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**Local food security and principle of organic farming (from farm to fork) in context of food culture in Indonesia:
Minangkabau`s case study**

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List of abbreviations and acronyms

ASL	: Above Sea Level
BPS	: Badan Pusat Statistik (central burro of statistic)
CIA	: Central Intelligence Agency
FEA	: Field Extension Agriculture
FWI/GWF	: Forest Watches Indonesia / Global Forest Watch
H.A	: Hypothesis A
H.B	: Hypothesis B
H.C	: Hypothesis C
H.D	: Hypothesis D
H.E	: Hypothesis E
H.F	: Hypothesis F
IK	: Indigenous Knowledge or Traditional Knowledge
IFOAM	: International Federation of Organic Agriculture Movement
KAN	: Kerapatan Adat Nagari (customary chamber)
Mt	: Mount
<i>Marantau</i>	: Voluntary migration
NGO	: Non Government Organization
NPLM	: Nagari Padang Laweh Malalo
NPS	: Nagari Pandai Sikek
NAB	: Nagari Aia Batumbuak
NU	: Nagari Ulakan
PTPN IV	: PT. Perkebunan Nusantara IV (National Plantation IV Ltd.)
PTS	: Padi Tanam Sabatang (rice intensification programme)
TFS	: Traditional Farming System
TVRI	: Televisi Republik Indonesia (Governmental Broadcaster)
OF	: Organic Farming
<i>Ojek</i>	: Public transportation (motorcycle)
<i>Rantau</i>	: Destination of <i>marantau</i>
<i>Tempeh</i>	: Fermented soya bean
US\$: United Stated Dollar (US\$1 = Rp. 9000)

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Chapter 1: Introduction

This dissertation is based on current issues about food security, biodiversity and traditional knowledge. Policy is important in order to protect biodiversity and ensure food security. In situ protection in biodiversity is inseparable from local and traditional knowledge of the people. On this note, the first chapter starts with a statement of the problem to provide background about the study.

1.1 Statement of the problem

Indonesia is one of the most bio-diverse countries in the world. It is home to 6% of the world's amphibian species, 7 % of its reptile species, 10% of mammals and 16% of bird species (FWI/GWF, 2002). It ranks first in the world for variety of terrestrial mammals (515 species) and breeding birds (929 species), third for reptiles (745 species) and ninth for amphibians (278 species) (Natus 2005, p.1). Furthermore, the record of Plant Resource of South-East Asia (PROSEA) revealed that Indonesia has at least 522 unique plant species, and there is still an enormous number of plants left undocumented (Kehati, 2008).

Indonesia also has a diverse population. Figures by the Central Intelligence Agency World Fact Book (2008) revealed that Indonesia has more than 237.5 million inhabitants. With over 300 distinct ethnicities including 40.6 % Javanese, 15 % Sundanese, 3.3 % Madurase, 2.7 % Minangkabaus, 2.4 % Betawi, 2.4 % Bugis, 2 % Banten, 1.7 % Banjar, and 29.9 % other or unspecified.

The agro-biodiversity of Indonesia does not automatically ensure food security. First of all, the diversity of species is endangered due to deforestation, land clearing, farm extensions, monoculture, etc. Secondly, indigenous knowledge in cultivation of land is also deteriorating, due to migration, globalization, and genetic erosion.

The diversity in ethnicity, species and topography has become the basis of Indonesian traditional farming for hundreds of years. According to Altieri (2001, p.109) traditional farming systems are based on bio-diversity where genetic diversity is a key component to manage risk and reliance on agro-chemicals. One of the most important features of traditional farming systems is their high degree of biodiversity (Altieri 2003, p. 350) which will also contribute to preventing the erosion of genetic resources. Moreover, a farming system provides a lifestyle that binds a household together and subsequently leads to passing of family heritages to future generations through inheritance of the farm (Edward 1993, p.102). On the other hand, the national policy tries to increase annual agricultural production to support the national food security by means of

agricultural industrialisation which leads to deforestation by opening new lands in several places (FWI/GWF, 2002), putting local diversity under potential erosion, depletion and degradation.

According to Brown (2007, p.13) one of the indicators in managing genetic diversity in situ is protection of traditional knowledge. Furthermore, he explains that genetic diversity is important in providing adaptation to environmental changes and extremes and providing the natural variation for the future. Biodiversity is one of the requirements to enrich the nutritional intake at the household level in order to increase food security.

Indigenous knowledge is a product of the adaptation of farming practices to the local environment, creating unique indigenous farming practices and food culture. Indigenous food cultures in Indonesia are usually rich in biodiversity, creating a demand for bio-diverse agricultural products. Therefore, if the demand for these food cultures can be sustained, the agricultural biodiversity can also be preserved for generations to come, subsequently supporting food security.

Plant diversity is essential to human health. Plants provide both nutrients and medical agents, form the component of robust ecosystem, and contribute to socio-cultural well-being (Johns 2007, p. 382). Traditional value and scientific conceptions concur in the necessity of dietary diversity for health. Conservation of biodiversity and the knowledge of its use, therefore, preserve the adaptive lessons of the past and provide the necessary resources for the present and future health. Although the link between agro-biodiversity, dietary diversity, and health appear in logical principle, the empirical data on validity of a food-based approach to health need to convince decision makers.

To meet the demands of development – cost-effective, time-effective, generating relevant insight, readily intelligible to non-expert – the formulation strategies must be created before hand (Sillitoe 2004, p. 2). There are two policy schemes in order to establish food security in Indonesia (see Figure 1): First of all, the national policy is focused on production and distribution of food; secondly, local policy is focused consumption and household nutrition.

Figure 1 shows that demand in household levels basically depends on the indigenous knowledge of producing, choosing and preparing the food. In a broad sense, culture is the predominant factor in biodiversity management from farm to fork.

The Minangkabaus¹ is an excellent example that illustrates the practicality of organic farming principles based on local indigenous knowledge, while managing biodiversity and natural

¹Minangkabau's is fourth largest ethnics in Indonesia

resources. As one of the biggest matrilineal² clans, the Minangkabaus, the mother plays a role from production until preserving the food. The interesting motivation of the Minangkabau`s is they maintain their farmland in unique way to achieve food security for themselves. For example, in comparison to other Southeast Asian, the Minangkabau`s kinship system does not require women to leave their relatives when they marry; women inherit land and women an active role in food production all for their families (Van Esterik, 2008).

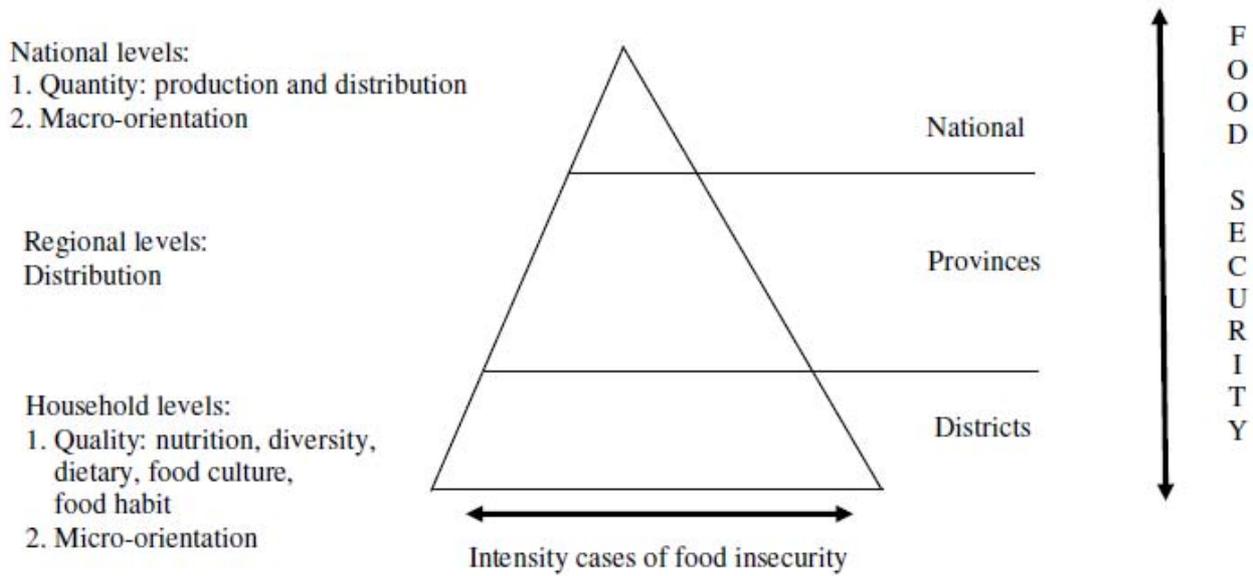


Figure 1: Food security in Indonesia

Generally, in Indonesia, women`s culturally described role (*ibu*) has allowed them to extend acting as *ibu* also beyond the parent-child relationship and the domestic domain. Although *ibu* is translated as ‘mother’, it is, in general, a respectful term for addresses adult women, including those who do not have children or are not even married. The phenomenon whereby it is culturally and socially acceptable for women to use the *ibu*-role to make decisions and claim authority and control, also in matters beyond the domestic context, is referred to as *ibuism* (Niehof 2010, p. 28).

Therefore, it is very necessary to know the role of traditional farming and food culture in Minangkabau`s society to support food security. According to Carol et al (1988), who conducted research on Minangkabau`s, the conclusion was that still a lot of aspects can be elaborated on concerning indigenous knowledge in agriculture systems in Minangkabau`s based on the local agro-socio-cultural situation. Indigenous knowledge is important because ‘when a knowledgeable old person dies, a whole library disappears’ an old African proverb says (Grenier 1998, p.1).

²Matrilineal system is a line of descent based on a female ancestor

On global environments and development programmes, the World Commission on Environment and Development (WCED, 1987) suggested that development strategy should involve working, learning and experimenting together at local, regional, national and international levels. The predominant focus is on local level and what indigenous knowledge can contribute to a local sustainable-development strategy, potential, experiences, and wisdom.

From this point of view, it is expected that through the indigenous knowledge, organic farming principle and food culture could raise food security and establish existences of agro-biodiversity.

Agro-biodiversity → Traditional farming*) → Food culture*) → local food security: *in order to establish existences of agro-biodiversity and food security, demand through traditional farming and food culture (farm to fork) should be re-developed.*

*) involves indigenous knowledge (in this study, indigenous knowledge is linked to matrilineal role)

This study aims to expose the factors as basic knowledge and give close insight before establishing community-based planning mechanism. This is an important part to avoid counterproductive policy.

1.2 Research assumption

The roles and behaviour is assumed to be an expression of the culture. In this study, each behaviour and community behaviour is assumed to be a part of evidence and wisdom of the people. It can be one possibility to analyse the indigenous knowledge of people and, furthermore, to get new ideas for the local policy.

1.3 Research hypotheses

Hypothesis A: The indigenous knowledge still plays an important role in traditional farming in Minangkabau`s, thus supporting local food security.

Hypothesis B: The indigenous knowledge still plays a role in food culture in Minangkabau`s where it is linked to matrilineal roles and leads to healthy nutrition.

Hypothesis C: *Marantau*³ plays a role in traditional farming and food culture in Minangkabau`s.

Hypothesis D: The local government plays a role in changing traditional farming systems and food culture.

³ Voluntary migration

Hypothesis E: Education and gender play a role in changing traditional farming systems and food culture.

Hypothesis F: The Mass media is influencing traditional farming systems and food culture in Minangkabau`s.

1.4 Research contribution

This research will contribute to food security policy regarding the indigenous knowledge of the Minangkabau`s. Also, this research will give some current results about food security and food culture in Minangkabau`s (West Sumatra). In addition, the results can be used for designing a programme in Minangkabau`s food security to respond effectively to current problems and the future challenges in society and environment.

1.5 Outline of the dissertation

This Dissertation is divided into nine chapters.

Chapter one, introduction, comprised of a statement of the problem, research assumptions, hypothesis, research contribution and outline of the dissertation.

Chapter two, literature framework is comprised of Minangkabau history, principle of organic farming in Minangkabau`s, food security in Minangkabau`s, food and culture in Minangkabau`s, *marantau*, *nagari*, contexts of food between nature and culture, mass media and current local government policy.

Chapter three, methodology is comprised of research site, data collections, qualitative data collection, quantitative data collection, research materials and resources, sampling techniques, error strategies, data analysis, analysis of qualitative data, and analysis of quantitative data.

Chapters four through nine are the results of the research.

Chapter four describes *Nagari Ulakan* for a coastal site.

Chapter five describes *Nagari Aia Batumbuak* for a hilly area

Chapter six describes *Nagari Padang Laweh Malalo* for a lake site.

Chapter seven describes *Nagari Pandai Sikek* for hilly site.

Chapter eight discusses the results of the four sites

Chapter nine gives the conclusions

Followed by a **Summary (Zusammenfassung)**

Chapter 2: Literature frameworks

This second chapter is presents literature framework of Minangkabau`s history, organic farming in Minangkabau`s, food security, food and culture in Minangkabau`s, *marantau* (*voluntary migration*), *nagari*⁴, food in context to culture and nature, mass media and current local policy. These topics are related to activities of the local people whereas the wisdom practiced daily.

2.1 Minangkabau`s history

Not much information remains about the ancient Minangkabau`s. In general, the evidence of the history is still in doubt. There are not many adequate manuscripts or monographs that give information about the ancient Minangkabau`s. Based on the story telling, *tambo*⁵, the ancestor of Minangkabau`s starts from the story of two brothers, *Parpatiah nan sabatang* and *Tumanggungan*. They were one of the other 40 passengers in Noah`s arch. They landed in Palembang⁶ or a small island close to it, which is called *Langkapura*. From there, they continued the journey to the hill which is called *Siguntang-guntang* which is later called *Pariangan*. There is no strong argument or evidence to support this story.

⁴ The lowest independent state in West Sumatera

⁵ Story about the ancestor and is passing orally

⁶ Now day is capital city of South Sumatera

The time line history can be seen in table 1 below:

Table 1: Timeline of history

ca. 10,000 B.C	Hunter-gatheres in Southeast Asia subsist on roots, wild plants, hunting wild animals, and fishing in fresh and salt water. People use a cultural complex of stone tools.
ca. 3000 B.C	The beginnings of plant and animal domestication in Southeast Asia include domestication of rice, pigs, dogs, and chickens. Archaeological sites from the period show evidence of pottery and metallurgy, including bronze.
ca. 500 B.C	Widespread evidence of wet-rice farming using water buffalo and iron implement.
ca. 100 B.C	Dodgson ritual complex widespread in region included large bronze drum.
400	The first Kingdom in Indonesia : <i>Kutai Kertanegara</i> (Hinduism)
640	The first Buddha's kingdom : <i>Kalinga</i> Empire
800	The first kingdom in Sumatra : <i>Sriwijaya</i> Empire
1293 -1520	The biggest empire : <i>Majapahit</i> Empire (conquer Siam, Malacca, and Cambodia)
1347- 1833	<i>Pagaruyung</i> empire recognized as kingdom of Minangkabau`s
1833	<i>Padri</i> War in Minangkabau`s, end of <i>Pagaruyung</i> kingdom
1945	Independent of Indonesian from colonialism the Netherlands and Japan
1997	The financial collapse of Southeast Asia
1998	National reform in Indonesia: the turn-over for autonomy of local government
2004	A tsunami killing 270.000 and displacing many more

Sources: Food culture in Southeast Asia (Van esterik, 2008) & History of Sumatera (Marsden, 1966)

Adityawarman is recognized as the founder of *Pagaruyung* kingdom. The only evident is in *Batusangkar* epigraph. In this epigraph he proclaims that he is the king of the *Malayapura*. He is a

son of *Adwayawarman*, which is stated in *kuburajo* epigraph and son from *Dara Jingga*, princess of *Darmasraya* Kingdom. He is also a colleague of *Gajah Mada* (*Majapahit* chief of army) and conquers *Palembang* and *Bali*.

Interestingly, *Saruaso* epigraph written in the Malayan language explains that *Adityawarman* built a canal for watering *Nandana sri surawasa* garden which is always rich of Paddy. This garden was made by his uncle (*mamak*) *Akrarendrawarman*, based on Minangkabau's culture, he (*kemanakan*) owns this garden.

In the beginning, *Adityawarman* duty is to conquer strategic places in Sumatera i.e Kuntu, Kampar where rich of paper and chilli and his duty as *raja bawahan* (lower king) is *Majapahit*. But there is no evidence which explains the relationship between *Pagaruyung* and Java.

Minangkabau means "winner buffalo" which consists of two words; *Minang* (win) and *Kabau* (Buffalo). Reputedly, once upon a time *Majapahit* (most sources said) came from the sea and wanted to conquer west coast of Sumatera. To avoid the battle, the ancient Minangkabau's initiated to make buffalo fighter and the outsiders agreed to join the competition. The outsiders had big aggressive buffalos and ancient Minangkabau's chose a hungry baby buffalo equipped with an iron horn. In battle, the baby buffalo thought that the big buffalo was its mother and tried to get milk. The baby buffalo gored the big buffalo and ripped the stomach of it. Ancient Minangkabau's won the battle and named their community by Minangkabau (Winner buffalo). In *Majapahit* history, *negarakertagama* (1365) mentioned that *Minangkabwa* was one Malayan Kingdom.

Minangkabau's culture is matrilineal. Women are responsible to pass down their clan and inheritances. Based on *tambo*, customary laws were announced by brotherhood with different father, *Datuk Perpatih Nan Sabatang* and *Datuak Katumanggungan*. *Datuak Perpatih Nan Sabatang* passes down *Bodi Chanigo* which has democratic ideology and *Datuak Katumanggungan* passes down *Koto Piliang* which has aristocratic ideology. There are not many adequate manuscripts or monographs to give information about when the matrilineal system in Minangkabau started. But one of the reasons to keep the inheritance as the woman's role is to avoid the conflict between the brothers who hereditarily have different fathers. If there is a different opinion, the consensus is used to solve the problems (*musyawarah mufakat*).

2.2 Principle of organic farming in Minangkabau`s

Based on International Federation of Organic Agriculture Movements (2005, p. 4) there are four principles for organic farming which are: health, ecology, fairness and care. The principle of organic farming is binding each others. The principles cover:

1. Health covers all kinds of aspects; soil, plant, animal, human and planet. The issues are not simply the absence of illness but to maintain the physical, mental, social and ecological well-being.
2. Ecology covers protection of landscape, climate, habitats, biodiversity, air and water. The issues are not only the protection, but also the sustainability in the future.
3. Fairness covers equity, respect, justice and stewardship of sharing of the world. The issue is not only for human beings, but for all living things.
4. Care covers technology, science, wisdom and traditional, experiences, and indigenous knowledge offer valid solutions, tested by the time.

Since a long time ago, Minangkabau`s is predominantly an agricultural area with subsistence crop like rice (*Oryza sativa*), is traditionally grown. Rice is cultivated on *sawah* (irrigated field) and *ladang* (dry field). The quality of the fields differs widely, but in some areas two harvests per year are possible, and in many areas people can harvest three times in two years.

Traditional farming systems in Minangkabau`s differ depending on the landscape and the local society with differs of wisdom, too. *Tigo tungku sajarangan* or *tigo tali sapilin*, are the main components giving advice to local policy makers. They are *penghulu*, *alim Ulama* and *cadiak pandai*. This advice will be given to *wali nagari* to be implemented.

All the local policy is actually made from the characteristics of the land itself. The flexibility to make such policy also creates heated discussions and is normally taken through *musyawarah mufakat* (consensus). After getting the final conclusion, the execution is lead by *wali nagari*.

Farming systems could not be separated from many aspects. The first aspect is soil. The soil differs greatly, according to Institute Soil Research in Bogor, West Sumatera (Minangkabau`s) soil is (Indonesian National Portal, 2009; Suparto, J. Tajin, T.Budiono, E.Husen, N. Prasodjo and U. Suryana, 1990):

1. *Podsolik* yellow red extensively 1.228.783 Ha or 29.05 % from the total area of West Sumatra.
2. *Latosol* extensively 893.117 Ha (21.11%) and widespread in *South Pesisir, West Pasaman, South Solok, Padang Pariaman, Limapuluh Kota, Sawahlunto/Sijunjung* and *Dharmasraya*.
3. *Regosol* is widespread in *West Pasaman, Padang Pariaman, Agam* and *Padang* with a total

area of 23.734 Ha (0.56%).

4. *Andosol* is widespread in *Sawahlunto Sijunjung, Dharmasraya, Tanah Datar, Solok, South Solok, South Pesisir and West Pasaman* with a total area of 37.426 Ha (0.88 %).
5. *Alluvial soil* is widespread in *south Pesisir, Solok, South Solok, West Pasaman, Limapuluh Kota and Padang* with a total of 170.149 Ha (4.02 %).
6. *Litosol and Regosol* widespread in *Agam, West Pasaman, Solok and Padang Pariaman* with a total area of 47.360 Ha (1.12 %).
7. The others types of soil are *Latosol and Andosol* with a total area of 26.889 Ha (0.64 %), *Andosol and Regosol* with a total area of 67.929 Ha (1.61 %), *Regosol and Latosol* with a total area of 18.944 Ha (0.54 %).
8. *Organosol* widespread in *Pasaman Barat, Pasaman, Agam, Padang Pariaman and Pesisir Selatan* with a total area of 346.704 Ha or 8.20 % from the total area of West Sumatra.
9. *Podsolik* widespread in *Limapuluh Kota, Pasaman, Sawahlunto Sijunjung, Dharmasraya and Tanah Datar* as 1.542.939 Ha (36.48); consist of *Podsolik red* 1.228.783 Ha and *Podsolik yellow* 1.228.783 Ha and *Podsolik brown* 314.156 Ha.

Moreover, the topographies are considered as a factor that influences the traditional farming system. West Sumatra was divided into 3 (three) different topographies;

1. Plain, in the coastal of west Sumatera, 0 until 50 meters ASL, comprises of *West Pasaman, Padang Pariaman, Pariaman, South Pesisir, Mentawai Island and Padang*.
2. Surge, with 50 – 100 meters ASL, is in the middle of *West Sumatra* comprises; *Solok, Tanah Datar, Padang Panjang, Agam and West Pasaman*.
3. Hilly, in the east of west Sumatera is 100 – 500 meters ASL comprise area: *Sawahlunto, Sawahlunto Sijunjung, Dharmasraya, Bukittinggi, Limapuluh Kota and Tanah Datar, part of Agam, part of Pasaman, South Solok*.

The average temperature on west coast of West Sumatera is between 21°C - 38°C, in the hilly area 15°C –34°C and east of the *Barisan* Mountains between 19°C - 34°C. Drought season occurs in April-August and monsoon season in March-December. The coastal area rains almost occur for the whole year.

Every year in West Sumatera monsoons occur two times with peaks in March and December. The lowest precipitations are in June and July. The maximum averages of precipitation reach 4000mm per year, especially on the west coast and east of West Sumatera; the minimum average of precipitation is around 1500- 2000mm/ year.

Diversity in soil and climate may lead to the diversity in cultivation. The crops are grown also diversely from one site to the other. In cultivating the land (farm stages), the Minangkabau`s still maintain the land based on their customary law (*adat*). The principles of *adat* in cultivation of land are stated in Minangkabau`s *adat* maxim as follows:

Aienyo bulieh diminum Its water may be drunk
Buahnyo bulieh dimakan Its fruit (may) be eaten
Batangnyo tatap tingga But its stem remains forever.

(Carol Davis 2007, p. 75)

This maxim suggests that ancestral land can be owned by an individual, but the land must be passed down from generation to generation (and, therefore, belongs to and collectively controlled by the lineage). The stem remains forever means the seeds and the land must be protected. It shows sustainable of crops or plants.

One example of a traditional farming approach is that, in some places the irrigation system is managed by the *adat*. One person is chosen as *kapalo banda*⁷ to manage the system. The land will be watered at night from 6 pm until 6 am in the morning; people are not allowed to see the water flow. There is a punishment if somebody tries to break the rule. Minangkabau`s has unique places to store their grain and rice stock (store stages). The buildings are built according to the purpose. Sometimes, they also dry or preserve the food to maintain the quality and edibility in situations such as drought season. In food preservation (fork stage), the other proverb symbolises the kinship playing a role:

Nasi samo ditanak karak samo dimakan As the Rice is cooked so the *karak*⁸ is eaten

(Carol Davis 2007, p. 77)

This particular proverb symbolises the need of people to share the good times and to help each other in times of difficulty. The quantity and quality of food offered or shared reflects a common understanding of the closeness of various types of social relationships. An example,

⁷ *Kapalo banda* is someone who responsible for irrigation system

⁸ *Karak* is the crust of the rice left at the bottom of the pot, which is either discarded, scraped out and eaten as a snack, or consumed as part of the rice meal if the family has limited financial resource.

according to Davis (2007, p.79), is that close female kin⁹ (mother, sister, daughter) are only given a drink (usually of water or plain tea) if they specifically ask. However close male kin (such as brother in law) would be offered sweetened coffee (a more expensive drink) and they and their children would only eat occasionally (usually during religious festivals).

The importance of serving and receiving food and drinks (either as host or guest) is learned at an early age by Minangkabau's children. If there are young girls in the household, they are expected to serve the food; children are gently encouraged to leave a token amount of food or drink to be polite (when not in their own home). In sustainable nutrition and food, this proverb demonstrates a relationship between preserving food and the family members. Respecting the mother and her choice for the food is made by their family members. Furthermore, Davis (2007, p.73) explains, women play an important role in Minangkabau's, as primary holder of the usufruct rights to ancestral property. They manage the land and are the main producers of rice, the staple food.

In traditional societies, kinship identity, together with all the duties and rewards it entails, is defined through descent principle that roughly fall into either of two categories: patrilineal or matrilineal. In matrilineal cultures kin membership is traced through the uterine line, so that children belong to the mother's kinship (*matrikin*) and not to their father's. A man's heirs are thus his sister's children, not his own (La Ferrara 2006, p. 281).

In agricultural development strategies, agricultural scientists and planners designing rural development projects seem to feel uncomfortable peering inside the household to see who gets what and how decisions are made (Udry et al 1995, p. 408). After more than three decades of research, it is clear that men and women play different roles within particular system in agricultural production, and occupy different socioeconomic positions as a result of these different roles. Of particular concern is the fact that, by virtue of often farming different crops or the same crops for different reasons, men and women have different vulnerability to such thing as climate change and shift in global markets for the crops under production. Shifts can filter down through the household and other social units to impact the long term well being of affected communities and individuals (Carr 2008, p. 901). According Canagarajah et.al (2001, p. 406) women tend to work inside in the home where participation does not depart from social custom. Choosing policies for agricultural development requires the use of information about the existing role of the matrilineal system. Gender and education in Minangkabau's is needed to gives a positive contribution in both

⁹ Kin are all the people in the family

traditional farming systems and food culture.

2.3 Food security in Minangkabau`s

Since the Minangkabau`s are very concerned about their food security, according to Davis (2007, p.75), many Minangkabau`s (women and men) say that ancestral land is primarily used to produce rice, and if they have enough rice to eat, then their survival is assured. Those people who have no ancestral land indicated that they felt less secure.

Furthermore, the symbolism of food security is also shown (figure 2) in the part of *rumah gadang* (big house) of Minangkabau`s which is called *rangkiang* (storage building) and used for seed, paddy, and rice are sometimes also used for agricultural utensils. *Rangkiang* is also a symbol of the social status which is the reflected wealth of the owner. According to their functions, *rangkiang* divided into four categories which are; (1) *Sitinjau lauik* is used to store stock of paddy which that is used for purchase for household usage, (2) *Sibayau bayau* is used to store stock of paddy which that are used for daily consumption, (3) *Sitanguang lapa* is used to store stock of paddy which is used in the dry season, (4) *Rangkiang kaciak* is used to store seed for the next cultivation season.

For this purpose, the Minangkabau`s tend to prepare their food securely in the household. In most Minangkabau`s, women always preserve the food in household, but occasionally, men are also involved in preparing the food.



Figure 2: (left) Rumah Gadang, (right) Rangkiang

(Sources: own pictures, 2009)

2.4 Food and culture in Minangkabau`s

Before European colonisation, Chinese and Arab traders brought spices to the mainland, where they were influenced by many recipes, particularly Malaysian and Indonesian food dishes (Van Esterik 2008, p. 12). Geographically, Minangkabau`s is located on the west coast Sumatera, which was part of the silk road for various commodities such as gold, camphor, silk, resin, wax, honey, tar, sulphur, iron, cotton, rattan, rice, which were exchanged with textile from India and horses from West Java.

Nowadays, according to Lipoeto et. al. (2001, p.15), rice, fish, coconuts and chilli are the basic ingredients of Minangkabau`s meals (see table. 1). Meat, especially beef and chicken, is mainly prepared for special occasions; pork is not halal¹⁰. Because most of Minangkabau`s are Muslim, vegetables are consumed daily. Fruit is mainly seasonal, but specific fruit, such as bananas, papayas and oranges can be found year-round.

Chilli is the main spice used, where a ratio of 1:1 is the general rule of thumb, which means that a kilogram of chilli should be used for each kilogram of meat. Vast amounts of chilli are still used in many dishes, such as the famous *rendang*¹¹. Coconuts are the main ingredient in many sauces of meals. It is commonly used in milk form. The endosperm, or coconuts meat, are scared and mixed with water and filtered.



Figure 3: Spices normally being used in Minangkabau`s food
Source: own picture (2009)

The Minangkabau`s are justly famous for their cuisine, known as *nasi padang*¹² (*Padang* rice). The best known is the labour-intensive beef *rendang*, a mixture of beef, coconuts, ginger, and

¹⁰ Halal is Moslem roles reverse to something that allows to do or eat.

¹¹ *Rendang* is curry beef cooked until dried

¹² Various menu of Padang cuisine is called *nasi Padang*

spices slowly braised until it is almost dried; in this form, it is suitable for use while travelling.

On some occasions, Minangkabau`s women of the same lineage share a meal and take a gift of *katupek*¹³ (hulled rice) and cake to their husband`s relative and receive a meal and cooked rice and *samba*¹⁴ in return (Van esterik 2008, p. 104).

Table 2: The ingredients of daily Minangkabau`s meal

Carbohydrates	Proteins	Fatty and oils	Fruits and vegetables	Spices
Staple: Rice*	Animal: Beef* Egg* Fish* Chicken* Eel	Fat: Coconuts milk* Viscera Oils: Coconuts oil Palm oil*	Banana* Papaya* Water melon* Pineapple Seasonal fruit: Mangos Durian Rambutan (Naphelium lappaceum) Duku (Lansium domesticum) Salak (Salacca zalacca)	Asem (tamarind) Basil lemon (Ocimum bacilicum) Betel leaf (Piper betle L) Candlenut (Aleurites moluccanus) Cardamon (Cinnamomum burmanii) Celery (Apium graviolens) Chilli (capsicum annum spp.)* Cinnamon (Cinnamom verum) Clove (Syzygium aromaticum) Corianders seed (coriandrum sativum) Caraway (carum carvi) Garlic (Allium sativum L)* Ginger (Zingiber officinale) Galingale (Alpinia galangal) Ginger Plant (Z. Officinalis) Gula jawa Keluak (Pangium adule) Lemongrass (cymbopogon) Leek (Allium ampeloprasum var. prum (L.)) Nutmeg (Mrystica) Pandanus leaf (Pandanus) Peanut (Arachis hipongea) Pepper (Piperaceae)* Shallots (Allium cepa L) Star anise (Illicium verum) Terasi (Fermented fish sauces) Tumeric (Curcuma longa) Tumeric leaf Wild lime leaf
Snack: Potato Corn Sago Cassava White bread	Plant: Tofu Tempe Mung bean Sweet soya sauces		Vegetable: Tomato Egg plant Cucumber Spinach Cassava leaf* Jackfruit (Artocarpus heterophyllus)* Pakis (Edible fern)*	

*) The most consumed and uses

Lipeoto et al (2001, p. 10) explain that there have been no changes in west Sumatera in food preparation and there is a slight difference in taste preference between the young and the old generation, but there has been a dramatic shift in food preferences, which is reflected by the changing percentage of energy consumed over the past 15 years.

¹³ *Katupek* is a hulled rice with cooked and covered by coconuts leaf

¹⁴ Various of meals of *nasi padang* called *samba*

Table 3: Meal components and preparation methods: determinants of the breakfast pattern

Core items	Components secondary core	Peripheral diet	Preparation methods	Meal patterns
Carbohydrate: Rice	Banana Cassava Glutinous rice Mung bean Pumpkin	Noodle White bread	Boiled with or without coconuts or milk	I Rice Fish Samba-lado Vegetable Water
Protein: Fish Egg		Meat	Frying	II Lontong Vegetable Kerupuk Sweet tea
Vegetable: Cucumber Green leafy vegetable			Raw Boiled with coconuts milk	III Banana Glutinous rice Grated coconuts Sweet coffee
Beverage: Water Tea Coffee	Tea + raw egg Coffee + Milk	Chocolate + milk		

Source: Lipoeto, NI, et al (2001)

Table 4: Meal components and preparation methods: determinants of the lunch and dinner patterns

Core items	Components secondary core	Peripheral diet	Preparation methods	Meal patterns
Carbohydrate: Rice		Noodle	Boiled	I Rice Fish Vegetable Crackers water
Protein: Fish Egg	Tofu/Tempe	Chicken beef	Frying Boiled with coconuts milk	II Rice Chickens Vegetable
Vegetable: Green leafy vegetable Seasonal vegetable			Boiled with coconuts milk Stir frying	
Beverage: Water	Seasonal fruit	Sea wage Glutinous rice		Banana Sea wage Water
Fruit: Banana Papaya Dessert				

Source: Lipoeto, NI, et al (2001)

From tables 2 and 3, there are three meal patterns for breakfast and two meal patterns for dinner time. Boiling and frying is dominant preparation method in Minangkabau`s meal. In Minangkabau`s, women cook the meal everyday, while men prepare e.g. beef dishes for special occasions. Meals for breakfast, lunch and dinner are generally cooked once a day, normally in the

morning between 9 -12 am and, for the dinner, only rice is cooked.

2.5 *Marantau* (voluntary migration)

According to the studies of Naim (1974), some Indonesia ethnic groups have high instances of voluntary migration. Of these, four (the *Minangkabau*, *Batak*, *Menadonese* and *Ambonese*) have an urban type migration. The *Minangkabau*, particularly, have a trend of increasing intensity in migration. The important factors which facilitate their migration are their social custom of matrilineal heritage and their encouragement of young people to travel to gain experience, knowledge and material wealth, the so called *marantau* (Soemarwoto 1976, p. 247).

