

## CHAPTER 4

### CONTEXT OF STUDY AREA

#### 4.1 Geographical, topography, and climate condition

Geographically, Bali province is located in  $8^{\circ}03'40''$  -  $8^{\circ}50'48''$  South Latitude and  $114^{\circ}25'53''$  -  $115^{\circ}42'40''$  East Longitude. The boundaries of Bali province are: North – Java Sea, South – Hindia ocean, West – Bali strait/ East Java province, East – Lombok strait/Lombok Island. The total area of Bali province is 5,632.86 square km or 0.29% from the total of Indonesia Islands (see Figure 4.1).

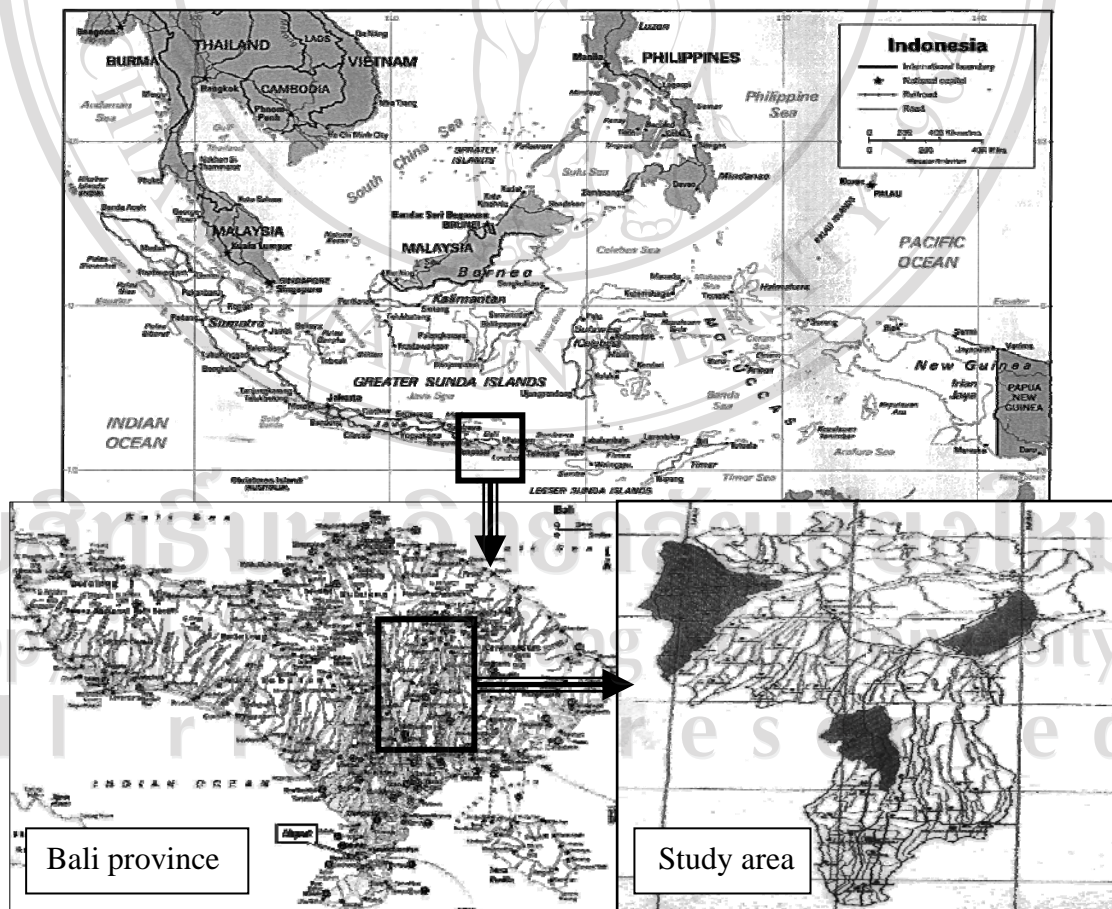


Figure 4.1 Map of Indonesia and Bali province

Bali province consists of six Islands, where Bali Island as the major Island and others are Nusa Penida, Nusa Lembongan, Nusa Ceningan, Serangan, and Menjangan Island. Bali province also divided into eight districts: Jembrana, Tabanan, Badung, Gianyar, Karangasem, Klungkung, Bangli, and Buleleng; and one municipality: Denpasar as the capital of Bali province. The largest area of Bali province is Buleleng district which covered 24.25% of total Bali area, followed by Jembrana (14.94%), Tabanan (14.9%), Karangasem (14.9%), and Badung, Denpasar, Klungkung, Gianyar, and Bangli (31%).

