

**JAYAWIJAYA**  
**WOMEN AND THEIR CHILDREN'S HEALTH**  
**(WATCH)**  
**PROJECT**

**KANGGIME EXTENSION**  
**1998 – 2000**

**BASELINE & MIDTERM SURVEY RESULTS**

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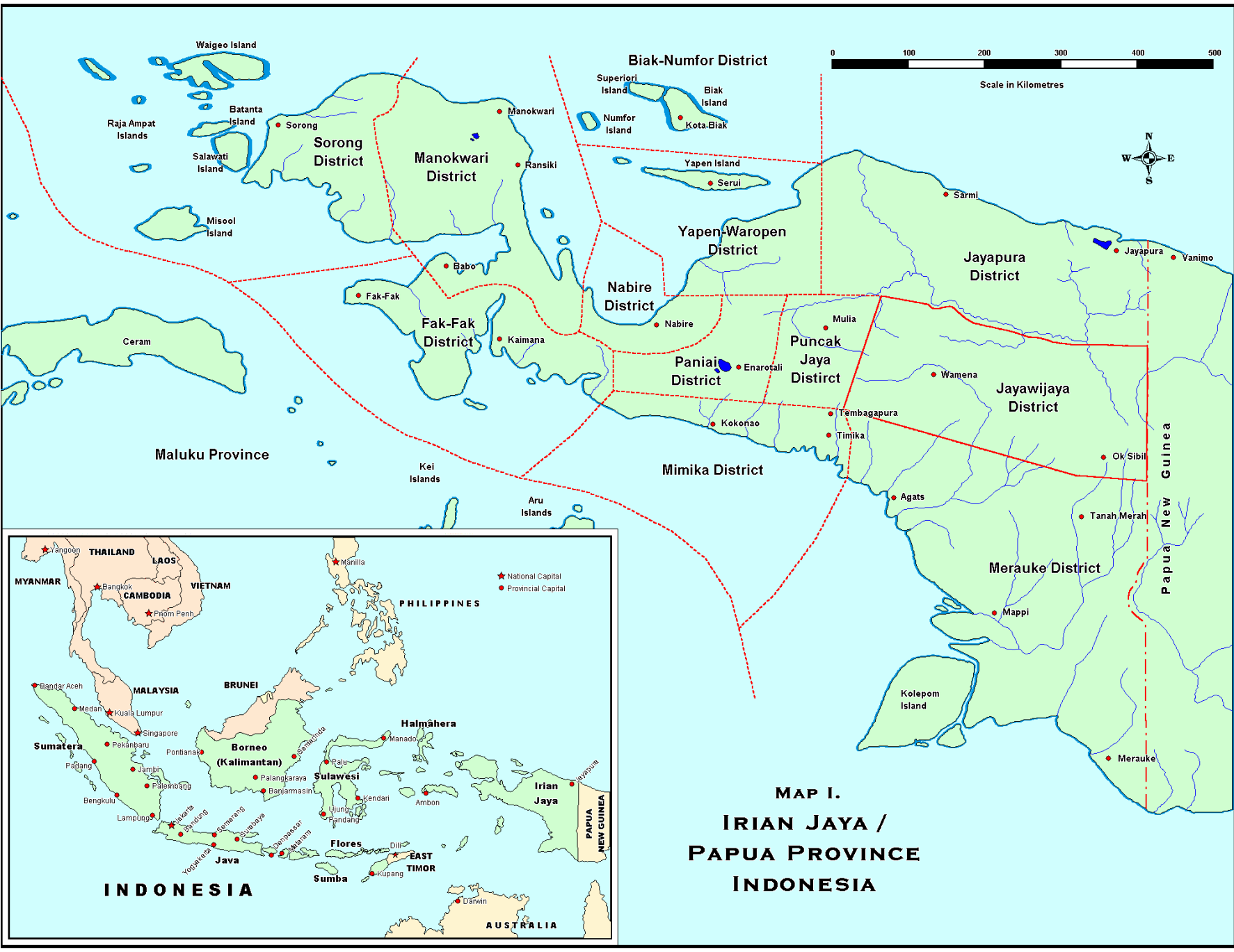
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**MAP I.**  
**IRIAN JAYA /**  
**PAPUA PROVINCE**  
**INDONESIA**