One of the indicators in managing genetic diversity in situ is the protection of the traditional knowledge. The genetic diversity is important for providing adaptation to environmental changes and extremes and providing the natural variation for the future (Brown 2007, p. 13). Biodiversity is one of the requirements to enrich the nutritional intake at the household level and establishing food culture. In order to pass along and maintain the traditional farming systems and food culture, the young generation is tended to go *marantau* and less of them choose to stay in their villages. This culture will strongly influence re-generation of the knowledge. People of the same lineage or sub-lineage migrated in search of new agricultural land with the intention of creating permanent settlements. As frontier for new settlements declined and a new economic opportunity arose, the pattern has changed to non-agricultural in occupational orientation. This activity is mainly carried out by individual males, and most probably directed to small urban centres. Over the years, an increasing number of woman have migrated, too, and one might assumed that this, together with the decrease in arranged marriages, might lead to loosening of consanguine ties and encouragement in the home village (Davis 2007, p 88).

In order to pass and maintain the indigenous knowledge and local wisdom, migration of the young generation is one of the most significant social challenges. *Marantau* is a part of custom; proverb explains how important *Marantau* is for the young generation:

Karatau madang dihulu, *Karatau*¹⁵ and *madang* (grown) far upstream,
Babuah babungo balun, No fruit, no flowers yet,
Marantau bujang dahulu, Go Merantau, young men, first,
Dirumah baguno alun. At home, no use yet.

(Tsuyosi Kato 1982, p. 118)

¹⁵*Karatau* is type of timber plant

In this proverb it is reflected that many of the young generation tend to migrate from their villages to the *rantau*¹⁶. In most cases, *parantau* (migrants) are active in many areas of the non-agriculture sector. Furthermore, Kato (1982) explains that in the beginning of the migration they are predominantly stimulated by population pressure and land shortage.

In a matrilineal system, a child is apart of his/her mother's family, not the father's family. A husband is "as" guest in the wife's family, it is also the same rule for the son within the father's family. Men in matrilineal system have no right to get inheritance from their family. Men only have rights to the land if they could buy it for themselves. Since buying land in Minangkabau's area is difficult (still much customary land), men tend to go *marantau* and buy a pieces of land there.

2.6 Nagari

The smallest social interaction in Minangkabau's culture is a clan, and the biggest social interaction is *nagari*. Therefore, customary law is applied in *nagari* area. The proverb said:

Lain padang lain ilalang Different field (grassland) may grow different grass

Lain lubuk lain ikannyo Different pool (pond) may grow different fish

Adat (custom) in Minangkabau's is only around *nagari's* area and became important between *nagari* and clan relationship. Based on *tambo*¹⁷ (de Rooy in Amir M.S, 2007), the First *nagari* in ancient Minangkabau's is *Pariangan* in *Padang Panjang* district. From this place, people migrate to all around the area and tried to make new settlements. The relationship between the old family and new family is harmonized by visit each other for occasional ceremonies. In the new place, they cultivated caught, and hunted fish for their daily lives. They chopped the trees as a symbol that this area belonged to them. This sign was juridical justification that the land belonged to them and they used that land as buffer land in case they need it. Slowly, the forests became a new settlement. However, the migrants admitted the first family as owners, therefore the new-comer tries tried to find new forest which does not belong to anyone. If there is no forest suitable for cultivation, the new-comer cultivates the land which is already established under the permission of the owner. At first, the neighbourhood has a close emotional relationship, but sometimes conflicts also emerge among them. Therefore, consideration of confederacy emerged, to collect the human

¹⁶ *Rantau* is destination of migration

¹⁷ Oral history of Minangkabau's

and natural resources together. This confederacy made them more powerful and brave to go downhill and build a new society in an area that had a lot of water available; it will become a new village called *koto*. Every family consistently works for its own land and also searches for the new land as an investment for the future. Slowly, those families approach the piedmont and valley that is fertile, which made it easier to cultivate their land. The livestock was also easier to feed. They know that land and soil are able to be cultivated again without losing the fertility. They start to cultivate rice fields. In this phase, they understand that water that flowed from the forest to their land is important for their land. Since then, they start to stay in that place permanently.

According to logical distribution of the people, the establishment of the first settlement was on the top of a hill or escapement of a mountain, this is reflected in the model of houses. At first, they lived as hunters and farmers. They lived in small houses called *dangau-dangau*¹⁸; this colony was called *banjar* or *kaful*¹⁹. Afterwards, many newcomers merged with local people; they started new neighbourhood, and become populous not only in numbers but also by clan. This second phase of the village is called *taratak*²⁰. *Taratak* can also be redefined as farm. The place where they live commonly is called as *Dusun*. *Dusun* normally consists of two clans. The descendent of the clan started to go downhill and establish the new settlement there. They lived close to the river or brook down in the wide flatlands. They started cultivation and established permanent houses; this colony was called *koto*²¹. They started to explore and search for new a place for settlements, which should be fertile and normally in the riverside, *Agam River*, *Batang Sinamar* and *Batang Ombilin*. They have established new colony which was more convenience safe, wide and comfortable. This was called *nagari*²².

Since then, in West Sumatera, the lower governance is *nagari*, but in 1979, authority of *nagari* was changed based on UU No 5 /1979 (Government regulation about the village's authority system). *Nagari* was divided into some villages (Chairiyah 2008, p. 106). In west Sumatera, the implementation of this regulation mislead where *jorong* became a village makes destruction of socio-cultural of *nagari*. This meant separation of authority and both custom and culture which were impossible in Minangkabau's society in West Sumatera in former times. Unity in culture was the foundation in the society and customary law, now, became village which was *jorong* and *jorong* its self was a small part of the integrity of *nagari*. Then in *jorong* there was no *kerapatan* in the

¹⁸ Simple house with four piles

¹⁹ Colony which is consist of one clan

²⁰ Colony which is consists of two clans

²¹ Colony which is consists of three clans.

²² Permanent colony where place on the top of the place around the riverside and has four different clans.

clan, the head of the clan, head of head of the clan, and *ninik mamak*²³. Informal foundation was very respectful in Minangkabau`s, and all those things is only respected in *nagari*.

Customs and all the apparatus that were already founded, likes *nagari* which was already established between custom and government, cannot be found in modern government including village authority. The foundation to achieve the power is not found in the modern village system, but in *nagari*. In different perspectives, the apparatus and mechanism of government, in village (*desa*) systems desires an implementation of UU No 5 TH 1979 but is not productive and lacks initiative. Appreciations of people of the custom and the culture itself become less and the regulation seems not care about the culture and the custom. *Kerapatan Adat Nagari* (KAN) (Customary law institution), with UU No 5 TH 1979 gave a good part in processing custom and *nagari* behaviour, through local regulation No 13 TH 1983; this becomes a foundation without competence in authority and government. KAN was replaced by other formal foundations. Therefore, the duty of *ninik mamak* is to moderate conflicts and make peace in *nagari*; that means changing the system of policemen, court and other governmental institutions. It is also the same case as a religious institution; they change by new modern institutions in many levels of the district until provinces. It is also *cadiak pandai* (intellectual person), as a part of apparatus in KAN. Their identification is not clearly stated like *ninik mamak* and *alim ulam* (religious person) – this is caused by the high number of educated person as civil servant and other private employment. The essence of the problem nowadays is the communication between the head of the clan and the head of the local government. Basically, there is no place for non-formal leaders to do their duty when their duty is taken by the local government, and if the people are reluctant to work with them, then, they are just ceremonial figures. These are the important issues before analysis of the indigenous knowledge, cultural and behaviour changes. The change of the custom structure has lead to the change of the local peoples' perspective.

2. 7 Context of food between nature and culture

Food plays an important role in developing culture. On the other hand, culture is a form of adaptation of people to their nature. Therefore, it is necessary to know the complete description of food in context between culture and nature. Comprehensive studies intended for looking which are good instruments for good policy.

What is food? According to an English dictionary (MacMillan 2002, p. 547) the meaning is

²³ Male relative of the mother and grandmother

the things that people or animals eat. In a broad sense, food means any nourishing substance that is eaten, drunk, or otherwise taken into the body to sustain, provide energy, promote growth, etc. What is nature? According to an English dictionary (MacMillan 2002, p. 944) the meaning is the physical world including all living things, as well as the lands and the seas. In a broad sense, nature is actually a part or product of the living things and the physical parts of the world.

Food is a 'real object' that all people can see and even touch. As a real object, food can be described by; physical, chemical and bio-chemical, etc properties. Therefore, food can be measured by the quantity, form, appearances, chemical components, and availability of microorganisms. Besides as a 'real object', food also has different ways to be described. This is because of food subjectively determined by human sense. Through this sensory ability humans are clustered differently based on their acceptances of food, what they like or what they do not like. According to Kolb & Wishaw (2009, p. 197) in fundamentals of human neuropsychology, the human sensory system is a part of the nervous system responsible for processing sensory analysis which commonly recognized as sensory systems are those for vision, hearing, somatic sensation (touch), taste, and olfaction (smell). Furthermore, the receptive fields, which are the specific part of the world to which a receptor organ or cells respond. For instance, the part of the world that an eye can see is its receptive field; the light each rod and cone can see is its receptive field. The receptive fields have been identified for the visual system, auditory system and *somatosensory* system, so far. Taste and smell refer to recognizing food; they perhaps have large of receptive fields, too. Up to today, vast amount of research is conducted about what humans can perceive through their tongues and noses. Until now, sweet, sour, bitter, salty, and MSG (umami) flavours are the components which can be perceived by human sensory receptors.

Eating is the process of ingesting food to provide a nutritional need through the human sensory systems. There are two main reasons why eating behaviour unconsciously generates differently responses. First, health is a reason. Healthy eating actually refers to choosing the types of foods that improve health and avoiding the types of foods that raise the risk for illnesses. Therefore, diet recommendations have been made according to ideal proportions of how much the daily intake for adults and even children should be. Dietary recommendations (dietary allowances) normally suggest some main nutritional information such as carbohydrates, protein, fat, minerals and vitamins, and mostly calorie intake. It is easily to find on the packaging of every 'modern' food. Men can measure and make evaluations for themselves about how much energy they will get and how they could control the calories intake themselves. Dietary recommendations are one of the food concepts. Men follow such rules in diet to get the ideal one. Ideal nutrition results in a healthy

body. In this perspective, men stand as subjects to analyse the 'food'.

Secondly, enjoyable eating are the sensations that emerge from the human sensory system (tongue and nose) and give individuals satisfaction. Therefore, vast studies also involve the psychological dimension. The empirical study carried out by Eldredge and Agras (1996, p. 80) shows that overweight individuals are more emotionally reactive and are more likely to over-eat when they are distressed than people of normal body weight. Furthermore, it is consistently found that obese individuals experience negative emotions more frequently and more intensively than normal weight persons do. This means that emotion actually also influences human nutritional intake.

Human emotion plays an important role in deciding what kind of food they will choose to eat. The study above mentions that emotional eating is 'the tendency to eat in response to negative emotions'. Human emotions such as being happy, sad or being bored are examples of psychology appearances; they are daily phenomenon which is influenced by their surroundings and environment. Indeed, human social interaction is the most important influence for human psychology.

Therefore, psychology of the individual and collective people's brings behaviour and influences the culture. Then, what is culture? According to an English Dictionary (MacMillan 2002, p. 355) culture is a noun meaning, a set of ideas, beliefs, and ways of behaving of a particular organization or group of people. An idea is a thought that men have about how to do something or how to deal with something. Similar to Heider (1991, p.10), who says that a basic definition of culture is that it is (1) learned, (2) shared, (3), ideas about behaviour.

Consequently, why are the same foodstuffs prepared differently in different countries? Jean-Louis Flandrin and Massimo Montanari (1999, p. 3) explain: because the specific technology, economic and social situations are different. It is the fact that technology provides the possibility to increase quality and creates new techniques in food preservation. The economy plays a role in food circulation; supply and demand always depend on the financial ability. In the end, social differences are actually clustered based on their own need, interest, educational background, culture, and availability of natural resources.

Food is a part of culture; food is a human creation that is unconsciously created. The issue becomes more about not only how to 'just' prepare the food, but how to get 'good' food from limited natural resources. From this point, while the primary purpose for food is nutrition, it also has a cultural dimension by which people choose what they eat not only by flavours or nutritional value but also by cultural, religious, historic, economic or social status, and environmental factors.

This actually becomes the issue that unconsciously creates the questions “what is good for body and what is good for soul?”. This is essential to understand since the quality for the body and for emotion is also relatively dependent on each individual. It cannot be measured in a general way, since people live in different places; the behaviour (culture) is also different.

Healthy eating and enjoying eating actually brings the food to the new context, between nature and culture. To meet the feeling, have enough energy and maintain a healthy condition, food preparation and food acceptability plays an important role. Indeed, food preparation and food acceptability depends on the culture and nature. Culture is responsible for the wisdom in technique, indigenous knowledge in preparation, cultivation, and choosing the food. Nature is responsible for providing foodstuffs sustainably and continuously. Therefore, food is much more than nourishment. It influences every aspect of human activity including history and culture, social arrangements, the structure of societies, feelings, and spirit. Dietary preferences define ethnic groups and whole societies and the growing globalisation of tastes and foodstuffs. In the end, better understanding of food in context of culture and nature is one way to establish a certain role and policy. It is not just focusing on the side of how people can use nature to get more food and make them secure, but also how the culture can play a role to keep and protect the nature in a sustainable way in providing food. This is why food must be considered as apart of nature ecosystem and also socio-culture interaction.

In this study, food security refers to accessibility of local people to diversity of food with consideration of local biodiversity. Furthermore, food culture is awareness and responsibility of people of ecological aspects while choosing, preparing, consuming and enjoying food consciously. Sustainable food culture is a useful link with the aesthetic and all senses, in the landscape and on the plate (Ploeger 2001, p 36).

2. 8 Media and current government policy

Rural residents have extremely complex standards of social organization (Oskam and Hudson 1999, p. 286). According to DeFluer and Ball-Rockeach (1989) in Oskam and Hudson (1999, p. 287) the social groups may share the same views on political, educational, religious and economic issues. There is no doubt that the mass media play an important role in public opinion and transfer of knowledge. The necessary information about the impact of mass media and in supporting local food security and food culture is needed. Not only is a fuller understanding of interaction with the physical surrounding needed, but also on knowledge on how the experiences of local people and their concern about the direct environment can be mobilised to achieve sustainable land use and a

balanced decision-making process (Volker 1997, p.107). In social dynamic interaction, mass media is expected positively to change the pattern of local behaviour in food security and food culture.

Besides mass media, local government policy is becoming a crucial factor to support local food security and food culture. Indonesia experiences different agricultural policy since 1969. It started with the Community Guidance Programme (BIMAS) (1969-1994). The government attempted to develop a better rice farming system and pay off: in 1984, Indonesia attained rice self-sufficiency (Niehof 2010, p.100). In 1997 the Asian Financial crisis set in, and from 1998 onwards, the time of political transitions, the crisis became an acute problem. The rice for the poor programme (RASKIN) was one of the current policies. Recently, West Sumatera provincial policy was started with *Padi Tanam Sabatang* (PTS) (Intensification rice production), which is the same like as BIMAS. Therefore, it needs the appropriate local policy approaches which are based on the current information in the micro-level.

In such a large and diverse country as Indonesia, the research team of Gadjah Mada University in Yogyakarta sees it as a danger of national policies become too rigid, centralised and do not sufficiently take regional and local variation into account. In the opinion of the team, the government should pay more attention to food diversification and the interests and characteristics of local communities. Community-based planning mechanisms should be established to ensure the sustainability of institutions that aims to enhance food and nutrition security and the synergy of food availability and local food production.

While the studies reviewed reveal the challenges facing both governments in meeting the food and nutrition needs of their populations, data in a specific sample indicate improvements in the nutritional status of children and adults. Ongoing social changes will have effects on food habits and food intake, but what form this takes will depend on the local context and circumstances (Niehof 2010, p. 111).

Chapter 3: Research methodologies

This chapter presents the research sites, data collections, research materials and resources, error strategies and data analyses.

3.1 Research sites

West Sumatera²⁴ is located in Sumatera Island (0°54'-3°30': 98°36'-101°53') with a total area of 42.297,30 Km² (4.297.300 ha). It consists of twelve districts and seven cities. It lies on the Middle Western part of Sumatera Island. This research was conducted in *Kabupaten*²⁵ *Padang Pariaman* (*Nagari Ulakan*), *Kabupaten Solok* (*Nagari Aia Batumbuak*) and *Kabupaten Tanah Datar* (*Nagari Padang laweh Malalo* and *Nagari Pandai Sikek*) and represented coastal site, hilly site, close to river site and close to lake sites (see figure 4).

Minangkabau`s geographically consist of plain, volcano highland and lies from the north-west to the south-east. The West Sumatera coastline is 375 km from north to south. The lakes of West Sumatera are *Maninjau*, *Singkarak*, *Diatas*, *Dibawah* and *Talang*. The rivers in west Sumatera are *Kuranji*, *Anai*, *Suliki*, *Ombilin*, *Agam*, *Sinamar* and *Arau*. The mountains of volcanoes in west Sumatran are *Marapi*, *Sago*, *Singgalang*, *Talamau*, *Talang* and *Tandikat*.

West Sumatera demography consists of *Minangkabau`s* (88%), *Batak Mandailing* (4%), *Nias* and *Jawa* (4%), *Mentawai* (1%). Most of the people are Muslim (98%), Christian (1.6 %), Hindi (0.0032%), and Buddhis (0.26%). Languages are *Minangkabau`s*, *Malayan* and *Indonesian*.

²⁴ West Sumatera is an area where the most of the Minangkabau`s live.

²⁵ Kabupaten is reversed to district in Indonesian government systems

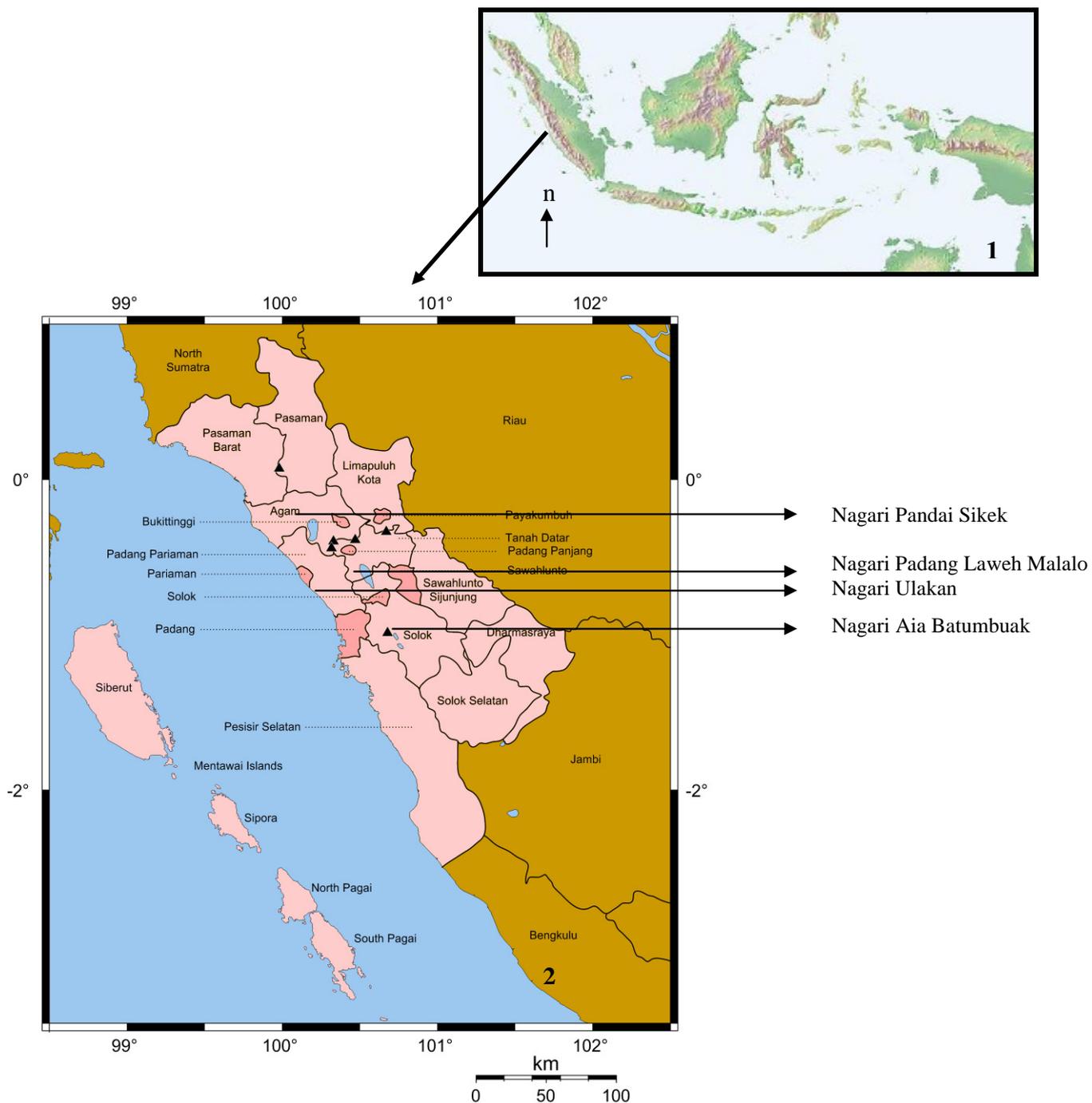


Figure 4: Research map: (1) Indonesia and (2) West Sumatra

3.2 Data collections

In order to answer the research question both qualitative and quantitative methods are used in this study. The primarily data collection method is Participatory Rural Appraisal (PRA) which is comprised of qualitative and quantitative data collections (see figure 5). PRA is an approach for holistic analysis of local conditions and formulate problem-based on cluster through active

participation of local stakeholder. Each data collection consists of direct observation as shown as in the table 5:

Table 5: Data collection structure

Sub themes	Qualitative data collection*)		Quantitative data collection*)	
	Primarily	Secondary	Primarily	Secondary**)
Preparing seed	Observation and In depth interview	Portraits, case study and story, traditional management and local resources collection		
Cultivation of land	Observation and In depth interview	Portraits, case study and story, traditional management		
Preparing manure	Observation and In depth interview	Portraits, case study and story, traditional management		
Plant rotation	Observation and In depth interview	Portraits, case study and story, traditional management		
Plant pest and disease control	Observation and In depth interview	Portraits, case study and story, traditional management		
Post harvest activities	Observation and In depth interview	Portraits, case study and story, traditional management		
Food processing in household	Observation, participation and story telling	Daily activity, key probes, intriguing practice and beliefs, seasonal calendars		
Culture in Household	Observation and participation and story telling	Daily activity, seasonal calendar, intriguing practices and beliefs, key probes		
<i>Marantau</i>	In depth interview	Story telling		
Demography status	Government officer interview			Governmental statistics
Nutritional Intake	Government officer interview		Questionnaire	Governmental statistics
Land status			Questionnaire	
Total crops production	Government officer interview			Governmental statistics
Income			Questionnaire	Governmental Statistic

*) self correcting field notes, **) review of secondary data and direct matrix-ranking

The principles of this technique are two core questions – How are the people? How is the ecosystem? - From the past, present and future (IUCN, 1997). The steps to collect data are:

-
- (a) In-depth interview of the key person (*mamak /penghulu*)²⁶ and government officer
 - (b) Interview the farmer/person that is recommended by the key person
 - (c) Observations follow the PRA technique.

In-depth interviews were used to obtain data from executing local government staffs and local communities on potential and challenges for food security in research area. The interview is a powerful method of producing knowledge of human situation, as demonstrated by historical interview studies, which have changed the ways of understanding the human situation of managing human behaviour throughout the twentieth century (Kvale 2009, p. 9). Both qualitative and quantitative data collections were also supported by bachelor students from *Andalas* University. They received a short training before learning about how to deal with qualitative and quantitative data collections. In this study, the development of integrated designs comprising qualitative and quantitative research is continuously collected of both sorts of data as the figure below:

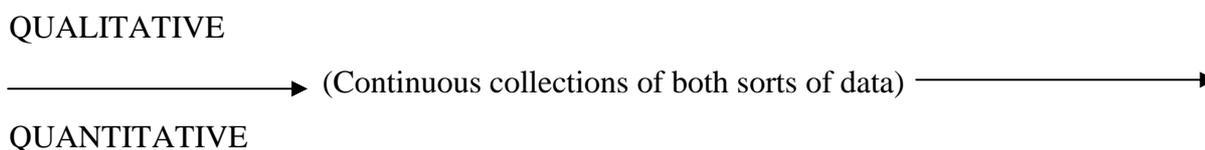


Figure 5: Research design for the integration of qualitative and quantitative research

(Adapted from Miles and Huberman 1994, p. 41)

3.2.1 Qualitative data collection

Case study is not a methodical choice, but a choice of what to be studied (Stake 2008, p 119). Therefore, to obtain as much possible data and information, two core methods are used for qualitative data analysis. The first method is ethnography (observation and in depth interview) with key persons (*mamak/ penghulu/ farmer*), local people and local government officers. It is a multi-method qualitative approach (participant observation, interviewing, discourse analyses of natural language, and personal documents) that studies people in their "...naturally occurring settings or 'fields' by means of methods which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting..."(Brewer, 2000). Participant observation is a method by which a researcher takes part in the daily activities, rituals, interactions, and events of a group of the people as one means of learning the explicit and tacit aspect of their life routines and their culture (Dewalt 2002, p. 1). In ethnography point of view, this study is an inclusive micro-study, close-up view, of a small social unit or identifiable activity within the social unit (Fetterman 1989, p.38).

²⁶ *Mamak* is bother's of mother, *penghulu* is a head of the clan

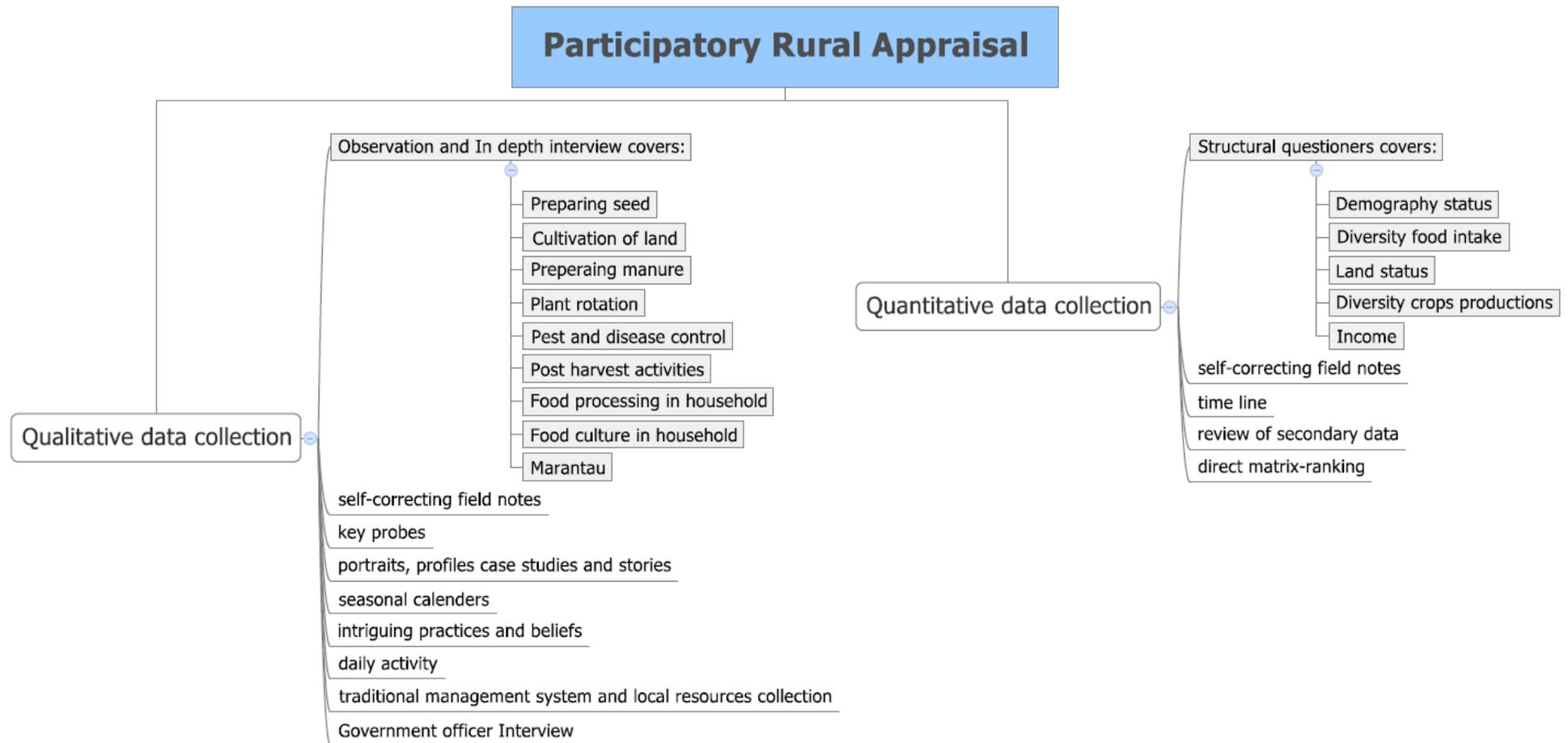


Figure 6: Data collection framework

To make the procedure clear, figure 7 shows the research logical framework, explains all about the research perspectives:

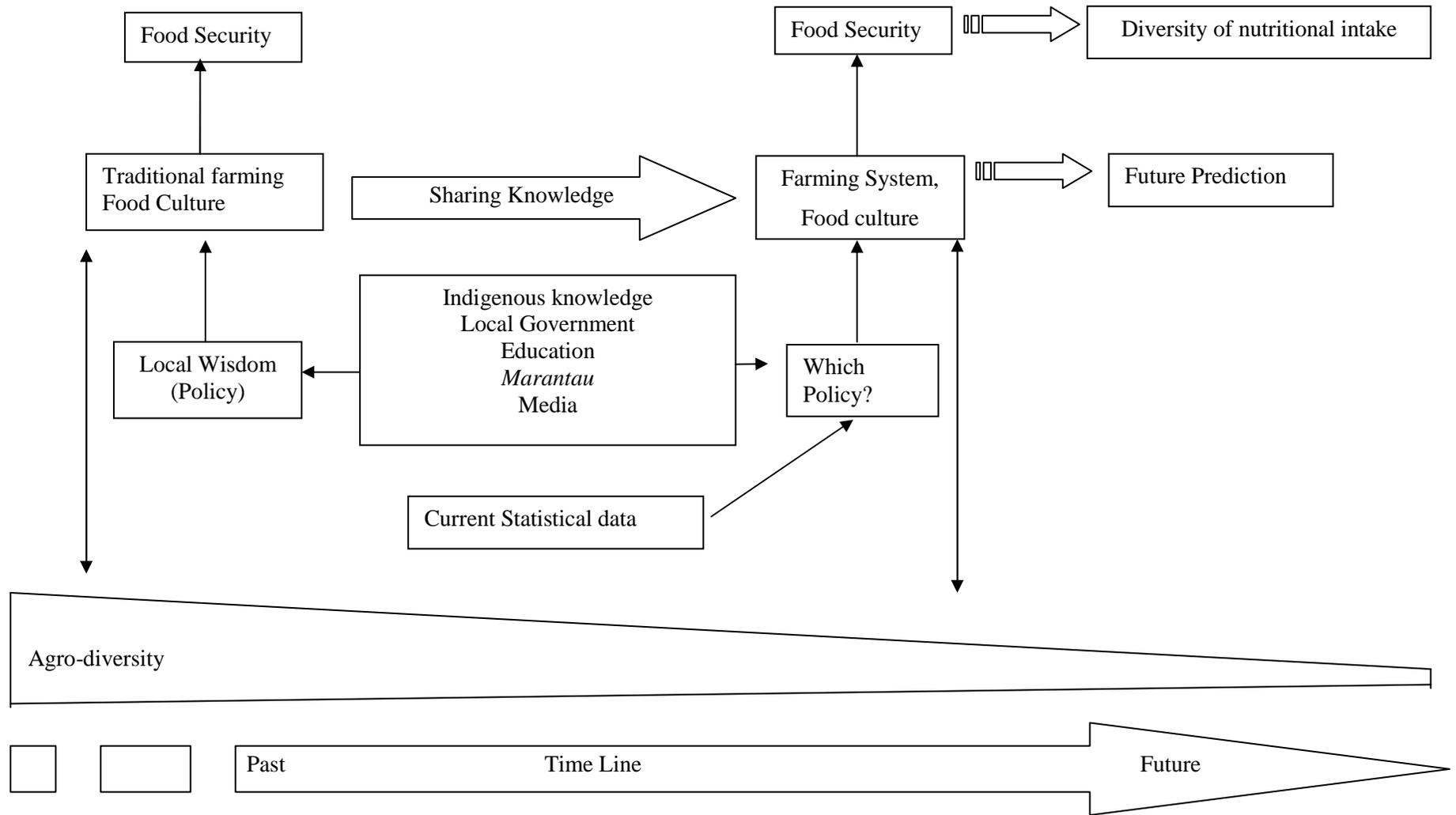


Figure 7: Logical research framework

The second method is life history; narrative inquiry and historical analysis are also used in this research. In traditional communities of the past, stories played a central role in the lives of the people. It is through story telling that the timeless elements of life are transmitted. Stories told generation to generation to carry enduring values, as well as lessons about life lived deeply (Atkinson 1998 p. 2). The life history is usually rewarding for both the key person and the researcher. This approach is most likely to pay off by generating useful insight into the participant's view of the world and relating those insights to the specific topic of study in a short period of time (Spindler & Spindler 1970, p. 293). Together with observation and interviewing, taking life histories allows the researcher to assemble a massive amount perceptual data with which to generate and answer basic cultural questions about the social group.

The researcher stayed in the villages together with the people. The observation covers all about the daily life activities from cultivation up to food culture. The observation is recorded into multimedia devices (small audio recorder). The audio recorder provides a much more detailed record of the verbal interaction than any amount of note taking or reflection could offer. It is easy to replay, produce transcripts and then selectively draw on these to provide demonstration of emerging arguments (Rapley 2009, p.39). The data are gathered into descriptions and coded into some keywords by using an indexed approach.

