own subsistence.

Fig. 19.3 Elements of food system in AtoinMeto



Clan-based land and water management has been found to be effective in the rural society of West Timor because of the “ikatan emosional” (emotional bonding) rooted in the value of users who identify themselves as sharing a common ancestor and history of the clan (Ratumakin et al. 2016). Additionally, in the three communities under study, there is a local concept of sustainability where *one should limit his own desire for the common good, to be self-sufficient and be grateful for what he has owned* (Tjoe 2016b). According to the local people in these communities, sustaining livelihoods in the region is not difficult if one (1) exercises self-control in using the available resources; (2) is self-sufficient in meeting food needs; and (3) achieves self-content when having low harvest. As these peoples are clan-based community, the “emotional bonding” also leads to individual moral duty to not overly exploit the natural assets, so that the younger generations can continue to have the necessary resources to live in and enjoy this semi-arid land.

The clan regime and local value become the foundation of their food production system which historically has allowed the community to have a stable food system throughout the years. The food system in AtoinMeto community resembles the following stages (Fig. 19.3):

19.5 Clan System, *Adat* Laws and Ancestral Territory

In rural West Timor, a number of clans may live within one village administrative system. In the context of *AtoinMeto*, individual clans have their customary laws, known as *Adat* and are independent of the village administration. Also, each clan has its ancestral territories, consisting of farmlands and forests and the resources within, while clan members are grouped into four *Ume* (house) based on their status as descendants of the same ancestor (Tjoe 2016b). Depending on the status, members inherit a certain block of farmland and are granted access to forest as their rights for livelihood. Their emotional bonding is reflected in their belief that ancestral territories are sacred because the ancestors who had passed away continue to

protect the resources (land, water and forestry) and the humans in these territories. Hence, any social occasion that affects land status (such as marriage between two clans or territorial disputes) will require the holding of community meetings with the presence of *Tua Adat* (clan customary elders) to clarify issues of territory, origin of ancestors and location of their burial areas, referred to as boneyards.

Clan regime continues to function because *AtoinMeto* People benefit from such membership, especially in getting the assurance that food, water and other resources within their ancestral territories are protected by *Adat* laws. Some members are landless due to decades of out-migration and decisions to return to the community, while some others have smaller farmlands due to their lower status in clan system (referred to as the lower rung member). These members can regain their right to subsistence after consulting with *Tua Adat*, by offering labour to work on a piece of land owned by their kin or negotiate for assistance with those members with multiple farmlands. This type of share-cropping subsistence, known as *garap*, is commonly practiced in West Timor.

Clan and *Adat* laws also play an important role in the control of water resources, which is derived from the local knowledge of community-based resource management. In studying the management of water sources in selected communities in Kupang, TTS and Malaka Regencies, Ratumakin et al. (2016) found that community-based management of water sources is more sustainable and these communities exhibited seven of the Ostrom's eight principles of managing a commons, plus two additional principles that reflect the local knowledge of West Timorese society (Table 19.2).

In dryland West Timor, water is a scarce resource and an essential source of livelihood for rural communities—"where there is a water source, there is life" (Tjoe 2016b)—communities always established their settlements around the water sources. Water sources are used and managed as a common-pool resource, and the usage and maintenance are strictly tied to local customary structures, usually the custom of a clan

Table 19.2 Determinants of sustainable management of water sources in West Timor

Ostrom's eight principles of managing a commons:
1. Clearly defined boundaries
2. Proportional equivalence between benefits and costs
3. Collective-choice arrangements for most individuals
4. Monitoring users and resources
5. Graduated sanctions
6. Conflict-resolution mechanisms that are rapidly accessible
7. Minimal recognition of rights to organise
8. Nested enterprises, in case of resources that are parts of larger systems ^a
Two principles in local context:
1. Collective memory (how the water source was discovered and by who) and emotional ties between members of community and the water source
2. Adoption of local <i>Adat</i> (customary) structure in the control of water source

Source: Ratumakin et al. (2016)

^aThe study did not find this principle to occur in the studied communities

that the community believed was the water discoverer, hence the right to control this water source is granted to the discoverer. Today, local folklores about founders of water sources and ancestral territory are still recited in clan rituals to enforce members' moral values. This ensures accountability in using natural resources within the territory, and maintaining connections with the ancestors, this process safeguards the water sources and protected water resources for keeping the local community alive in the future.

19.6 Food Production and Food Availability

We harvest once and eat for a year. (Mama Yun, female farmer, Kupang Regency)

The food (corn) production process takes place on individual farmlands, often called “*Bikin Kebun*” (meaning to make garden). It begins with the clearing of farmland by individual farmers in the hottest season (usually in September and October) to utilise the heat and high temperature which dries and reduces the weeds. It then ends after the sowing of seeds during rainy season (December to March) where farmers utilise the combination of weather, temperature and rainwater to grow the crops. For *AtoinMeto* People, *bikin kebun* is regarded as a sign of industriousness and self-sufficiency. The locals commonly used a phrase: *today's harvest equals one year of the household's food stock*. Figure 19.4 below illustrates the process of their food production and food availability.