**MAP III.**  
**TOPOGRAPHY OF JAYAWIJAYA DISTRICT**  
**IRIAN JAYA, INDONESIA**

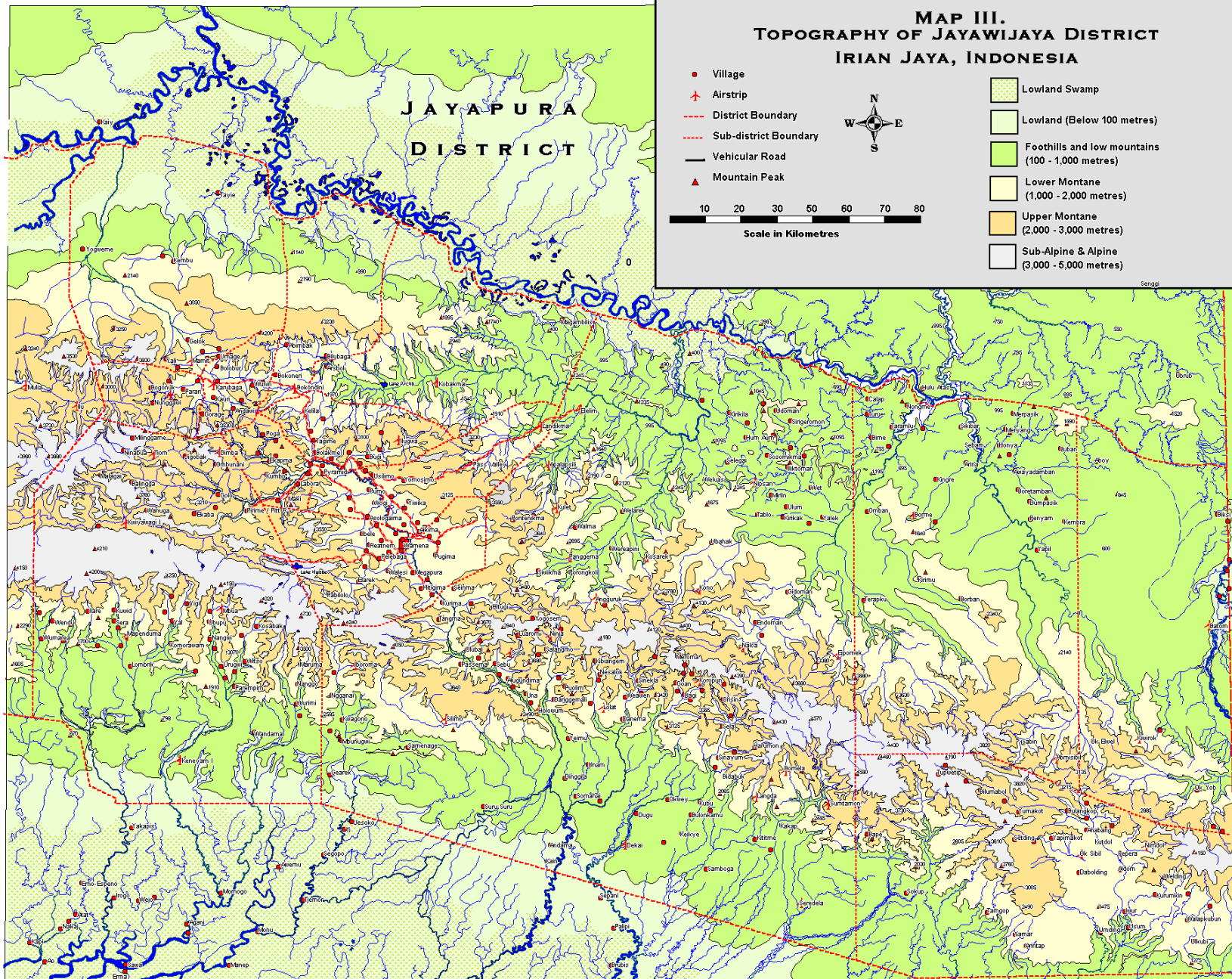
- Village
- ✈ Airstrip
- - - District Boundary
- - - Sub-district Boundary
- Vehicular Road
- ▲ Mountain Peak
- ▨ Lowland Swamp
- Lowland (Below 100 metres)
- Foothills and low mountains (100 - 1,000 metres)
- Lower Montane (1,000 - 2,000 metres)
- Upper Montane (2,000 - 3,000 metres)
- Sub-Alpine & Alpine (3,000 - 5,000 metres)