The qualitative approach is chosen, as the aim is not to produce any statistical data (representative study) beside to achieve understanding of the indigenous knowledge of the local people. All the qualitative data collection is primary data. For any contradiction, unreliability or invalidity of the data that emerged during fieldwork time, more investigation is adapted immediately by the researcher to get the right and complete sense for the study.

Before the main research began, it was important to be familiar with the village setting. The map was constructed to learn more about the research sites as shown in table 6. The challenges could be diluted by using PRA methods, which is very suitable for indigenous knowledge research. To observe the rural area and know more about the people and the environment, the PRA technique were designed in table 6 as follows:

Concerning the quality of qualitative research, this study allows room for diversity of the data and avoids a premature exclusion of neglect of such diversity (Flick 2007, p.36). The theoretical sampling is not only a way to interesting material but also a way to open the door for diversity in the field into the researcher's data.

Table 6: PRA technique

Participatory mapping and modelling	Researcher transect walk , guided field walk and mapping exercise	Resource collection	Supplementary research technique
Direct observation	Direct observation	Direct-matrix ranking	Review of secondary data
Semi-structured interviewing	Semi-structured interviewing	Intriguing practise and belief	Do it yourself
Portraits, profiles case studies, and stories	Portraits, profiles case studies, and stories	Seasonal calendars	Time line
Key probes	Key probes		Night halts
Folklore, song, poetry, and dance	Traditional management system and local resources collection		Self-correcting field notes
Futures possible			Daily activity
Intriguing practices and beliefs			

*) Explanation in glossary adopted form Greiner (1998)

To strengthen the validity and reliability of data collections which was unusual (Fetterman 1989, p. 43) in this study, methodological triangulation was used (Flick 2007, p. 37). This means this study used more than one method for checking the results, testing one source of information against another to strip away alternative explanations and prove a hypothesis (Fetterman 1989, p. 89). This is also called cross examination. This idea provides the confidence of the result with different methods. This study uses, in primary data collection, and qualitative data collection, the ethnography method (including observation and in-depth interview) and life history; then in quantitative data collection statistical surveys are used. In the secondary data collection some information covering the demography, land status, nutritional status, and crop production are covered by statistical survey.

3.2.2 Quantitative data collection

The quantitative data collection consisted of primary data and secondary data. In this study, statistical surveys were conducted by using a structured questionnaire for the household with a personal in-home survey. The structured questionnaire covers nutritional intake, income, land status, total crop production and demographic status. Concerning quantitative analysis, descriptive and frequency statistics were carried out to analyse the quantitative data collected from the questionnaire surveys. This is done by the statistical programme Microsoft Excel, which presented the graph and figures. *Xmind* programme was used to generate ideas and frameworks.

3.3. Research materials and resources

Various materials and resources were used for data collection throughout the field work:

Table 7: Research materials and resources

Description	Types	Purposes
Secondary data	Material	Reviewing the activities, programme of the local government, local government policy; compiling statistics and other relevant information about the characteristic of traditional farming system and food culture
Maps of area	Material	Identifying general site and specific location of the research; illustrating the land use planning and the features of the area.
List of names	Material	Snowballing local interviewees and identifying relationship between those who suggested the next person for the interview and the recommended persons in order to reduce biases.
Questionnaire	Material	Directing and supporting the process of semi structured, in depth, informal and expert interview and quantitative with arrange selective informant.
Voices recorder and notebook	Material	Recording verbal responses of interviewees during the fieldwork (voice recorder use only with permission of interviewees)
Digital camera	Material	Documentating events, pictures, recourses and activities during fieldwork.
Local instructors	Resources	Identifying local respondent and participant for interview
Local assistant	Resources	Facilitating the communication with local people
Facilitators and interview assistants	Resources	Facilitating group meetings and discussion and helping interview with local household

3.4 Sampling techniques

The sampling technique was snowball sampling. It is very useful to find out which people know whom and how they know each other: it is also useful in this study of a small, bound, but difficult to find population. This technique is used to deal with the special inter-connection networks of local communities, local government and also works well in selecting unique and particular cases for in-depth investigation. Convenience technique is used for interviewing the head of the clan and respective person. The sampling technique for quantitative analyses is a non-probability sampling approach. It is useful to identify the relevance focus of the study rather than the representativeness of population. The conveniences sampling technique were also used to anticipate the diversity of characteristics of people, those who are available and willing to participate in the survey.

3.5 Errors strategies

Errors occurred in several steps of this research. Granier (1998, cited from Stone and Campbell 1984) categorized errors which are: (1) non-sampling; (2) sampling errors; (3) socio-cultural errors; (4) courtesy-bias errors; and (5) language and translation bias errors. In this research, errors were diluted by: (1) non-sampling errors can be countered by making

specific questions and avoiding sensitive topics; (2) Sampling error can be countered by using stratified sampling based on the agriculture; (3) Socio-culture error can be countered by not using an unfamiliar survey format, culturally inappropriate; (4) Courtesy-bias errors can be countered by choosing appropriate topics and making conversation beforehand. (5) Accurate translation is needed throughout the research process. Languages and translation were countered by following the procedure as shown:

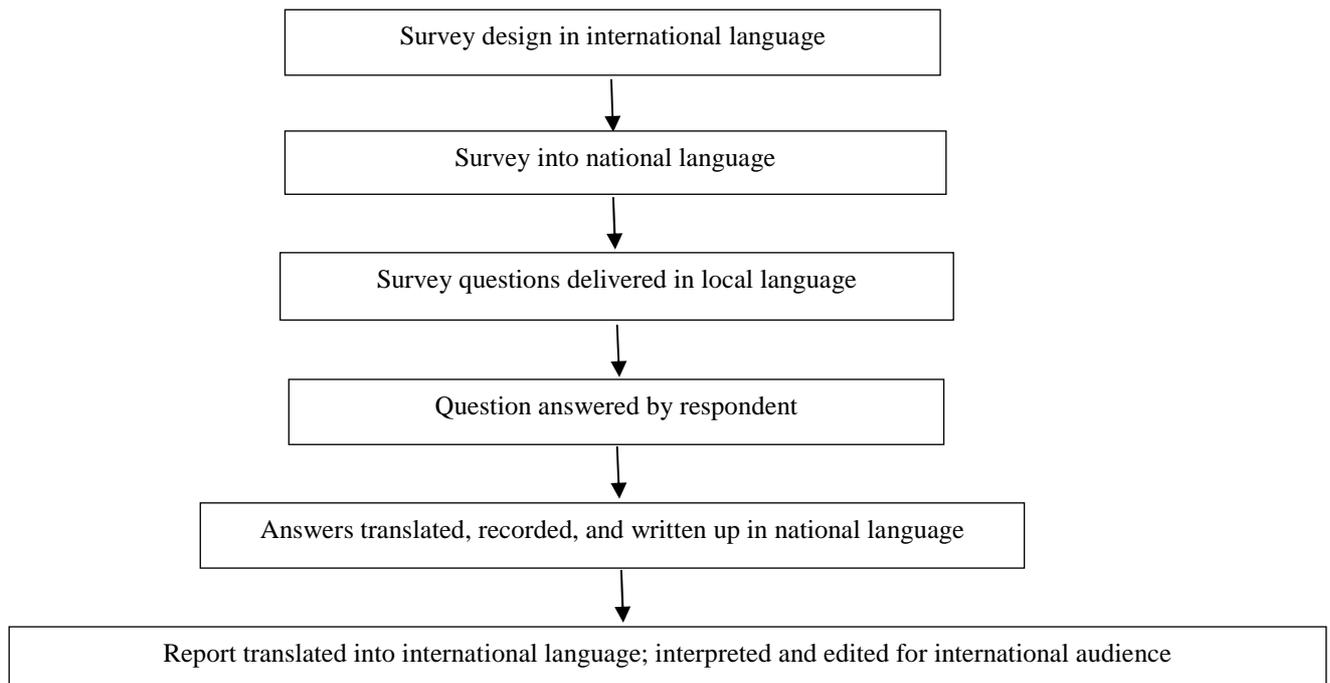


Figure 8: Translation steps in research

(Adopted from Greiner 1998, p. 36)

This research faced some challenges as follows (Grenier 1998, p.46):

1. Knowledge is power, so individuals are not willing to share among themselves, or with outsiders.
2. Indigenous knowledge is embedded in culture
3. Indigenous knowledge includes both explicit and implicit knowledge
4. Indigenous knowledge can be complex. For instance, maintaining biodiversity at the farm level, including maintaining the different varieties and management processes.

3.6 Data analysis

This section pays careful attention to the methods of analysis of both qualitative and quantitative data since they affect the quality of the results and finding the research. The nature of research that involves mixed methods for collecting data from different sources

requires different methods of data preparation and analysis based on scientific principles (Decrop 1999, p. 158). According to Hesse-Biber & Leavy (2006), there are four reasons that make qualitative data analysis different from the quantitative approach. First, the methods of qualitative analysis are less standardized, involving different inductive approaches to analysis. Second, qualitative analysis could start the analysis from the beginning or over the process of data collection by looking for the pattern of the relationships of social reality and complexity. Third, rather than testing the hypotheses via standardized statistical methods or applied math, qualitative research intends to generate new concepts or theory by combining empirical facts and conceptual data. Fourth, instead of categorizing data into statistical figures based on a predefine hypotheses, variables, parameters and mathematical calculation, qualitative research applies many approaches to analysis to provide detail and social life. In order to support the qualitative data collection, this research also collected some quantitative figures from the field. The combination of this data collection makes senses to generate new concepts of policy and perhaps new methodology.

3.6.1 Analysis of qualitative data

The qualitative data was computed in Computer Assisted Qualitative Data Analysis (CAQDAS) (see figure 9). The qualitative analysis used MAXQDA version 2010 for text analysis and voice analysis (Corbin & Strauss, 2008). MAXQDA supports and performs qualitative analysis with systematic evaluation and interpretations of texts (Lewins 2007, p. 98). It is commonly used for sociology, political science, psychology, public health, anthropology, education, marketing, economics and urban planning. The MAXQDA is of high technical standard and power and can be combined with an easy and, in most parts, almost intuitive use of the tool. Information and stories are recorded and documented; then tabulated and presented in descriptions and figures. Microsoft Excel and *Xmind* programme (collaborative software to generate ideas and frameworks) are used to present the graphs and figures, too.

The audio analysis was performed by the MAXQDA, combined with f4 software developed at Marburg University, Germany. This audio-transcription can run as; mp.3, wav, ogg, aif, and wma formats. This software is compatible with MAXQDA and also easily imported and exported. After editing and formatting, content analysis is performed. It is used to look at the objective description and quantitative description of the manifest content of communication (Berelson 1971, p. 18). The data is clustered based on the causality.

3.6.2 Analysis of quantitative data

Concerning quantitative analysis, data are computed into Microsoft Excel. The data analysis scheme as follows:

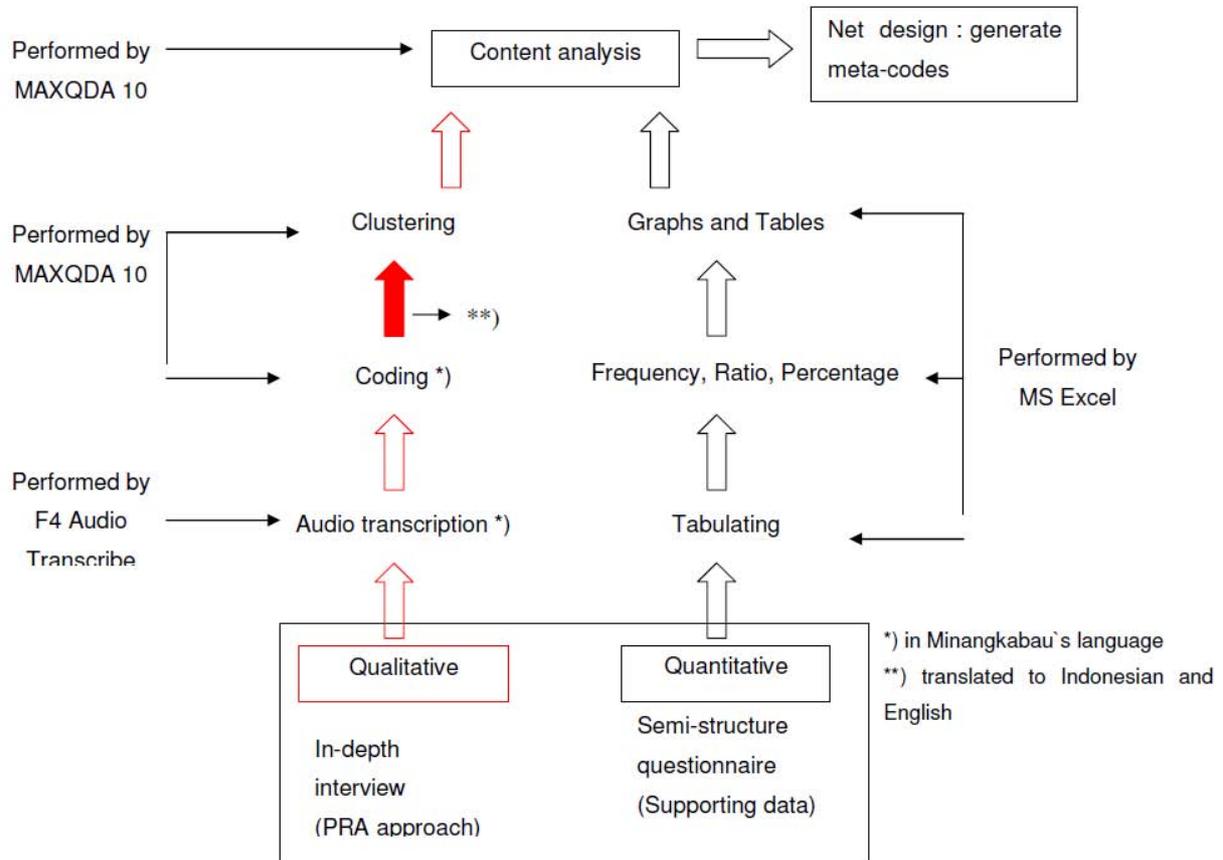


Figure 9: Data analysis scheme

3.7 Research time table

This research was collected primarily data from fieldwork in end of May 2009 until end of September 2009. The second data collection was in June 2010. Based on IK complexity, this study is in the category indigenous technical knowledge (ITK) (Sillitoe 2006, p. 56) with basic technique for ethno-science investigations. The observations and interviews are divided into four parts. Each part collected data from one plot area of study. Plot areas of study are based on clans in one village. The villages and the places are chosen according the key person.

Chapter 4 Results: Nagari Ulakan

Chapter four presents the research site located in the coastal area. This chapter explains about *Nagari Ulakan* (NU), which includes; topography, demographic, farm to fork description and cluster analysis as well.

4.1 Topography of Nagari Ulakan

NU is located in a coastal area with:

1. Geographical sites : 100°16'00'' east longitude
0°45'00'' south latitude
2. Borders : North side *Nan Sabaris* sub-district
South side *Batang Anai* sub-district
West side Indonesia Ocean
East side *Lubuk Alung* sub-district
3. Total area : 21 km²
4. Number of *Jorong* : (11) *Lapau Kandang, Maransi, Kp. Landang, Tiram, Sungai Rimba, Gantiang, Sikabu, Padang Toboh, Kepala Koto, Kp. Galapuang, Pasa Ulakan*
5. Elevation ASL : 7-100 meters

Based on observations, and according Suparto et al. (1990), soil characteristic in NU are *Entisols* and *Ultisols* (red clay soil). *Entisols* is distinguished by having little or no evidence of the development of middle horizons (FitzPatrick 1980, p. 140) with sub-order is *Aquents*²⁷, *Arents* and *Fluents*²⁸ (Moormann and Breeman, 1978. p 58). The most dominant crop that is cultivated is rice (*Oryza sativa*). The soil is suited to grow rice because water is freely available with enough distribution supported by *hydromorphic* soils and high rainfall regions (Moormann and Van Breeman 1978, p. 51). Erosion and flood affected the fertility of soils compounded with elevation of the rivers between 1.5 - 2 m and forced farmers depended on rain feed system. There is no traditional irrigation system in this area.

²⁷ Major importance (*phreatic* and *phreatic anthraquic*)

²⁸ Local importance (*phreatic* and *irigated*)

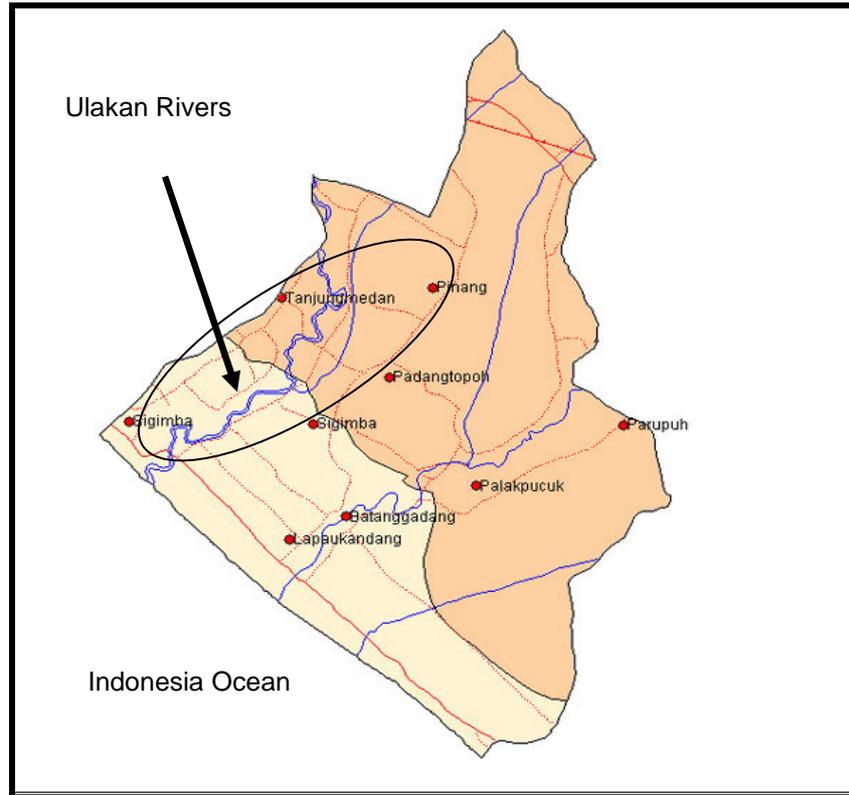


Figure 10: Soil map in Nagari Ulakan

Violet: Andisols, Brown: Inceptisols, Dark Brown: Ultisols, Bright Brown: Entisols

Sources: Suparto, J. Tajin, T. Budianto, E. Husen, N. Prasodjo and U. Suryana. (1990)

The annual rainfall in the NU is almost similar in comparison to other places in West Sumatera which ranged from 1.500 – 4.000 mm. It is noted that at a total rainfall of 1.600 – 4.600 mm or more, water availability is generally acceptable in pluvial rice lands of the inter-tropical zone, except for soil with a low water-holding capacity (Moormann and Van Breeman, 1978 p. 144). Beside, the high rainfall generates erosion. The largest river is the *Ulakan* River, as shown in figure 9. Rice fields are located along the river. The streets is perpendicular each other. The streets are side by a side with the river and the other street along the coastal area.

The land became fragmented because it divided for several generations. This occurs when new family members are married and need new homes to be built. The utility of land has been changing, as shown in figure 10; rice fields (*sawah*) make up 34 % of the area. Dry fields, houses, streets, shifting cultivation (*ladang*) and others are 25%, 17.6%, 9 %, 5.2% and 9 % respectively. Rice fields (*sawah*) dominate the total area almost by 34 % compared to 36 % in 2005. Shifting cultivation has decreased from 6.5 % in 2005 to 5.2%. Dry field area has decreased from 26 % to 25 %. This change has due to increasing of houses from 15 % to 17.6

% in 2008 and the street area from 7 % to 9 %. Wet land has decreased dramatically due to converting land to houses and due to the dry season, too.

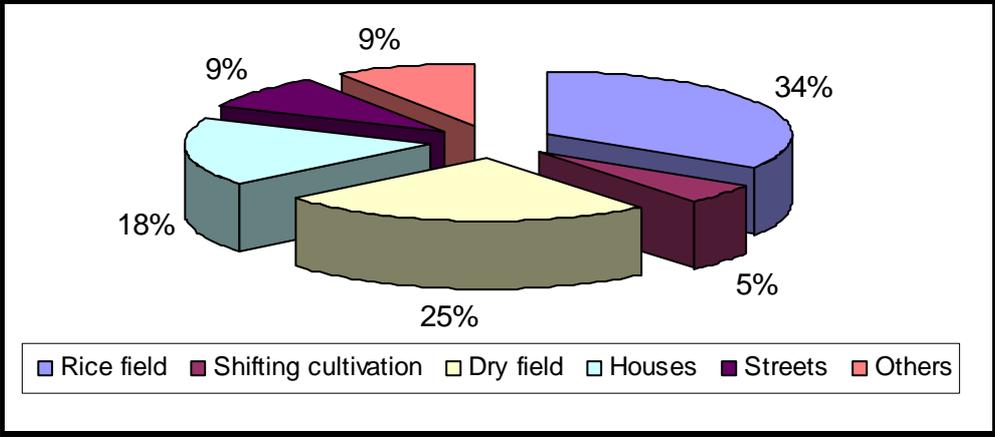


Figure 11: Percentage of land utilization in NU

Sources: Agriculture services *Nagari Ulakan Tapakis* (2008)

The houses are built along the roads; that makes it easier for the people to bring their agricultural and marine products to the market. The settlement is clustered based on particular clans, which allow them to set up homes on their own heritage. The road, river, land heritage and coast are important aspects for the developing pattern of settlements. The settlement pattern symbolises accessibility for household activities, but not for agricultural activity. Before, the river had clear water which could be used for sanitation and cooking, but sometimes when hard rain comes from upstream the water becomes turbid. Nowadays, this river is not being used for sanitation and drinking because each house is equipped with sanitation facilities.

4.2 Demographics of Nagari Ulakan

In 2007, the total population was 20.004 with 9.235 male and 10.679 female²⁹ with 100% Moslem. The clans in NU are *Panyalai, Jambak, Sikumbang, Guci, Tanjung, Koto* and *Piliang*. Minangkabau`s is a widely spoken language among them with the *Ulakan* dialect. They normally speak louder than other Minangkabau`s, they are adapted by waves sound. Farming and fishing are both main activities followed by trades. Based on Indonesian family welfare standard, NU has 320 households pre-welfare and 768, 1.145, 754, and 62 for welfare I, II, III and welfare III plus respectively³⁰. Tuberculosis is the main disease followed by

²⁹ Central board of statistic of *Padang Pariaman* district
³⁰ Family planning board *Padang Pariaman* district (criteria of welfare see appendixes)

Diarrhoea and upper respiratory tract infection³¹.

A typical household characteristic according to investigation, consist of father, mother and 3-4 children (n = 50) with a ratio of male and female being 1:1.2. Grandmothers sometime live together with their daughters. Food intake is 3 times a day (n = 50). There is no special day for eating out. The families investigated have a monthly income of Rp.500.000-Rp.1.000.000 (US\$ 55.5 - US\$ 111.1)³² (n = 16) and the rest had more than Rp.1.000.000 (US\$ 111.1) (n = 34) monthly income. These farmers, who do not have any land, fish. They had side jobs; *lapau* (n = 24) and *ojek* (n = 18). The land status is family ownership (n = 50), with less than 1 ha (n = 50) and with evident ownership.

4.3 Farm side

Traditional farming in NU is already ruined by modern farming systems. In the last two decades new farming systems were introduced by extension officers. Since 1975, intensive agriculture is one of the government priorities. Increasing of production is the main policy to feed people. Since 2005, the government has a new programme called *Padi Tanam Sabatang*³³(PTS), which is adopted from provincial agricultural policy. Even though NU is not of local government priority (due to lack of irrigation) but as apart of *Padang Pariaman* district, the policy is implemented based on provincial instruction.

There is no ritual before cultivation³⁴; they discuss within the family and decide who will cultivate the land for the next season. Based on culture, the land is owned by the mother (female related); therefore, only the mother, her sisters and her daughters have rights to manage the land. Men can be involved and work in the field but women conduct all the management. Preparation of land is started when the first rain comes, which is normally the middle of June every year. They wait for the rain to make the soil mushy and then it is easy to cultivate the soils. The cultivation is started by ploughing the field with a hand-plough-tractor; water buffalo are not being used anymore. After the land is ploughed, it takes sometime to wait and let the rain comes again for watering the field.

The mother has a right to cultivate the land and usually hires people to do it through *patigoan* (one third); this is a sharing method in managing the land, one third for the farmer, one third for the land owner (mother) and one third for production cost (seed, fertilizer and

³¹ Health department *Padang Pariaman* district

³² US\$ 1 = Rp. 9000

³³ Adopted from SRI (the system of rice intensification)

³⁴ Cultivation means rice fields

insecticide). The measurement of sharing uses *belek*³⁵ scale, one *belek* is equal to 20 litres of paddy. The share of the harvest is done directly on the rice field during the harvest time. Only farmers work on the farm while the mother stays at home and wait until the harvest.

According to direct investigation and cross check to history of landowners, there was once bamboos surrounding rivers, which allows the existence of habitats for snakes. This now no longer exists due to land fragmentation. They use “normal” pesticides and insecticides to control the pests and diseases, which depend on the epidemic during that season. They said that with these pesticides and insecticides it will be very easy and fast to control the fields even though they are really not convenient because of the prices of these “helpers”. They said that they appreciate following the natural plant protection with natural predators, but they could not take simultaneous action to change to natural plant protection cost. Indeed, to meet the demands of stakeholders is the important issue, whereby the mother wants to get more grains; workers need more harvest to get money. To get high yield is usually accompanied by additional capital investments such as; fertiliser and fuel (hand tractors). The worst part is that the selling price of grain normally goes down when the harvest comes. Farmers tried to reduce the cost production by using less fertiliser. They are eager to reduce any kind of production costs to meet the demand of the yield besides cultivating different crops at the same time.

The common crops planted are paddy (*Oryza sativa*) followed by chilli (*Capsicum Annum*), egg plant (*Solanum melongena*), cucumber (*Cucumis sativus L*), and swamp cabbage (*Ipomoea aquatica Forssk*). The annual crops are orange (*citrus sinensis*), durian (*Durio L*), guava (*Psidium L*), papaya (*Carica Papaya*), banana (*Musa paradisiaca*), jackfruits (*A. Heterophyllus*), melinjo (*Gnetum Gnenom*), pineapple (*Annanas Comusus*) and water melon (*Citrullus Lanatus*). There is no definite plant rotation in *Nagari Ulakan*. They do not use manure any more, although they did get natural manure when water buffalo was used to plough their land. Manure normally comes from farmers who have cows. Some of the farmers interviewed stated that it is good to use manure for fertile land but it takes time to apply and is not available continuously, in either quality or quantity. From the tradition, they said that their great-grandfather used manure only for the horticulture crops, but not for paddy.

Mice are the biggest enemy for farmers. Even though they make traps for the mice, it

³⁵ Name of the tube (scale)

is not effective at all because the population growth of the mice itself is high. The elderly people said that the surrounding environment was once full of trees and bamboo, but it is a different situation today (see figure 12). The predators of mice are extinct because their habitats were destroyed by the land expansion policy.

Seeds are selected from the last harvest, which is done by the farmers. The best grains are selected with certain characteristics, clear from pests and diseases. Paddy is harvested twice a year without any ritual ceremony for the harvest, like before (*mandoa padi naik*³⁶). Since the last decade, paddy is directly sold on the field when the middleman comes and directly pays for the paddy. Most of the farmers interviewed answered that they feel secure in food but still, depending on the season, they have variations in income from farming and fishing. The prices of grain and fish are the main factors that make them feel secure or not (based on the provincial government report, NU is in the category of red area³⁷). If both of these commodities' prices could be increased, it would be possible for them to reach food security for the whole year.

In the discussions and interactions with elderly farmers, they said they give up on their land nowadays where it is hard to reach high yields and good revenue. Therefore, the seed company enticed the farmers to use promising seed and fertiliser, but again, after they are successful, they have to pay much more than what they can gain. Even though the yield increases significantly, this does not automatically make the farmer secure for his food when there is less accessibility (income) and less availability (farm management).

³⁶ Small pray and ended with eating together.

³⁷ Productivity < 4.5 ton/ha (2008) (sources: Department of Agriculture and Horticulture, Province of West Sumatera)



Figure 12: Landscape in NU

A = coconut trees, B = Rice Field, C = Brushwood, D = Houses

Source: Own picture (2009)

Food availability in the household has a direct relation to income from harvest and fishing. Fishing is done by using a traditional boat equipped with a small motor power to sail. It takes one or two hours to reach the place that is rich in fish. Fishermen start to sail after sunset and come back before sun rises. In full-moon time, they will not go to sail because they will not get the fish when the light of moon is too bright. They use netting and use minnows as bait. One group consists of three to five fishermen. Around 5 am, fishermen will reach the coast and near the coast there is a small place like a temporary fish market. Fish is sold by an auction, which starts with a high price and then the price slowly goes down. If they are lucky, they will get more money in the auction but mostly they are not satisfied with the price because they have weak bargaining comparison to the middlemen. First of all, the middleman knows how many fishermen have landed and they normally calculate how many fish they could buy, including number of middlemen joining at that time. Secondly, this auction normally has weakness, especially for fishermen. Since marine products spoil easily, the middlemen will wait until around 9 am and the price will automatically go down, therefore, fishermen always get low income. Based on our interview with head of the fishery department in *Pariaman*, there is assistance's programme for fishermen, such as, a boat equipped with cool storage. This programme is still under process because the financial support comes from the national government.

To improve their income, according to our surveys, people choose to have a side job such as *ojek* (n = 18), and *lapau* (n = 24). Nonetheless, the income cannot be included easily

as household income. *Ojek*, for instance, is normally done by young boys and they spend the money for themselves. *Lapau* contribute to the household income; the most income comes from *lontong* and beverages they serve. However, there still of people (n = 8) who do not have a side job and most of them are Hodge. They do not have land or capital; these groups are susceptible to food scarcity.

4.4 Fork side

The role of the mother is dominant, starting from the kitchen. There are two types of kitchens in NU. First, conventional, most of the farmers and the *Ulakan's* people have this kitchen which consists of a wood stove, covered by iron to protect from fire. The floor is made from cement, but sometime just sand or without cement. Secondly, a modern kitchen which consists of a gas stove, covered by marble and well decorated. Even though they have a modern kitchen for big festival or special occasions, they will use a wood stove. They said that gives a better taste and it is also not possible to cook in the gas stove due to the small capacity. The traditional kitchen in NU is almost the same between each house. It is usually located behind the house. In NU, there are many who people already use gas stoves and kerosene stoves although there is also the use of firewood. A place to store firewood is called *salayan*, and to store glassware and cookware is called *salayan pinggan*.



Figure 13: Kitchen in NU

Left picture: modern, right picture: traditional

Sources: own pictures (2009)

The mother (n =36) strongly play an important role in the kitchen, followed by the grandmother (n = 9) and daughter (n = 4). According to observations, the kitchen is a place for the discussions in the family and most of the time they are seated on the floor while preparing the food. Daily meals are made and led by the mother while talking to the

grandmother and her daughter. The mother cooks and decides the meal everyday and prepares the spices, firewood and main meal. The mother is also responsible for keeping the meal warm which is a symbol of protection and wellness. The mother cooks one time a day, which starts normally from 9 am – 11 am. They normally prefer to fry, but sometime boiling and sauté is also their preference. Most of the spices come from the weekly market, but a few of them still cultivate in their backyards. The mother learns to cook from her mother, which is passed down from generation to generation. The daily food is all about fish and marine products, i.e. fried fish with chilli or fish soup (*asam padeh*), which is easy to prepare. If there is no time and less money they will just make eggplant with chilli and *tempeh* or *tofu*. The recipes are actually not different from their mother's recipes, but sometimes the way the mother cooks makes it taste different. The most common conversation in the kitchen is gossip about their neighbours; therefore the kitchen is a secret place which means their discussion is only for their family consumptions. If a girl will be married it will always be asked; could she do kitchen activity or could she be a good cook? It is despicable for the family when a daughter can not cook, therefore, neatness in the kitchen, dining delights and drinks produced will raise the degree of a woman.

Table 8: Meal pattern and diversity food intake of people in NU

Core Item	Components Secondary core	Peripheral diet	Preparation method	Meal Pattern
Carbohydrate: Rice (100%)*	Tofu Tempeh	Fried rice (16%) Fried noodle (8%)	I Frying	I One of the peripheral diet
Proteins: Fish (88%)*	Mung bean Coconuts milk	<i>Bakso</i> (20%)* <i>Lontong pical</i>	II Boiled with coconuts milk	Water II
Egg (12%) Vegetables: Cassava leaf (64%)	Chile Tea + Raw egg	(12%)* <i>Lontong</i> (12%)* <i>Sate</i> (20%)*	III Sate for Vegetable or sometime boiled	Mostly one of the peripheral diets. Rice, Fried fish with <i>sambal lado</i> and Vegetable.
Spinach (16%) Other (24%)	Coffee and milk	<i>Pangsit</i> (8%)* <i>Pical</i> (4%)*		III Rice Fish + Coconuts milk
Beverages: Water Tea Coffee				Vegetables Water Fruits
Fruits: Banana (40%) Papayas (20%) ** Oranges (44%)*				

Source: own survey n = 50 (2009), *** see appendices description of traditional food, **) in 2005 there is no local production, *) local product-freshwater fish

Rice is consumed to 100%³⁸ for carbohydrate intake, 88% of protein intake is fish and 12 % from egg (see table 8). Beef is normally consumed on the occasion of a wedding ceremony or *Idul Fitri* and *Idul adha*³⁹. Peripheral diet dominantly comes from street vendors such as fried rice, fried noodles, *pical*, *lontong pical* and *lontong*, which is easily found in *lapau*. *Sate*, *bakso* and *pangsit* are normally sold by using a cart which can be move to surround the *nagari*. The dominant preparation methods are frying, boiling and sautéing. The meal pattern is three times a day, with mostly a peripheral diet for breakfast and lunch. Tea with raw egg is commonly a favourite drink, which is called “*teh talua*”⁴⁰. It is popular drink in *lapau*. *Tofu* and *tempeh* is normally only for combination of *samba* with fish. The vegetable eaten the most is cassava leaf; it is easy to find, cheap and also easy to prepare. Papaya is preferred to be eaten today. Instant noodles are not popular among the local people, just for a snack and they rarely become one of the peripheral diets. It is difficult to find spices in the surrounding are. They normally buy them at a weekly market, but they can easily get coconut milk. To store food is sometimes difficult because high humidity makes the food can become covered with mildew easily.