AtoinMeto People employ *Tumpang Sari* (mixed cropping) in their sowing stage, which allows N-fixing legumes to coexist along with corn planting. Four types of seeds are sown into each planting hole: three corn, one pumpkin, one Chinese long bean (*Vigna unguiculata* subsp. *sesquipedalis*) and one pigeon pea (*Cajanus cajan*). Throughout January and February, rainwater continues falling and brings water and humus from the hills down to the valley bypassing their farms, where the corn kernels have developed and have grown large. Individual households have to remove weeds in between corn stalks to prevent them from hindering the growth of corn or becoming pests.

From March to April, households which have taken care of their “garden” attentively will have plenty of crops ready to be harvested. Corn and pumpkins are harvested within 3 months, while Chinese long beans and pigeon peas are normally harvested in the fifth month after sowing and may continue until the seventh or ninth month. Entering the dry season (April–November), these people allow their farmland to lie fallow from April to September, while continue to visit this farmland to harvest pumpkin, pigeon pea and Chinese long bean.

AtoinMeto are independent and have full control over the food system, yet they actually have a period of “food stock finishing” before entering the period of “full stock of food”, particularly their stock of corn as staple food. In rural West Timor, the availability of food in each household can be categorised into two types (Boli Sura et al. 2010): first type is called *amsenat*, a situation where households have full stock of food (corn, pumpkin, and various types of beans); and second type is called *fun amnahas*, meaning normal hungry, a situation that often takes place between

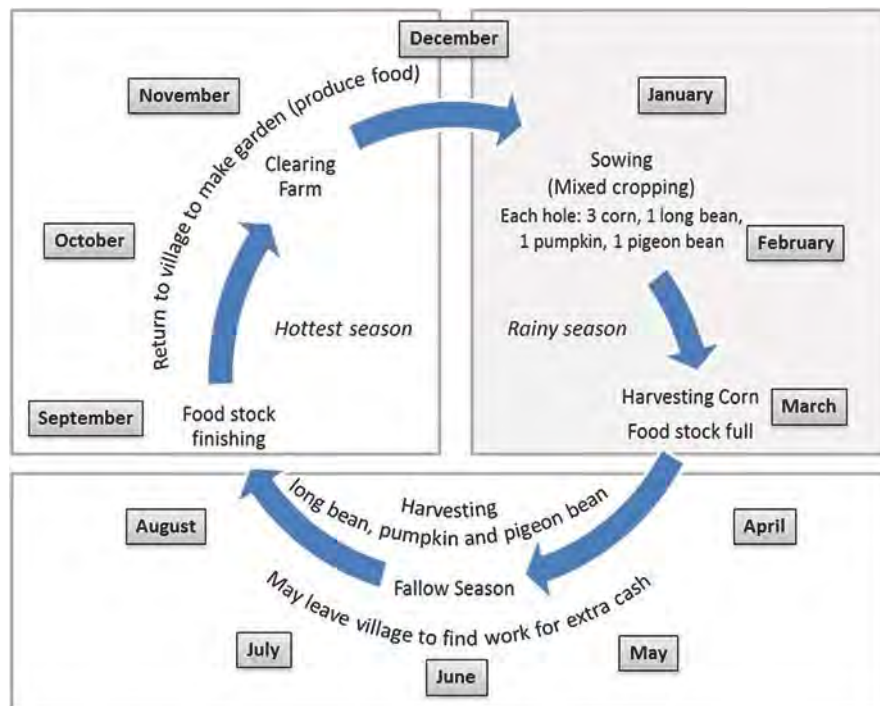


Fig. 19.4 AtoinMeto cycle of food production and food availability

September⁵ and March, where households experience insufficient food because the 1-year stock in their kitchen is finished. To overcome this period of “normal hungry”, the three communities under study carried out a combination of activities to support their food needs, including:

1. Gathering produces from trees cultivated in the community forest.
2. Generating cash through the sale of animals and produces from the community forest such as *kemiri* (candlenut), tamarind (*Tamarindus indica*), and timber products for building materials.
3. Temporarily departing the community (mainly males) to work for extra income, particularly during fallow season (May to August). The males go to towns to work as paid labour in construction projects, while some females (in Kupang Regency) go to another village to work in irrigated paddy fields.