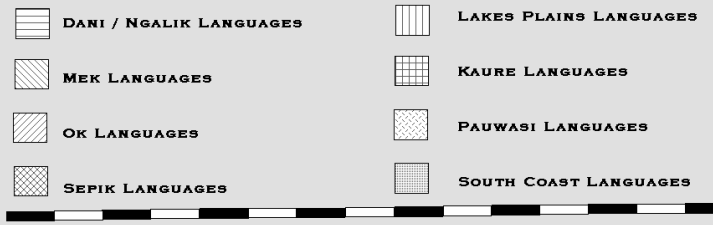
PUNCAK JAYA DISTRICT

JAYAPURA DISTRICT

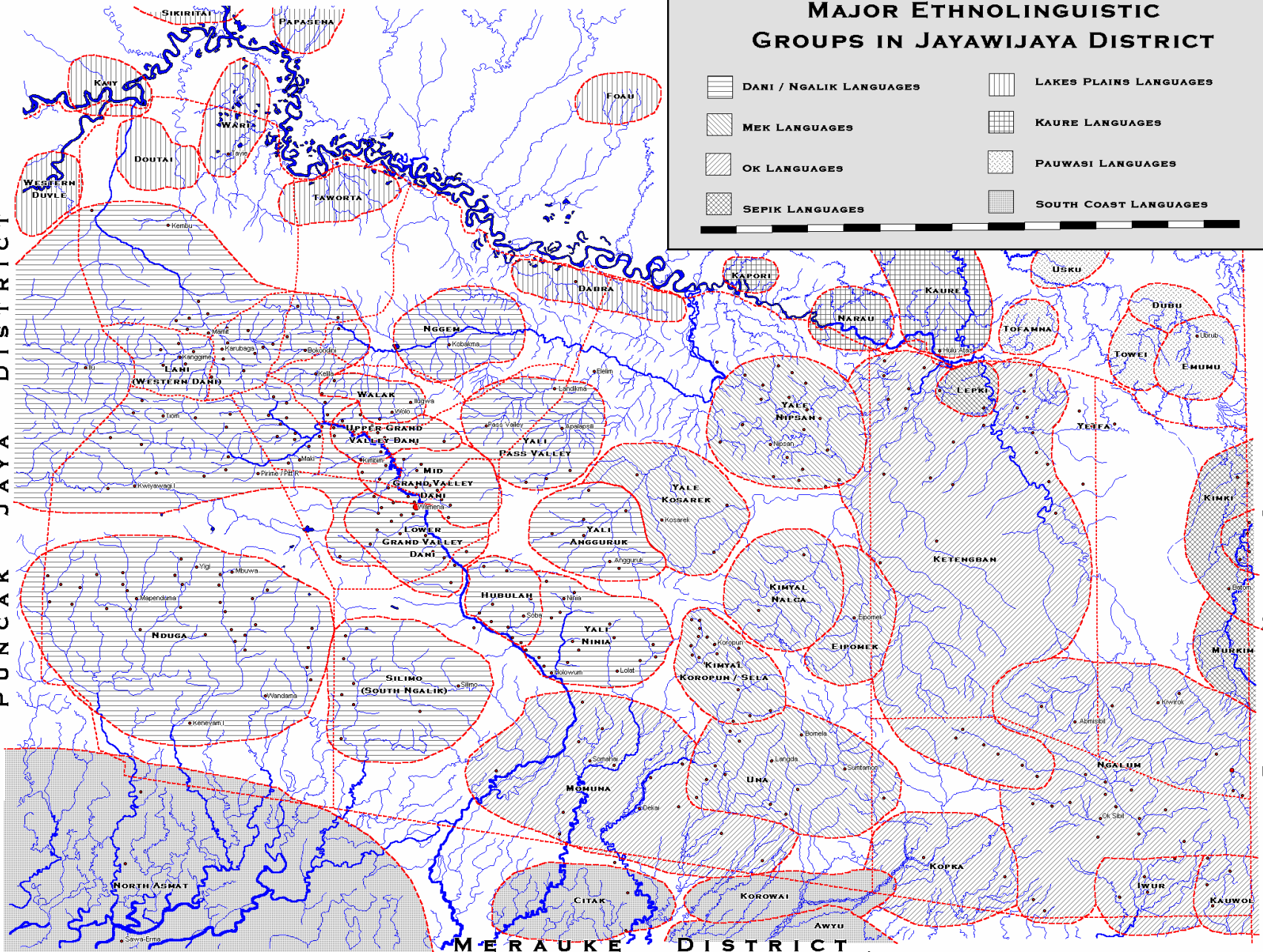
PAPUA NEW GUINEA



# MAJOR ETHNOLINGUISTIC GROUPS IN JAYAWIJAYA DISTRICT



PUNCAK JAYA DISTRICT



PAPUA NEW GUINEA

MERAUKE DISTRICT

## EXECUTIVE SUMMARY

This document contains a description and analysis of the results in the baseline and mid-term project monitoring surveys. Data was collected in the Kanggime and Kembu Sub-Districts by a survey team made up of project staff and nursing school students and primarily for the purpose of evaluating the effectiveness of project interventions in the WATCH Kanggime Extension Phase 1998 – 2000. While evaluating whether the project influenced the behavior and thinking of the Lani / Western Dani target communities was the main purpose of the study, the surveys also served a number of secondary functions. They aided in the design of effective development project monitoring and evaluation approaches for Jayawijaya, in the transfer of data gathering and reporting skills to future health workers, they facilitated a better understanding of health, community development and gender issues in Jayawijaya, and they were a means to investigate the validity of the assumptions guiding the project.

The Jayawijaya WATCH Project was a women and children's primary health care project that began in 1991. Funded by AusAID, the project was managed by World Vision Australia and jointly implemented by World Vision International Indonesia and the Jayawijaya Department of Health. Because of favourable reviews and requests from local government, in 1994 when the project had planned to conclude, AusAID granted a three-year project extension. In 1997 AusAID approved a further extension known as the Kanggime Extension that ran from 1998 through until October 2000. This second extension focused on improving the health and well being of women, children and the broader community in Kanggime and Kembu-Mamit Sub-Districts, as opposed to all of Jayawijaya, which had been the scope of project interventions between 1991 and 1997. As the history, approaches and interventions of the Jayawijaya WATCH Project have been thoroughly described in a number of other documents<sup>1</sup> background information on the WATCH Project and general information about Irian Jaya and Jayawijaya have been omitted from this report.

It was originally intended that this report should include the results of an End-of-Project survey. A rapidly deteriorating security situation in the last few months of the project however, led to the evacuation of project staff from Jayawijaya. Even before the evacuation, field data collection activities had come to be considered inappropriate given the situation.