Table 9: Biodiversity in NU

Main crops (4)	Fruits and other crops (14)
Paddy (<i>Oryza sativa</i>)	Orange (<i>citrus sinensis</i>)
Maize (<i>Zea mays L</i>)	Durian (<i>Durio L</i>)
Cassava (<i>Manihot Utilisima</i>)	Guava (<i>Psidium L</i>)
Ground nut (<i>Arachis hypogea L</i>)	Papaya (<i>Carica Papaya</i>)
	Banana (<i>Musa paradisiaca</i>),
Spices (3)	Jackfruits (<i>A. Heterophyllus</i>),
Chilli (<i>capsicum annum spp.</i>)	<i>Melinjo (Gnetum Gnenom)</i> ,
Pandanus leaf (<i>Pandanus</i>)	Pineapple (<i>Annanas Comusus</i>)
<i>Ruku ruku (Ocinum sanctum L)</i>	Water melon (<i>Citrullus Lanatus</i>).
	Coconuts (<i>Cocos nucifera</i>)
Vegetables (4)	Mango (<i>Mangifera indica L</i>)
Eggplant (<i>Solanum melongena</i>)	<i>Rambutan (Nephelium lappaceum L)</i>
Cucumber (<i>Cucumis sativus L</i>)	<i>Duku (Lansium Domesticum)</i>
Swamp cabbage (<i>Ipomoea aquatica</i>	<i>Sapodilla (Manilkara zapota)</i>
<i>Forssk.</i>)	
Spinach (<i>Spinacea oleraceae</i>)	

Source: own survey (2009)

³⁸ People notice that they feel they have eaten properly if the meal contains rice, but if there are only noodles; it's just for a snack.

³⁹ Moslem festivals.

⁴⁰ Raw egg (without albumen) mixed with hot tea and lemon. Sometimes it is also mixed with chocolate or honey.

Table 9 shows only 3 spices out of 29 to compliment the unique flavour of Minangkabau`s cuisine. They have 4 main crops but they are not consumed as main courses. They have 4 different vegetables but only 2 are consumed daily, the rest are sold at the market. They have 14 different fruits but only 3 are dominantly consumed, the rest are sold at the market. The nutritional status of this area is classified as well nourished⁴¹. Up to now, there is no case of child malnutrition. The community strongly supports any government programs that improve the nutritional status of the community. Based on observations, they eat together in the household at dinnertime, while usually sitting on the floor.

In the 1970s, production of crab and shrimp were very high, which seem to indicate a valuable product. Fishermen said, if shrimp are dried then they do not make money; hence the idea arose to make crab crackers. If it is boiled, it can only be preserved for one day; if it is made into cracker it will be likeable and long lasting to store.



Figure 14: Rakik are sold in Lapau

Source: own picture (2009)

*Rakik*⁴² is one alternative to make crab and shrimp become valuable, which is made with rice flour, chilli, onion, garlic and, betel leaf. These recipes are well known by the local people. The quality and the taste of the *rakik* are very significantly dependent on the raw material of the crab and shrimp. *Rakik* is becoming a side income for those people living in the costal area.

Marantau is an individual decision, which is encouraged by cultural and economical reasons, but sometimes the decision is made by the mother when none of the family members stay to accompany the mother. *Marantau* is driven and inhibited by some other factors such as network, success stories, accessibility, age and gender. On the other hand, keeping the land

⁴¹ Health department Padang Pariaman district

⁴² *Rakik* is a chip made by rice flour combining with crabs and shrimp.

and heritages and family responsibility are inhibiting factors. Someone who goes *marantau* usually can cook very well, but they are not involved in cultivation. *Rantau* destinations are *Jakarta, Bandung, Pekanbaru* and *Medan*, where they have contact with their *mamak*. They become traders and entrepreneurs in those cities, but they start from the bottom, for example as a shopkeeper and most of them are male between the ages of 16-21 years.

The number of family members strengthens their motive to go *merantau*. Network is built by *mamak*, which is morally responsible to promote their nephew to be successful in *rantau*. Once a year, overseas Minangkabau will go back home, the time when *Idul fitri* or *Idul adha*. Once they come, a lot of stories are told. The action of *mamak* directly teaches their nephew how to learn a new way of life, from farm to business. Therefore, the number of young people who go fishing has decreased because they prefer to go *marantau*. They prefer to continue their studies abroad or outside of *nagari*. Fishing is men's work, which means that females just stay at home or work on their land. Few of the women go to *rantau*, mostly because of arranged marriages.

NU is a part of the sub-district *Ulakan Tapakis*, the local agricultural officer depends on the regency policy and major policy in the provincial policy. The current policy is aimed at increasing the production of paddy with a system of rice intensification. Constraints occur when the local officer's competency is low. Most of them were university graduates, but they have different backgrounds. In the Indonesia agricultural education system, the bachelor programme focusing on a special subtopic for example, soil, agronomy, plant protection and agribusiness. They do not really have comprehensive competency on agriculture. The programme from the government is always changed. This influences the outcome of the programme, which is not evaluated well. Monitoring and evaluation of the programme is generally weak. There are no parameter fixed to measure whether the programme approaches the right track or not. It is really obvious that the government programme influenced the traditional farming system in NU.

The mothers do not go to the farm any more. They have money from *rantau*, and they pay someone for cultivating their land. The land is regularly cultivated based on the schedule, for instance, when a mother has three daughters, the land was regularly cultivated by the mother and her three daughters. They cultivate in a different season with a one manager rule. The kitchen and cooking considered womanly activities, even though men cook for special occasion or culture festivals. Fishing is considered an activity for men and none of the women go fishing.

Only (n = 5) daughters are involved in kitchen activities, followed by the grandmother (n = 9) and the mother (n = 37). The mothers have completed senior high school (n = 25), junior high school (n = 9), elementary school (n = 9) or none (n = 9). In senior high school they learn the hygienic and nutrition of food. The communication can be established through *arisan ibu-ibu*⁴³, which effectively created interaction between mothers and their neighbourhoods. Information and sharing of knowledge can be effective when they gathered together based on the local tradition. The problem occurs when the mothers are not eager to attend the *arisan ibu-ibu*. The main reason is they do not have enough money. Normally in *arisan ibu-ibu*, money is collected every month and one lucky person is randomly chosen to get that money. Based on this, not all the mothers will gather in the *arisan ibu-ibu*.

The unique thing about *Nagari Ulakan* is that most of them have *lapau* in their houses, even though -what I experienced- there is not much market share for this product. *Lapau* is aimed to gain extra income besides fishing; therefore, in almost everywhere we could easily find *lapau*. *Lapau* is a simple place with bank chair where people can sit 5 to 7 persons equipped with a small television and some snacks to eat. The men enjoy the break time around 10 am – 12pm; this is the right time for fishermen who are just coming back from the sea. They enjoy a cup of half coffee⁴⁴ or *teh talua* and talk with the other *lapau* costumers or *lapau* owner. The topic of discussion starts from the television news; from politics and gossips. The discussions are sometimes analytical in comparison to their education background. They are good in criticising and giving opinions.

Most of the costumers of *lapau* vary in age and background, which range from around 17 years to 60 years old. Based on this fact, we found, the knowledge was transferred from the old generation to the young generation. The young generation could practice their rhetoric. But in some *lapau*, there is only a group of young people or only elderly. Transferring the knowledge in *lapau* is effective to change the young generation's perspective. Sometimes they also discussed their daily activity i.e.; fishing, how to prepare fishing or farming, and sharing the experiences. It is obvious that mass media or information systems are only for their entertainment. Discussion and rhetoric based on national politic is done in *lapau*. It's hard to find out if they discuss nutrition, and only sometimes they are discuss about farming and fishing.

⁴³ Gathering among mothers

⁴⁴ Half coffee is a half portion of coffee

4.5 Cluster of potentials and problems of food security and food culture according to the results

Figure 14, the actual potentials and problems in NU. It shows that the mother plays an important role in controlling farm to fork activity. But, nevertheless, the external factors such as: local government policy, climate changes, commodity prices and *marantau* are obstacles to food security and food culture.

Indigenous knowledge is ruined by the new programme from the government. The climate is changing and there is no strong local government policy to increase the ability of the farmers to protect the IK. **HA** can provisionally be accepted as a factor that influences food security and food culture in NU.

The mother plays an important role in the daily meal which includes: food storage, land ownership, spices, work in *lapau*, kitchen activity (preparing wood for stove), and keeping the tradition of *marantau*. **HB** can provisionally be accepted as a factor that influences the food culture and food security in NU.

Maranatu generates less young people who work on farmland and go fishing. Nevertheless, remittances from the *rantau* are valuable for the family, too. It is confirmed by investigation that *marantau* has both a role in food culture and the traditional farming system; first of all, remittances positively affected the farmers to continue their farm. Secondly, less young generation staying on the farm affected the number of farmers on farm. Both resulted in sustainability in the short term. The activity of *marantau* makes an impact on the spread of the Minangkabau's cuisine. **HC** can provisionally be accepted as a factor that influences the food culture and food security in NU.

Local government plays a role in changing the traditional farming systems of the farmers. The changes of the traditional farming systems are on the introduction of intensify farming systems programme (called *Padi Tanam Sabatang*). The national authorities only control the price which is not guarantee farmer's income. **HD** can provisionally be accepted as a factor that influences the food culture and food security in NU.

Men and women have equal opportunities to go to school, but the access to higher education is still low. Arranged marriages are one of the reasons women tend to leave their school. Fewer women have access to school, which threatens the future mother's education. **HE** can provisionally be accepted as a factor that influences the food culture and food security in NU.

There is no evidence that mass media changes the local food security and food culture.

The television in *lapau* is only used for entertainment. There is no evidence that they change their food habits just because of the influences of the media; if there is a change it is just because of less income rather than habits (culture). **HF** can not provisionally be accepted as a factor that influences the food culture and food security in NU.

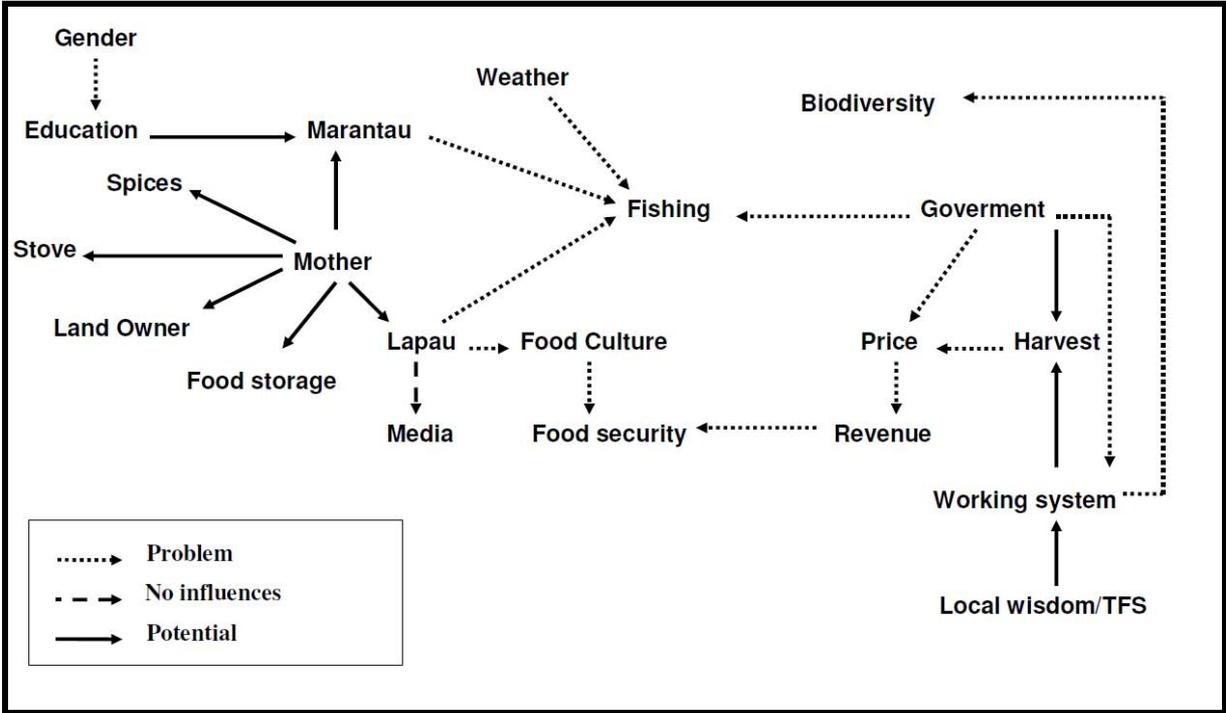


Figure 15: Cluster of potential and problems of food security and food culture according to the results of the investigation

Sources: own analysis with Maxqda10 (2009)

Chapter 5 Results: Nagari Aia Batumbuak

Chapter five presents the research site located in the hilly area. This chapter explains about *Nagari Aia Batumbuak* (NAB) West Sumatera and includes topographic and demographic information, farm to fork description and cluster as well.

5. 1 Topography of Nagari Aia Batumbuak

NAB is located on the area with:

1. Geographical sites : 0°52'33'' and 01004'40'' South Latitude
100°31'34'' and 100041'58'' East Longitude
2. Boundaries : North side is *Kubung* sub-district
South side is *Pesisir Selatan* district
West side is *Padang City*
East side is *Lembang Jaya* sub-district
3. Area : 65 km²
4. *Jorong* in *Aia Batumbuak* : (6)*Koto Ateh, Koto Baruah, Madang, Sangkar puyuah, Lambah*
5. Elevation ASL : 950 meters

NAB is located on the highland plates and precisely close to the peak of *Mt.Talang*, with a rainy, humid and cold climate, which is very suitable for horticulture condition for vegetables, passion fruit and *Solanum betacium*. *Andisols* and *Inceptisols* are dominantly characteristic of the soil in NAB. One of the outstanding features of *Andisols* is their high natural productivity, which has dominant physical properties that are favourable to the growth most of plants. This is because of the most common of the soils in areas of considerable rainfall has resulted in volcanic soils being generally regarded as highly fertile soils (Smith, 1978: p. 271). The annual rainfall in NAB is 2570 mm⁴⁵, which is considered as moderate rainfall in comparison to the annual average rainfall in West Sumatera, which is a range 1500 mm – 4000 mm. The highest rainfall is from mid July - September and the lowest in February - April.

⁴⁵ *Gunung Talang* is a sub-district from *Solok* district

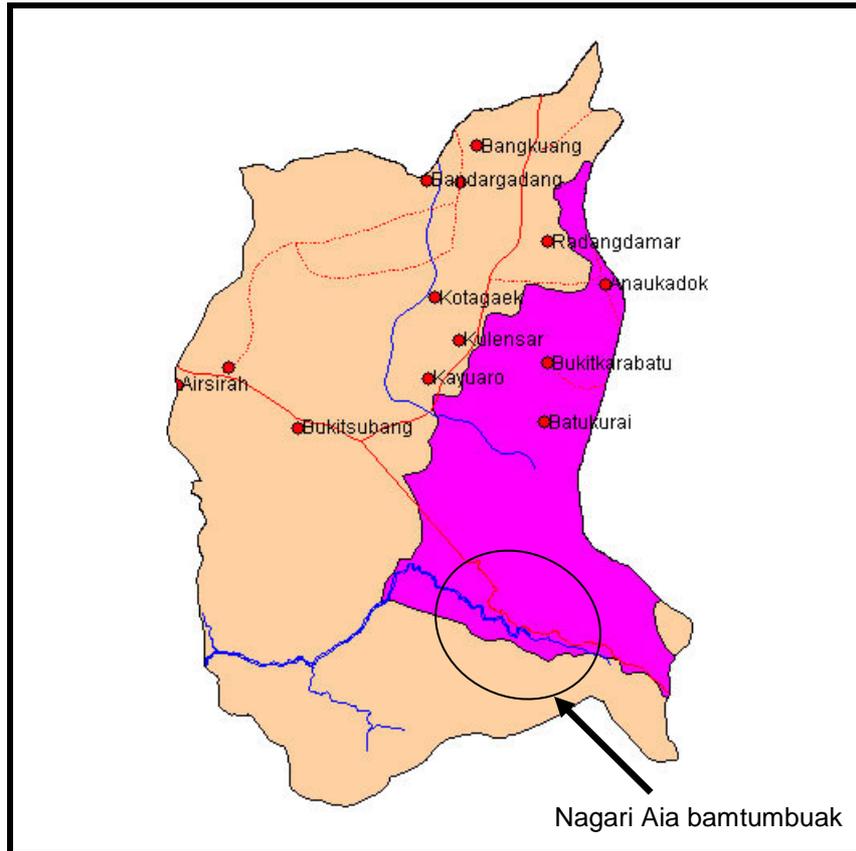


Figure 16: Soils map of Nagari Aia Batumbuak

Violet: Andisols, Brown: Inceptisols

Sources: Suparto, J. Tajin, T. Budianto, E. Husen, N. Prasodjo and U. Suryana. (1990)

5. 2 Demographics of Nagari Aia Batumbuak

In 2007, the total population was 2978 with 1509 male and 1469 female⁴⁶. The majority of them are Moslem. Minangkabau's language is widely spoken with *Solok* and *South Solok* dialect. Farming is the main activity. Based on the Indonesian family welfare standard, NAB have 54 pre-welfare and 194, 61, 391, and 7 for welfare I, II, III and welfare III plus respectively⁴⁷. Tuberculosis is the main disease and upper respiratory tract infection and rheumatics⁴⁸.

The typical household characteristics according to investigation, consist of father, mother and 1-2 children (n = 50) with a ratio of male and female of 1:1. Grandmothers live together with the oldest daughter. Food intake is 2 times a day (n = 7) or 3 times a day (n = 43). There is no special day for eating out. The families that we investigated have a monthly

⁴⁶ BPS- Statistic of *Solok* district

⁴⁷ Family planning board *Solok* district (criteria see appendix)

⁴⁸ Health department *Solok* district (2007)

income of Rp.500.000 – Rp.1.000.000 (US\$ 55.5 - US\$ 111.1) (n = 41) or more than Rp.1.000.000 (US\$ 111.1) (n = 9) monthly income. Most of them are farmers (n = 48) and civil servants (n = 2). Not many of them have a side job, only *ojek* (n = 1) and *lapau* (n = 2). Families own the land (n = 50) with less than 1 ha (n = 40) and 1 ha-2 ha (n = 10), and all of them have evident ownership.

5. 3 Farm side

The family members discussed the planting plan for the next season which has three options in land preparations; (1) they do it by themselves, (2) cooperation with partnership or (3) they pay someone to work for them. They prefer to do it by themselves if the land is not too wide. The cooperation with other farmers (10 to 25 members) is chosen when they have wider land (called *kongsi*⁴⁹). They prepare the land and start from one land to the other land. This method is effective and efficient in term of energy and cost, and creates closeness between the members. The members are a part of the matrilineal line or at least they are in same neighbourhoods, and if one of the members could not come at the cultivation time, they have to pay the penalty as much as one day's work salary, Rp.30.000 (US\$ 3.3) or they have to search for somebody else from their family to work that day. For the farmer who is not a member of *kongsi* and not able to cultivate alone, they will chose the third option. They will pay somebody to work on their land; this costs from Rp.25.000 - 30.000 (US\$2.7 - US\$3.3) per day. Most of the workers on farmland are older farmers (n = 25), followed by old women (n = 15), young men (n = 9) and young women (n = 2)⁵⁰.

The contour of the landscape consists of various slope, therefore, land is prepared following a terracing system. Water is collected from the closest canal which comes from different wellsprings from *Mt.Talang*. Water resources are well managed by the farmers and there is no competition among them. The size of their land is differs with (n = 40) had less than 1 Ha and (n = 10) had 1-2 Ha⁵¹.

⁴⁹ Cooperation systems in cultivating the land

⁵⁰ Old > 30 year old, young < 30 year old, own survey, total n = 50 (2009)

⁵¹ Source: own survey, n = 50 (2009)



Figure 17: Landscapes of NAB

Source: own picture (2009)

Based on our investigation, there are two concepts of terminology for pesticides/insecticides; *racun* (toxic) and *ubek* (medicament). The word *racun* is most commonly used in this area to indicate pesticides and insecticides. That means farmers really know the risk, but nevertheless they still used it because of the difficulties to manage the field and reduce pests and disease. They believe that the location of the land will influence the “degree” the amount of *racun* used. The closer the land to the hills, the higher the level of “biodiversity” (herb, pest), which means the farmers need a high quantity and combinations of *racun*. But, even though there is low biodiversity in the lower part of the region, *racun* is highly necessary due to insect and pest immunity, a consequence of intensive chemical practice in the last two decades.

The farmers believe that aside from the intensive cultivation, the climate change is also a main factor. The belief that if the climate would be stable as before (summer and rainy season balanced in every year) it would not be necessary to uses excessive pesticides and insecticides. The level of biodiversity and unpredictable rain fall make farmers think they are not able to avoid using pesticides to control and manage their land. For examples, some pests include slime and rot disease on onion skin, yellow leaf diseases and fruit rot of chillies (figure 18), stem rot disease in potatoes, and other diseases caused by worms and micro organisms. Pest and disease control is done by spraying pesticide into the plant. Spraying is done by a regular dosage, which starts from early growth and lasts until harvest.



Figure 18: yellow leaf diseases of chilli
(Own sources: 2009)

The fertilisation is carried out during land preparation, but sometimes is conducted when the plant has grown. Manure is often used, which is obtained from suppliers. The price of one sack of manure is between Rp.7000 – Rp.9000 (US\$ 0.77- US\$1). The reliance on fertiliser makes the land become infertile. Therefore, far from new lands, they have tried to cultivate organically. The organic lands are normally located closer to the peak of Mt. *Talang* and far from conventional land. The aim is to avoid contamination by pesticides and chemicals from the conventional land nearby.

The seeds are collected and prepared by farmers. The seed preparation is carried out by the farmers usually in large quantities. Seedling preparation usually ranges between 3 to 6 weeks, depending on the type of crops or sometimes to wait until the seedling is ready to plant onto the plot.

The harvest is done by farmers, family and paid-workers. The wages between males and females are different, where wages for male workers are as much as Rp.20.000 – Rp.30.000 (US\$ 2.2 - US\$3.3) per day, while for women workers they are Rp.20.000 (US\$ 2.2) per day. There are more female workers than male workers; this is the reason for the different wage. The celebration of the harvest season is only done by farmers if paddy is harvested, which is done by inviting all residents to eat together at home and then pray together. This is a belief that the rice harvest will bring sustenance and happiness for family farmers who are harvesting it.



Figure 19: Farmers group

Sources: own picture (2009)

Recently, local government and non government organisations tried to start organic agriculture. The farmers started to gradually reduce pesticides usage on crops. The work has begun to control pests and diseases with natural predators. The farmers have changed to apply organic agriculture where the fertiliser usage is reduced. The field courses are conducted by the government to increase agricultural output by providing counselling.

According to a survey in 2007 which was conducted by *Solok* District Health Department, NAB people contain pesticides in their blood. Therefore since 2007 the organic agriculture has started. The local government has begun to give the land, infrastructure and tools, as well as place for seedling and manure, too. The member of organic farmers group is selected by the local government and they get trainings, too. The group gets Rp.100 million (US\$ 11.200) to start an organic farm. The organic farm (new land) is far from the conventional land in order to avoid the contaminations with the conventional farm. The policy is also aimed at accelerating or improving the quality of the farmer's income.

The basic problems for organic farm are that there is no specific market for organic products, there are low human resources, and there is lack of manure and water resources. The price of organic products is similar to conventional products does not stimulate farmers to continue to cultivate organically. Even though, provincial government gives an incentive of Rp.250 (US\$ 0.27) per kg production, but this still does not stimulates the farmers to cultivate organically.

The organic pesticide consists of *Tithonia diversifolia*, garlic⁵² and other spices.

⁵² General insect repellent and deters Japanese beetles according to Mason (2003, p 92)

Guidelines to make the “organic pesticide” are conducted by local government. The organic seed comes from the conventional seed, after being used in conversion phase then this seed considered as “organic seed”. The manure comes from urine, chaff and coconuts *exocarp* and other fermented green leaves. They use insect traps such as, flowers, garlic, natural flavour, and aroma from *Surian* leaf (*Toona sureni*), *serei wangi* (*Cymbopogon flexuosus*), *mahoni* (*Swietenia macrophylla*).

The plant rotation is performed three times in a year (see table 10) to maintain soil fertility. They maintain the steps such as, preparation, planting time, and harvest. Therefore, we could find the farmers who plant the crops and the farmers who harvest the crops at the same times. This is very profitable for middlemen because there is always a supply for agricultural product; it is, very easy to get it. The main crops of this area are tomato (*Solanum Lycopersicum L*), potato (*Solanum tuberosum L*), chilli (*Capsicum annum*), onion (*Allium cepa L*), and cabbage (*Brassica oleraceae*).

Rice is stored only in the house of the farmer. *Rangkiang* was not found in this region and *kapuak* no longer exists in that region. They normally sell the foodstuff immediately after harvest. Since the farmers have low income, they are dependent on cash crops to maintain their livelihood. Most of the stock is being sold to fulfil the needs of the farmer.

Table 10: Plant rotation in NAB

Month	Farmer groups 1		Farmer groups 2		
	Tomato (<i>Solanum lycopersicum L.</i>)	Chilli (<i>Capsicum frutescens L.</i>)	Onion (<i>Allium cepa L.</i>)	Cabbage (<i>Brassica oleracea</i>)	Potato (<i>Solanum tuberosum L.</i>)
January	Land preparation		Land preparation		
February	Planted		Planted		
March	Harvest		Growth		
April	Harvest		Harvest		
May		Land preparation		Land preparation	
June		Planted		Planted	
July		Growth		Growth	
August		Growth		Harvest	
September		Growth			Land preparation
October		First harvest			Planted
November		Harvest			Growth
December		Harvest			Harvest

Sources: own survey (2009)

Mamak plays an important role in advancing all about the division of a large family inheritance. If there is one family member who wants to sell the treasures, it must be discussed by all family members. The share of heritages should be distributed to all family

members and agreed upon by each family member.

5.4. Fork side

Most kitchen activities and daily meal decisions are determined by the mother (n = 49), grandmother (n = 1), or daughter (n = 0), which is not relevant in showing matrilineal systems in Minangkabau's culture⁵³. The kitchen is a place to prepare food, but also a symbol of family secrets and deeply linked with female activity. Therefore, the knowledge and skills of daily cooking activities must be transferred from mother to daughter. A mother is morally responsible for passing the art of her cooking on to her daughter. Cooking activity is done only once a day; between 9 am 12 am it needs 1-2 hours for preparation. The techniques; processes, composition and spices are known only by the mother; thus, each family can be said to have its own secrets. The various techniques of slicing, mixing, sautéing, grinding, portioning, all affected the final taste.

All meals, breakfast, lunch, and dinner, are prepared at the same time. For dinner, only rice is further preparing while the main menu is simply re-heated. The rice must be always warm; it is a symbol of protection and delicacy. Recently, the role of the mother in transferring the family art of cooking to the next generation has declined as more young girls attend school far from their homes. Mothers have learned to cook through directly experiencing the traditions of their nearest female ancestors. As global changes support the formal education of more young females, finding time for the cultural transfer of these rich food traditions is becoming a challenge.

The husband does not interfere in cooking, or determine what food will be cooked. These decisions are the absolute authority of the wife, and will not be questioned by the husband. Sometimes, a husband may request specific foods. During celebrations, or for guests, *rendang* is cooked, *kalio*⁵⁴ meat, fried chicken or other meals with larger portion sizes. Based our observation, family unit are generally eating together at dinner time while sitting on the floor (see figure 20).

⁵³ n = 50, own survey (2009)

⁵⁴ See appendixes description of traditional food



Figure 20 : Home eating behaviour

Source: own picture (2009)

The cooking is done by using firewood, kerosene or gas stoves. The availability of wood is readily obtained from fields, gardens or forests that surround *nagari*. The spices needed for cooking can be found growing in household gardens, or are easily purchased. Spices grown in household gardens are turmeric, ginger, galangal, and basil.

Rice is the main carbohydrate consumed. Protein sources are mostly fish, eggs, and poultry. Even though *Nagari Aia Batumbuak* is located far from sources of freshwater fish, they have a relatively high fish consumption of 62 %, followed by eggs at 30 %, and poultry at 8 %. Horticulture thrives here, and as a result, they consume various vegetables such as; cassava leave, spinach, cabbages, cucumbers and carrots. The peripheral diet is composed of fried rice, fried noodle, *bakso* and *pangsit*. Secondary components are tofu and *tempeh* which are only eaten when no fish, egg, or poultry are available, or when they want more diversity in their diet. Instant noodles are not popular in these places. The noodles are only being consumed together with *bakso*. There is no evidence that people link to consume instant noodles on regular basis.

Table 11: Meal pattern in NAB

Core Item	Components Secondary core	Peripheral diet	Preparation method	Meal Pattern
Carbohydrate:	Tofu	Fried rice (8%)	I	I
Rice (100%)	Tempe	Fried noodle (8%)*	Frying	Rice
Proteins:	Coconuts milk	Bakso (22%)*	II	Fish
Fish (62 %)	Chile	Pangsit (4 %)*	Boiled with coconuts milk	Sambal-lado Vegetable
Egg (30 %)	Tea + Raw egg *		III	Water
Chicken (8 %)	Coffee and milk		Sate for Vegetable or sometime boiled	II
Vegetables:				One of the
Cassava leaf (26%)				Peripheral diet
Spinach (16 %)				III
Cabbage (30%)				Rice
Cucumber (2 %)				Fish + Coconuts milk
Carrot (14 %)				Vegetables
Beverages:				Water
Water				Fruits
Tea				
Coffee				
Fruits:				
Banana (64%)				
Papayas (28%)				
Oranges (19%)				

Source: own survey n = 50 (2009)

*) see appendices description of traditional food

The nutritional status of this area is classified as well nourished⁵⁵. To date, there are no cases of child malnutrition. The community strongly supports any government programs that work to improve the nutritional status of the community.

Table 12: Biodiversity in NAB

<p>Main crops (6) Paddy (<i>Oryza Sativa</i>) Groundnuts (<i>Arachis hypogea</i>) Cassava (<i>Manihot utilisima</i>) Sweet potato (<i>Ipomea batatas L</i>) Potato (<i>Solanum tuberosum</i>) Maize (<i>Zea mays L</i>)</p>	<p>Vegetables (3) Common bean (<i>Phaseolus vulgaris L</i>) Tomato (<i>Solanum lycopersicum</i>) Cabbage (<i>Brassica oleracea L</i>)</p>
<p>Spices (9) Chilli (<i>Capsicum annum spp.</i>) Clove (<i>Syzygium aromaticum L</i>) Candlenut (<i>Aleurites moluccana L</i>) Cinnamon (<i>Cinnamomun verum</i>) Onion (<i>Allium ascalonicum</i>) Turmeric (<i>Curcuma longa</i>) Ginger (<i>Zingiber Officinale</i>) Galangal (<i>Alpinia galangal</i>) Basil (<i>O. Basilicum L.</i>)</p>	<p>Fruits and other crops (7) Coconuts (<i>Cocos nucifera</i>) Tobacco Coffee (<i>Cofea Arabica</i>) Tea (<i>Camelia sinensis</i>) Cacao (<i>Theobroma cacao L</i>) Passion fruit (<i>Passiflora edulis</i>) Terung pirus(<i>Solanum betaceaum</i>)</p>

Source: own survey (2009)

⁵⁵ Health department Solok district

As shown in Table 12, of the 29 basic spices used in the Minangkabau`s food, only 9 spices were available in the surrounding area. Nonetheless, NAB is categorized as food secure; a government calculation and categorized as green zone based on the rice harvests⁵⁶.

Marantau plays a role in traditional farming and food culture. It is estimated that about 5 – 10 %⁵⁷ young people gone to *marantau*. Many of the children prefer to work on farms in the area. The destinations of *rantau* are mostly in Riau, Jambi, and South Sumatra. Women mostly are migrating to *rantau* because of arranged marriages.

The educational background of mothers is typically very low, only (n = 3) have graduated from a university, (n = 13) completed senior high school, (n = 8) finished junior high school, while most only finish elementary school (n = 28)⁵⁸. According to elementary and secondary education directorate explain that nutrition explanation has already been given in the early year in junior high school. This is not enough to guarantee that young women will develop the skill needed to maintain sustainable nutrition in household.



Figure 21: Lapau in NAB

Source: own picture (2009)

In the past, women often did not leave their farm land. The opportunities for women to get a better education were less than today. Therefore, a policy priority should be the construction of a high school. Based on interviews, the enthusiasm of the young generation for their own continued education is high. The geographic distance between homes and schools was identified as the major barrier for students to continue in their studies.

Most of the males are used spending their time in *lapau*, which can be seen figure 21.

⁵⁶ Productivity 5 – 5.5 ton / ha (2008) (Departement of agriculture and horticulture, province of West Sumatera)

⁵⁷ Own survey 2009

⁵⁸ n = 50, own survey (2009)

They are normally drinking “*teh talua*”, coffee or ice tea. There is small television in the corner of *lapau*. Based on observation, casual conversation is common, often related to the news or other hot issues seen on this television. There are no television programmes offering information about agriculture or nutrition. Therefore, there is no transferring knowledge about agriculture and nutrition through television.

The local government has started the organic farming systems, even though it is hard to implement needing time and capital to convert the land. During this conversion period, farmers earned little profit due to the selling price for organic product not promising. The other factors is that the farmers dependent on the supermarket in *Padang* to sell their harvest. Furthermore, they do not have storage equipment which creates loses of production during harvest. Therefore, when the lowest prices period occurs they choose not to harvest their plant.

5.5. Cluster of potentials and problems of food security and food culture according to the results

The IK no longer exists in this area. The shifting from conventional agriculture to organic farming systems is a result of the local government initiative. Weather and selling price are the main problems for the farmers to improve their food security. **HA** can provisionally be accepted as a factor that influences the food security and food culture in NAB.

The mother plays an important role in farm to fork processes such as; kitchen activity, land management, *marantau*, food culture, and include the gender preference to continue the art of cooking. **HB** can provisionally be accepted as a factor that influences the food culture and food security in NAB.

Marantau has overwhelmingly changed the farmland activity. This is because they had more choices to work regionally, such as PTPN IV (tea plantation). The local government is increasing its effort to improve the income of farmer’s through introducing organic farming. **HC** can provisionally be accepted as a factor that influences the food culture and food security in NAB.