The topography of Bali Island is detached by two diverse conditions: a) northern part of Bali Island which consists of mountainous area, and b) southern part of Bali which consists of flat area. Based on that condition, the land use for agriculture in Bali province, mostly are paddy and lowland rice and food crops farming systems in the southern part of Bali, and in the northern part, usually have upland rice, food crops, and plantation crops. In 2006, the proportion of land use in Bali province 24.35% is for food crops, 21.84% for plantation crops, 23.84% for forest, 14.37% for paddy field, 8.28% for homegarden, and 7.14% for other use (see

Figure 4.2).

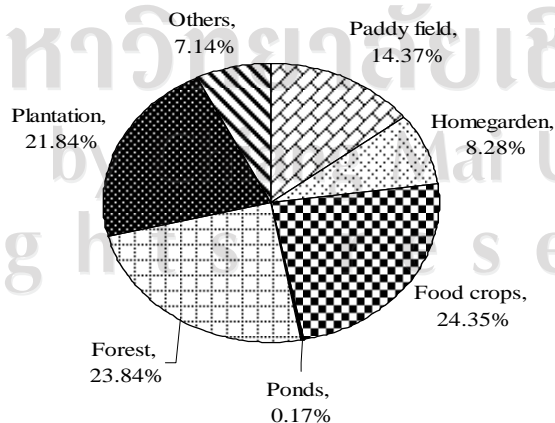
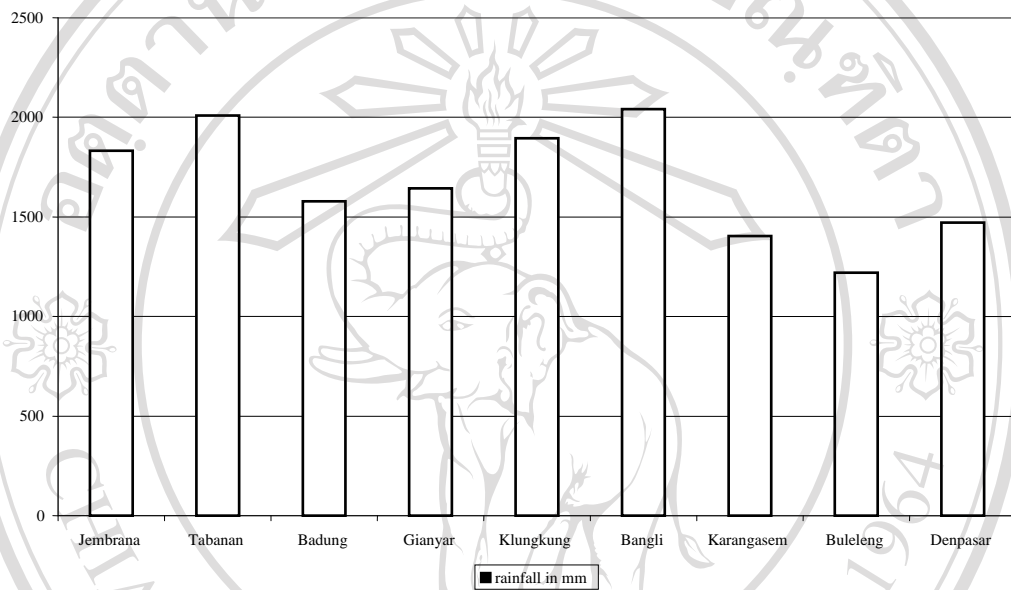