This report has five sections as well as a series of annexes. The first section contains information on the purpose and functions of the surveys, the methods used, the fieldwork experience, as well as the lessons learned in the course of conducting the surveys. The second section is the largest section and contains the results of the baseline survey as well as a considerable amount of ecological, demographic, social and economic information to help conceptualize the survey findings. The third section of the report presents the results of the baseline survey's health section as well as information about the Indonesian Health system. The fourth and fifth sections are almost entirely survey results and analysis. They are, respectively, the GAD and the Health sections of the mid-term survey.

---

1 Reviews of different aspects of the Jayawijaya WATCH Project can be found in Dibley (1994), Cowled (1996), Dawson (1997), Grimes (1999), Gunawan (1999), Hewat & Hewat (2000). Other documents produced by the Jayawijaya WATCH Project, including planning documents, regular and special reports, etc., are also useful and the most significant of these are listed in the bibliography.

# SECTION I

## METHODS AND METHODOLOGY

---

### 1 SURVEY METHODOLOGY AND RATIONALE

#### 1.1 PRIMARY PURPOSE

The primary purpose of the survey is to establish sufficient baseline data against which to monitor the progress of WATCH interventions. It is therefore primarily a management and monitoring tool designed to measure the projects progress in helping communities to move away from conditions of poor community health and welfare.

#### 1.2 SECONDARY FUNCTIONS

Besides this primary purpose, the annual surveys fulfilled a number of secondary functions that were of considerable importance in the project=s overall strategy of establishing an effective and sustainable model for PHC in Jayawijaya. These secondary functions include:

1. To experiment and practically test a variety of methods and strategies for field data gathering and project monitoring as part of the attempt to design an effective and sustainable PHC model;
2. To help develop the capacity of the Jayawijaya health service and Health Information System by transferring skills in data collection and basic research methods to SPK graduates who are the health workers of the future;
3. To facilitate greater understanding amongst project staff, managers and donors, of actual problems being faced by the members of the target communities and to assist with the planning of future interventions;
4. To investigate the validity of the assumptions underlying the WATCH project as well as the assumptions underlying health care and development activities in Jayawijaya.

As such the practice of conducting annual surveys has become an integral part of the central project strategy and not just as a peripheral monitoring system.

## **2. SURVEY METHODS**

### **2.1 THE SURVEY TEAM**

The field data collection for both the mid-term and baseline surveys was done by a survey team consisting of 15 final year students of the Wamena Nursing School (*Sekolah Perawatan Kesehatan – SPK*) and headed by the Health Coordinator, nutritionist, midwife and health assistant. The GAD/CD personnel also assisted the survey team, particularly with the PLA, market surveys and CD questionnaires. Since the position of WATCH Monitoring and Evaluation Officer was vacant throughout the period of the Kanggime Extension, the monitoring and evaluation officer from WATCH's sister project, the Alor Community Based Health Project (ACBHP) came to Wamena for approximately one month early in 2000. He assisted the project staff with formulating better approaches to the gender and development survey and helped to improve the questionnaires and sampling methods. He also helped staff conduct a refresher-training course for the SPK students involved in the survey team and he accompanied the team into the field.

#### **2.1.1 TRAINING**

Prior to the baseline survey a three-day training course was held to teach the members of the survey team various aspects about conducting a survey. As well as information specifically relating to conducting surveys, communication skills were covered in this pre-survey training. The main reference used here was the *Survey Trainers Guide for PVO CS Project Rapid KPC Survey 1994*. With the assistance of the monitoring and evaluation officer from the ACBHP, refresher training was also conducted prior to the midterm survey.

### **2.2 FIELD DATA COLLECTION**

Most field data for the baseline survey was collected over the course of four separate visits to the target area. The first survey visit was in October 1998 and lasted for a total of two weeks. The next visit was in November 1998. The third visit, which only involved the health section of the survey team, was conducted in December. The final survey visit was held at the end of January 1999. Field data collection for the mid-term survey was conducted over two weeks in late February 2000.