Men and women have the same distribution within the agricultural sector, but women get paid less due to the perception of farming as a male job. There is no such discrimination in the provision of education; all the men and women are equal gone to school. The problem is that the girls have less time together with their mother, in order to pass down the knowledge

and skills of the kitchen. **HD** can provisionally be accepted as a factor that influences the food culture and food security in NAB.

Mass media has not significantly changed the food habits of people in NAB; they said that they changed the meal because of less income and availability of food stuff. Henceforth, mass media is not given any impact on farming system. **HF** can not provisionally be accepted as a factor that influences the food culture and food security in NAB.

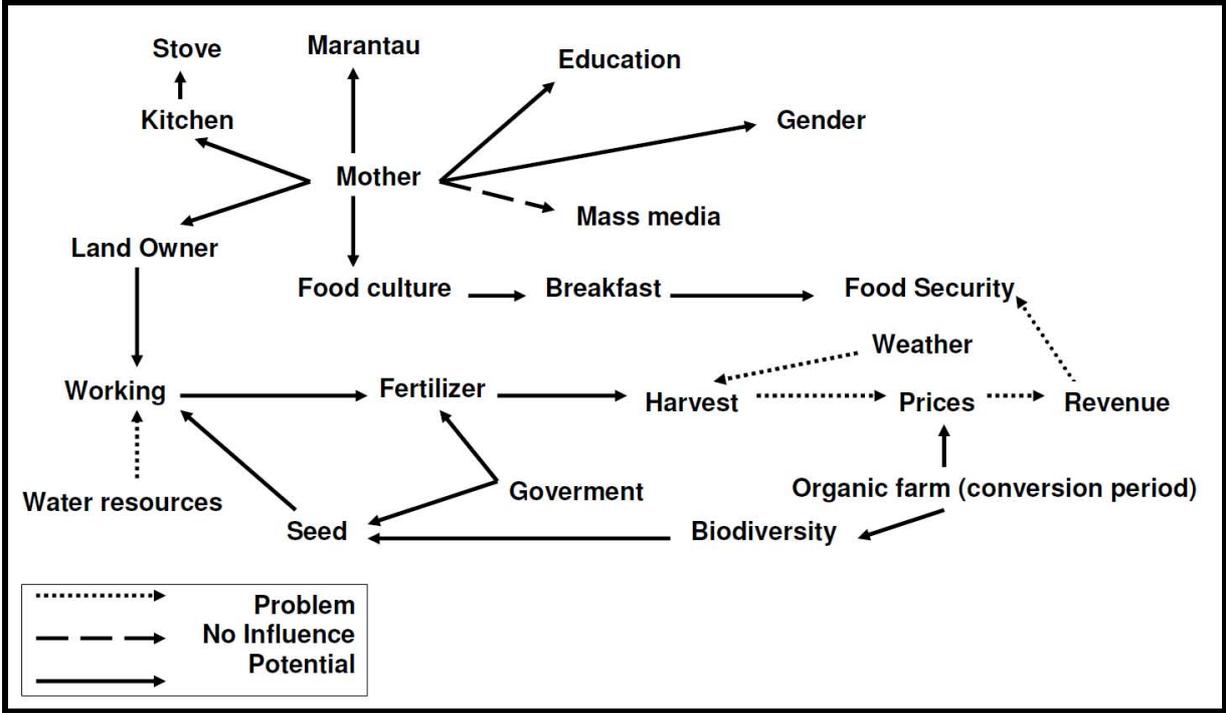


Figure 22: Cluster of potentials and problems of food security and food culture according to the results of the investigation

Source: analysis with Maxqda10 (2010)

Chapter 6 Results: Nagari Padang Laweh Malalo

Chapter six presents the research site located nearest to a lake. This chapter explains about *Nagari Padang Laweh Malalo* (NPLM) West Sumatera includes topography, demographic, farm to fork, and cluster analysis as well.

6. 1 Topography of Nagari Padang Laweh Malalo

1. Geographical sites : 0°29'38'' and 0 ° 35'30'' South Latitude
100 ° 22'36'' and 100 ° 31'44'' East Longitude
2. Borders : North side is *Batipuh* and *Rambatan* sub-district
South side *Solok* district
West side is *Padang Pariaman* district
East side is *Rambatan* and *Solok* district
3. Area of NPLM : 14.70 km²
4. Number of *Jorong* : (3) *Padang Laweh, Tanjung Sawah, Tangah Duo Puluah*
5. Elevation ASL : 500 meters

Soils in NPLM are dominantly *Inceptisols* which can describe as cool to very warm. Humid and sub-humid regions can be found in equatorial to tundra regions, and in landscapes that are relatively active, such as mountain slope (Soil Survey Staff, 1999: p.489). Based on investigation, there are many stones on farmland which reflected the typical soil closer to volcanoes; located between Mt. *Marapi* and Mt. *Singgalang*. The stones make farmer's hoe often damaged. There other typical soil is *Andisols*, which have *andic* soil properties in 60 percent of the upper layer with one outstanding features of high natural productivity (see figure 21).

The water sources are coming from hills adjacent to the farmland. The spring used for irrigation of the rice fields, is also used for household activity. There are at least 20 springs, some of them merging to form a larger flow. The water resources come from several springs such as: *Aia Situngka Banang, Sungai Baliang, Bigau, Aia Batuang, Batu Hampa, Aia Ubun-ubun, Sungai Rak Ili, Batang Lasia, Muaro Buluah, Aia Lalu, Pincuran Lubuk, Siku Banda, Sawah Jambak, Sungai Pakak, Aia Sawah Dukik, Umpia* (which is used as a source of drinking water in a clean water program). When the dry season comes, most springs will run

dry even with a maximum annual rainfall of 4761.90 mm.

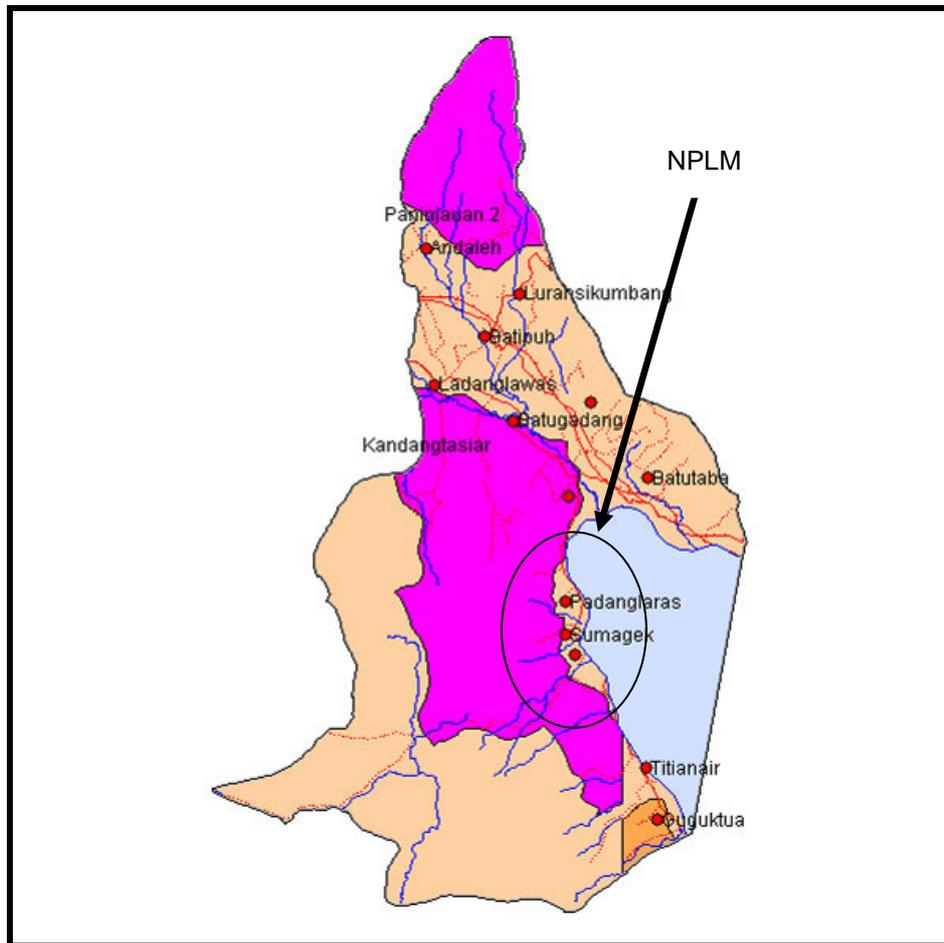


Figure 23: Soils map in NPLM

Violet: Andisols, Brown: Inceptisols, Dark Brown: Ultisols

Sources: Suparto, J. Tajin, T. Budiarto, E. Husen, N. Prasodjo and U. Suryana. (1990)

6. 2 Demographics of Nagari Padang Laweh Malalo

In 2005, the total population was 2312 with 1049 male and 1263 female⁵⁹. All of them are of Moslem faith. Based on investigation, the clan of *Sikumbang* had the largest land in comparison to other clans; *Chaniago*, *Koto*, and *Piliang*. Minangkabau is the widely spoken language among all clans. Farming is the main activity.

A typical household characteristic according to our investigation is consisting of a father, mother and 3 children (n = 50) with a ratio of male to female being (1:1). The grandmother normally stays with her daughter. Food consumption occurs 2 times per day (n =

⁵⁹ Central bureau of statistic *Tanah Datar* district

22) and 3 times per day (n = 29). They will occasionally eat out during work day (n = 4), 1 time per week (n = 24) and 1 time per month (n = 15). The families investigated had a monthly income of Rp.500.000 (US\$ 55.5) (n = 16), Rp.500.000-Rp.1.000.000 (US\$ 55.5-US\$ 111.1) (n = 21) and more than Rp.1.000.000 (US\$ 111.1) (n = 12). Most of them were farmers (n = 27), traders (n = 13) and civil servant (n = 3). They have side jobs such as livestock breeding (n = 13), *lapau* (n = 1), *ojek* (n = 2), woods trader (n = 1) and fishermen (n = 3). Land status is clan ownership (n = 24) and family ownership (n = 6) and father ownership (n = 2) and rent (n = 1). For the clan ownership and family ownership the lands are divided by *mamak* (n = 27). The families that investigated have less than 1 ha (n = 24), 1 ha – 2 ha (n = 7), and 2 ha- 5 ha (n = 1). Since most of the lands (n = 30) are under clan ownership therefore only (n = 1) farmer could show evidence of ownership. The clans' ownership has less freedom in managing the land rather than individual ownership.

6. 3 Farm side

There is a meeting among farmers before cultivation begins. The meeting is to discuss when, each peaces of land is to be cultivated or harvested, and to whom the work should designated. There is a share system in NPLM which is depends on the processing stages: *manyang*⁶⁰, *malambuik*⁶¹ and transport. For example in 100 *sukek*⁶² rice (from harvest) the wages of workers is 12 *sukek*. Normally harvest one family will get up to 3000 *sukek*.

Topographically these location experiences cloudy conditions daily, the winds come from the top of the hill, north east of the NPLM. Interestingly, there is not enough rainfall even though data shows an annual rainfall is 4761.90 mm⁶³ (2007), the rain largely fall behind the hill. The people describe this phenomenon as “*shadow of the rain area*” (see figure 24). Despite this high annual rain fall, the particular valley where they live does not benefit because the topography diversity water flow into adjacent regions. However, there are also some advantages to this local micro-climate. The dry wind blowing from the top hill creates conditions in which pests and plant diseases cannot survive. This seasonal and predictable phenomenon provides a dependable and ecological plant protection strategy.

In certain area there are also many larger destructive plant pests such as mice, monkeys, and rice bugs (*Leptocorisa oratorius Fabricius*). Farmers use traditional plant

⁶⁰ Clearing from weeds

⁶¹ Separation of fascicle from the stem

⁶² Measurement system's in NPLM

⁶³ *Tanah Datar* agricultural department.

protection methods to reduce these pests. For rats, monkeys, these methods include hunting or trapping. For the rice bug, farmers will burn the common lake-growing plant, *Jariamun* (*Potamogeton. malaianus miq*), in the middle of the field rice like a torch, thus driving this pest from the farm (see figure 26). But in contrast to that, *P. malaianus Miq* is actually a *macrophyte* which help the lake as they act to stabilize sediments, absorb nitrogen and phosphorus both from over lying water and sediments, and at the same time provide habitat for *Piscivorous* fish (Orth and Van Montfrans. 1984: Søndergaard et al., 1996).

Singkarak Lake is a tectonic lake with habitat for many *macrophytes*, fish, and algae. This lake is 20 km in length, and 6.8 km wide, covering 107.8 km², with a maximum depth 268 m. The primary inflow is the *Sumani River* and the primary outflow is *Batang Ombilin*. NPLM is located in the western part of the lake which is directly close to the *barisan* hills. Therefore, people frequently go fishing on the lake, often catching *Bilih* fish (*M. padangensis*) (see figure 25). The fish size is around 7-10 cm with glittery skin. *M. Padangensis* is a native fish of *Singkarak* Lake which a natural resources that is an asset for this community. Based on the provincial government report, NPLM is categorized as a green zone⁶⁴, this according to the local government automatically categorizes the region as high in food security.



Figure 24: “Shadow of the rain area”

Source: own picture (2010)

The crop rotation is based on *tahun gadang*⁶⁵; rice planted as monoculture, with no intercropping occurring (14 months with 3 times the rice harvest). The rice is stored in *goni* (fiber sacks) whereas *Rangkian* and *kapuak* are no longer being used for storage because of they are now sold directly from the field, since farmers do not want to pay additional

⁶⁴ Productivity 5-5.5 ton/ha (2008) (Department of Agriculture and Horticulture, Province of West Sumatera)

⁶⁵ A cultivation calendar is equal to 14 months.

transportation costs from the field to their house. As part spiritual activities and beliefs, they still practice a procession of *doa tolak bala*⁶⁶. It is performed at night around their fields with the hope that they do not experience crop failure, pests, or plant diseases. They believe that the success of their harvest is possible only through divine intervention. This traditional ritual is still performed by some people, and not by others⁶⁷.

Table 13: Crops rotation on NPLM

Months	Crops		
	Paddy (<i>Oriza sativa</i>)	Peanuts (<i>Arachis hypogaea</i>)	Corn (<i>Zea mays L.</i>)
January	Planting		
February			
March	Harvest	Land preparation	
April			Land preparation
May		Planting	Planting
June		Growth /Harvest	Harvest
July			
August		Harvest	
September			
October			
November			
December	Land preparation		

Sources: own survey (2009)

In last 5 years, organic agriculture has begun to develop. The symptom of pesticide resistance in insect population was increasing; the soil was damaged, and the cost of production was high. Farmers began to reduce or eliminate fertilizer usage inspite of active promotion from fertilizer companies. Farmers who tended to use conventional fertilizer products became dependent on this input. According to investigation; farmers think that organic farming system takes a lot of time, a lot of energy, and are generally a hassle. Seed companies takes advantage of this sentiment by offering cheap seeds and seasonal credit programmes, includes fertilizer designated for that seed. Most farmers would rather choose to use seed from companies compared to following organic farming systems.

Local awareness of the scarce water conditions has allowed the people of NPLM to face this challenge with wisdom. “*aia adat*” (water resources controlled and regulated by custom) is one of their strategies to distribute the water. The general rule is that irrigation will flow from 6 pm – 6 am regularly to all farm land, but the rule wills ammended when rains occur. Alternatively, water resources can be used during the day from other sources, such as

⁶⁶ *Doa tolak bala* is a pray to defence from misfortune

⁶⁷ *Muhammadiyah* and *Nahdatul Ulama* has different way to perform Syaria’ in Muslim religion

creeks, without special supervision. The traditional irrigation systems are strictly managed by *ninik mamak*⁶⁸, which directly appointed "*kapalo banda*" (which regulates water sharing during the night – irrigation). *Aia adat* is used only for paddy cultivation, with accordance to the quota; if there is a violation of the rule, customary sanctions are used to punish the guilty parties.



Figure 25: Bilih fish (*Mystacoleues padangensis*)

Source: own picture (2009)

Marantau has two primary impacts to the community. First is giving of direct remittances to the mother (land owner) which can be used for daily consumption and invest on farm. Secondly, the lowest productivity on farmland is because fewer farmers are working on the farms, and most of workers are now elderly. *Marantau* plays an important role in traditional farming and food culture in NPLM. In food culture, the second generation often moves to *rantau*, and are not able to cook traditional food properly.

The national government annually announces the fixed price for grain and other basic needs, initially aimed as a protection from gluts in the market. It is important for the farmer to sustain their production from season to season. Unfortunately, for most farmers in NPLM, accomplishing this goal is often dependent on the remittances from their relatives in *rantau*, which are not always received on a regular basis. The illegal logging done by the neighbour's of *nagari* will certainly impact the area of NPLM. The illegal logging in some places outside NPLM are motivated by the need to open a new farmland due to a scarcity of arable land for paddies linked to the fact that 60 % of West Sumatran lands are covered by national forest and forbidden from cultivation.

⁶⁸ Bother's from mother lineage



Figure 26: Jariamun (*Potamogeton malaianus miq*)

Source: own picture (2010)

Seeds are provided by the local government to groups of farmers (*kelompok tani SAKATO*). Farmers prefer to prepare the seed themselves; feeling it is more suitable for the land. The method uses a salt water mixture, in which the concentration is gradually increased until it can support the flotation of a chicken egg. The best seeds are then selected by submerging all into water, after a short period; the most virile seeds will sink and thus be chosen as for cultivation. This is the way the farmers select their seed. This method is enhanced through trainings which are given by FEA.

Table 14 shows that only some of the spices being used are actually being cultivated in the surrounding area. Many are imported from outside. Some spices have to be purchased such as; onion (*Allium cepa*), ginger (*Zingiber officinale*), cloves (*Syzygium aromaticum*), potato (*Solanum tuberosum*), shrimp paste, cooking oil, salt, and sugar. They normally buy the spices at the traditional market in *malalo* every Tuesday; they purchase a stock for a week.

While leaves of lemongrass (*cymbopogon*), galangal (*Alpinia galangal*), turmeric (*Curcuma longa*), chilli (*Capsicum annum*), *ruku-ruku* leaf (*Ocinum sanctum L*) (figure 27), and cinnamon (*Cinnamom verum*), and lemon leaves, bay leaves several types of vegetables such as: cassava leaf, kale leaf, spinach they got from the fields and plant fence deliberately cultivated in their respective backyard.

Most of Minangkabau`s fish cuisine must use *ruku-ruku* leaves (*Ocinum sanctum L*) (see figure 25). These leaves are usually used as a seasoning when cooking fish. These leaves are able to eliminate the stench of fish. In Java, people use basilicum which can repel flies (Mason 2003, p. 92). The leaves provide fresh aromas to fish dishes. Sometimes the flower of

this plant is also being used in various recipes.

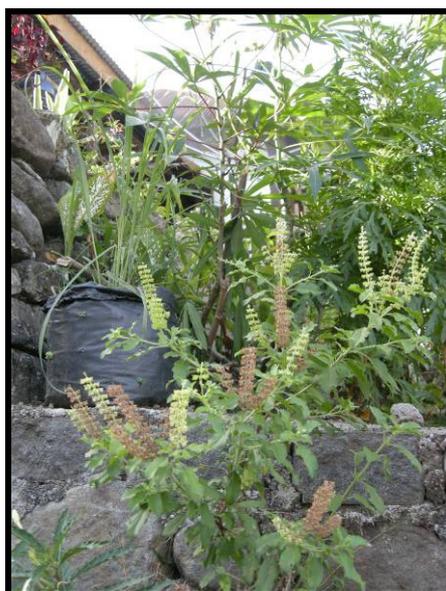


Figure 27: Ruku-ruku leaves (*Ocinum sanctum* L).

Source: own picture (2009)

Table 14: Biodiversity in NPLM

Main crops (3)	Vegetables (3)
Paddy (<i>Oryza Sativa</i>)	Spinach (<i>Amarathus spp</i>)
Cassava (<i>Manihot utilisima</i>)	Cassava leaf (<i>Manihot utilisima</i>)
Sweet potato (<i>Ipomea batatas L</i>)	Kale (<i>Brassica oleacera</i>)
Spices (12)	Fruits and other crops (19)
Nutmeg (<i>Myristica fragrans</i>)	Coffee (<i>Cofea arabica</i>)
Vanilla (<i>Vanilla planifolia</i>)	Coconuts (<i>Cocos nucifera</i>)
Clove (<i>syzygium aromaticum</i>)	Cacao (<i>Theobroma cacao</i>)
Candle nut (<i>Alleuretus molucanna</i>)	Kapok (<i>Caeba petandra</i>)
Cardamom (<i>Amomum comppactum</i>)	Areca nut (<i>Areca catechu</i>)
Ruku ruku (<i>Ocinum sanctum L</i>)	Sugar palm (<i>Arenga pinata</i>)
Lemongrass (<i>Cymbopogon</i>)	Sawo (<i>Manilkara zapota</i>)
Galangal (<i>Alpinia galangal</i>)	Rambutan (<i>Naphelium lappaceum</i>)
Turmeric (<i>Curcuma longa</i>)	Durian (<i>Durio L</i>)
Chilli (<i>Capsicum annum</i>)	Purple mangosteen(<i>Garcinia mangostana L</i>)
Cinnamon (<i>Cinnamom verum</i>)	Avocado(<i>Persea americana</i>)
Lemon leaves (<i>Citrus Limon</i>)	Orange (<i>Citrus sinensis</i>)
	Banana (<i>Musa paradisiace</i>)
	Papaya (<i>Carica papaya L</i>)
	Kuweni (<i>Mangifera odorata</i>)
	Bell fruit (<i>Syzygium aqueum</i>)
	Guava (<i>Psidium guajava L</i>)
	Pomegranate (<i>Punica granatum</i>)
	Sugar apple (<i>Annona squamosa</i>)

Source: own survey (2009)

6. 4 Fork side

The mother plays an important role in deciding the daily meal (breakfast, lunch and dinner). The role includes land ownership, food storage, spices, teaching her daughter, education, and almost all activity in the kitchen. The mother promotes nutritional consumption for her family, but nonetheless, diet is also related to family income. Based on investigation the food would store well (only for rice), but because of low monthly income of Rp.500.000 (US\$ 55.5) (n=16), Rp.500.000- Rp.1.000.000 (US\$ 55.5 - US\$ 111.1) (n = 22), and more than Rp.1.000.000 (\$ 111.1) (n = 12) respectively. The mother has to sell the reserves of rice to get money for other activities, such as education, or to invest on the farm. *Bilih* fish (*M. padangensis*) is not consumed every day because of low availability. The mother spends 2 hours cooking and it takes normally from 10- 12 am every day. She gets the spices from the backyard or sometimes from the backyards of her neighbour. She still uses firewood stove (see figure 28). In addition to giving a unique taste to their food, firewood can be easily found from the surrounding area. Taking firewood from the forest is strictly prohibited in NPLM.

The mother has an important role in teaching the daughter how to cook. It is considered shameful in the Minangkabau`s culture if girls can not cook well. The challenge today is less time for these interactions between mother and daughter because of the distance of schools from the house. Little time together between mother and her daughter is a key obstacle to transferring the art of cooking in today`s world.

The daily food is cooked and prepared by the mother (n = 50) and assisted sometimes by the girls⁶⁹. Options for the family menu are entirely at the discretion of the wife as mother of the household, who is considered to be more aware of family tastes. It is undeniable that the role of mothers in the custom here is very large related to the management of the internal household. However, when many family members are in *rantau*, food is prepared only one time a day consider only mother and father will eat. Once the food has been cooked it enough to be consumed thought the day, for all three meals. When food is left over, it will be stored in a cabinet and often consumed the next day. The cooking is done conventionally, with firewood or kerosene stoves for frying, making soup, and boiling vegetables. Based on observation, eating together inside the household is done at dinner time while sitting down on the floor.

⁶⁹ n = 50, own survey (2009)

The culinary herbs and spices are derived from plants grown in the backyard of the house. Instant noodles are not popular in this area; they are consuming instant noodle just for the side dishes and even this is rare. There is no evidence that the local people adopting instant noodles into their food habits. The nutritional status of this area is classified as well nourished⁷⁰. Up to now, there is no case of child malnutrition. The program is conducted in the form of intensified the division of neighbourhood health centre and additional food for free. The community strongly supports any government programs aimed at improving the nutritional status of the community.

Table 15: Meal pattern of people in NPLM

Core item	Component secondary core	Peripheral Diet	Preparation method	Meal Pattern
Carbohydrate: Rice (100%)	Compact rice	----	I. Frying	I. Rice , fish, <i>sambal lado</i> , vegetable, water
Protein: Fish (32%), Egg (12.7%) Beef (30.7%) Other (24.6%)*	*Tempe (soya bean) or tofu		II. Boiled with water	II. Rice, fish + coconuts milk, vegetable, water and fruit
Vegetable: Cucumber (25.4%) Cassava leaf (60.6%) Jackfruits (14%)			III. Cooked with vegetable or sometime boiled	
Fruit: Banana (48%), Papaya (45%), Water melon (7%)				

Own sources: semi-structure questionnaire, n=50 (June-Sept 2009)



Figure 28: Mother role in NPLM

Source: own picture (2009)

⁷⁰ Health department Tanah Datar district



Figure 29: Transportation systems in NPLM

Source: own picture (2009)

Most of the mother have only graduated from elementary school (n = 21), with junior high school (n = 18), senior high School (n = 7) and university (n = 3) following respectively. There is unwritten cultural expression that a woman is not *fully* a woman if they can not cook well. Therefore, beginning their teens, girls are helping their mother to prepare food and cook each day. This role has been respectfully admitted by men. Men are not involved in cooking and food preparation, therefore they trust what women prepare and cook. The daily food preparations have the similar distinct flavours of one clan which can be tasted during traditional festival. For instance, *Pangek sasau*⁷¹ and *bilih* fish is a dish that cannot be found in any other place. Even in *nagari* around the *Singkarak* there is a distinctly different taste.

Radio and television is a popular means to get information. Commonly, houses will appear in poor physical condition, yet they still have a television. The advertising on television does not attract much attention from the villagers. Newspapers are purchased via requests to regional bus drivers, often taking an average of 4 hours to receive (figure 29).

The national and regional television broadcast system is easily accessed by the local people. This pipeline to modern visual media offers a glimpse at many diverse and modern lifestyles, including advertisements for many non-traditional foods. Based on our observation, many modern food and beverage products are sold in small shops or markets nearby. But in fact, local people seem little if at all affected by this marketing, as evidenced by the lack of changes in their food habits. In every stall of *lapau*, although there are cappuccinos, cola drinks, etc., they mostly consume tea and coffee. Instant noodles are rarely set out on display at these stalls, and also rarely consumed by the people. Eating three meals a day at home with rice and side dishes are enough for the people. Instant noodles are only consumed

⁷¹ See appendices description of traditional food

occasionally as another variation of the daily menu (as a complement to vegetables sauces).

6. 5 Cluster of potentials and problems of food security and food culture according to the results

The local wisdom such as, *aia adat*, *jariamun*, *bilih* fish, conditions from the “*shadow of the rain area*” are actually supporting food security, yet doubts of whether future generations will continue to farm the lands remains a central challenges. **HA** can provisionally be accepted as a factor that influences the food culture and food security in NPLM.

The mother is responsible for food storage, land ownership, food culture, and includes gender preference to continue art of cooking, education and kitchen activities. Because of this role, a mother will feel insecure when her food stock must be sold because the family must get cash for other activities. **HB** can provisionally be accepted as a factor that influences the food culture and food security in NPLM.

Most of the young men and women are moving to *rantau*. Most of them are not able to cook as good as their mother and not involved on farmland before. The remittances are helping the sustainable for farm on the short run. The little participation of young men on the farm is leading towards an unsustainable agriculture system. **HC** can provisionally be accepted as a factor that influences the food culture and food security in NPLM.

The local government introduces intensive farming systems, often not taking into consideration the existing indigenous knowledge or local conditions. Because local farmers are experiencing a strong need to improve their own conditions, they are often compelled to accept the advice and financial resources of the agricultural ministry. The intensive programmes supported often do not support high levels of biodiversity. **HD** can provisionally be accepted as a factor that influences the food culture and food security in NPLM.

Men and women are equal in getting access to formal education but men, increasingly, are tending to get their higher education in none agricultural sectors. Kitchen is intimately linked with femininity. It is shameful for a girl who can not cook properly. Time spent in school is not time spent in the kitchen. More girls are taking the opportunities of an education over the opportunities of perpetuating food tradition. **HE** can provisionally be accepted as a factor that influences the food culture and food security in NPLM.

Mass media and communication system are not having any impact on the changing traditional farming system and food culture. They used mass media only the purpose of

entertainment. **HF** can not provisionally be accepted as a factor that influences the food culture and food security.

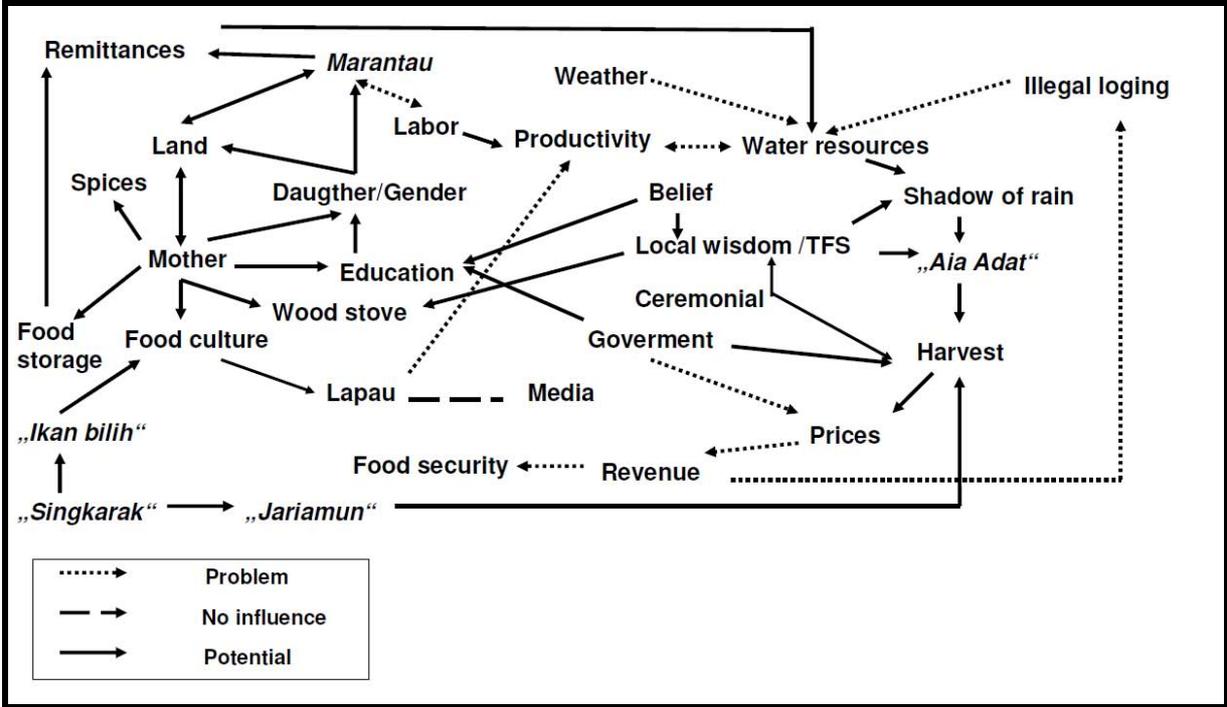


Figure 30: Cluster of potentials and problems of food security and food culture according to the results of investigation.

Source: own analysis with Maxqda10 (2010)

Chapter 7 Results: Nagari Pandai Sikek

Chapter seven presents the research site located in hilly area. This chapter explains all about *Nagari Pandai Sikek* (NPS) West Sumatera includes topography, demographic information, farm to fork and cluster analysis as well.

7. 1 Topography of Nagari Padai Sikek

NPS is located in hilly area with:

1. Geographical sites : 0°24'154'' South Latitude
100°23'556'' East Longitude
2. Borders : North side *is Agam* district
South side *Padang Pariaman* district
West side *is Padang Pariaman* district
East side *is Batipuh* sub-district
3. Area of NPLM : 16.26 km²
4. Number of *Jorong* : (4) *Koto tinggi, Tanjung, pagu-pagu* and *baruah*
5. Elevation ASL : 1094 meters

Soils in NPS are predominantly *Inceptisols*. This is a common soil in cool to very warm, humid and sub-humid regions which occur from equatorial to tundra regions and in landscapes that are relatively active, such as mountain slopes (Soil Survey Staff 1999, p. 489). Based on our survey, NPS is located in a very sloping region; nearby *Mt. Singgalang* and the surrounding areas are predominantly *Andisols*. This soil is typically developed by volcanic *ejecta* (such as volcanic ash, pumice, cinders and lava). *Andisols* have *acidic* soil properties in 60 percent of layer in the upper part of the soil, with an outstanding feature of high natural productivity. *Bt. Singgalang* is the river throughout the *Nagari* that is 6 km in length. The highest rainfall rates are in March and October with an annual rainfall of 4.762 mm with almost 268 days of rain in years, which is higher than the other sites.