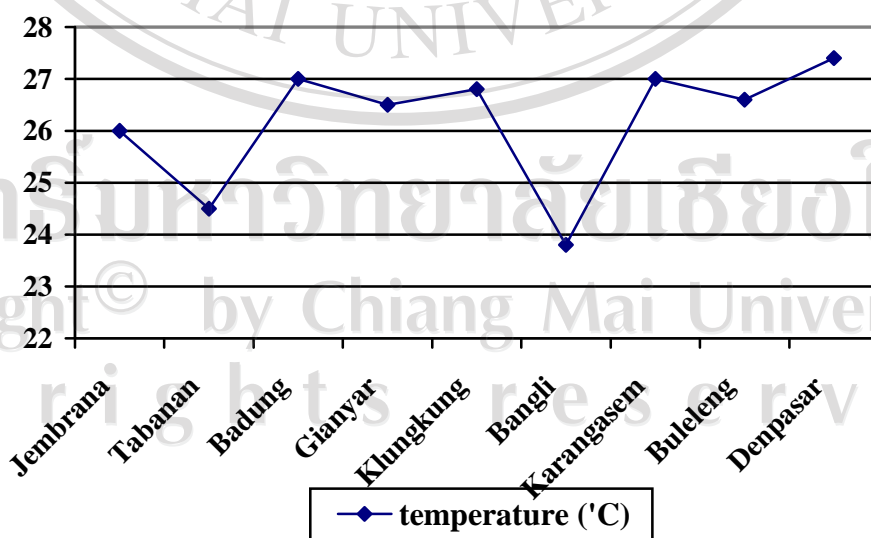
Figure 4.2 Land use in Bali province in 2006

In general, Bali climate is categorized as tropical sea climate, which is affected by seasonal wind. There are two seasons: dry season, and rainy season. From the rainfall, Bangli district has the highest rate of rainfall in 2006 compared to other districts. The detail is shown in Figure 4.3.



Source: Statistical Bureau of Bali province (2007)

Figure 4.3 Rainfall data in Bali province, 2006 (in mm)



Source: Statistical Bureau of Bali province (2007)

Figure 4.4 Average annual temperatures (in °C) in Bali province in 2006

From figure 4.4, the lowest average annual temperature occurred in Bangli district (23.8 °C) since the area is the mountainous area, and the highest temperature happened in Bali capital city, Denpasar (averagely 27.4 °C).

Bangli district located between 115° 13' 48" and 115° 27' 24" East longitude and from 8° 8' 30" to 8° 31' 87" South latitude. Its position is held at the center of Bali Island, therefore Bangli district is the only district which doesn't possess the seashore. The total area of Bangli district is 520.81 sq.km or 9.25% percent of total area of Bali province. The altitude of Bangli district is between 100 – 2,152 meters a.s.l therefore any kind of plants could grow in this district. Physically, at a part of this south district is an upland plain. The highest peak is called peak Penulisan, there is mount Batur with its crater, Batur Lake. The area is about 1,067.5 ha. The distance from Bangli to Denpasar, the capital of Bali province, is about 40 km.

Based on the land use, about 2,890 ha is used for paddy field, 29,244 ha is used for non-irrigated farm land, 9,341 ha is used for state forest, 7,562 ha is used for estate crops, and 3,044 ha is used for others such as road, housing, etc. The most of area of Bangli district is upland plain. This situation and the air flow circulation influenced by the climate causing high relative rainfall in 2006.

Bangli district is surrounded by Buleleng district in the north, Karangasem district in the eastern part, Klungkung district in the southern part, Gianyar district in the south-west part, and Badung district in the western part. Bangli district is consists of 4 subdistricts, namely: Susut, Bangli, Tembuku, and Kintamani.

Kintamani subdistrict has the largest area 366.9 sq. km or 70.45% of total area of Bangli district. The altitude in Kintamani subdistrict is varying from 100 – 2,152 m a.s.l.