This study found that local people in Region B combined subsistence agriculture and cash income activities as their strategies to cope and adapt to the impacts of changing climate. The accessible public transport has allowed the locals to easily

⁵Those who have smaller farm and production may experience early fun amnahas, starting June to March.

travel in and out of their village to sell their produce in several farmer markets and/or look for work in the capital city (Kupang). In contrast, local people in Region A and C have to depend on subsistence agriculture in their farmland and community forest because of the poor roads and the distance to market places (taking 6–10 h of travel to Kupang the Capital City to sell their produce for cash). Cattle (pigs and cows) are not easily sold in these regions unless there is a *papa lele* (agent who buys farmers' harvest and sells to the market) who visits to look for good breeds and prices. Most of the time produce is stored in the houses. Local people in Region A and C often leave their villages for 2 days to sell their produce, or for 3 months to generate sufficient cash money before returning home.

19.7 Utilisation of Food and Economic Access to Foods and Non-foods: Produces from the Farm, Backyard and Community Forest

From the farm, the newly harvested corn is then preserved using a traditional storing technique of hanging bunches of cobs under the even temperature of the kitchen-roof; and allowing the heat and smoke of cooking to continuously dry the kernels. This traditional technique effectively preserves and protects corn from “fufuk” (corn flea beetle). This corn is edible for a year or more, ensuring the availability of food for individual households until the next harvest. In addition to subsistence crops in their farmland, the *AtoinMeto* People also breeds a number of animals in their backyard and cultivates a range of crops for various purposes.

From the list of produces shown in Table 19.3, the diet of the *AtoinMeto* People is composed mostly of carbohydrate foods (corn, rice and cassava), with plant proteins (mainly from beans). Animals are not consumed on a regular basis, because animals are used as a reciprocal exchange to support members in the core-family who are holding a wedding or funeral. In addition, animals (especially beef cattle) are bred for paying educational expenses as many parents have become aware of the benefit of education for their children in obtaining modern employment.

It was found from the survey that households do not spend much income on food items, rather a large sum of expenditures is used for children's educational fees and school uniforms and ingredients for cooking (such as cooking oil, sugar, salt and coffee). Over half of the total respondents (57.7%) had expended between Rp 101,000 and Rp 500,000 (USD\$10 and USD\$50) and 9% over Rp 1,000,000 (USD \$100) in the past month—these households have at least three children to support, at high school or university level. 32.2% of total respondents spent between Rp 15,000 and Rp 100,000 (USD\$1.50 and USD\$10) in the past month for basic cooking and cleaning needs. Six respondents (1%) reported spending Rp0 because they rarely buy these cooking items listed above.

Figure 19.5 below summarises the *AtoinMeto* People's food sovereignty and food security system, where individual pillar of food security is built up from the

Table 19.3 Utilisation of food in *AtoinMeto* Food System

Utilisation of food	Location of production	Variety
Domestic needs	Farmland	Corn Pumpkin <i>Kacang turis</i> or pigeon pea (<i>Cajanus cajan</i>) Chinese long bean (<i>Vigna unguiculata subsp. sesquipedalis</i>) Chilli paddys Tomatoes
Educational expenses, social-cultural occasions and as cash crops	Backyard, fallowed lands, forest	Small animals: chicken, dog, pig, goat Large animals: beef cattle
Alternative foods, shelter needs and cash crops	Community forest	Alternative food and cash crops: Lima beans (<i>Phaseolus lunatus</i>) Rice beans (<i>Vigna umbellata</i>) Cassava Pumpkin Papaya Banana Mango Apple guava Tamarind (<i>Tamarindus indica</i>) Candlenut Betel leaf Shelter materials and cash crops: Various palm trees (gebang palm, coconut, betel nut) <i>Lamtoro</i> (<i>Leucaena leucocephala</i>) <i>Mahoni</i> (broad-leaf mahogany) <i>Jati</i> (teak or tropical hardwood) <i>Gamal</i> (<i>Gliricidia</i>)

Source: Tjoe (2016b)

pillar underneath with local customary laws and values as the foundation that maintains stability of the system. Nevertheless, this system has weaknesses and with increasing climate anomalies in the region, these communities need support to adapt and to improve the food security system. The next section discusses these issues.

19.8 Nutritious and Economic Values of Local Production

For many decades, poverty issues in West Timor and other islands within NTT province have been inseparable from continuing child malnutrition. Prevalence for underweight children and malnutrition in NTT is among the highest in Indonesia. Over the years between 2007 and 2013, this rate remained twice the national