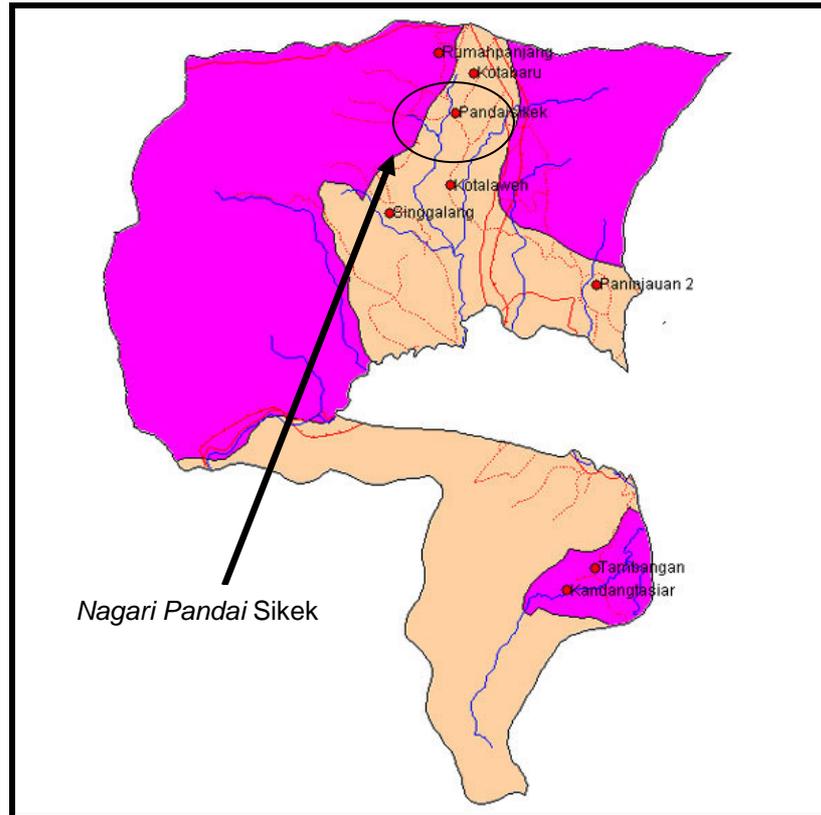


Figure 31: Soils map in NPS

Sources: Suparto, J. Tajin, T. Budiarto, E. Husen, N. Prasodjo and U. Suryana. (1990)

Violet : Andisols, Brown: Inceptisols, Dark Brown: Ultisols, Bright Brown: Entisols

7. 2 Demographics of Nagari Pandai Sikek

In 2007, the total population was 5523. All are of the Moslem faith. Earlier in this region there were only four major clans; *Koto*, *Guci*, *Sikumbang* and *Pisang*. These clans are growing and becoming nine clans. The current clans in NPS are the *Panyalai*, *Jambak*, *Sikumbang*, *Pisang*, *Guci*, *Koto Gantiang*, *Koto Limo Paruik*, *Koto Tibalai*, and *Koto Sungai Guruh*. Minangkabau`s is the widely spoken language among them with all clans sharing a *Pandai sikek* dialect. Farming is the main economic activity.

A typical household profile according to investigation, consists of a father, mother, and 2-3 children (n = 50) with ratio of male to female (1:1). The grandmother stays with the closest family. Food intake is 2 times a day (n = 8) and 3 times a day (n = 42). They are rarely eating out, only on working days (n = 1), once a week (n = 3), or once a month (n = 4). The families that were investigated have a monthly income of Rp.500.000 (US\$ 55.5) (n =1), Rp.5.00.000-Rp.1.000.000 (US\$ 55.5 - US\$ 111.1) (n = 12) and more than Rp.1.000.000 (US\$ 111.1) (n = 33). They have side jobs such as farmer (n = 10), or weaver (n = 18). Most

of the land is under family ownership (n = 40), rent (n = 4) and sharing system (n = 1). Most of them have less than 1 ha (n = 41) and 1 ha-2 ha (n = 4). All of the land has evidence of ownership (n = 45) which means that the land has been divided based in division of inheritance.

7. 3 Farm side

Every clan has their own land which divided according to *paruik* (matrilineal system). In a family, the land cultivation duties are rotated among female owners each season, or on some lands, the head of the clan will create a profitable enterprise for communal activity and profit. The right to manage it depends on the agreement among families. Where in many cases, land owners are not able to work on their farm, they may rent the land for at least one year planting cycle (16 months). The other option is a profit-sharing model with farmers. When land is in this manner, the free is determined based on land productivity, or the rice yield for the first time planting. Standard measurement is *katidiang*⁷², where 1 *katidiang* of rice equal to Rp.70.000 (US\$ 7.77). If a field is capable of producing 20 *katidiang* rice, then the rent for 1 planting cycle (16 months) is equal to Rp.1.400.000 (US\$ 155.55), land with very fertile soils, and close to the river or other irrigation systems are more expensive to rent.

The land preparation starts with land clearing. Next, holes are made and manure inside is displaced inside (see figure 30). Land land is prepared by the family with the father providing a leadership role in workmanship, cultivation and harvest. The mother and daughter will also help with work on the farm. It starts with "*malunyah*" (for rice land). At the same time, drier land is prepared through clearing, followed by "*mametak*" – the making of plots. The father is responsible for managing the land during the entire process of cultivation, from planting, through harvest. Sometimes the mother will help. The mother has no big role in cultivation.

Pesticides are used in plant protection here, sprayed periodically according to plant needs and pest cycles. This method is very powerful because it can impede and even eradicate pests quickly. They perceived that this is the good way to protect their plant. Based on investigation, they really understood that this is not the best way to manage pests or diseases but they did not feel that they had any alternative options. During the late 1990's, NPS was routinely preventing pests and diseases through weekly pesticide regimes. More recently,

⁷² Unit of volume, 1 *katidiang* is equal to 20 liters of rice

spraying is spraying only done after evidence of the pest and diseases are discovered. According to observations, recently, they wish for to transition from insecticide to the use of natural predators. Yet it is not evident that they are concerned about the environment but, rather, about the high cost of pesticides more. Up to now, farmers have not tried to utilize natural predators, because they do not have any knowledge about that. The farmers typically use “normal” fertilisers, and it is rare to find farmers using manure. Even though the current government works to guarantee the accessibility and availability of fertiliser; it can still be a challenge to find in the market.



Figure 32: Landscape of NPS

Source: own picture (2009)

The main crops are vegetables such as; chilli (*Capsicum annuum*), tomato (*Solanum lycopersicum L*), celery (*Apium graveolens*), eggplant (*Solanum melongena*), and cabbage (*Brassica oleracea*). According to interviews, they said that the crop rotation is aiming to recharge soil fertility and produce a diverse harvest. Little competition among farmers is the main reasons for sustained high prices. But not all the farmers are using a crop rotation.

The native paddy varieties are *Angku Rabun* and *Mundam*. Farmers said this type of paddy have a good taste and match with local farming conditions. There has been a significant change in the management of the paddy fields. Several years ago the plough was pulled by using a buffalo, in the last a few years this method has been replaced by the use of tractor. Tractors allow for faster and cheaper management, yet the draught power of the buffalo resulted in less intensive tillage of the soil. Paddy *kuniang* and paddy *samek* are originally come from NPS. But since a few years ago these types of rice began to disappear in NPS because other species, introduced from the local government, have been increasingly utilized. Normally, the seed is selected by farmers themselves, most of it being purchased from other

farmers. This method is considered the best way because the breed is better and more suited to the geographical condition.

The crop rotation allows the farmer to harvest every week or even two times a week. They have to sell the crop directly on the day of harvest because a lack of cold storage. Based on the interview, the seed that comes from outside the region can not growth well in NPS. Therefore, the local knowledge on seed selection is considered to be beneficial. The plants are harvested without any special ritual or ceremony, because the harvest has been a daily activity in NPS. For example chilli is harvested by the family and directly brought home to prevent acts of theft, while the mustard greens are usually left on the farm or by the roadside in the village before carrying to market the next day. Chilli is categorized as cash-crop because the prices are good. People feel secure with their food. According to our interview they said that as long as if there is still raw food stuff to be cooked, it's enough for them. The storage of crops (rice) has been replaced by sacks made from plastic while *rangkiang* and *kapuak* no longer exists only a symbol of culture.

The clans that have the largest amounts of land are *Pisang* and *Koto*. However, immigration has grown in the last few years; the population and the distribution of land ownership have been changing. Until now, the land has been divided and managed based on a family's agreement. The special offer is given by *Pisang* clan; with head of the clan receiving a share from the harvest. Selling the land to outsiders is prohibited. This land is only for the people inside the clan of *nagari*.

7. 4 Fork side

The mother plays an important role in cooking and deciding the daily meal. Rice is cooked once a day and usually stored in an electrical heater or in *pariuk*⁷³. Meanwhile, vegetables are usually cooked for each meal and side dishes are cooked at least 2 times a day. The cooking process is done by using a firewood or kerosene stove and most foodstuffs and some spices are taken from one's own garden or ponds. The art of the cooking process are passed from generation to generation. Based on observation, salted fish, vegetables and '*sambalado mudo*'⁷⁴ are the most common foods at home. The recipes are passed down from the parents. Warm meals are a priority and a symbol of love and care. Up to now, cooking in the family is still as it used to be in the sense that there are no new dishes that have been

⁷³ Traditional rice cooker

⁷⁴ Green chilli

developed or adopted anytime in recent history. The management of the kitchen is not really organized. Sanitation is a problem that needs to be addressed (see figure 33). The traditional kitchen is very exposed to the elements. Typically, each has two wood stoves, adjacent to a small glassware hanger on which all cooking utensils are hung. The *tadia*, or back wall, is made from bamboo, and is used to block wind, but also provides an important function of retaining family secrets regarding food preparation.



Figure 33: Traditional kitchen in NPS

Sources: own picture (2009)

The mother plays an important role in the kitchen (n = 48), followed by the grandmother (n = 0) and daughter (n = 2). The grandmother is no longer helping in the kitchen. She engages in other activities such as prayer or sometimes weaving (see figure 34 and 35). She often is going to *surau*⁷⁵ or other social activity, and only sometime helps to prepare the small dishes such as vegetables or *sambal lado*. The interaction between mother, grandmother and the girls are becoming less since only (n = 2) of the young generation are involved in the kitchen activity and grandmother is not any longer active in the kitchen.

Almost 100 % of carbohydrate intake is from rice (see table 16). Interestingly, even though NPS is not close to freshwater-fish, they consume 88 % salted-fish as their dominant protein intake, followed by egg 10 % and other meat (chicken and beef) 2 %. Most vegetable intake consists of cassava leaves at home. Jackfruit is categorized as a vegetable which is consumed in *lapau* (it is in the sauces of the *lontong*). Tofu, tempeh and “*teh talua*” are the alternative protein intake. Based on observation, men have a habit to drink the talua in *lapau* in every day, breakfast, lunch and dinner. Most fruits being eaten are bananas and papayas. The reason is that both fruits are always available in this area. Based on our survey, the

⁷⁵ Mosque

peripheral diets consist of *bakso* and *gado-gado*. NPS is a hilly area where the temperature is moderately cool compared other places. *Bakso* is a kind of hot meatball soup which is enjoyed by people in the region.



Figure 34: Grandmother Activity

Source: own picture (2009)

Table 16: Meal pattern of people in NPS

Core Item	Components Secondary core	Peripheral diet	Preparation method	Meal Pattern
Carbohydrate: Rice (100%)	Tofu Tempe	<i>Gado-Gado</i> <i>Bakso</i>	I Frying	I Rice
Proteins: Fish (88 %)*) Egg (10 %) Other (2% **)	Tea + Raw egg Coffee and milk	<i>Lontong</i> , <i>Pical</i> <i>Sate</i>	II Boiled with coconuts milk III Sate for Vegetable or sometime boiled	Fish <i>Sambal-lado</i> Vegetable Water II One of the Peripheral diet III Rice Fish + Coconuts milk Vegetables Water Fruits
Vegetables: Cassava leaf (10 %) Jackfruits (2 %)				
Beverages: Water Tea Coffee				
Fruits: Banana (56 %) Papayas (26 %) Orange (10 %)				

Sources: own survey 2009, n = 50, *) Salted fish, **) tofu or tempeh

The preparation methods dominantly are frying boiling and sautéing with meal patterns categorized into three different groups (see table 16). A meal of rice with salted, *sambal lado*, and vegetables is the most common pattern, sometimes using freshwater-fish. Peripheral diets are mostly eaten in *lapau*. In most cases, farmers leave their house in the morning without having eaten, they have breakfast in *lapau*. Most of the time, they also have dinner in *lapau*. Instant noodle are not popular with *bakso* among the local people. There is

no evidence that the local people are changing their food habits to adopt instant noodle. Based on observation, eating together inside the household is done at dinner time by just sitting down on the floor.

Based on survey, they plant their spices in the backyard or in their farmland. The nutritional status reported is good enough because until now no case of malnutrition. According to interview, they said they are -generally- food secure, but sometimes feel insecure when they have less income. Even though farmers in NPS have the highest income in comparison to farmers in NU, NPLM and NAB, they nonetheless still have an income problem. Cash crops such as chilli, cabbage, shallot, or onion often have prices that fluctuate dramatically. The nutritional status of this area classified as well nourished⁷⁶ which is until now; there is no case of child malnutrition.

Table 17: Biodiversity in NPS

Main crops (4)	Vegetables (4)
Paddy (<i>Oryza sativa</i>)	Long bean (<i>Vigna unguiculata sesquipedalis</i>)
Maize (<i>Zea mays L</i>)	Tomato (<i>Solanum lycopersicum</i>)
Groundnut (<i>Arachis hypogea</i>)	Eggplant (<i>Solanum melongena</i>)
Cassava (<i>Manihot utilisima</i>)	Cabbage (<i>Brassica oleraceae</i>)
Spices (3)	Fruits and other crops (4)
Chilli (<i>Capsicum annuum</i> sp)	Papaya (<i>Carica papaya L</i>)
Celery (<i>Apium graveolens</i>)	Water melon (<i>Citrullus lanatus</i>)
Cinnamon	Banana (<i>Musa paradisiaca</i>)
	Coffee (<i>Cofea Arabia</i>)

Source: own survey (2009)

The families that investigated have a monthly income of Rp.1.000.000 (\$ 111.1) (n = 36) followed by Rp.500.000-Rp.1000.000 (\$ 55.5-\$ 111.1) (n = 13) and less than Rp.500.000 (\$ 55.5) (n = 1). Interestingly, based on the interview (n =25) said that farming was their side job, their main jobs are as craftsmen, drivers, *lapau* owners and civil servants. The high income in comparison to the other sites is not reflective of their farm management, but more because of additional non-agricultural income. Based on the provincial government report, NPS is in the category of blue area⁷⁷, categorized as high in food security.

Weaving is considered a side job for women. The traditional *songket*⁷⁸ from NPS is very popular in Indonesia. One pieces of the *songket* from NPS it could cost until Rp.5.000.000 (\$ 555.5), which can support the household income. Therefore, NPS local

⁷⁶ Health department *Tanah Datar* district

⁷⁷ Productivity > 5.5 ton/ha (2008) (Department of Agriculture and Horticulture, Province of West Sumatera)

⁷⁸ Traditional woven fabric

government taking efforts to establish patent rights in the name of ‘*Pandai Sikek*’ which is currently waiting for approval. It aims to safeguard the public economy, prevent the use of ‘*Pandai Sikek*’ by outsiders, and also to be a good source income for NPS. Weaving is a skill traditionally passed from one generation to generation.

Recently, the *nagari* has no programs to address food security. The educational status is good; kindergarten through high schools is available in the region. The local government is a strong supporter of the importance of education. As well, a general societal awareness of this importance has grown with age.



Figure 35: Women activity in NPS

Left picture: a woman waving, right picture: a woman shows the motif of the *songket*

Source: own picture 2009

7. 5 Cluster potentials and problems for food security and food culture according to the results

Figure 34 shows the cluster of potentials and problems in NPS. The main opportunity for improvement lies in the empowerment of the role of mothers. From this empowerment, benefits will extend to areas of land ownership, mother-daughter relationships, and education of women, farm management, local wisdom, food storage, and food culture. The supports offered from local governments are often impacting these same areas. There are still problems

that neither mothers nor local governments are addressing. The main issues are linked to *lapau* activity, seed management, and low crop prices. *Lapau*'s have shifted breakfast and caused changes in food culture. Low crop prices are reflected by low agricultural income.

The IK longer exists in NPS. There is no evidence that the IK still exists in NPS. They are told that two varieties of paddies already extinct. **HA** can provisionally be accepted as a factor that influences the food culture and food security in NPS.

The mother plays an important role and responsible in kitchen activity such as: preparing wood, spices, deciding the daily meal, land ownership and weaving. **HB** can provisionally be accepted as a factor that influences the food culture and food security in NPS.

Most of the young men are going to *marantau*, or migrating away from their villages. The farm management is experiencing changes such as the transition from a traditional labor sharing system to more conventional land rental agreements. Those who have gone to *marantau* have adapted their food preferences away from traditional practices. **HC** can provisionally be accepted as a factor that influences the food culture and food security in NPS.

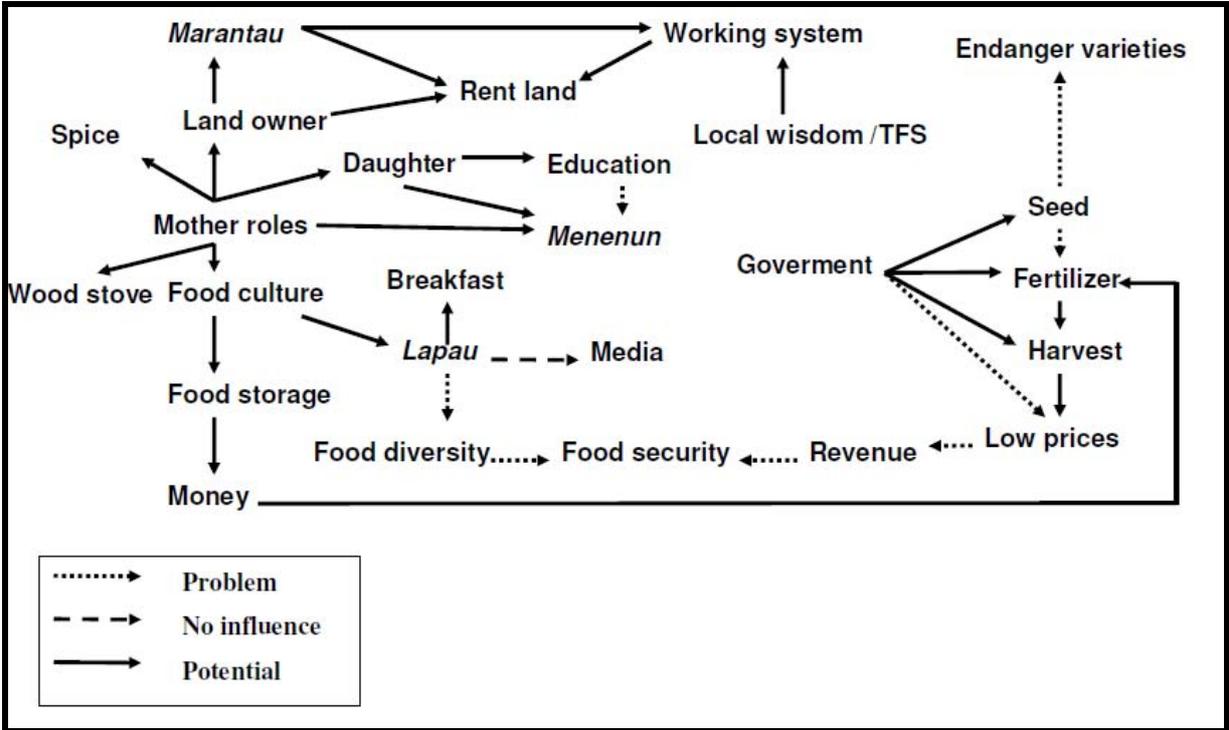


Figure 36: Cluster of potentials and problems for food security and food culture according to the results of investigation

Source: analysis with Maxqda10 (2010)

The local government plays an important role in seed availability. The farmers are

depending on the government seed stock. The local government sets the selling prices; it seems that in peak season the price is always sloping down. **HD** can provisionally be accepted as a factor that influences the food culture and food security in NPS.

Farming is a man's job, but women can sometimes assist. Weaving is a women's job, this has become a source of non-agricultural income. Both men and women are equal in education, but since most of the young girls are now going to school, there is less time for mother-daughter interactions. **HE** can provisionally be accepted as a factor that influences the food culture and food security in NPS.

Mass media is not exerting any impact on food culture and food security. The food culture is dependent on both their agricultural income and non agricultural income. Most of the changing of food diversity is because of the *lapau* activity. **HF** can provisionally not be accepted as a factor that influences the food culture and food security in NPS.

Chapter 8: Discussions

This chapter discusses opportunities and challenges of the investigated sites. The discussions include: topographical and biodiversity, opportunities and challenges of the study, principles of organic farming, policy strategies, and comparisons with other studies.

8.1 Topographical and biological diversity

The diverse topography and biology of these regions represents ideal conditions for a wide range of plant growth. In all sites, the altitude ranges from 0-1094 m, temperature ranges from 19-34° C, with annual rainfall ranges from 1.400 – 4762 mm. Soil classifications include *Andisols*, *Inceptisols*, *Ultisols*, *Entisols* (see table 18). These conditions are actually giving the perfect environment for plant growth and diversity (Machackova, 1992; Beck, et.el, 2010, Diamond, 2010). The only drawback is the intensive sloping in some areas that can lead to high levels of erosion.

Table 18: Biophysical diversity of the studies

Site	Soil classification	Altitude (M)	Rainfall (mm/year)	Temperature (°C)	Main crops	Vegetables	Fruits	Spices	Status categorized by provincial government *
NU	<i>Entisols</i> and <i>Ultisols</i>	7-100	1400-4600	21-38	4	4	14	3	Food security (red zone)
NAB	<i>Andisols</i> and <i>Inceptisols</i>	950	2570	19-34	6	4	7	9	Food security (green zone)
NPLM	<i>Inceptisols</i> and partly <i>andisols</i>	500	4.761,90	19-34	3	3	19	12	Food security (green zone)
NPS	<i>Inceptisols</i>	1094	4762	19-34	4	4	4	3	Food security (blue zone)

(Year: 2009) *) rice productivity < 5 ton /ha (red zone), 5-5.5 ton/ha (green zone), > 5.5 ton/ha (blue zone) (2008).

The intensive agriculture policy set out by the government, has been imposed on the farmer within few decades causing significant changes to the traditional farming system. However, topography (soils, altitude, rainfall, and temperatures) is not a factor that impacts the high level of food crop –biodiversity. According to investigated sites, the management of biodiversity through indigenous knowledge and in situ protection might be the strongest reasons. Therefore the need for on-farm diversification refers to enhancing varieties in crops and cropping patterns. Also to retain specific varieties or crops that serve different purposes or can be harvested at different times, thus reducing risk and strengthening the self reliance of

the farming households (Niehof 2010, p. 120). Furthermore, a strategic plan for farmers or local people to protect food crop –biodiversity- is needed. Human intervention leads the highest diversity when it is managed properly. The ecological prerequisites for biodiversity are, alone, not able to ensure sustainability in the face of extreme climate change. NPLM has higher crop food-biodiversity compared with the other sites, even though with relatively similar in temperature and rainfall. This high food crop -biodiversity- is because of the awareness of local people in NPLM. They realized they were in an unfavourable climate and topography; therefore they have taken measures to be more prepared for any possibility. They also have more initiative to cultivate their spices in their backyard.

Based on our investigation, only NAB and NPLM have crop rotations based on agreements among farmers, mostly dependent on the monsoon season. It is an important task to increase the biological plant protection which allow biological agent to protect plants from the insects. According to Mason (2003, p. 92) for instance basil can be grown to repel flies, carrots can repel onion flies, and celery can deter the cabbage butterfly. Further, clover can fix nitrogen, garlic can repel insects. Leek can deters carrot fly, Onion can deter carrot fly and chewing beetles. Table 19 shows the basic information regarding the use of biodiversity as tool for biological plant protections in four investigated sites.

Table 19: Distribution of biodiversity

Categories	NU	NAB	NPLM	NPS
Main crops (6) :				
Paddy (<i>Oryza sativa</i>)	+	+	+	+
Cassava (<i>Manihot utilisima</i>)	+	+	+	+
Sweet potato (<i>Ipomea batatas</i> L)		+	+	
Maize (<i>Zea mays</i> L)	+	+		+
Groundnut (<i>Arachis hypogea</i>)	+	+		+
Potato (<i>Solonum tuberosum</i>)		+		
Spices (15) :				
Nutmeg (<i>Myristica fragrans</i>)			+	
Vanilla (<i>Vanilla planifolia</i>)			+	
Clove (<i>syzygium aromaticum</i>)		+	+	
Candlenut (<i>Alleuretus molucanna</i>)		+	+	
Cardamom (<i>Amomum comppectum</i>)			+	
Ruku ruku (<i>Ocinum sanctum</i> L)	+		+	
Lemongrass (<i>Cymbopogon</i>)			+	
Galangal (<i>Alpinia galangal</i>)			+	
Turmeric (<i>Curcuma longa</i>)			+	
Chilli (<i>Capsicum annum</i>)	+	+	+	+
Cinnamon (<i>Cinnamom verum</i>)		+	+	
Lemon leaves (<i>Citrus Limon</i>)			+	
Celery (<i>Apium graviolens</i>)				+
Pandanus leaf (Pandanus)	+			
Onion (<i>Allium ascalonicum</i>)		+		
Vegetables (11) :				
Spinach (<i>Amarathus spp</i>)	+		+	

Cassava leaf (<i>Manihot utilisima</i>)				+
Kale (<i>Brassica oleracea</i>)				+
Long bean (<i>Vigna unguiculata sesquipedalis</i>)				+
Tomato (<i>Solanum lycopersicum</i>)				+
Eggplant (<i>Solanum melongena</i>)	+	+		+
Cabbage (<i>Brassica oleraceae</i>)				+
Swamp cabbage (<i>Ipomoea aquatica Forssk</i>)	+			
Cucumber (<i>Solanum melongena</i>)	+			
Tomato (<i>Solanum lycopersium</i>)			+	
Common bean (<i>Phaseolus vulgaris L</i>)			+	
Fruits and other crops (28) :				
Coffee (<i>Cofea arabica</i>)			+	+
Coconuts (<i>Cocos nucifera</i>)	+	+	+	
Cacao (<i>Theobroma cacao</i>)			+	
Kapok (<i>Caeba petandra</i>)			+	
Pinang (<i>Areca catechu</i>)			+	
Sugar palm (<i>Arenga pinata</i>)			+	
Sapodilla (<i>Manilkara zapota</i>)	+		+	
Rambutan (<i>Naphelium lappaceum</i>)	+		+	
Durian (<i>Durio L</i>)	+		+	
Purple mangosteen(<i>Garcinia mangostana L</i>)			+	
Avocado(<i>Persea americana</i>)			+	
Orange (<i>Citrus sinensis</i>)	+		+	
Banana (<i>Musa paradisiace</i>)	+		+	
Papaya (<i>Carica papaya L</i>)	+		+	+
Kuweni (<i>Mangifera odorata</i>)			+	+
Bell fruit (<i>Syzygium aqueum</i>)			+	
Guava (<i>Psidium guajava L</i>)	+		+	
Pomegranate (<i>Punica granatum</i>)			+	
Sugar apple (<i>Annona squamosa</i>)			+	
Water Melon (<i>Citrusllus lanatus</i>)	+			+
Duku (<i>Lansium Domesticum</i>)	+			
Pineapple (<i>Annanas Comusus</i>)	+			
Melinjo (<i>Gnetum Gnenom</i>)	+			
Jackfruits (<i>A. Heterophyllus</i>)	+			
Tea (<i>Camelia sisnensis</i>)			+	
Tobacco			+	
Passion fruit (<i>Passiflora edulis</i>)			+	
Terung pirus (<i>Solanum betaceum</i>)			+	

(Sources: own survey, 2009)

8. 2 Opportunities and challenges according to the results of investigation

The cluster is used to explain the possible strategy policy regarding local policy that could be taken. Among all investigated sites, the similarity and differences of within the problems are found. The comparison potentials and problems from all investigated sites are shown in table 20.

Table 20: The comparison from all investigated sites according to hypothesis

Categories	NU	NAB	NPLM	NPS
Indigenous knowledge	no longer exists	no longer exists	1. <i>aia Adat</i> 2. <i>jariamun</i> 3. “shadow of the rain “	no longer exists
Mother role	1. land owner 2. kitchen activity 3. decides meal	1. land owner 2. kitchen activity 3. decides meal	1. land owner 2. kitchen activity 3. decides meal	1. land owner 2. kitchen activity 3. decides meal
Marantau	remittances	--	remittances less labours	remittances
Government role	<i>Padi Tanam Sabatang (PTS)</i>	introduction of organic farming system	<i>Padi Tanam Sabatang (PTS)</i>	<i>Padi Tanam Sabatang (PTS)</i>
Education & Gender	fishing and farming is men’s job.	women earn less than men	men and women are equal in education	<i>menenun</i> is women job
Mass Media	men tend continue to higher education	men and women are equal in education	Entertainment	Entertainment
Extra features:	Entertainment	Entertainment	Entertainment	Entertainment
Farm management	<i>Patigoan</i> no plant rotation	<i>Kongsi</i> plant rotation	IK plant rotation	Rent no plant rotation
Food security obstacle	household income	household income	household income	household income
Food culture obstacle	schooling time	schooling time	<i>marantau</i>	<i>marantau lapau</i>

(Sources: comprised from cluster analysis on chapter 4, 5, 6 and 7)

Table 21: Similarities of potentials and problems according to the clusters

	Potentials	Problems	No influences
NU	mother role local government role education working system local wisdom	price revenue <i>lapau</i> <i>marantau</i> gender weather	mass media
NAB	mother role local government role organic farming systems kitchen land owner food culture biodiversity working system fertilizer (manure) seed	prices revenue water Resources weather	mass media
NPLM	mother role local government role <i>singkarak</i> Lake <i>bilih</i> Fish <i>jariamun</i> food storage food culture harvest <i>aia adat</i> shadow of the rain area local wisdom belief ceremonial (ritual) remittances <i>marantau</i> labour	revenue price <i>lapau</i> <i>marantau</i> local government illegal logging water resources productivity weather	mass media
NPS	mother role local government role food culture food storage fertilizer rent land <i>marantau</i> land owner working system local Wisdom daughter role	revenue price education seeds local government food diversity	mass media
Modus	2	2	1

(Sources: according to the cluster on chapter 4, 5, 6 and 7)

It can be seen that the role of both the mother and local government play an important role in developing food security. Revenue and price are the common problems to increasing food security. Mass media yields no influences on food security. Food patterns shows that instants noodles have not significantly changed the food habits in the four investigated sites. They are still dependent on rice as a carbohydrate sources. The pattern can be seen on table 22 below:

Table 22: Food culture in different investigated sites

Main core	NU	NAB	NPLM	NPS
Carbohydrate	Rice (100%) 1 out of 4	Rice (100%) 1 out of 6	Rice (100%) 1 out of 3	Rice (100%) 1 out of 4
Protein intake	Fish (88%) Egg (12%)	Fish (62%) Egg (30%) Chicken (8%)	Fish (32%) Egg (12.7%) Meat (30.7%) Other (24.6%)	Fish (88%) Egg (10%) Other (2%)
Vegetables	Cassava leaf (64%) Spinach (16%) Other (24%) 3 out of 4	Cassava leaf (26%) Cabbage (16%) Cucumber (2%) Carrot (14%) 4 out of 4	Cucumber (25.4%) Cassava leaf (60.6%) Jackfruits (14%) 3 out of 3	Cassava leaf (10%) Jackfruit (2%) 2 out of 4
Fruit	Banana (40%) Papayas (20%) Oranges (44%) 3 out of 14	Banana (64%) Papayas (28%) Oranges (19%) 3 out of 7	Banana (48%) Papaya (45%) Watermelon (7%) 3 out of 19	Banana (56%) Papaya (20%) Orange (10%) 3 out of 4
Preparation	Frying, boiled, Sate	Frying, boiled, sate	Frying, boiled, cook	Frying, boiled, sate
Total peripheral diet	8 items	4 items	---	5 items
Total spices needs	29 items	29 items	29 items	29 items
Total spices available	3 items out of 3	9 items out of 9	12 items out of 12	3 items out of 3
Durable food intake	3 times a day	2 - 3 times a day	2 -3 times a day	2 -3 times a day

Sources: own survey (n = 200, year: 2009)

8.1.1 Indigenous knowledge, traditional farming system and food culture

Indigenous knowledge and traditional farming system

Table 20 shows that only Nagari Padang Laweh Malalo is still practicing indigenous knowledge. In Nagari Ulakan, Nagari Aia Batumbuak and Nagari Pandai Sikek there are only the stories left behind. Table 18 shows that the highest food crop biodiversity is in Nagari Padang Laweh Malalo especially for spices. There is an awareness of scarcity among local people because of they are realizing that their topography has less water resources; therefore they are more preparing for any possibility.

According to our investigation, *rangkiang* and *kapuak* is no longer being used. Farmers normally sell their paddies directly on field after harvest even though not popular and banned by culture. Lately, the culture has become flexible because they need money to make them secure. In the 1970's, rice became a cash crop, stimulating farmers to sell, rather than save, their crops. This degrades traditional farming systems that are based on local wisdom. Transforming policy through local wisdom it needs community-building and public input, which means engaging more partners, enhancing the power of committees, knowledge building, and providing access to information. Therefore, too effectively address the many interrelated constraints in these culturally diverse, remote and disadvantaged communities;

strong community engagement is needed to develop solutions and mechanism rooted in the specific location and culture (Backwell and Colmenar, 1999; van de Fliert, et all, 2010).

Indigenous knowledge and food culture

In food culture, an obvious fact is that carbohydrates are consumed only from rice even though all investigated sites do have different staple crops. Most of the people said that if they do not eat rice they have not really eaten. Fish has become the most prominent protein sources for all sites even though some of them are far from fresh water fish. NPLM, for example, has the lowest fish consumption even though this region is very close to a lake. But this does not reflect that the people do not like fish, but rather that they prefer to eat fresh fish, based on investigation only two sites consume fish; NU and NPLM. Both NAB and NPS only ate salted fish. Cassava leaf is the common vegetable for all sites, which is very easy to grow and easy to prepare. NPLM has the highest availability of spices, out of 29 used spices in Minangkabau's food, NPLM has 12, followed by NAB, NPS and NU. Most of the sites have 2-3 meals per day. Two times a day with one peripheral meal in *lapau*. Three daily meals are considered without peripheral diet. **Hypothesis A can be accepted as a factor that influences the food culture and food security.**

8.1.2 Matrilineal system, traditional farming system and food culture

Matrilineal systems and traditional farming systems

Mother owns the land and responsible for the cultivation, but also depends on sharing system among the family members to complete these tasks. For instance, *patigoan* (one third) (Nagari Ulakan), *kongsi* (share) (Nagari Aia Batumbuak) and rent (Nagari Pandai Sikek); is a sharing method to manage the land. The goal of this sharing can be different at each site. Yet in all cases, it aims to share the natural and human resources. Profit sharing occurs directly on the rice field during harvest time. The mother is not directly involved the farming activities.

Matrilineal system and food culture

The mother typically cooks once a day and decides the daily meal. She prepares the spices, firewood and main meal. The activity starts normally from 9-11am. The meals; breakfast, lunch, and dinner, are prepared at the same time. For dinner, only rice is prepared, while the main menu is only re-heated. Rice must be always warm; it is symbol of protection, wellness, safety, and delicacy. Fried food is preferred but sometime boiled and sautéed meals are also enjoyed. The mother gets spices from a weekly market but some of the women still cultivate herbs and spices in their backyard. Young women learn to cook from their mothers.