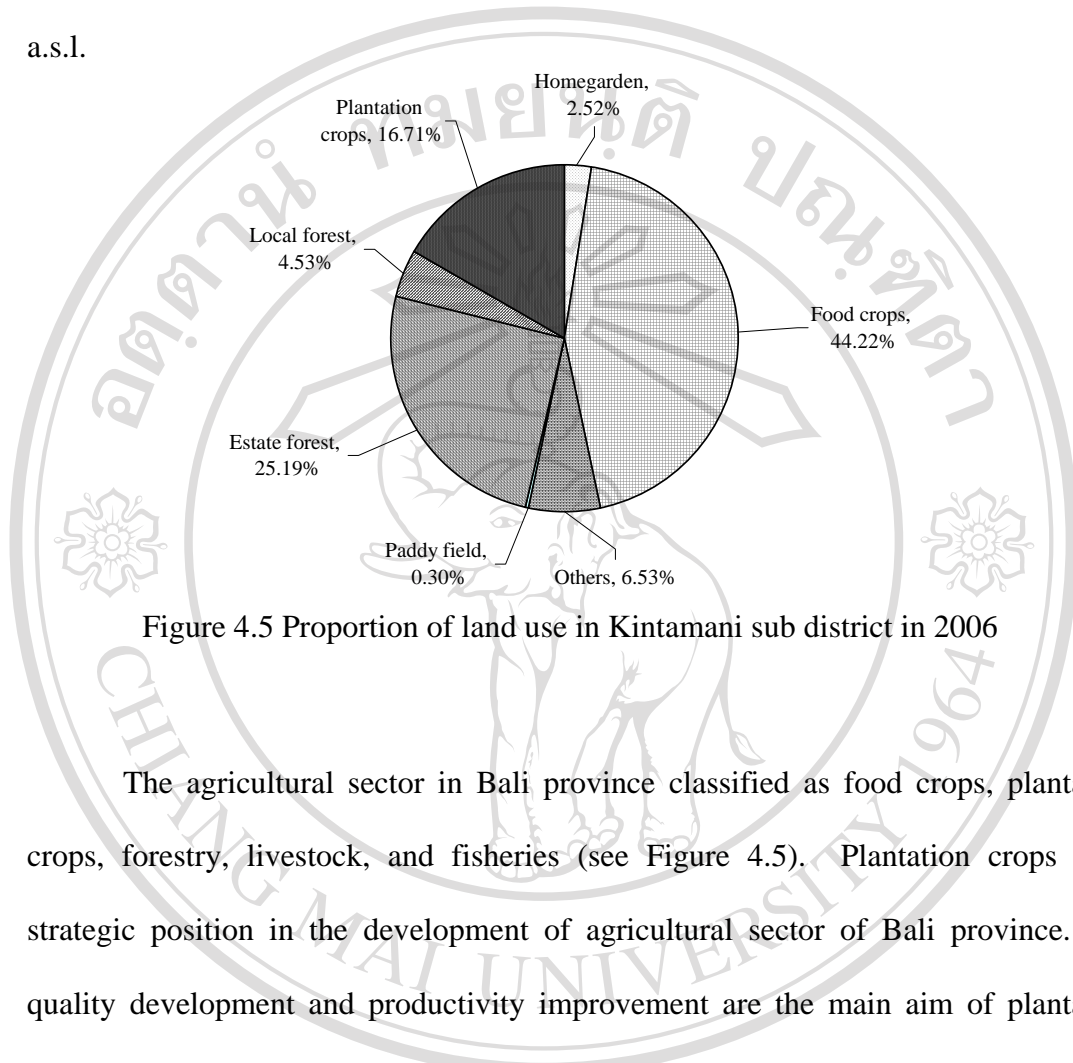


Figure 4.5 Proportion of land use in Kintamani sub district in 2006

The agricultural sector in Bali province classified as food crops, plantation crops, forestry, livestock, and fisheries (see Figure 4.5). Plantation crops have strategic position in the development of agricultural sector of Bali province. The quality development and productivity improvement are the main aim of plantation crops policy. The plantation crops commodities which have high potential to be developed in Bali province are: Coconut, Coffee, Clove, Vanilla, and Cashew nuts.

There are two kinds of coffee grown in Bali, robusta (*Coffea canephora*) and arabica (*Coffea arabica*). For arabica coffee, the land use for growing has been decreased from 7,556 ha in 2005 to 7,511 ha in 2006, and the production also decreased from 3,279.47 ton in 2005 to 2,679.06 ton in 2006 (CBS, 2007). Arabica coffee mostly produced in Bangli district, especially in Kintamani sub district.

Administratively, there are 48 villages covered under Kintamani subdistrict with total 21,131 households in 2006 (Bangli in Figures, 2007). In 2006, there are 8,253 farmers are farming arabica coffee with the total area of production is 4,395.5 Ha. The study was conducted in three villages as the major producer of arabica coffee in Kintamani sub district: Belantih village, Catur village, and Pengejaran village.