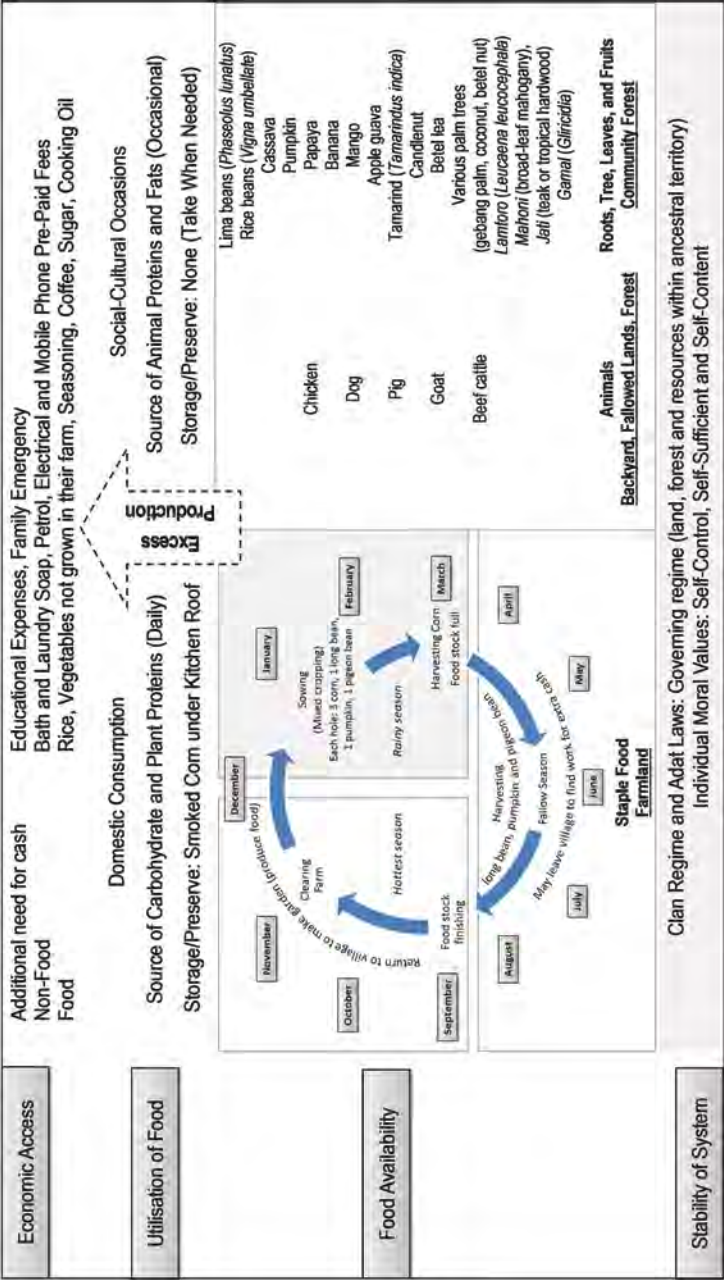


Fig. 19.5 The four pillars and bottom-up process of food security in AtoinMeto, West Timor

Table 19.4 Nutrition security in NTT

Nutrition security indicators	2007				2013			
	Kupang	TTS	NTT	National	Kupang	TTS	NTT	National
% Children underweight (5–12 years old)	21.6 (M) 15.3 (F)	29 (M) 23 (F)	23 (M) 19 (F)	12.1	20.4	19.1	20.4 (M) 18.3 (F)	11.2
% Children undernourishment (<5 years old)	37.9	40.2	33.6	18.4	33.4	46.5	33	19.6
Mortality rate/1000 (<5 years old)	N/A	N/A	80	44	N/A	N/A	58 ^a	40 ^a
Ratio of Puskesmas/1000 people	6.74	5.56	5.69	3.65	7.73	5.98	7.28	3.89

Source: BPPK (2008, 2013), Ompusunggu et al. (2013), Pusdatin (2008, 2014)

^aData for year 2012

average (BPPK 2008, 2013). However, there has been major improvement in the provision of health services for the poor, through the increasing number of Puskesmas (community health centres) to treat both the pregnant mothers and their children (Table 19.4). The ratio of community health centres per 1000 population in 2013 was 7.28 in NTT (higher than the national average of 3.89). In the regencies of the three communities under study (Kupang and TTS in West Timor), the figures are even higher; for every 1000 people, there are eight puskesmas in Kupang, and 6 puskesmas in TTS.

In Indonesia, Puskesmas provides basic healthcare to local communities at districts level, under the supervision of the Ministry of Health. Its main services include maternal care, prenatal and postnatal care, immunisation, and communicable disease control (especially malaria prevention programs in NTT). At the village level, Pustu (supporting units of Puskesmas) and Posyandu (integrated service post) deliver the healthcare to the villagers. In the effort to meet the earlier eight Millenium Development Goals (now SDGs), the Indonesian Government set several health development targets in its National Medium-Term Development Plan (RPJMN) 2010–2014, one of the targets was to reduce the prevalence of child malnutrition to 15% by 2015 (Kemenkes 2011). These targets have not been met even with increased access to community health centres.

Since 2011, the national government has allocated budget via the Ministry of Health *Dana BOK* (*Bantuan Operasional Kesehatan*, or Health Operational Assistance) to implement *Program Penambahan Makanan Tambahan—Pemulihan* (PMT-P, or Supplementary Food-Recovery Program) to regions of high prevalence of child malnutrition. The program was carried out at local Posyandu with the help of local women's group (PKK Desa). Each day for 3 months, mothers would bring their toddler (children aged 5 or below) to the Posyandu in order to receive training and counseling, as well as a set of nutritional recovery foods (predetermined menu by the department of health) for stunted toddlers.