### **2.3 PRIMARY DATA COLLECTION**

#### **2.3.1 QUESTIONNAIRES**

There were two main questionnaires used for the baseline survey. The first, a health questionnaire, was borrowed from the Child Survival Support Program at John Hopkins University. It aimed to capture the incidence and attitudes of such things as breastfeeding practices and child nutrition and health, maternal health and nutrition, diarrhea, malaria and pneumonia, payment for health services and medicines, and environmental health including clean water and latrine usage. The second questionnaire was designed to capture information about socioeconomic factors and changes in the target communities. This information was principally for monitoring the Gender & Development (GAD) and Community Development (CD) programs.

For the mid-term survey, the health questionnaire was modified slightly whereas the questionnaire for the Gender and Development section was completely overhauled. Two questionnaires were drawn up, the first targeted members of WATCH groups only whilst the second targeted both group members and non-group members (the control group). The purpose of this questionnaire was to measure the impact of participation in WATCH activities on the attitudes and behavior of group members (as opposed to non-group members). It focused on the dimensions of skill transfer, community financing and community health. This design intended to alleviate the problems with monitoring and evaluation that have existed due to the project's lack of adequate baseline data on the socio-economic status of the members of CD groups.

### **2.3.2 NUTRITIONAL & ANTHROPOMETRIC SURVEYS**

In addition to the health and social-economy surveys, nutrition surveys were conducted using two popular methods: the twenty-four hour recall method (getting respondents to describe what they remember eating during the last 24-hours) and anthropometric surveys (i.e. height, weight and middle upper arm circumference measurements).

### **2.3.3 PARTICIPATORY LEARNING AND ACTION**

While WATCH had been using Participatory Learning and Action (PLA) techniques with community development groups since the first phase of the project, it was not until the end of the second phase of the project that WATCH began using PLA in their annual surveys. As part of the Kanggime Extension Baseline Surveys, 204 cadres were trained in PLA techniques including the ten seed method for determining family budgetary priorities and the wealth ranking technique for determining the approximate wealth distribution within the community. After this training the cadres were required to return to their respective groups and carry out a group mapping assignment including an activity plan and group expectations over the next two years.

Unfortunately, the initial group mapping exercises were not entirely successful. There were problems with cadres not understanding the point of the exercise and with difficulties in them expressing their ideas in Indonesian (all but one of project staff couldn't understand Lani). Moreover, as almost a month passed between the PLA activities and the collection of the data, many cadres seem to have become distracted from completing their task. Also, there were still many unresolved problems with the registration and membership of CD groups. The groups that formed in WATCH I were not operating effectively. It was found that different people from the one family would be registered in different groups or that groups might be registered both with WATCH and with the WVII Area Development Program (that covered Karubaga, Kanggime and Kambu-Mamit). This proved problematic both for conducting PLA surveys and also for interviewing group members. After these issues had been resolved and when project field staff had more time to provide further supervision and support, group mapping and planning exercises were more successful. However, these results did not manifest until after the baseline survey and so had to be shifted into the mid-term survey. The data generated from other PLA activities, such as wealth ranking exercises and group discussions, were included in the baseline survey results.

### **2.3.4 FIELD OBSERVATION**

Field observation was an extremely important method both for generating data and also for increasing the reliability of data gathered by other means. To collect a wide variety of information on social conditions, agriculture and animal husbandry, and gender relations, the gender and development staff used field observation extensively. The Gender and Development Assistant also conducted market research by attending both the Kanggime and Mamit markets on four separate occasions each. The health section used field observation principally for evaluating the performance of health workers, cadres and traditional birth attendants but also used it to cross-examine many other findings.