Belantih village is one of villages under Kintamani sub district, Bangli district. Belantih village consist of eight communes: Belantih, Mabi, Tangguan, Pangkung, Sabang, Luahan, Pandan, and Kayu Padi. Belantih village is located 14 km from Kintamani. The boundaries of Belantih village are: North – Selulung village, East – Daup village, South – Belanga village, and West – Catur village. Belantih village, Catur village, and Pengejaran village are located in 115° East Longitudinal, and 8° South Latitude with height 1,200 – 1,517 m a.s.l. The topography of the three villages is similar, where consist of flat area 51%, textured 39%, and hill 10%. These areas were having two seasons, rainy season happened during October until March, and dry season happened during April until September annually. The rainfall is 1,800 – 3,000 mm per year, the average temperature is 17 – 28 ° C, and relative humidity is 60% to 90%. The soil type is sandy-loam from volcanic eruption, with pH 6 – 7.

#### **4.2 Soil and water resource characteristics in Bali province**

For soil characteristics in Bali province, it is very abundant and diversified, and the summary of soil characteristics is shown in Table 4.1 and Figure 4.6.

Table 4.1 Soil types in Bali province in 2006

Name of soil types	Area	
	Hectares (Ha)	Percentage (%)
Grey brown Alluvial	20,979.294	3.72
Alluvial hydromorf	4,785.594	0.85
Grey Brown andosol	21,623.645	3.84
Lake	2,711.321	0.48
Yellow brown latosol	106,281.197	18.87
Red brown latosol and litosol	14,524.56	2.58
Brown latosol and litosol	134,030.013	23.79
Brown mediteran	7,539.948	1.34
Red brown mediteran	28,746.461	5.10
Brown regosol	28,585.883	5.07
Yellow brown regosol	49,186.164	8.73
Grey brown regosol	28,446.071	5.05
Humus regosol	42,454.740	7.54
Grey regosol	69,081.689	12.26
others	4,309.42	0.77
<b>total</b>	<b>563,286</b>	<b>100</b>

Source: Planning and Development Agency of Bali Province, 2006

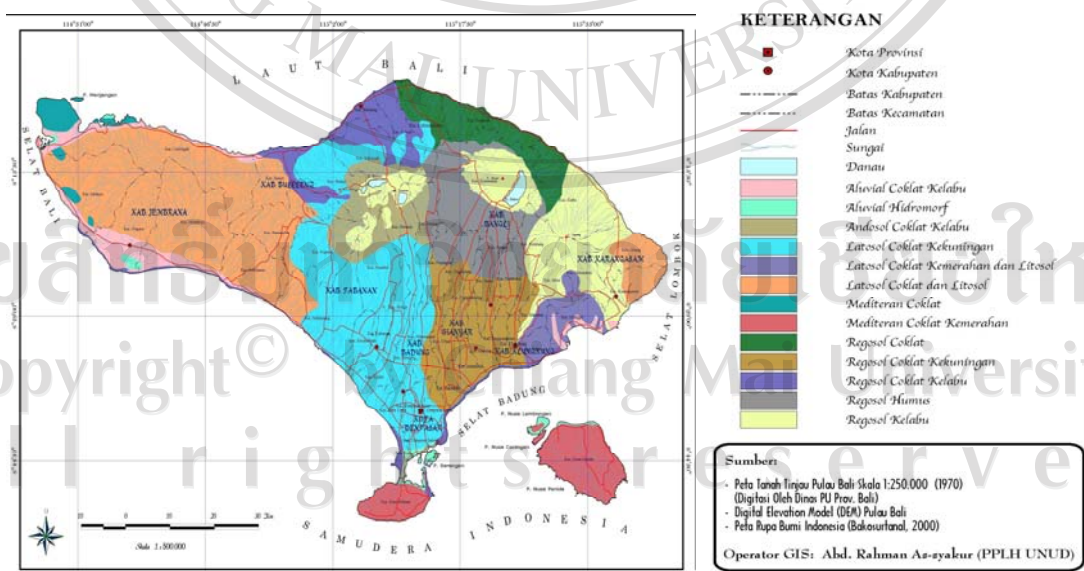


Figure 4.6 Soil map of Bali province in 2006

Most of the relief of Bali island is the mountainous area (85% from total land) and the mountainous chain fettered from west to east, which mostly structured by volcanic rock from quarter volcano, while other sediment rock occurred in western part of Jembrana, Buleleng, and southern part of Badung district.

From the soil map of Bali province, the soil type in Bali province is dominated by regosol and latasol and only small amount of alluvial, mediteran, and andosol. The soil type latosol is very sensitive to the erosion, spread in Gianyar, Badung, Bangli, Klungkung, and karangasem districts. Also, this type of soil occurred in a small part of Buleleng district in northern seashore. In Bangli district, there are two soil types covered: humus regosol and grey regosol. And, in Kintamani sub district, the soil type is grey regosol (black sandy-loam) from volcanic eruption of Mount Batur in the centre part of Kintamani.