From the fieldwork, this study found that services provided in Pustu and Posyandu are very limited and mostly focus on immunisation and providing vitamins to infants and pregnant mothers; and there was no PMT-P activities. According to the Regulation of the Minister of Health No. 11/2015 (on Technical Guidance of BOK), eliminating child malnutrition is still the top priority of MoH and PMT-P Programs remain one of the activities financed by BOK.

In addition, the government also allows various aid agencies to finance the PMT-P Program some additional funding coming from the community, businesses and APBD (local government's budget). A local newspaper reported that PMT-P program in NTT Province had not resumed since 2014 due to the complicated procedure, including submitting proposals and bank details for fund disbursement (Radio Republic Indonesia 2015). In other regions of Indonesia, this program also has not been optimally implemented for a number of reasons,⁶ including limited budget, lack of health staff and lack of timely reporting systems.

Providing counselling and distributing supplementary food from health centres only provided temporary support and recovery for the mothers and children; but it did not effectively lead the households to healthy dietary habits. It was found that in general, pregnant mothers and mothers prefer traditional methods taught by their mother or mother-in-law for pre and postnatal care. Similar patterns are observed in their diets, where they follow the recipes of their grandmother or mother in their daily activities. What is more interesting, is that in selling produces to market, such as produce from their farm, backyard and community forest, the local people tend to select the ones that are in best quality, leaving the poor quality produce (overly ripen) for domestic consumption. Rather than consuming eggs laid by the chickens in their backyard, eggs are regularly sold at the market. In summary further education and behaviour change are needed to support these communities to achieve a balance of their utilisation and sale of local food.

19.9 Impact of Rainfall Anomalies on Local Productions

Rainfall during December to March was reported by the local community as “very little” or “it stopped after we sow the seeds”, unlike the normal rainy season, where the distribution of rainwater was more even over the three or four months period. Figure 19.6 below shows the annual rainfall in Kupang City, West Timor from 1986 to 2013. According to Lasiana Kupang Climatological Station and a local NGO (PIKUL), since 2010 there has been an uneven distribution of rainfall across the island of West Timor during the rainy season. The island experienced climate anomalies, in which during the dry season, the incidence of rain increased, and in some areas rain occurred more during the hottest season (September and October) which coincided with the garden cleaning period.

⁶This was found in villages of Gunungkidul Regency (see Pambudi 2015) and Surabaya Municipality (see Tyas Arum Sari Dewi and Rahaju 2015).

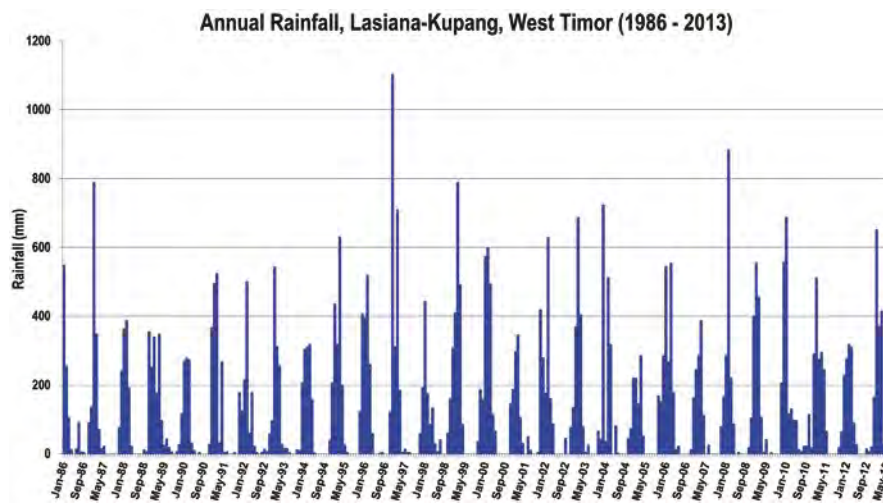


Fig. 19.6 Annual Rainfall in Kupang, West Timor. Source: Fieldwork, secondary data, Lasiana Kupang Climatological Station

On the contrary, during the rainy season, there is a decreased incidence of rain but an increased intensity of rainfall where big drops of rain fall with more force on the soil surface and increase the surface run-off (Fanggidae and Ratumakin 2014), thus resulting in loss of yields and crop failures.

The three communities under study also experienced a reduction in food production, and thus now need more cash to buy food from outside sources. Animals that are mainly sold to fund child registration to school or university intake or a family emergency are now being sold in order to buy more food from the market. Similarly, the resources in the forest are now being sold to buy other foods. Some households were willing to try planting even with this climate disruption but many others were pessimistic whether they would have a positive and fruitful result.