It is traditional knowledge that is passed from generation to generation through experience. It's obvious that the transfer of knowledge in cooking is dependent on mother-daughter relations. Since most of the young girls have less time together with their mother due to the time requirement of school, only a few of them are now involved in the kitchen.

According to investigation, from all investigated sites, there is no tendency among people to consume instant noodles excessively. They consume only for combined with the other meal. However in NAB, they are eaten often. Instant noodles are just consumed by children who have less appetite or other eating difficulties hard to eat. *Bakso, pangsit, lontong* and *gado-gado, pical* are not traditional foods from Minangkabau's⁷⁹. Based observations, all of the investigated sites have continued the practice of eating together inside the household. Eating together is done at dinner time. They simply sit down on the floor. Lunch is normally at the farm and breakfast is normally at the *lapau* or house. **Hypothesis B can be accepted as a factor that influences the food culture and food security**

8.1.3 Marantau (voluntary migration), traditional farming systems and food culture

Marantau and traditional farming system

In NU, NPLM and NPS most the young boys have gone to *marantau*; if they are single, they are free to do migration. If wage work is not available in the immediate area, the household labour allocation strategy may necessitate one or more member becoming involved in circular migration (Gubhaju and De Jong 2009. p. 36). Increased income is the goal of these young boys, but it is a different situation with young girls. Most of them have gone to *marantau* because of arranged marriages. Even though in the last few years arranged marriages have decreased slightly. Most of the people in *rantau* are not even concerned about their land ownership in their village. They simply trust their relatives to take care of it, but often this will result in conflict. The heads of clans are responsible for making sure the land is divided based on the customary law.

When their ancestor dies, the land should be divided based on the customary law. This law requires that the female gains the biggest part, this is only for the high heritage (not direct parental properties but from their great-great grand mother). Men get a smaller portion of this

⁷⁹ See appendixes

inheritance, and leads fewer resources to feed their families therefore motivate them gone *marantau* and change the farming system (see table 23). The distributions of lands are becoming stagnant, while the land size is only less than 1 ha per household.

Table 23: Voluntary migration rate, farming systems, food culture and remittances

Sites	Migration rate	Farming system	Food culture situation*)	Remittances uses for
NU	3 person/family	<i>Patigoan</i>	Changes in peripheral diet	Daily needs
NAB	1 person/family	<i>Kongsi</i>	Changes in peripheral diet	--
NPLM	3 person/family	Applying IK	Changes in peripheral diet	farm
NPS	3 person/family	Rent	Changes in peripheral diet	farm

(n = 8 households, year; 2009), *) Interviewe with those who done *marantau*

Because of men tend to go *marantau*; the land was handled by women. But the work is normally done by men. In NU, NAB and NPS, they had shared or cooperative work, so in this way they can still cultivate the land even with less workers. The commonly use paid labor for work that was previously done entirely within the family.

Marantau and food culture

Most of the young men who have gone to *marantau* will normally cook, even though in *rantau*, but they are not able to cook properly like their mother. There is a missing element of the recipe in their preparation. According to our survey none of young males are involved in the kitchen and only (n = 6) young female are actively helping their mother in the kitchen. They said that changes to the recipe are common because the spices are often not available in the market (it is often those who *marantau* to Java). The food habit are changing, they are not familiar with the traditional breakfast (peripheral diet), and it changes to milk and bread (those who migrate to java or big cities). Red meat and poultry are being consumed more often.

The other phenomenon of *marantau* is the widespread use of the Minangkabau`s cuisine⁸⁰ (see table 24). It is done by the people who have gone to *marantau*. The *Padang* food is established throughout Indonesia and the region, according to *Ikatan Warung Padang Indonesia* (Iwapin)⁸¹, in Jakarta, alone, there are at least 20,000 *Padang* restaurants including notable Minangkabau restaurants such as *Sederhana, Garuda, Pagi Sore, Simpang Raya, Sari Ratu, Sari Minang, Salero Bagindo* and *Natrabu*.

The cuisine is usually cooked once per day, and in restaurants customers choose from

⁸⁰ Known as Padang food

⁸¹ Association of Padang food restaurant

those dishes, which are left out on display in the window of the *Padang* restaurant. During a dine-in (*hidang*) style Padang restaurant, after the customer has been seated. The waiter immediately serves the dishes directly to the guests. The table will quickly be set with dozens of small dishes filled with highly-flavoured foods such as beef *rendang*, curried fish, stewed greens, chilli eggplant, curried beef liver, trips, intestines, foot tendons, fried beef lung, fried chicken, and of course, *sambal*, the spicy sauces ubiquitous at Indonesian tables.

Table 24: Minangkabau traditional food in Padang restaurant

Name of food (37 items)	Description
Rendang	Chunks of beef stewed in spicy coconut milk and chili gravy, cooked well until dried. Other than beef. Rendang ayam or chicken rendang also can be found.
Daun ubi tumbuk	cassava leaves in coconut milk
Sate Padang	Padang style satay, skewered barbecued meat with thick yellow sauce
Soto Padang	a soup of beef
Sambal Balado	sambal with large sliced chilli pepper
Sambal Lado Tanak Kalio	similar to rendang but while rendang is rather dry, kalio is still watery and light colored
Gulai Cancang	curry of meats and cow internal organs
Gulai Tunjang	curry of cow foot tendons
Gulai Babek or Gulai Babat	curry of cow tripe
Gulai Iso or Gulai Usus	curry of cow intestines usually filled with eggs and tofu
Gulai Limpo	curry of cow spleen
Gulai Ati	curry of cow liver
Gulai Otak	curry of cow brain
Gulai Sumsum	curry of cow bone marrow
Gulai Itiak	duck curry
Gulai Talua	boiled eggs curry
Gulai Kepala Ikan Kakap Merah	red snapper's head curry
Dendeng Batokok	thin crispy beef
Dendeng Balado	thin crispy beef with chilli
Palai. Paru Goreng	fried cow lung
Asam Padeh	fish soup with mostly chilli and <i>asam kandis</i>
Ayam Bakar	grilled spicy chicken
Ayam Goreng	fried chicken with spicy granules
Ayam Pop	Padang style chicken, boiled/steamed and later fried. While fried chicken is golden brown, ayam pop is light colored
Ikan Bilih	fried fish
Udang Balado	shrimp in chilli
Rajungan Goreng	crispy fried crab
Petai Goreng	fried green stinky bean (<i>Parkia speciosa</i>)
Lemang	mixture of sticky rice, coconut milk and pandan in thin bamboo (<i>talang</i>)
Tapai	fermented sticky rice
Teh Talua	mixture of tea and egg
Dadiah	fermented buffalo milk
Bubur Kampiun	porridge made from rice flour mixed with brown sugar
Es Tebak	mixed of avocado jack fruit, tebak, shredded iced with sweet thick milk
Karupak Jangek	cow's skin cracker
Karipiak Balado or Sanjai	cassava cracker coated with hot and sweet chilli paste

(Sources: collected from different sources, 2009)

Marantau and remittances

The family network tends to be a strong motivator for the young generation going *marantau*. *Mamak* is morally responsible for supporting the success of their nephew in the *rantau*. Those in the *rantau* generally return home once each year. Through the success stories shared during these homecomings, more young men are enticed into a new lifestyle away from the farm. While this migration reduces family farm labour, it also increases remittances that can be used to invest in the land.

Looking at all investigated sites, a household income of Rp. 500.000 (US\$ 55.5) (n = 17) Rp.1.000.000 (\$111.1) (n = 90) and between Rp.500.000- Rp.1.000.000 (US\$55.5 - US\$111.1) (n = 88) per month. According to BPS (2005), West Sumatran spend Rp.173.502 (US\$ 19.3) month for food based on the conditions of the current year (with an assumed inflation 10 % this is equal to Rp.190.000 (US\$ 21.1)). Based on survey, family have 1-2 children (n = 50), 2-3 children (n = 50), or 3-4 children (n = 100); this means that one family spends at least Rp.1.140.000 (US\$128) per month. This calculation does not include the other necessities like education, water, and electricity. Therefore, the remittances are very useful as an additional supplement to non-agricultural income (*rakik*, *ojek*, weaving, fishing or *lapau*). The number of children per household can be one of the reasons that households face conditions of scarcity.

The mothers' feeling of security regarding food supply depends on the remittances from *rantau*. *Marantau* has an impact in both labour supply, and remittances. On one hand, farms need more labour. On the other hand, farms also need capital investment. Only NU and NPLM *marantau* give remittances which may be used for farming activities. NU and NPLM are dependent on remittances. They normally use these for investments on the farm. This is one way of explaining how, up to now; they could still farm even though they have failed to earn revenue for sometime. They said that farming is their soul, even though most of the time they are failing to earn revenue. Only in NPLM, the farmers are very worried about the continuity of labour on farmland because none of the younger generation is interested in agriculture. Remittances are effectively supported the sustainability of farming systems, but they give no guarantee protecting the local biodiversity. Local biodiversity needs traditional farming systems where the young generations act as agents to continue the in situ management. **Hypothesis C can be accepted that *marantau* is a factor that influences the food culture and food security**

8.1.4 Local government policy, traditional farming system and food culture

Local government policy and traditional farming system

Local government policy is inseparable with national policies which have been regulated since 1968. The emphasis in this regulation is largely focus on food production and supply, with little attention to food distribution purchasing power for accesses to food (Simatupang, 2007). In all investigated sites, the PTS programme does not guarantee farmers will get more income. They have higher yields but at the same time they have the income, and are potentially food insecure. At the same time, increased yields produce a surplus which automatically lowers selling prices.

In the 1970's, the government introduced varieties PB5 and PB8. As a result, many of the local varieties are gone or disappearing, as has happened at NPS. Two local paddy varieties are extinct and two others are endangered. Biotechnologies, and specifically genetic engineering, are used to increase yields and to make the rice likeable. Therefore, because of mass production and the big campaign to increase the yield, *Oryza sativa* from Asia and *Oryza glaberrima* from West Africa are mostly cultivated. Today, Indonesia has become the biggest importer of rice. Within three decades, the national authority has ruined the local biodiversity and traditional farming system. **Hypothesis D can be accepted as a factor that influences the food culture and food security**

8.1.5 Education of women, gender, traditional farming systems and food culture

Education of women and traditional farming systems

Men and women have equal opportunities for getting a formal education. With the exception that women have fewer chances to continue onto higher education, mostly because of arranged marriages. Even if a woman continued to maintain control of her own land, lower levels of education would make her less likely to benefit from non agricultural income. Improvements in female schooling observed in the younger generation could enable women to move out of agriculture, which, with increasing population pressure, would no longer be able to absorb the growing labour force (Quisumbing & Otsuka 2001, p. 2106).

Gender and traditional farming systems

Most farmers tend to be men, working the land with help from women (see table 25). In Nagari Aia Batumbuak, women get paid less than men for harvesting work which is because of the disproportionate number of women in the workforce. In Nagari Padang Laweh

Malalo, women have initiative to cultivate the spices in their backyard. Farming and fishing in Nagari Ulakan is a job belonging to men, even though some women are allowed to help or work on the land. In Nagari Pandai Sikek, women sometimes help the men work on the land, but most of the time they were at home, doing non-agricultural activity. Therefore, even though women (matrilineal system) have a big role on their own, they have less activity on the land itself. This means that the transferring the knowledge in traditional farming systems occurs through father-son or father-nephew interactions.

Table 25: Gender and Traditional farming systems

Sites	House (kitchen)	Land (farming)	Other activity
NU	M = 0 F = 24	M = 26 F = --*	M = 24 (Fishing)
NAB	M = 0 F = 19	M = 31 F = 19	--
NPLM	M = 0 F = 16	M = 34 F = 6	--
NPS	M = 0 F = 29	M = 21 F = 4	F = 14 (Weaving)

(n = 200, Year: 2009), M = male, F = Female, --*= no clear descriptions, -- = no data

Gender and food culture

Processing techniques, ingredients, and spices needed for food preparation are known only by the mother that is why this can be called a family secret. The techniques: slicing, mixing, sautéing, grinding, and portioning, all influence the final taste. The mother has the role teaching their daughter how to cook, and it is a sources of shame in the Minangkabau`s culture if a girl cannot cook well. The challenge of today is the decreasing time for interactions between mother and daughter (observation, teaching) (see table 25). There is an unwritten cultural expression that a woman is not *fully* a woman when they cannot cook well. Therefore, from the time that girls become teenagers, they are helping their mothers to prepare and cook for food daily. This role has been respectfully accepted by men. Based on observations, men were not involved in cooking and preparing food. Men trust what women prepare and cook. Women try to make to a good meal even though they are under economical pressure. Men are not used to cooking when they are married, and in some parts of Indonesia, it is a shameful for men to cook. Men cook only on special occasions, festivals, or if he has a job in a restaurant. In some cultures to cook would threaten a man`s masculinity (O`Laughlin, 1974 in Fürst 1997, p. 442). In *Minangkabau`s* culture cooking was gender specific activity even though this boundary in the last decade has become very unclear. The mother plays an important role as land owner and head of the kitchen. Men are not *allowed* to cook; it is shameful when men perform the work of women. According to O`Laughlin (1974) in Fürst

(1997) explains that in some cultures to cook would threaten the man’s masculinity. The other reason that the kitchen is a place associated with women (mother) is that in preparing their families food, a woman is expressing her sense of protection as an apart of the mothering role. This hypothesis can be accepted as a factor that influences the food culture and food security.

Table 26: Encouragement mother, grandmother and daughter in cooking and food processing

Sites	Mother	Grandmother	Daughter
NU	36	9	4
NAB	49	1	-
NPLM	50	-	-
NPS	48	-	2

(n = 200, Year: 2009)

There is no discrimination between men and women in job, but it is culturally recognized that, in all sites, farming is men’s job. Men tend work on the land even though women have the role of owning the land. In Nagari Ulakan fishing is a man’s job. In Nagari Pandai Sikek weaving is only a woman’s job. This activity is very helpful for gaining extra income. Fishing is also recognized as a man’s job, only *menenun* and kitchen activity is recognized as a woman’s activity. Both male and female had the same opportunity to get an education. Many men get further higher education because women tend to get married earlier. The traditional farming system changes because not many of the young generation are choosing agriculture as their job.

Education of women and food culture

Education is an important part of communication regarding food culture from generation to generation. The ability for a woman to utilize diverse spices, and prepare a meal through a variety of techniques is largely dependent on her educational background. Most of the mothers being interviewed (n = 64) had completed university (n = 6), senior high school (n = 19), junior high school (n = 18), and elementary school (n = 21). In senior high school they learned hygiene and nutrition. Traditional events are often excellent environments for mothers and daughters to communicate and learn about food culture. **Hypothesis E can be accepted as a factor that influences the food culture and food security**

8.1.6 Mass media, traditional farming system and food culture

Based on observation, most of the people have access to the national television broadcasts. The appearances of their houses are not good, but they usually will still have a television set. Television has replaced the traditional art performances which were once commonly performed around the *nagari*. According to our observations, most television programming viewed consists of news and infotainment type shows. There is no television programmes related to agricultural extension or cultivation. While the audience for such programming is unknown, this void in content may be one reason why agriculture and food culture is not being affected by the media. Farmers were commonly found to be subscribers of newspapers or magazines.

Mass media and food culture

The people are barely affected by the trends on television, including the food advertisements. The food consumption patterns of modern society are aired by a massive television marketing campaigns, but there is no evidence showing that farmers have been changing their food habits. Based on investigation of all sites; most of them had 2-3 meals per day, with 100% carbohydrate intake from rice, fish and eggs as their protein sources, cassava leaf their primary vegetable, and banana and papaya as the most common fruits. There are no changes of the meal pattern. Parallels with Lipeoto et al (2001) explains that there have been no changes in west Sumatra in food preparation methods, but that now there is a slight difference in taste preference between the younger and the older generation. There also has been a dramatic shift in food preferences, which is reflected the changing percentage of calories consumed over the past 15 years.

The *lapau* (*small coffee shop*) provides tea and coffee. Various noodle products are often displayed in these stalls. Compared with urban populations, noodle consumption levels are low. Most people still prefer to consume three meals per day consisting of rice and side dishes, while the noodles are only consumed occasionally as another variation of the daily menu.

The television has been popular. In addition to home viewing, television sets are also available in the *lapau*. Subscription newspapers and radio are not popular. Mobile phones have become widely used in recent years. Based on interview in four different research sites, there is no change in food culture. They use the television just for entertainment (movie, live shows, and news). They also report no changes to their farming systems. Based on investigation, the infotainment, *sinetron* and news (especially politics) are preferable

programs. While mobile phones are prevalent, the use of this technology to improve market understanding is under utilized. For example, contacting multiple middle-men and distributors by phone to have a bargaining position and secure better market prices. **Hypothesis F cannot be accepted as a factor that influences the food culture and food security**

8. 2 Principles of organic farming

Table 27: Awareness of local people about principles of organic farming

Organic farming principles	NU ^a	NAB ^b	NPLM ^c	NPS ^d
<u>Health</u>				
Soil	0.12	0.12	0.12	0.17
Plant	0.22	0.24	0.21	0.25
Animal	0.24	0.24	0.21	0.25
Human	0.22	0.26	0.24	0.25
<u>Ecology</u>				
Landscape	0.29	0.29	0.35	0.25
Climate	0.12	0.24	0.35	0.25
Habitats	0.15	0.24	0.26	0.25
Biodiversity	0.15	0.26	0.29	0.25
Air and water	0.20	0.21	0.35	0.25
<u>Fairness</u>				
Equity	0.12	0.12	0.24	0.17
Respect	0.22	0.24	0.35	0.33
Justice	0.20	0.24	0.24	0.25
<u>Care</u>				
Technology	0.32	0.24	0.21	0.25
Science	0.22	0.26	0.24	0.25
Wisdom traditional	0.12	0.21	0.29	0.25
Experiences	0.24	0.24	0.24	0.17
Indigenous knowledge	0.10	0.15	0.35	0.27

Sources: respondents (a = 41, b = 34, c = 34, d = 12) (2009), a ratio between total respondent answering positive feedback about organic farming principles question and total respondent.

In all investigated site, the awareness of people which related to principles of organic farming questions can be seen on the table 27, this analysis based on recordings taken when discussions with the community. NPLM had a high awareness of ecology, fairness and care in comparison to other sites. NPS and NAB had a high awareness of health and care, meanwhile NU had high awareness in care. However, this does not necessarily reflect the awareness of local people to actively contribute in the protection of biodiversity. Therefore, there is a need for integration between ecology, agriculture, social, economic and cultural sensitivity.

Collective action is crucial to maintaining the crop genetic diversity, however, this is substantively different from the collective actions involved in managing fixed assets, such as irrigation systems and fishing territories, that are associated with common property (Brush 2007: p.1511).

8. 3 Policy strategies

In the literature, the concept of diversification refers to strategies to reduce vulnerability, especially for farming households. When farming is a source of income and cannot provide an adequate living anymore, people try to diversify their sources of income. Therefore, from the cluster in chapter 4, 5, 6 and 7, one recognizes three different categories of strategies; societal, management and ecological aspect (figure 37):

- 1) Societal-aspect: gender is actually inseparable and classifies men and women at work. In NAB, even though women are working on farms, they are earning less than men. Education is equal for men and women, but in some cases women may leave school earlier because of arranged marriages. Poor education happens in NU and NAB, mostly due to arranged marriages and distance of school from their homes. Therefore most of young people are going abroad and less young people are helping in agriculture. The activities at the *lapau* offer relaxation for men after work and also contribute to changes in food habit. They overwhelmingly tend to have breakfast in *lapau* rather than in their home. More time is spent in the *lapau*, and this leads to lower productivity of the land.
- 2) Management-aspects: the loss of TFS is the most common situation, with the exception of NPLM; the high level of food crop-biodiversity and the-wise use of their natural resources wisely. Even though it is still facing potential insecurity, this region can protect their biodiversity. Most of the local government policy drives farmers away from an awareness of biodiversity protection.
- 3) Ecological-aspects: loss of biodiversity has occurred. Unavoidable climate change has put increased pressure on the productivity of farmers while reducing their revenue. There is no way for farmers to get out of it except to adapt self-sufficient agriculture through low input technology (LEIT).

The low agricultural income may potentially lead to food insecurity and low levels of biodiversity protection. In NU, NPLM and NPS they have an alternative income, this may be one of the options to increase food security, but does not guarantee for better protection of biodiversity. The dominant problem of food security in this study is the pricing policy.

Interestingly, most of the actual problems documented have come from the action of the government. The government should be the first to protect the farmers, but in most cases they are actually contributing to food insecurity. There are four different policies which are pushed by government such as:

1) Price policy

Policy-makers in developing countries are always confronted with a fundamental dilemma. On the one hand, they want high prices for food in order to encourage agriculture production; on the other hand they want low prices to protect (at least in the short run) poor and low income residents from food insecurity (Streeten 1987, p. 1). The main idea of price policy is to control the selling price when the stocks are low or high. The strategy is also designed to help people who live in urban areas. According to BPS (2005) West Sumatrans spends more less 11.25 % their net income for rice Rp. 190.000 (US\$ 21.1) for food per person. This means that for a family of 5 at least Rp. 950.000 (US\$ 105.5) would be required to secure an ample rice supply. Based on survey, most farmers have an income of Rp.500.000 - Rp.1.000.000 (US\$55.5 - US\$111.1) (n = 90). This means that their income has a significant impact on their daily budgeting and cannot guarantee the protection of biodiversity. A parallel study conducted in the upland regions of Indonesia revealed that fluctuation in farmer revenue has a negative impact on overall sustainability (Arsanti and David 2008, p. 14).

According to Streeten (1987, p.2) the dilemma has three origins. First, agriculture price policies have attempted to pursue many objectives (i.e. taxes, subsidies, exchange rate, tariffs and others). Second, policy-makers find themselves with the heritage of a complex structure of interventions relating to both explicit and implicit measures of output prices. Third, the origin of the dilemma is tied to political constrains.

In all investigated sites, the dilemma can be solved with; a clear awareness of the objective and their conflicts. First, protection of farmers income by increasing the price gradually, this might be regarded as a price worth paying for nutrition. Second, storage facilities and transportation infrastructure should be the high priority to increase the sustainability of the production. Less damage, as well as control of the food stocks is requirements for balancing demand and supply. Third, the subsidies must be selective by concentrating on vulnerable groups, or on basic staples consumed by the poor. The government actually does have a programme similar to this objective called *raskin*⁸² (only for

⁸² Abbreviation from *beras miskin* (rice for poor people)

rice) but this programme has not been successful in rural areas for several reasons. They generally have enough rice, they produce their own rice; and they do not feel comfortable accepting aid for such a staple crop due to cultural reasons. Nonetheless, this programme is successful for the poor people in urban areas.

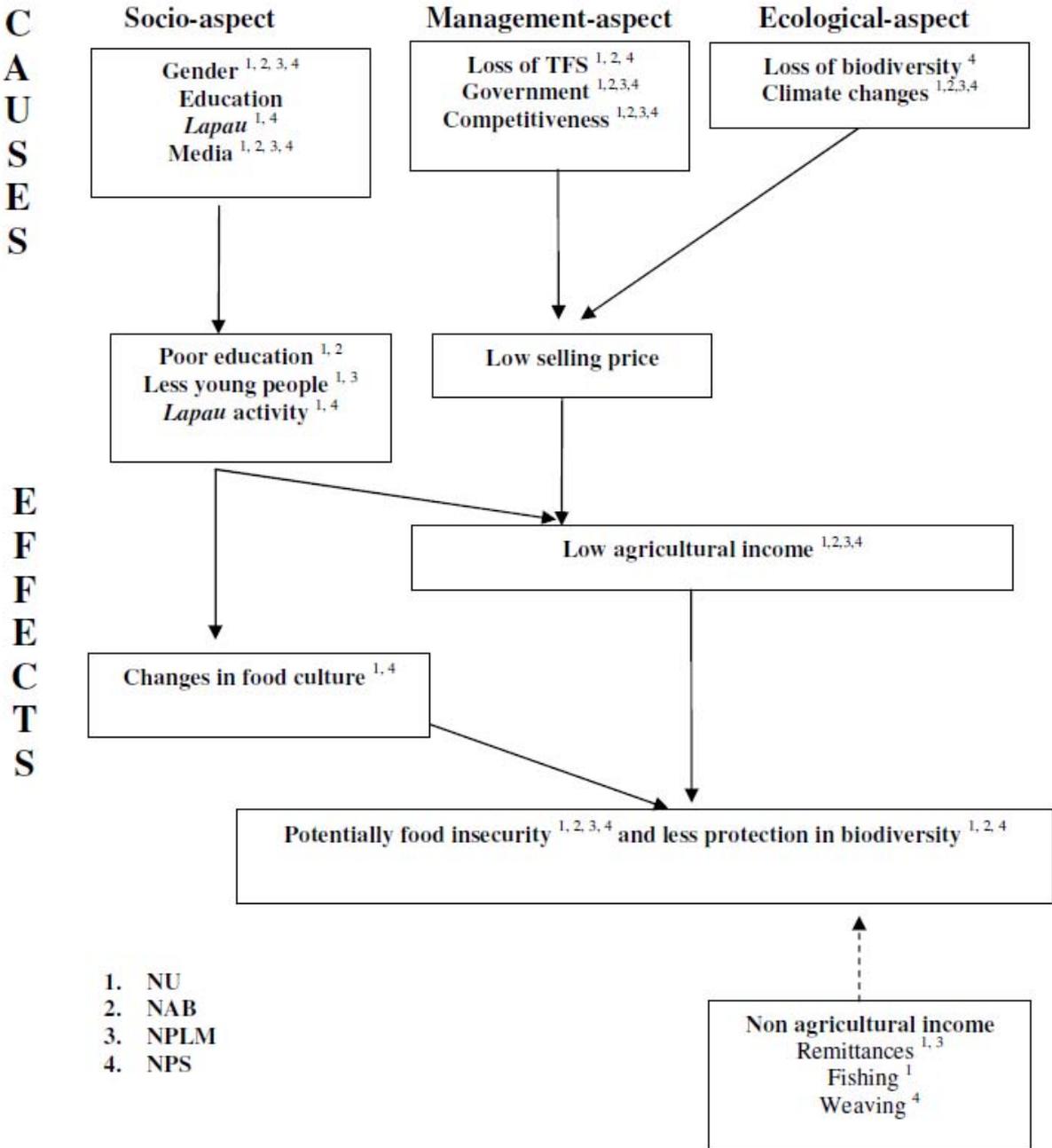


Figure 37: Causes and effect countered by farmers in four different investigated sites

To maintain the selling price, storage systems are one of the solutions to increase the bargaining position of the farmer at the market. But since *rangkiang* and *kapuak* are not being used anymore, no more grain can be stored. All grain crops are sold directly on the field and

farmers then need money to buy their food.

2) Seed policy

In 1969, the directorate of paddy production under the Indonesian Agricultural Ministry started to improve the quality of paddies. In 1971, the *badan benih nasional* (national seedling board) was established with the special task of formulating a seed policy. The awareness of the farmers has been strong regarding the use of high quality of seed under guidance from the *balai sertifikasi* benih (hall of seed certification). This institution is focused and shaping seed policy such that it is appropriate and beneficial. Since the 1990's, the policies have not yielded significant impact for the farmers. The problems have changed slightly from high yield to increased income expectations. The use of high quality seed does not guarantee a sustainable income for farmers, with gains in production. Therefore, seed policy should be based on the local wisdom of the farming communities, together with empowering educational efforts to increase market awareness among the farmers themselves.

3) Fertiliser policy

Fertilisers are controlled by the national authority, and for that reason, provincial and district authorities are assigned quota for application. The low supply of the fertilisers is caused by; 1) the fertilisers company has less efficiency due to the old machinery, 2) the limited energy resources to produce fertilisers due to 60 % natural gas are needed to produce Urea. The supplies of the natural gas from the private companies are declining due to appliance from the UU no 22 TH 2001 about liberalisation of gas companies, 3) the demand of the fertilisers increases due to the agriculture intensifications programme.

On the other hand, the distributions are dependent on the region, and are not flexible. There is no possibility of adjusting the supply based on demand within provinces. The lack of evaluation and supervision from the local government (*kabupaten/kota*) makes the disparity of distribution of the subsidized fertiliser high. The greatest problem is the misuse of subsidized fertilisers. The price of these fertilisers tends to increase, because the raw materials are imported and adjusted based on the US dollar. Even though there is some supervision offered by the commission in each district, corruption and smuggling still lead to widespread misuse of the subsidized fertilisers. One real possibility to stabilize the fertilisers programme for local governments is making a coupon for the farmers eligible to receive the subsidy. This strategy would be convenient and could reduce smuggling.

4) Irrigation policy

According to PP No 20 TH 2006 about irrigation, local governments have responsibility to give assistance to the farmers in the area of water management. The farmer has to maintain the efficient, effective, and safe distribution of water resources. In all investigated sites, there were no problems occurring in irrigation since the lands are rain feed (due to the high annual rainfall). Only in some areas was seen a problem with water shortages and most often solved through the cooperation of local people.

8. 4 Transforming policy through local wisdom

Transforming policy through local wisdom requires community-building and strong community engagement to enable the development of location and culture specific solutions and mechanisms (van de Fliert, et. all 2010, p.331). Therefore, policies can be recommended for the local and provincial government as below:

1. Empowerment of the farmers through self sufficiency on manures, cooperative seed development, and sustainable management of farm. Farmers should learn the fluctuation of supply and demand in the market, and have a tool to access and predict these market cycles. Local governments can facilitate the farmers to look at the possibility of new crops to grow. The consensus among the groups, or *nagari*, should be an alternative strategy to control prices. Like in Nagari Aia Batumbuak, organic farming systems can be an option for low cost production. Marketing research and promotion should be encouraged to generate massive demand for new organic products, with local governments should focus on campaigns to increase on the regional demand.
2. Increasing non agricultural income from side jobs; specifically weaving (NPS), handy craft (NPS) and fishing (NU) is recommended. The remittances from people who gone to *marantau* (NU and NPLM) are effectively promoting the sustainability of farming systems, but it gives no guarantee for the protection of local biodiversity. The policies must also ensure that people have the purchasing power to remain food secure. These efforts should be integrated with nutrition policies, and embrace much more than ensuring the supply of food.
3. Empowerment of the mothers in these communities is critical because of their vital role in shaping and preserving household food culture. Since mothers have more power in communities, they could work to promote the cultivation of spices in backyards. Improvement in information and informal education about food security and nutrition

could be done in the *arisan ibu-ibu* or during the *lapau* activities.

8. 5 Comparison with other studies

Recent studies have done in different places, including Indonesia (Mentawai & Baduy) and the Philippines (Balibat, Roa & Tarlac), both characterized by different types of ecology: coastal, lowland, alluvial plains, and hilly land near the coast (Niehof 2010, p.35). These studies show how households in diverse ecological, social and cultural environments generate livelihood to provide human basic needs. People diversify to spread the risk and generate much needed extra income, both on the farm and combining farm, off-farm, and non-farm activities. On-farm diversification is seen in intercropping and mixed cropping systems.

The possibilities and opportunity for profitable farming is determined by multiple factors. The quality of the ecological and institutional environments, the connection to markets, and the household's access to other resources such as knowledge and finance all work to support agricultural activity. Labours is the most important resource for the poor households. It is often their only resource apart from their social network, especially their network of kin.

The study also shows diversity in the way households provide their basic needs in different environments. While food needs, in terms of adequate intake of calories and micronutrients are basically the same for people everywhere, the ways of procuring food and food preferences differ substantially.

Chapter 9: Conclusions

The conclusions presented are based on the results and discussions. They are followed by comments on the need for future research into local food security within a context of organic farming principles and food culture. Recommendations are given to the government and local people in order to contribute to the future of related rural development. Farm to fork insight provide clear explanations about the current situation of the people regarding “what they really have”. The different figures show that every place has both uniqueness and similarities. The aim of this study was to discover the factors which can be used to give basic knowledge and closely insight of household condition. It is also important to avoid counter-productive and confusing policies. Therefore this study affirms several factors to guide to next phase of research.

According to the results and the discussion, the following hypotheses can be stated:

Hypothesis A: Indigenous knowledge still plays an important role in traditional farming in the Minangkabau`s culture, thus supporting local food security.

This hypothesis confirmed by the research results. The NPLM case is an excellent example of a community which is still practicing indigenous knowledge, and has higher food crop biodiversity in comparison to research sites. The potential food insecurity is not primarily due to decreasing yields, but more so because of the uncertainty of market prices. To protect biodiversity and ensure the in situ management of natural resources, an adequate farmer`s income is required.

Hypothesis B: Indigenous knowledge still plays a role in food culture in the Minangkabau`s culture where it is linked to the matrilineal role of women and leads to healthy nutrition. The mother still plays an important role in kitchen activities; she makes decisions about the meal, and as the land owner. When the agricultural income is low, it is mother who has to decide whether to change the meals, or feel insecure regarding to food. This hypothesis can be confirmed by this research. Educational background and less time with her daughter threaten the generational transfer cooking knowledge. The mother has a potential role to increase the food diversity in her household by using local plants to support biodiversity, such as through spices cultivation in the backyard.

Hypothesis C: *Marantau* plays an important role in traditional farming and food culture in Minangkabau culture today. On one hand, *marantau* impacts capital inflow to

households; the farmers depend on money from *rantau* to invest in the farmland. On the other hand, it results in less labour in agriculture, which inhibits the transfer of indigenous knowledge to continue to protect biodiversity. *Marantau* has changed food habits for those who go abroad. At the same time, this activity also gives possibilities to promote the Minangkabau cuisine across Indonesia. Hypothesis C can be confirmed, stating that marantau plays an important role in traditional farming system and food culture.

Hypothesis D: The local government plays a role in changing the traditional farming system and food culture. It can be seen in NU, NPLM, and NPS, the priority of the government is only PTS (*Padi Tanam Sabatang*) where there is no guarantee of the farmers' receiving sufficient revenue from their land. Farmers can not increase their agricultural income, which means they feel potentially insecure. This hypothesis can be confirmed from this study.

Hypothesis E: Education and gender are playing a role in the changing of traditional farming systems and food culture. Education opportunity is equal among men and women, but in some cases, women tend to leave school earlier because of arranged marriages. Poor education happens in NU and NAB. The reasons for this are arranged marriages and the distance of a school from their homes. Therefore most of young people go abroad and this lead to the fact that less young people are helping in agriculture. According to the investigation, men predominantly work in farm and fishing, while women work in the kitchen. In NAB, even though women work on farmland they earn less income than men. Weaving (NPS) and kitchen activity is recognized as women's work. This hypothesis can be confirmed by this investigation.