Water resource has very important role in agriculture, especially for fulfil the irrigation water needs. In Bali province, the resources of water is usually comes from rainfall, ground water, water spring, and surface water. The rainfall in Bali province ranging from 1500 mm in the coastal area until 3000 mm in mountainous area annually (Adnyana, 2006). Total of annual rainfall volume reached 10.264 million cubic metres per year. Lake is one of important surface water resource in Bali province, there are four main lakes in Bali province: Batur lake (in Kintamani) with water holding volume up to 815.38 million cubic meters, Beratan lake (in Buleleng district) with water holding volume up to 49.22 million cubic meters, Buyan lake with water holding 110.26 million cubic meters, and Tamblingan lake which can hold water up to 27.05 million cubic meters.



The major problems regarding water resource in Bali province are: 1) the deficit of water debit in the river and spring, as an example, water spring in Gebangan, Kayubihi village in Bangli district which is the main source for water supply company in Bangli district, nowadays is desiccated; 2) the deficit of water surface in Buyan and Tamblingan lakes; 3) increasing of scarcity for irrigation water which happened almost in every district in Bali province, which enforced conflict and dispute among people; and 4) the decreasing of water quality in water resources caused by pollution.

Batur Lake, located in Kintamani sub district, is the biggest water basin among the four major lakes in Bali province. Nevertheless, the three villages covered in this study were located 7 km west part from Batur Lake. Mostly farmers in these villages are highly depending on rainfall, not only in doing their farming systems, but also in their daily life. Almost in every house, they have a big gallon or pool to collect the water from rainfall for their sanitary needs. For other use such as cooking and drinking, they buy water from the nearby seller, or they collected from nearby water spring.

#### **4.3 Social economic conditions in Bali province**

In 2006, the number of people of Bali province is 3,263,296 peoples where the 50.12% are males and 49.88% are females. In the case of population density, the densest city is Denpasar, the capital of Bali province, with 3,697 peoples per square km. For Bangli district, the density is 407 peoples per square km.

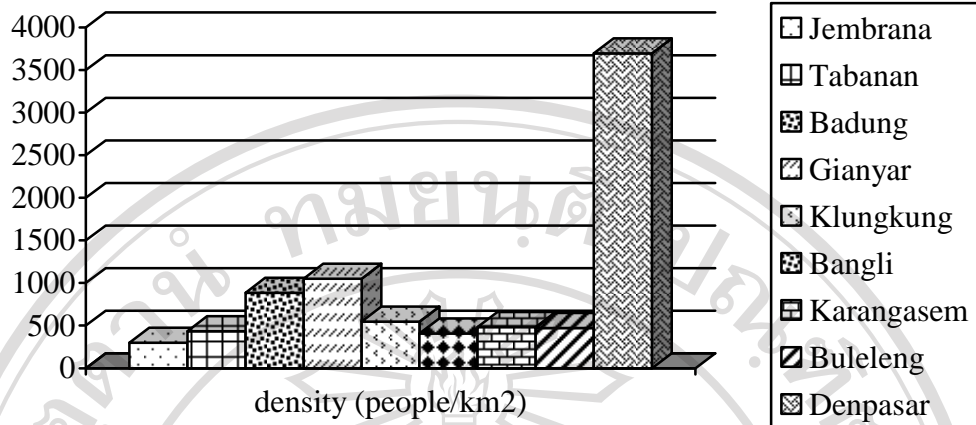


Figure 4.7 Population densities in Bali province, 2006

Bali province as one of 33 provinces in Indonesia is well-known by its tourism sector. Bali bombing that happened in 2002 and 2005 shocked the tourism sector and it absorbed only 21.58% of labor force in 2007. Eventhough Bali is famous because of its tourism sector, but agriculture sector is the mainstay for Balinese people. In 2006, 35% of Balinese peoples work in agriculture sector (Statistical Bureau of Bali province, 2007) (see Figure 4.8).