The parents and elderly want to return to subsistence farming and make *kebun* [garden], but it might be the current daily needs [for cash] which have caused difficulties in allocating time and energy. If only there is enough energy, they might want to do both [subsistence farming and cash generating work], it all depends on how they can meet the daily needs. (Mama Yayu, Housewife, TTS Regency).

Households are gradually shifting to “cash” work, such as transmigrating short-term to work as labourers in the nearby town or migrating overseas. For those close to the coastline and beaches time can be spent in an alternate livelihood collecting *batu warna* (beach pebbles), earning approximately Rp 8000–Rp 30,000 per bag⁷ (equivalent to approximately US\$ 0.80–US\$ 3.00).

The inability to secure stable food production has social and economic implications on these communities. Individual self-worth and self-esteem has been

⁷Each bag may weigh 20 kg to 50 kg, depending on the size of stones.

impacted. Economically, these peoples are now not only vulnerable to the impact of climate change, but also likely to be disadvantaged by the fluctuation of prices in the market, both as a supplier of low-skilled labour as well as a consumer who buys food from the market.

NTT Provincial government has committed to improve water resources infrastructure. Between 2014 and 2018, the regional development plan included the building of one dam, 27 large reservoirs for irrigation, 801 small farm reservoirs and 850 drilled wells (DPU NTT 2014). However, by conserving water in reservoirs, the role of these mega infrastructures tended to tackle drought issues on farmlands that require large supply of water, such as paddy productions. In fact, from 1986 to 2014, there have been over 530 reservoirs built in this region (BWS NTII 2016). Several initiatives funded by national government and International organisations have also addressed water scarcity related issues; Table 19.5 highlights three of the existing programs in NTT: Pamsimas (*Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat*), P3A (*Perkumpulan Petani Pemakai Air*), and SPARC. Each initiative has delivered considerable amounts of outputs that are community-based, including provision of drinking water, construction of sanitation facilities, irrigation systems, and climate risk information system. However, many of infrastructures and systems which have been built as part of Pamsimas and P3A programs, have not functioned optimally, some are even left stalled, due to mismanagement and conflicts among local people (Ratumakin et al. 2016). There are a number of sustainability challenges, in which this study identified:

- Lack of awareness of the need of post-program infrastructure maintenance.
- Lack of effectiveness in post-program management, including limited sanctions against violators of rules and agreements, and no viable mechanism to resolve conflicts and grievances of communities.
- Lack of awareness of the need to protect all water sources.

In contrast to sustainable management of water sources in West Timor shown in Table 19.2, the above-highlighted three programs have overlooked the need for clearly defined boundaries of water resources, which can be problematic as water users do not know which are of watershed they should protect and maintain. Also, the two local context principles are commonly missing in implementation of Pamsimas and P3A. The adoption of Adat structure and acknowledgement of history of local water discoverer are essential for establishment of emotional bonding between users and water sources, enforcing the moral duty of individual users to protect water sources.⁸

⁸P3A group in Noelbaki village, Kupang Regency is well-known for its best irrigation model in NTT. The group acknowledged the Oematan family as descendant of the water discoverer and adopted local Adat structure in monitoring, control and protection of watershed and source water (Ratumakin et al. 2016).

Table 19.5 Initiatives and strategies to address issues of drought, low rainfall and climate change

Initiatives/ strategies	PAMSIMAS Community-based water supply and sanitation program	P3A Water User Farmer Association	SPARC in NTT Strategic Planning and Action to strengthen climate resilience of Rural Communities in NTT
Program year, implementing partners, and management	<p>Nationwide 2008–2012: Phase I 2013–2016: Phase II Implementing partners:</p> <ul style="list-style-type: none"> – Ministry of Public Works – Ministry of Health – Ministry of Home Affairs <p>PAMSIMAS is managed by an independent body BPSPAMS, comprises:</p> <ul style="list-style-type: none"> – Chairman – Secretary – Treasurer – Various sections (technical, health, etc.) – Members <p>Village head and religious leaders acting as protectors and advisors of program</p>	<p>Nationwide Since 1984 (Presidential Instruction No. 2/1984) Current status is regulated in the Government Decree No. 20/2006 P3A development is supported by agencies under:</p> <ul style="list-style-type: none"> – Ministry of Public Works, – Ministry of Agriculture <p>P3A is managed by a group of farmers, comprises:</p> <ul style="list-style-type: none"> – Members meeting – Chairman and vice chairman – Secretary – Treasurer – Production input section – Technical executor – Business section – Block leaders and members 	<p>NTT: East Sumba, Manggarai and Sabu Raijua Feb 2013–Dec 2016 Implementing partners:</p> <ul style="list-style-type: none"> – Ministry of Environment (MoE) – Bappeda NTT (NTT Provincial Development Planning Agency) <p>Key stakeholders consulted include:</p> <ul style="list-style-type: none"> – UN SDGs, National level: Ministries of Environment, Agriculture, Public Works, Bappenas (National Development and Planning Agency), BMKG (Meteorological, Climatological and Geophysical Agency), BNPB (National Board for Disaster Management), National Climate Change Council – Development partners: World Food Programme, FAO, and AusAID – Local level: Bappeda, government agencies – Private sectors: bank, academics, agribusiness, local NGOs and civil society organisations