Hypothesis F: Mass media is not impacting any changes in traditional farming systems or food culture in current times. The traditional farming systems show change because of intensive agricultural extension is introducing new methods for agriculture. There is no evidence that people want to change any of their food habits despite the increased *lapau* activity, which allows them to get more food choices not made at home.

The contributions of this investigation can be seen in the recommendation to local food security policy. These can be implemented to respond effectively to the current challenges in society and environment. The recommended policies are limited to a particular diversity of topography, culture, natural resources, and local wisdom which considerably impacted policy development. This study can encourage other research in this field in different regions. The

suggestions are provided as follow:

1. Empowerment of the farmers with self sufficiency of manure, cooperative seed, and sustainable farm management. Farmers should know – “where are they in the state of knowledge” – with a better understanding of the agro-ecosystem and familiarity with the local experiences; farmers build up confidence in their own knowledge, learning capacity and decision making capabilities. The farm management guidelines can than be adopted from their wisdom.
2. Increasing the non-agricultural income is recommended. The remittances from the people who have gone to *marantau* can be invested in non agricultural jobs.
3. Empowerment of the mother is important since she has plays a powerful and important role in farm to fork activities. The mother can be the one who initiates and promotes the cultivation of spices in the backyard. Improvement of nutritional knowledge through information and informal public education (*arisan ibu-ibu* and *lapau*) can be another good option.

The challenges to apply the recommendations are:

1. The gap between institutions and organizations of local government. For example, one district has more then one department which is involved in food security policy. The communication among the policy makers must be improved.
2. The rapid interaction between local government and farmers depends on the field extension agriculture (FEA). This means the policy from the local government is implemented by FEA and based on observations, each *nagari* has only one FEA, this is not adequate. The local government budget for agriculture is absorbed entirely by the salaries of the civil servants whose duties limited programme design.

Further investigations are needed to measure the self sufficiency in agriculture with low-internal-input-technology (LEIT) and give feedback of research to local people, which is expected can supports sustainable income for local farmers.

Summary

The basic idea behind improving local food security consists of two paths; first, accessibility (price, stock) and second, availability (quantity and biodiversity); both are prerequisites to the provision of nutrients and a continuous food supply with locally available resources. The objectives of this thesis are to investigate if indigenous knowledge still plays an important role in traditional farming in the Minangkabau's culture, thus supporting local food security. If the indigenous knowledge still plays a role in food culture in the Minangkabau's culture which is linked to the matrilineal role and leads to a sound nutrition. Further, it should be tested if *marantau* influences traditional farming and food culture in Minangkabau's, and if the local government plays a role in changing of traditional farming systems and food culture. Furthermore this thesis wants to prove if education and gender are playing a role in changing traditional farming system and food culture, and if the mass media affects traditional farming systems and food culture for the Minangkabau.

The study was completed at four locations in West Sumatera; *Nagari Ulakan* (NU) (coastal area), *Nagari Aia Batumbuak* (NAB) (hilly area), *Nagari Padang Laweh Malalo* (NPLM) (lake area), *Nagari Pandai Sikek* (NPS) (hilly area). The rainfall ranged from 1400- 4800 mm annually with fertile soils. Data was collected by using PRA (Participatory Rural Appraisal) to investigate indigenous knowledge (IK) and its interactions, which is also combining with in depth-interview, life history, a survey using semi-structured-questionnaire, pictures, mapping, and expert interview. The data was collected from June - September 2009 and June 2010. The materials are; map of area, list of names, questionnaires, voices recorder, note book, and digital camera. The sampling method was snowball sampling which resulted in the qualitative and quantitative data taken. For qualitative data, ethnography and life history was used. For quantitative, a statistical survey with a semi-structured questionnaire was used. 50 respondents per each site participated voluntarily. Data was analyzed by performing *MAXQDA 10*, and *F4* audio analysis software (created and developed by Philip-University Marburg). The data is clustered based on causality.

The results show that; the role of IK on TFS (traditional farming system) shown on NPLM which has higher food crop biodiversity in comparison to the other three places even though it has relatively similar temperature and rainfall. This high food crop biodiversity is due to the awareness of local people who realized that they lived in unfavourable climate and topography; therefore they are more prepared for any changes that may occur. Carbohydrate

intake is 100 % through rice even though they are growing different staple crops. Whereas most of the people said in the interviews that not eating rice is like not really eating for them. In addition to that, mothers still play an important role in kitchen activities. But when the agriculture income is low, mothers have to decide whether to change the meals or to feel insecure about their food supply. *Marantau* yields positive impact through the remittances it provides to invest on the farm. On the other hand, it results in fewer workers for agriculture, and therefore a negative impact on the transfer of IK. The investigation showed that the local government has a PTS (*Padi Tanam Sabatang*) programme which still does not guarantee that the farmers are getting sufficient revenue from their land. The low agricultural income leads to situation of potential food insecurity. It is evident that education is equal among men and women, but in some cases women tend to leave school earlier because of arranged marriages or the distances of school from their homes. Men predominantly work in agriculture and fishing, while women work in the kitchen. In NAB, even though women work on farmland they earn less than men. Weaving (NPS) and kitchen activity is recognized as women's work, which also supports the household income. Mass media is not yielding any changes in TFS and food culture in these days. The traditional farming system has changed because of intensive agricultural extension which has introduced new methods of agriculture for the last three decades (since the 1980's). There is no evidence that they want to change any of their food habits because of the mass media despite the *lapau* activity which allows them to get more food choices, instead preparing traditional meal at home.

The recommendations of this thesis are:

1) The empowerment of farmers.

It is regarding the self sufficient supply of manure, cooperative seed, and sustainable farm management. Farmers should know – where are they in their state of knowledge – so they can use their local wisdom and still collaborate with new sources of knowledge. Farmers should learn the prognosis of supply and demand next prior to harvest. There is a need for farm management guidelines; that can be adopted from both their local wisdom and modern knowledge.

2) Increase of non-agricultural income

Increasing the non-agricultural income is strongly recommended. The remittances can be invested on non-agricultural jobs.

3) The empowerment of the mother.

The mother plays an important role in farm to fork activities; the mother can be an initiator

and promoter of cultivating spices in the backyard. Improvement of nutritional knowledge through information and informal public education can be done through *arisan ibu-ibu* and *lapau* activity.

The challenges to apply these recommendations are:

- 1) The gap between institutions and organizations of local governments. There is more than one institution involved in food security policy.
- 2) Training and facilities for field extension agriculture (FEA) is needed because the rapid change of interaction between local government and farmer's dependent on this agency.

Zusammenfassung

Es gibt zwei Wege zur Verbesserung der lokalen Ernährungssicherheit in den untersuchten Regionen West Sumatras, das sind zum einen die Zugänglichkeit (Preis, Lager) und zum anderen der Verfügbarkeit (Menge und Artenvielfalt) von Lebensmitteln. Die beiden Voraussetzungen müssen erfüllt werden, um eine ernährungsphysiologisch ausreichende und kontinuierliche Lebensmittelversorgung von den lokal Lebensmittelressourcen bereit stellen zu können.

Die Ziele dieser Arbeit sind es zu untersuchen, ob das indigene (lokale) Wissen immer noch eine wichtige Rolle zur Ernährungssicherheit in der traditionellen Landwirtschaft sowie in der dortigen Esskultur Minangkabau (West Sumatra, matrilineare Gesellschaft), spielt. Des Weiteren soll untersucht werden, ob ‚*Marantau*‘ (Auswandern) die traditionelle Landwirtschaft und Esskultur in Minangkabau beeinflusst und ob die lokalen Regierungen (und ihre Programme) eine Rolle bei der Veränderung der traditionellen Landwirtschaft und Esskultur spielen. Schließlich wird in dieser Arbeit untersucht, ob die Bildung und das Geschlecht eine Rolle bei der Veränderung der traditionellen Landwirtschaft und Esskultur spielen, und letztendlich ob die Massenmedien einen Einfluss auf die traditionelle Landwirtschaft und Esskultur in Minangkabau haben.

Die Untersuchung wurde in *Nagari Ulakan* (NU) (Küstengebiet), *Nagari Aia Batumbiak* (NAB) (Hügelland), *Nagari Padang Laweh Malalo* (MPLM) (See), *Nagari Pandai Sikek* (NPS) (Hügelland), in West Sumatra, Indonesia durchgeführt. Die jährlichen Niederschläge reichten von 1400- 4800 mm mit fruchtbaren Böden. Mithilfe der Methode des Participatory Rural Appraisal (PRA) wurden die Daten in dieser Untersuchung gesammelt, um das indigene Wissen und dessen Interaktionen zu untersuchen. Ergänzt wurde mit Tiefeninterviews, Aufnahme der Lebensgeschichte, Fotos, Landkarten und Semi-strukturellen-Fragebögen sowie Experteninterview. Die Daten wurden von Juni bis September 2009 und im Juni 2010 aufgenommen. Als Materialien dienten eine Karte des Gebiets sowie eine Liste von Namen, Fragebögen, Stimmenaufnahmegerät, Notizblock und Digitalkamera sowie Fragebögen. Als Probenahmeverfahren kam die Schneeball-Stichprobe zum Einsatz, in die sowohl qualitative als auch quantitative Daten eingegangen sind. Bei den qualitativen Daten wurden Ethnographie und Lebensgeschichte verwendet. Bei den quantitativen Daten wurden die statistische Erhebung mit semi-strukturierten Fragebögen verwendet. 50 Befragten an jedem Standort haben freiwillig teilgenommen. Die Daten wurden mittels Analyse der von der

Philip-Universität Marburg entwickelten Software MAXQDA 10 und f4 Audio-Analyse ausgewertet. Die Daten wurden entsprechend der Kausalität gruppiert.

Die Ergebnisse zeigen, dass das indigene Wissen auf die traditionelle Landwirtschaft im Vergleich zu anderen untersuchten Standorten in NPLM eine Rolle spielt. Trotz der relativ ähnlichen Temperaturen und Niederschläge zeigt NPLM im Vergleich zu den anderen 3 Standorten eine höhere Lebensmittelbiodiversität. Weil die Menschen in einem ungünstigen Klima und Topographie leben, sind sie mehr für die Veränderungen vorbereitet. Diese Sensibilisierung für das Vorhandene verursacht die hohe Biodiversität der Lebensmittel. Die Kohlenhydratzufuhr erfolgt zu 100% über Reis, obwohl sie dort verschiedene kohlenhydratreiche Nutzpflanzen wachsen. Die meisten Menschen haben in den Interviews gesagt, dass das Essen ohne Reis kein richtiges Essen für sie sei. Mütter spielen noch eine wichtige Rolle bei den Tätigkeiten in der Küche. Sie entscheiden über das Essen. Sie sind Eigentümer bebaubaren Landes. Wenn das Landwirtschaftseinkommen niedrig ist, treffen die Mütter die Entscheidung, das Essen zu verändern oder sich mit der Versorgung Nahrung unsicher zu fühlen und in der Landwirtschaft etwas zu ändern. Marantau wirkt sich zum einen auf Entscheidungen auf dem Hof aus, auf der anderen Seite können weniger Arbeiter in der Landwirtschaft beschäftigt werden, die das indigene Wissen transferieren können. Die Untersuchung ergab, dass lokale Regierungen ein Programm namens PTS (*Padi Tanam Sabatang*) durchgeführt haben. Leider kann trotz des Programms nicht garantiert werden, dass die Landwirte immer über genügend Einnahmen aus der Ernte ihres Landes verfügen. Es macht keinen Sinn, wenn sie höhere Erträge erzielen leisten, aber zur gleichen Zeit bekommen sie niedrigere Einnahmen durch rückläufige Marktpreise. Niedrige Erträge der Landwirtschaft führen in eine potenziell unsichere Situation. Deutlich geworden ist, dass Männer und Frauen potenziell über eine gleiche Bildung verfügen können. Aber in einigen Fällen neigen Frauen dazu, dass sie aufgrund der Ehe früher die Schule verlassen oder sie besuchen die Schule nicht weiter aufgrund der weiten Entfernung zwischen Wohnung und Schule. Männerarbeiten überwiegend in der Landwirtschaft und der Fischerei während Frauen in der Küche arbeiten. Die Untersuchung zeigt, dass in NAB die im Reisfeld arbeitenden Frauen schlechter bezahlt als die Männer werden. Weberei (NPS) und Tätigkeiten in der Küche werden als Tätigkeiten für die Frauen anerkannt, wobei sie die Einkommen der Haushalte unterstützen. Die Untersuchung zeigt auch, dass die Medien bisher zu keinen Veränderungen in TFS- und Esskultur geführt haben. Das traditionelle Landwirtschaftssystem hat sich wegen der intensiven landwirtschaftlichen Erweiterung

verändert und weil in den letzten Jahrzehnten (seit 1980) neue Methoden für die Landwirtschaft eingeführt wurden. Auch gibt es keinen Beweis, dass die Bevölkerung auf dem Land sie wegen der Massenmedien ihre Ernährungsgewohnheiten verändern wollen trotz der 'lapau Tätigkeit', die ihnen mehr Auswahl von Lebensmitteln anstelle der Vor- und zubereitung zu Hause erlaubt.

Die Empfehlungen dieser Arbeit sind:

- 1) Schulung der Landwirte in der landwirtschaftlichen Betriebsführung um mit vorhandenem Dünger und Samen ausreichende Erträge zu erzielen. Die Landwirte sollten über den Stand des Landwirtschaftlichen Wissens informiert sein, um Sowohl aufgrund des Erfahrungswissens in Kombination das neue Wissen anwenden zu können. Die Landwirte sollten die Prognose von Angebot und Nachfrage zur Einkommensverbesserung für die nächsten Ernten lernen. Die Grundsätze in der Betriebsführung müssen erlernt und durchgeführt werden.
- 2) Erhöhung der nicht landwirtschaftlichen Einkommen wird stark empfohlen. Die Auslandsgelder (vom den im Ausland lebenden Verwandten) können in nicht-landwirtschaftliche Arbeitsplätze investiert werden.
- 3) Wertschätzung und Empowerment der Mutter. Die Mutter spielt immer noch eine wichtige Rolle bei den '*fork activities*'; Die Mutter kann als eine Initiatorin und leitende Person des Haushalts Funktion die Gewürze im Hinterhof anbauen. Eine Verbesserung des Ernährungswissens durch Schulung informelle Bildung kann durch öffentliche *Arisan ibu-ibu* und *lapau* Aktivität durchgeführt werden.

Die Herausforderungen, diese Empfehlungen anzuwenden sind:

- 1) Es besteht eine Lücke zwischen der institutionellen und organisatorischen Tätigkeit der lokalen Regierungen. Zudem sind mehr als eine Institution an der Umsetzung der Ernährungspolitik beteiligt, Alle Beteiligten sind einzubeziehen.
- 2) Training und Einrichtung Einer Organisation für landwirtschaftliche Felderweiterung (*field extension agriculture, FEA*), Vom ihnen hängt die Geschwindigkeit der Interaktion zwischen Gemeinden und Bauern von ihnen ab.

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Glossary

Daily-activity profile: Researcher can explore and compare the daily activity patterns of men, women, youth, and elderly people.

Direct observation: Observations related to questions, such as what? When? Where?, Who?, Why?, How?

District: Part of the provinces with have own governments and consist of sub-districts (KBBI Online, 2008)

Do it yourself: Villagers are encouraged to teach a researcher how to do various activities. The researcher will learn how much skill and strength are required to do day to day rural activities. Roles are changed: villagers are the 'expert's' and attitudes are challenged.

Folk, song, poetry, and dance: are analyzed to provide insight into value, history, practices and belief.

Future possible: People are asked how they would like to think to be in the future and predict what will happen if nothing is done or something is done. It is about wishes, desires or expectations.

Indigenous knowledge: used synonymously with traditional and local knowledge to differentiate the knowledge developed by a given community from the knowledge generated through universities, government research centres and private industry (the international system, sometime called the Western system) (Warren, 1992)

Intriguing practices and beliefs: Indigenous and beliefs are noted, even if they are based on myth and superstition.

Key probes: A question addressing a key issue is asked to different people and the answers are compared.

Matrices: To gather information and facilitate and focus analysis and discussion.

Minangkabau's: Ethnic group mostly living in West Sumatra, with a total population of approx. 6 millions all around Indonesia and Malaysia. They belong to the matrilineal system; property land will be passed down from mother to daughters. Strongly influence by Islamic and adat.

Night halts: The researcher lives in the village during the research process.

Participatory rural appraisal: One of the data collection techniques to collect information and observe indigenous knowledge.

Participatory mapping and modelling: Using local material, villagers draw or model current or historical conditions. The researcher then interviews the villager by ‘interviewing the map’. This technique can be used to show watershed, forest, farm, home garden, resident area, soil, water resources, wealth ranking, household assets, land-used pattern, and changes in farming practices, constraints, trends, health and welfare conditions, and distribution of various resources.

Portraits, profiles case studies, and stories: Household histories or history how certain conflicts resolved are recorded. This can provide short but insightful description of characteristic problems and how they dealt with.

Review of secondary data: Secondary data are analyzed to a large extend, but too much emphasis on previous analysis and opinions can mislead the investigation.

Seasonal calendars: Variables such as rainfall, labour, income, expenditure, debts, animal fodder or pest, and harvesting periods can be drawn.

Self-correcting field note: Rereading field notes on the regular basis helps the researcher to correct errors and indentifies problems and solutions.

Semi-structured interviewing: A semi structured interviewing and listening technique uses some predetermined questions and topics but allow new topic to be pursued as the interview develops. The interviews are informal but carefully controlled.

Time lines: Major historical community events and changes are dated and listed. Understanding the cycles of change and this can help communities to focus on the future actions and information requirements.

Traditional management system and local–resource collections: Local people collect samples (for example: plant, soil). This can be an efficient way to learn about local biodiversity and management systems.

Transect walk and guided field walk: The researcher and key informants conduct a walking through the area of interest to observe, to listen, to identify e.g. different zones and conditions, and ask questions to identify problems and possible solutions.

Appendices

A. Family welfare indicators

Family Welfare Indicators basically deriving from the subject matter being linked to the law No. 10 in 1992 along with the assumption that welfare is a composite variable consisting of a variety of specific indicators and is operational. The family welfare indicators and criteria set forth are as follows:

A. Pre welfare family: are families who can not meet one or more of five basic needs. There are two categories:

1. Poor family

It is the family that can not meet one or more indicators that include:

1. At least once a week the family eats meat / fish / eggs.
2. Last year the entire family received at least one set of new clothes.
3. House floor is area at least 8 m² for each person.

2. Very poor family

1. In general, all family members eat two meals a day or more.
2. Family members have different clothes for home, work / school and travel.

B. Phase I for family welfare is those families who have been able to meet their basic needs on a minimal level i.e.:

1. Conducting religious worship according to each family member.
2. In general, the whole family eat 2 (two) times a day or more.
3. All members of the family have different clothes for home, work / school and travel.
4. The widest part of the house rather than from the ground floor.
5. When a child is sick or couples of reproductive age want to carry / health workers.

C. Phase II family welfare i.e.:

1. Families, who have been able to meet the criteria in addition prosperous family, must also meet the social requirements psychologies 6 to 14 are:
2. Family members practice their religion regularly.
3. At least once a week the family provides meat / fish / eggs as side dishes.
4. All family members get at least one new set of clothes per year.

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5. House floor area at least 8 m² per person of the house is recommended.
 6. All members of the family have been in good health in the last three months.
 7. At least 1 (one) of family members aged 15 years and older has a fixed income.
 8. All family members aged 10-60 years who could read Latin.
 9. All of the children aged 5-15 years of schooling at this time.
 10. If children live two or more, families are still eligible couples use contraception (except for being pregnant)

D. Phase III of the family welfare

1. Those parents who qualify one to 14 and may also qualify 15 to 21, provided family development, namely:
 2. They have an effort to enhance their knowledge in religion.
 3. Some of the family income can be set aside for family savings for family savings.
 4. Usually eat together at least once a day and the opportunity is used to communicate among members of the family.
 5. Participate in community activities in the neighbourhood.
 6. Held a joint recreation outside the home at least 1 time / 6 months.
 7. Can get news from newspapers / television / magazines.
 8. The family members are able to use means of transport in accordance with local conditions.

E. Phase III plus family welfare

Families who can meet the criteria I to 21 and can also meet the criteria of 22 and 23 family development criteria, namely:

1. Regularly or at certain times of voluntary donations to community social activities in the form of material.
2. Head of Family or family member is active as a board associations / foundations / institutions of society.

B. Traditional foods descriptions

Food name	Description
Made from rice	
<i>Lontong</i>	Rice porridge, hardened and then cut into compact squares. Eaten with young jackfruit or other vegetables cooked with coconut milk
<i>Pical</i>	Hulled rice combined with salad and hot-peanut sauces
<i>Sate</i>	Hulled rice (<i>katupek</i>) in coconut leaf with grill meat with hot-chilli sauces
Made from noodle	
<i>Bakso</i>	Noodle with ball-meat soup <i>Bakso</i> is not originally Minangkabau traditional food. It's becoming popular in late 1970's. The name Bakso is originated from Bak-So, the Hokkien pronunciation for 'Shredded-Meat'. As most Indonesians are Muslim, generally Bakso is made from beef or is mixed with chicken. Bakso is commonly made from the mixture of ground beef and tapioca flour. Bakso are usually served in a bowl of beef broth soup, with yellow noodles, bihun (rice vermicelli), salted vegetable, tofu, egg (wrapped within bakso), Chinese green cabbage, bean sprout, siomay or steamed meat dumpling, and crispywonton, sprinkled with fried shallots and celery.
<i>Pangsit</i>	A wheat based noodle which was brought to Southeast Asia by Chinese merchants, and is today a common ingredient, especially in Thailand and in Indonesia. The dish has also been further developed to more closely align with the local tastes.
Dishes	
<i>Asam padeh</i>	Fish soup with mostly chilli and <i>asam kandis</i>
Others	
<i>Bakwan</i>	Fried vegetable with flour, sometime with chilli sauces or raw chilli
<i>Lapek</i>	Made from banana or cassava flour and covered by banana leaves

C. Survey and interview tools

1. Qualitative data collection tools

1.1. Ethnography (in –depth interview and direct observation)

The technique uses in-depth interview and open question to the key person (mamak / penghulu). Key person will be chosen by the other interviewee. The question will be adapted from the situation of the interviewee. The answer will be collected and grouping into special categories will be based on Indexical methods. The data collection is also supported by audio recorder. The qualitative question will cover several questions as follows:

(A) Questionnaire for qualitative in-depth interview

Subject: Hypothesis A ‘traditional farming system, food security’

Object: head of clan, farmer, local people

Questionnaire No:

Date:

Personal information

Name	Age:			
Marital status	<input type="checkbox"/> single			<input type="checkbox"/> married
Role in the household	<input type="checkbox"/> husband	<input type="checkbox"/> wife	<input type="checkbox"/> child	<input type="checkbox"/> others
Total of children	_____ man		_____ woman	
Education				
Occupation				
Other occupations				
Address	village			
	sub district			
	district			

Cultivation:

What are the activities before cultivation?

How you and your community prepare the land?

How the cultivation started?

Who is the responsible person in cultivation?

Who will participate on the cultivation?

What is the role of the mother on cultivation?

What is the old experiences did you follow?

Why you still used the old experiences?

Pest and diseases control:

How you control the pest and diseases?

How much time do you need?

Why do you think this is the appropriate way to control disease?

How and why did you follow from the old experiences?

Plant rotations:

What are the common crops are planted?

What kind of crops did you growth?

Have you changed your crops?

Why do you change your crops?

Did you follow the rotation from the old experiences?

Preparing manures:

How did you prepare manure?

Why do you think this is the appropriate way to get good manure?

How did you follow/learn from the old experiences?

Seeds:

How did you select the seed?

Why do you think this is the appropriate way to select the seed?

Where you get the seed?

How did you follow/learn from the old experience?

Post harvest activity and storage:

How you harvest the crops?

What kind of festival in harvest time?

How you preserve the crops?

What kind of post-harvest activities did you do?

Food security:

In your opinion, do you feel/think that you are secure in food?

If not, what are the important things should be done?

What is missing things since lasts decade in cultivation?

In your opinion, what should the government and local people do?

Is the *rangkiang* still being used as storage places?

If not, where are the places for storage?

Land owner

Which clan has the largest land here?

How is the works done?

How the clan divided for their clan member?

Who the most person play a role is in divided the land?

(B) Questionnaire for qualitative in-depth interview

Subject: Hypothesis B ‘food culture, matrilineal role, Object: Head of clan, Mother, local people

Questionnaire No:

Date:

Personal information

Name	Age:			
Marital status	<input type="checkbox"/> single	<input type="checkbox"/> married		
Role in the household	<input type="checkbox"/> husband	<input type="checkbox"/> wife	<input type="checkbox"/> child	<input type="checkbox"/> others
Total of children	_____ man		_____ woman	
Education				
Occupation				
Other occupations				
Address	village			
	sub district			
	district			

Food processing in household:

Who cooks and prepare the meal for your family?

Who decide and choose the meal?

How mother play a role in preserve the food?

How many time mothers cook everyday? When?

What is usually the cooking process of your family?

How did you get the spices?

How do you learn to cooks?

Food culture in household:

What is the common meal in your family?

How do you preserve the meal?

Is the meal its follow from your mother or grand mother recipes?

What are the special meals for festivals?

What is missing since lasts decade in your family meals?

(C) Questionnaire for qualitative in-depth interview

Subject: Hypothesis C' *matantau*, traditional farming, food culture,

Object: Head of clan, mother, and families has someone in *rantau*

Questionnaire No:

Date:

Name	Age:			
Marital status	<input type="checkbox"/> single			<input type="checkbox"/> married
Role in the household	<input type="checkbox"/> husband	<input type="checkbox"/> wife	<input type="checkbox"/> child	<input type="checkbox"/> others
Total of children	_____ man		_____ woman	
Education				
Occupation				
Other occupations				
Address	village			
	sub district			
	district			

Marantau:

Is there any of your family members' going *marantau*?

Did s/he could cooks?

Did s/he play important role in cultivation before?

Did s/he involve in farming before going to *marantau*?

Food Culture

Did s/he ever sad to you that miss the food of mother cooks?

Did s/he ever tell you that to try cooks by them self just like recipe here?

Did s/he ever tell you that what are spices that s/he could not find or had some difficulties to find in *rantau*?

Based on question no.3, how s/he compromised with those situations?

Agro biodiversity and diversity of food:

What is missing in cultivation?

What is missing in plat protection?

What is missing in food preparation in house?

What would you do after flooded?

(D) Questionnaire for qualitative in-depth interview

Subject: Hypothesis D & E' government, gender, education, changing of traditional farming system, food culture'

Object: Government officers, expertises

Questionnaire No:

Date:

Name of officer /expertises':

Responsibility:

Region:

Demography status

What is the current demography situation in your area? (E.g. poverty, youth and unemployment)

What is the main programme to solve the food security?

What is the main problem to do the programme?

Who is involved in the programme?

Is there any significant changing?

Education

What is the current educational status in your area? (e.g. literacy indices)

What is the main programme to accelerate the education in your area?

What is the main problem to do such a programme?

Is there any specific programme for the farmers?

Who involved in the programme?

Is there any significant changing in the farmers?

Some changing in cultivation in decade

What is the main differences' of cultivation compared with last decade?

Which one is better in your opinion, today or last decades?

What should be improving for the future?

What should government do?

Gender

Who are doing the main job?

Is there strict role for the different gender?

Is there taboo related to gender?

What do you think about gender?

Food culture

Is there any changing in food habit in the last decades?

In what extant the local people change their meal?

Why the people still/change their meal?

Is there any programme for changing the food habit?

Nutritional intake

What is the current of the nutritional status in your area?

What is the main programme to improve the nutritional status?

What is the main problem to do such a programme?

Who is involved in the programme?

Is there any significant changing?

Total crops production

What is the main crops production in your area?

What is the main programme to increase the food security in your area?

What is the main problem to do such programme?

Who is involved in the programme?

Is there any significant changing?

(E) Questionnaire for qualitative in-depth interview

Subject: Hypothesis F' Mass Media' Object: Local People

Questionnaire No:

Date:

Name of officer /expertises':

Responsibility:

Region:

Do you have any, television, Radio, Newspapers, or Mobile Phone?*

What kind information do you need from those facilities?

How many time a day you getting information?

Is it important the information for your work activity?

Is there information change your lifestyle?

Do you think what the most positive change from those facilities is?

(F) Form for seasonal calendars

Subject: Hypothesis A, B, C, D, E and F

Object: Local people and environments

Form No.:.....

Date :.....

Surveyor:.....

Name of the place:.....

January	:	_____
February	:	_____
March	:	_____
April	:	_____
May	:	_____
June	:	_____
July	:	_____
August	:	_____
September	:	_____
October	:	_____
November	:	_____
December	:	_____

1.2. Life history

Researcher will be involved in daily life and will also be getting some interaction with local people. The data will divide into description and also recorded into audio devices. The subject is about traditional farming system, food culture, merantau and biodiversity. Life history will covers some method which are self correcting field notes, key probes, portraits, profile and case studies and stories, intriguing practices and beliefs, daily activities, traditional management system and local resources collection and also local government interview.

2. Quantitative data collections tools

2.1. Statistical survey

(A) Questionnaire for semi-structured interview with rural households

Subject: Hypothesis A&B 'Diversity intake, income, land status'

Object: local people

Questionnaire No:.....

Date :.....

Surveyor:.....

1. Nutritional Intake

Name	Age:			
Marital status	<input type="checkbox"/> single	<input type="checkbox"/> married		
Role in the household	<input type="checkbox"/> husband	<input type="checkbox"/> wife	<input type="checkbox"/> child	<input type="checkbox"/> others
Total of children	_____ man		_____ woman	
Food intake	<input type="checkbox"/> 1/day			
	<input type="checkbox"/> 2/day			
	<input type="checkbox"/> 3/day			
Main calorie intake	<input type="checkbox"/> Rice			
	<input type="checkbox"/> Instants noodle			
	<input type="checkbox"/> Other _____			
	Notes* _____			
How much? **	<input type="checkbox"/> half portion			
	<input type="checkbox"/> one portion			
	<input type="checkbox"/> Other _____			
Main protein intake	<input type="checkbox"/> Fish			
	<input type="checkbox"/> Chicken			
	<input type="checkbox"/> Beef			
	<input type="checkbox"/> Egg			
	<input type="checkbox"/> Other _____			
	Notes* _____			
How much? **	<input type="checkbox"/> Half portion			
	<input type="checkbox"/> One portion			
	<input type="checkbox"/> Other _____			
Main fruits	<input type="checkbox"/> Banana			
	<input type="checkbox"/> Papaya			
	<input type="checkbox"/> Water melon			
	<input type="checkbox"/> Other _____			
Main vegetables	<input type="checkbox"/> Cassava leaf			
	<input type="checkbox"/> Cucumber			
	<input type="checkbox"/> Jack fruit			
	<input type="checkbox"/> Other _____			
Who cooks?	<input type="checkbox"/> Mother/ wife			
	<input type="checkbox"/> Grandmother			
	<input type="checkbox"/> Daughter			
	<input type="checkbox"/> Other _____			
	<input type="checkbox"/> Father			
	<input type="checkbox"/> Mother			
Who decides for a meal?	<input type="checkbox"/> Son			
	<input type="checkbox"/> Daughter			
	<input type="checkbox"/> Others _____			

Favourite's meal	_____
Eating out	<input type="checkbox"/> 1/ day <input type="checkbox"/> Only working day <input type="checkbox"/> 1/ week <input type="checkbox"/> Other _____ village
Address	sub district
	district

*) Explain of specific options. In example: what kind of fish.

**) Portion are explained by interviewer during interview

2. Income

Income assumption	<input type="checkbox"/> < Rp.500.000/month <input type="checkbox"/> Rp.500.000-Rp 1.000.000 /moth <input type="checkbox"/> > Rp. 1.000.000/moth <input type="checkbox"/> _____
Education	<input type="checkbox"/> None <input type="checkbox"/> Elementary School <input type="checkbox"/> Junior High School <input type="checkbox"/> Senior High school <input type="checkbox"/> University <input type="checkbox"/> Others vocational _____
Occupation	<input type="checkbox"/> Farmers <input type="checkbox"/> Land owner <input type="checkbox"/> Civil servant <input type="checkbox"/> Other _____
Side Job	<input type="checkbox"/> Ojek (Public transportation using motorcycle) <input type="checkbox"/> Warung (Small kiosk) <input type="checkbox"/> Poultry <input type="checkbox"/> Other _____

3. Land status

What is your land status?	<input type="checkbox"/> Clan _____ * <input type="checkbox"/> Family <input type="checkbox"/> Husband
If from clan, how is divided?	<input type="checkbox"/> Mamak <input type="checkbox"/> Penghulu <input type="checkbox"/> Court _____
How large is it?	<input type="checkbox"/> Less then 1 Ha <input type="checkbox"/> 1 Ha – 2 Ha <input type="checkbox"/> 2 Ha – 5 Ha <input type="checkbox"/> more then 5 Ha
Did you have the land ownership certification?*	<input type="checkbox"/> Yes _____ <input type="checkbox"/> No _____

*) asking by explicit question

(B) Form for mapping

Subject: Hypothesis A, B, C & D Object: Local people and environments

Form No.:.....

Date :.....
 Surveyor:.....
 Name of the place:.....
 Categories of map:.....

(C) Form for direct matrix ranking

Subject: Hypothesis A, B, C, &D
 Object: Local people and environment
 Form No.:.....
 Date :.....
 Surveyor:.....
 Name of the place:.....

No	Problem	Score	Rank	Explanations
1	Lack of seed			
2	Lack of manure			
3	Lack of oxen and tools			
4	Lack of transportation			
5	Lack of information			
6	Lack of market			
7	Lack of supervision from government			
8	Lack of infrastructures			
9	Lack of education			

(D) Form for matrix of participation of the local people in cultivation and food preparation

Subject: Hypothesis A, B, C &D
 Object: young men, old men, young women, old women
 Form No.:.....
 Date :.....
 Surveyor:.....
 Name of the place:.....

Young men	Old men	Young women	Old women (mother)
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2.2. Secondary data

The secondary data will be collected from statistic data of governmental offices. It will cover some topics such as demography, land status, and crops production.