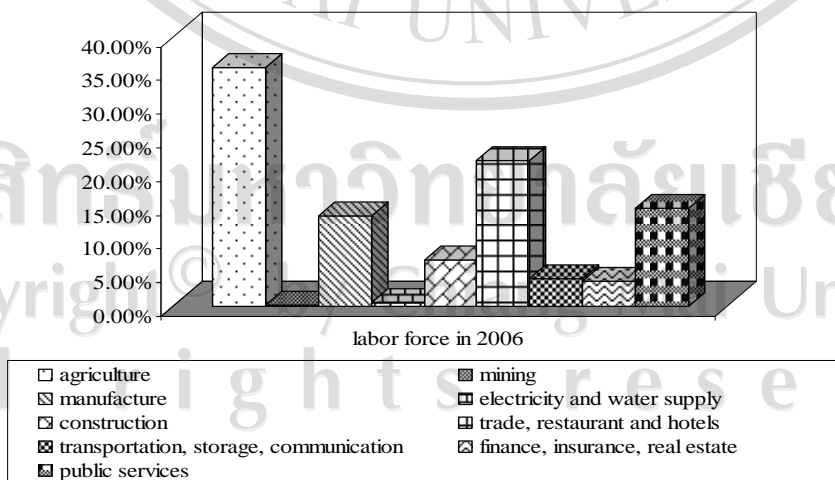


Figure 4.8 Employment condition in Bali province in 2006

Based on population census in 2006, the population in Bangli district registered was 212,014 peoples with growth rate around 0.39 percent in 2005 – 2006. The employment data in Bangli district in 2006 shows that only 25.55% of labor force was worked in agriculture sector (see Figure 4.9).

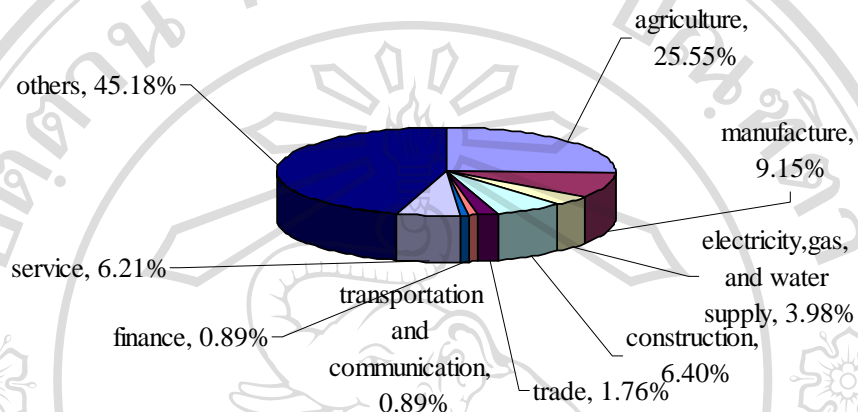


Figure 4.9 Employment condition in Bangli district in 2006

In Belantih village, there is four subak abian as farmers' organization, while in Catur village, there is seven subak abian, and in Pengejaran village, there is three subak abian as farmers' organization.

#### 4.4 Subak abian concept and definition

Subak abian is known as a traditional dry-land farmer's group or farmer's organization. Dry-land here means that farming systems which are not deal with paddy or wet land. Mostly, subak abian is an organization of farmers which cultivate plantation crops commodity, such as: coffee, cocoa, etc. The member of subak abian is called "Krama". The activity carried out in subak abian is based on the Hindu philosophy: *Tri Hita Karana*, which means Three Happiness Causes, those are:

## A. Parhyangan

*Parhyangan* in the context of *Tri Hita Karana* explained about the relationships between human and God in all of His manifestation. The word *Parhyangan* means holy place, where in Hinduism called as *Pura* or temple. As Balinese people believe in Hinduism, they applied this philosophy in everyday life. There are some kinds of *Pura* which are important in Subak abian, namely: *Sanggha Catu/Tugu* in individual farm; *Pura Puseh/Pura Desa* in village level; and *Pura Ulun Danu* in community level which is usually located nearby lake.

There are two kinds of ceremonies that *krama subak* usually does:

### a) Individual ceremony

1. *Ngawiwit*, the ceremony that farmer did in the seedling time.
2. *Memula*, the ceremony in the planting time
3. *Neduh*, the ceremony held in certain of time, in hoping that the plant will be prevented from the pest and diseases

### b) Group ceremony

The religious ceremonies held in group level, namely:

1. “*Mapag Toya*”, to respect the water sources as the symbol of prosperity, usually held in the watersource nearby the community.
2. “*Tumpek Bubuh*”, in relation with honor to “*Sangkara*” as the God of Plants, as a symbol of thankful and hopes of farming systems will be succeed, the production increase which can bring prosperity to all of *Krama Subak*.