(continued)

Table 19.5 (continued)

Initiatives/ strategies	PAMSIMAS Community-based water supply and sanitation program	P3A Water User Farmer Association	SPARC in NTT Strategic Planning and Action to strengthen climate resilience of Rural Communities in NTT
Major funding source	World Bank, Government of Indonesia, and Government of Australia. Local communities raise funds to finance the maintenance of water facilities	Local government funded the construction of capturing and irrigation infrastructure (sharing between provincial and regency governments based on area coverage). Individual groups raise funds to finance the maintenance, including irrigation system, building and networks among users	UNDP (United Nations Development Programme), SCCF (the Special Climate Change Fund, operated by the Global Environmental Facility), and NTT Provincial Government
Objectives	To increase the number of low-income rural and peri-urban populations accessing safer water and improved sanitation facilities, and enhanced hygiene behaviour	To accommodate water-related problems and assist farmers' needs for irrigation, agribusiness and marketing	To develop climate resilient institutions and strengthen rural communities' livelihoods, food and water security in anticipation of the impacts of climate change
Outputs in NTT	Between 2008 and 2015, construction of Pamsimas drinking water and sanitation facilities reached 819 villages across 19 regencies and 1 city of NTT	<ul style="list-style-type: none"> – 27 large reservoirs for irrigation – 611 farmer associations (P3A): <ul style="list-style-type: none"> – 71 well developed – 174 developing – 366 undeveloped 	Expected outputs include: <ul style="list-style-type: none"> – Developing a community-based climate risk information system (covering 120 communities) – Supporting 40 communities to switch from subsistence farming to more flexible practices – Assisting 40 communities to diversify income sources to be less sensitive to climate change – Improving water resources infrastructure and management in 40 communities to anticipate changes in rainfall patterns

Sustainability challenges	<p>Performance of Pamsimas in NTT is still below the national average, and many of the water and sanitation facilities are now not functioning due to several issues:</p> <ul style="list-style-type: none"> – Lack of awareness of the need of post-program maintenance. Almost 50% of coverage regencies did not raise funds to finance the maintenance of the facilities – The host (water source owner) initially agreed to the construction of water facilities, but then expects compensation (monthly payment from users), otherwise forbids people from using the water – Lack of effectiveness in BSPAMS in post-program period, especially resolving conflicts and grievances of communities regarding the costs and benefits of program – Lack of community participation and transparency in reporting 	<p>In NTT, 60% of the 611 farmer associations are undeveloped and damages to irrigation infrastructure have been left unattended. Several local issues include:</p> <ul style="list-style-type: none"> – Lack of firm sanctions and conflict resolution mechanisms in the P3A when users violate rules or agreements – Lack of awareness of the need of source water and watershed protection – Lack of capacity and human resources in the management of farmer associations 	<p>Program evaluation and monitoring results are not yet published, but several risks may potentially impede program implementation and undermine the objectives to counter effects of climate change on rural communities, for examples:</p> <ul style="list-style-type: none"> – Regional governments (province or regency) fail to allocate funding due to competing interests – Ineffective coordination among various agencies and inconsistency in reporting as the program involves large number of government and non-governmental institutions – Bureaucratic processes or red tape
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Source: Pamsimas (2017); UNDP (2017); Ratumakin et al. (2016); World Bank (2015b)

19.10 Concluding Remarks: Solutions to Food Security

So, *Why is local knowledge and values important?*

This chapter provided a snapshot of food security system in *AtoinMeto*, a subsistence community in semi-arid West Timor, and identified that local food production system is sustainable as a result of the local effective clan regime and the emotionally bonded moral values in attaining food sovereignty in disadvantaged rural areas.

Subsistence living is not all about living standards, backwardness and traditions that inhibit development. In the context of disadvantaged areas such as the semi-arid rural West Timor, the collective conscience to live a subsistence way of life allows the limited resources to regenerate and replenish; so the members and importantly children of these communities can continue a sustainable livelihood in the region. In the three communities under study, the clan customary laws and individual values effectively keep this collective conscience intact and govern the use of natural resources within ancestral territories. In this regard, International Organisations and the national governments in the development process must consider this important point and how it applies to local communities.

From the above discussions, it shows that *AtoinMeto* People have a well-established food system that has given them the sovereignty in securing and sustaining food needs for many generations. However, the weaknesses are in the utilisation of the produce i.e. their diets which lack nutrition and their produce that lack market value. Increasing climate anomalies have impacted on the local production. The loss of yields and also crop failures are not merely due to longer droughts and poor rainfall, but also due to the high intensity of the rainfall, over shorter periods of time, during the farmers' sowing period.