## **2.4 SECONDARY DATA SOURCES**

The baseline survey also drew from a range of secondary sources. The most important of these was the data generated through the Jayawijaya Health Information System (HIS). Any reports of maternal or infant mortality from HIS records were cross checked by project staff, either with the mothers whose babies who were reported to have died or the sisters of women who were reported to have died. Other sources included: records from the Bureau of Statistics, and data from the Puskesmas, subdistrict Administration offices and village level health posts in across Kanggime and Kembu-Mamit sub-districts. Literature about the Lani and other neighboring groups and about certain aspects of development theory was also used both for historically contextualising and for theoretically situating the surveys findings.

## **2.5 SAMPLING METHODS**

### **2.5.1 CLUSTERING AND RESPONDENT SAMPLING**

The sampling method to be used in the baseline survey had to be chosen carefully. Whilst the size of the new target area had been reduced considerably from the first two phases of the WATCH Project, it was still a very large area (around 4,000 km<sup>2</sup>) and most villages were only accessible by foot. Therefore it was considered unfeasible to collect data by visiting each small community, or even each administrative village (*Desa*) centre. Instead the survey team used a mixture of selective and random sampling to select a total of 10 villages in the two sub-districts. The criteria for selecting survey locations was that sample villages should be grouped according to their proximity to transport and health services so that a range of geographical conditions and locations could be represented. 50% of the locations were to be located within an hours walk of the airstrip and puskesmas, 30% should be located within half a days walk of the airstrip and puskesmas whilst the remaining 20% should be located over half a days walk from the airstrip and puskesmas. The locations that were ultimately selected and surveyed can be seen in table 1.

However, the sampling methods used in the baseline survey were still considered inadequate because they omitted a great deal of the target area. It was a major oversight to not represent the most remote and disadvantaged communities (those lying in the lower reaches of the Toli river and on the northern slopes of the Kembu Range). The technique of randomly selecting subjects by interviewing whoever was met whilst walking around each center would have also introduced bias in the sample. As the monitoring and evaluation team looked conspicuous, it is doubtful that selection was all that random. Only people motivated and able to meet

with the visiting survey team would have been interviewed. In selecting respondents to the health questionnaire, only women with babies under two years old were chosen as many of the questions related only to infant and maternal health. With regards to the socioeconomic questionnaire, thirty out of the 96 CD groups were questioned about the status of their group and their perceptions of health, gender, social and economic issues. For the sake of efficiency most of the respondents to this questionnaire were the same respondents for the health questionnaire. Whilst this 'doubling up' of questionnaires considerably reduced the workload for data collectors, it increased the time and patience required by each respondent. Furthermore, the target of 30 respondents at each of the ten surveyed villages proved to be too high.

**TABLE 1. WATCHBASELINE SURVEY TARGET AREAS**

| CRITERIA  | SURVEY TARGET <i>DESA</i> | SUB-DISTRICT |
|---|---------------------------|--------------|
| Groups living in areas around the airstrips.                          | Wama                      | Kanggime     |
|   | Kumbur                    | Kanggime     |
|   | Kuttime                   | Kanggime     |
|   | Woraga                    | Mamit        |
|   | Latian                    | Mamit        |
| Groups living in areas several hours (2 – 6) walk from the airstrips. | Tingkom                   | Kanggime     |
|   | Nelewere                  | Kanggime     |
|   | Gatini                    | Mamit        |
| Groups living in areas over a days walk from the airstrips.           | Paba                      | Kanggime     |
|   | Yali                      | Mamit        |