3. *Nangluk Merana*, one of ceremony to manage the pest (in related with Integrated Pest Management) which is adapted with the local community norm, ethic, and condition.

#### B. Pawongan

Pawongan show the relationships between human. The relationships covered the membership of krama subak, management of the organizational structure of krama subak, meeting systems, set of laws which called “*Awig-awig*”, etc.

##### 1. Membership (*Pekraman*)

In general, the membership of Subak abian can be divided into three groups:

- a. *Krama pengayah* (active member) is the member of Subak abian which actively attached with the activities of Subak abian.
- b. *Krama pengampel* (passive member) is the member of Subak abian that because of certain reasons could not be actively ingage with the activities, and for those, they got the dispensasion
- c. *Krama laluputan* (special member) is the member of Subak abian that liberated from all obligation, because of his position in the community, i.e. *sulinggih* (hindu priest), village headman, etc. (Satya Wacana, 1975; Pitana, 1989).
- d. Organizational Structure (*Prajuru*) where in every subak abian is consisting of: leader (*Kelian*) of Subak abian; vice of leader (*Petajuh*); Secretary (*Penyarikan*); Finance (*Petengen* or *juru raksa*); Informan (*Juru arah* or *Kesinoman*); special assistant (*Saye*).

## 2. Commune Law (*Awig – awig*)

*Awig – awig* is one form of customs law, which contains guidance and expressed the sanctions to be executed in relation with *Tri Hita Karana*.

### C. Palemahan

*Palemahan* is one of *Tri Hita Karana* which deal with the relationships between the human or the member of subak (krama subak) with the nature surrounding. *Palemahan* can also be defined as the boundary of work of the subak abian. (Plantation crops agency of Bali province, 2007).

#### 4.5 Bali-Kintamani coffee

Plantation crops in Bali province mostly belong to smallholder, and because of that, there are two things maintained by the provincial government, those are: (a) the commodity which is suitable with the local condition; (b) farmers or smallholders who cultivate it.

Geographically, the area of Kintamani Highland is located between 1,000 m to 1,500 m a.s.l., with fertile volcanic soils from Mount Batur. Bali Arabica Coffee was formerly very popular in the world market; however, after the big eruption of Agung volcano in 1963 its popularity decreases due to lack of production. In Kintamani sub district, tangerine was the most popular crops which mostly farmers cultivated in monoculture in the past three decades, but then robusta coffee introduced to the area in the late of 1960s, and they integrated it with tangerine. When the tangerine hassled by CVPD (pest and disease in tangerine) in the early of 1970s, farmers mostly cut it off and changed into monoculture robusta coffee plantation.

At the end of 1970's, when CVPD was eradicated and also high demand on Kintamani's tangerine, farmers started to grow it again either integrated with coffee or monoculture way. At the same time, government started to develop arabica coffee in the high area of Kintamani and farmers pursued it and changed from robusta coffee to be arabica coffee. Started with only small demonstrating plot for arabica coffee, farmers found out that the price of arabica coffee was higher than robusta coffee, so, they expanded arabica coffee plantation until at the end of 1980's the majority plantation crops in the study area was arabica coffee. In addition, government supported with a project on quality improvement which was started at the middle of 1980's. At the end of 1990's mostly farmers were cultivated arabica coffee in monoculture way with shade trees such as *Erythrina*, *Albizia*, *Gliricidea*, and *Leucaena*. When the crisis of coffee price happened in the early of 2000's, some farmers cut-off arabica coffee and shift back to tangerine system, while others still integrated it with tangerine, with more effort to improve the yield of tangerine.

Since 2001, government of Bali province has been developing the plantation crops extension program based on farmer groups in dry land farming systems which called as "Subak abian". Recently, there are 729 Subak abian exists in Bali province, where 126 Subak abian already have productive Small Medium Enterprises, which 17 of it already established Plantation Crops Cooperative. In 2007, the program still continuing and targeted 10 Subak abian from all over Bali province to manage their organization based on productive enterprises classification. One of the Subak abian that has been developed by this program is Subak abian Bakti Yasa in Pengejaran village.