The government's programs and infrastructure developments have focused more on giving food and water to the people and their farms. While missing out the fact that food sovereignty has been well established at the community level, government interventions can potentially harm the unique local knowledge for the problem-solving. In the era of global warming induced climate change, without a proper solution to sustain their food security, communities are likely to become increasingly dependent on government and market, and more farmers and young adults will migrate out of the village to find a paid job opportunity such as working as migrant workers to sustain their livelihoods.

Based on these issues identified by this study, this chapter suggests that the local knowledge and values in *AtoinMeto* remain as the foundation of their food system. Three solutions are proposed to improve the utilisation of local produces and to support this community in adaptation to climate change (Fig. 19.7). These solutions are to be implemented as collaborations between technology and local knowledge, through partnerships between the community and actors from multiple agencies, professions and joint expertise, in the following areas:

1. Innovation of the appropriate technology to tackle local issues of climate anomalies (drought, low incidence of rainfall and high intensity of rainfall) during the

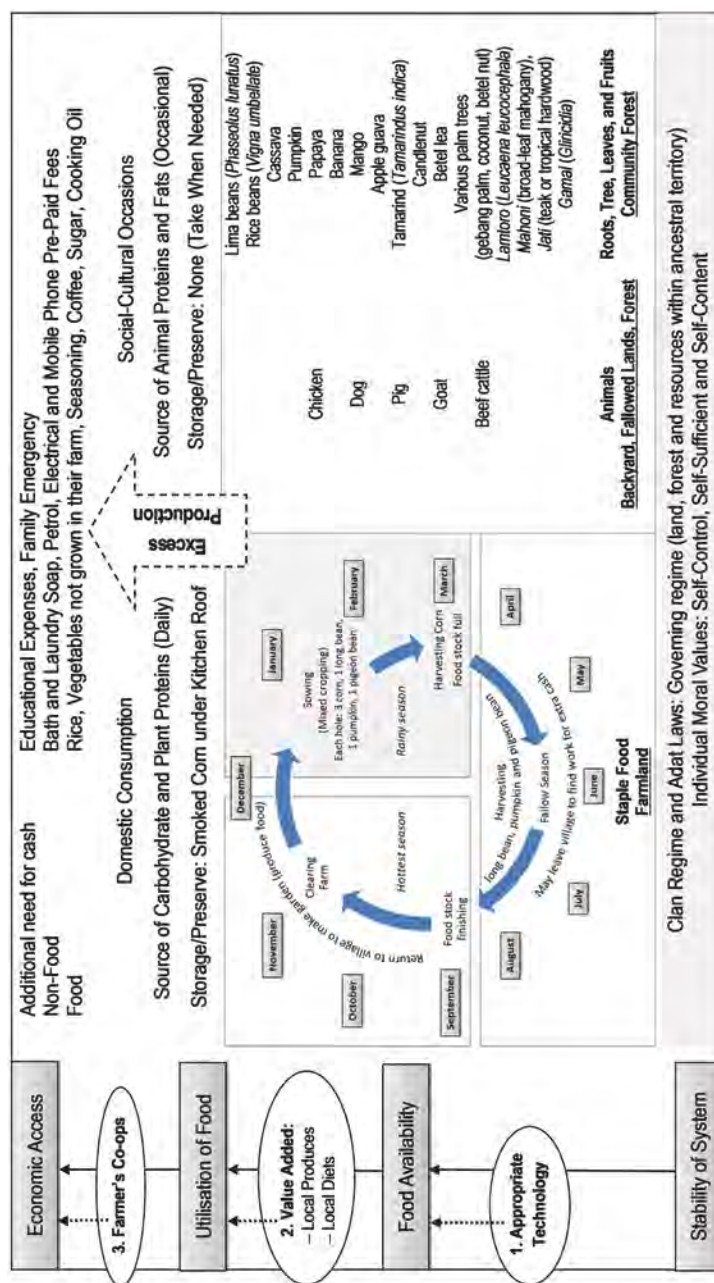


Fig. 19.7 Grounded solutions to food security in AtoinMeto, West Timor

sowing period, adapting to these conditions so the people can continue to perform subsistence farming and be self-sufficient.

2. Enhancement of knowledge in the utilisation of local produce by involving the people to develop local nutritious diets from their farm and forest products, so communities learn to prepare more nutritious diets for their family and create value-adding to local produces.
3. Revitalisation of farmers' cooperatives (Co-ops) to organise gatherings and the sale of excess production to larger markets in other towns and cities, improving the bargaining power of the farmers, generating community's fund through farmers' Co-ops, so individual members can have access to fund when needed.

The paper is explained in the video titled "Subsistence community in West Timor".

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