In order to improve the quality of sampling methods in the mid-term survey, the monitoring and evaluation coordinator from ACBHP recommended the use of a rapid sampling technique that was originally designed and developed for the WHO's Expanded Program on Immunisation. This technique employs a two-stage process for respondent sampling. Firstly, 30 clusters are defined and selected. These clusters should have the same number of subjects in them regardless of the size of the area. As there was no reliable population data and as the government administrative boundaries in the target area were unclear, churches were chosen as the most appropriate boundaries to draw clusters from and 17 clusters were drawn in Kanggime and 13 were drawn in Kembu-Mamit. Secondly, simple random sampling was done during visits to the field. They selected 10 people to make up a cluster by simply sending out word that the survey team had arrived to select women with children between 0 and 23 months old to interview. This was logical in light of the fact that settlements in the project area were spread over large and extremely rugged areas and so it was considered unfeasible for the survey team to reach these remote settlements and collect a proportionally representative sample. In most cases more potential respondents turned up than was required and so the survey team simply selected respondents via lottery. The project fell 30 short of the ideal number of 300 respondents. Once in the field the monitoring and evaluation team was broken down into 3 groups with each group surveying between 8 and 11 clusters.

## 2.5.2 DETERMINATION OF SAMPLE SIZE

The number of respondents targeted by the survey questionnaires can be determined using the formula:

$$N = z^2 (pq) / d^2$$

Where n = sample size

z = degree of statistical reliability

p = estimated prevalence

q = p-1, and

d = degree of accuracy / margin of error

In order to establish the maximum sample size using the above formula we use the value p = 0.5. The value of d depends upon the required degree of accuracy, which in turn depends upon the type of research being undertaken. In the case of the WATCH annual surveys, which are primarily conducted for monitoring and evaluation purposes, we can accept a higher margin of error than would be required in more scientifically oriented research. The lower the value of d the higher the degree of accuracy. For the WATCH surveys a value of d = 0.1 was applied. The degree of statistical reliability was set at 95% or z = 1.96. Based upon these values we were able to calculate the required sample size as follows:

$$n = [(1.96 \times 1.96) \times 0.5 (1 - 0.5)] / 0.1 \times 0.1$$

$$n = 96$$

To reduce the margin of error we chose to increase the sample size well beyond that which was calculated. Based upon past experience using sample sizes of around 210 respondents (7 respondents per cluster) have proved to be adequate for monitoring and evaluation surveys, but for these surveys we aimed for a target sample size of 300 respondents and ultimately managed to cover a total of 270 respondents.

## 2.6 DATA ANALYSIS & RESULT WRITING

The survey team supervisor checked the accuracy of the field data before being classified according to a cluster. Quantitative data was sorted using EPI Info 6.01, (a computer program developed by *The Division of Surveillance and Epidemiology, Centre for Disease Control and Prevention, CDC, 1994*). Survey results were then analysed and written up in Indonesian by WATCH personnel. In the process of translating the report into English, the results were again revised, statistically cross-checked and reanalyzed, statistical data was graphed and some additional graphic materials, including maps and pictorial diagrams, were added. Whilst on the one hand the involvement of numerous people in the processes of data collection, analysis and result writing may have introduced more room for statistical error, such errors would be minimized by the rigorous cross checking and the contributions of involved allowed the staff to produce a comprehensive and insightful report.

### **3. LESSONS LEARNED FROM CONDUCTING THE SURVEYS**

#### **3.1 PREPARATION AND FIELD TESTING OF SURVEY QUESTIONNAIRES**

Not enough time was allowed for the preparation and field-testing of survey questionnaires. Indeed the final questionnaire for the mid-term survey was not completed until the survey team was ready to depart for the field. This resulted in the team only being training and informed regarding the final questionnaire when they were about to use it. The lack of field tests prior to the collection of field data meant that revision of this tool took place whilst it was being used in the field. This was less than ideal because it distracted the team from their main task of doing the survey.

#### **3.2 THE SURVEY TEAM**

The decision to use SPK students as data collectors was an excellent one. It facilitated the transfer of skills between project staff and SPK students through allowing the latter to be involved in a practical research exercise. As many of these students have already or will shortly become the next generation of health workers in Jayawijaya, they will be more aware of the importance and methods required for on-going HIS data collection.

#### **3.3 RELIANCE ON AIR TRANSPORT**

The survey team was highly reliant on the light aircraft owned by the Mission Aviation Fellowship (MAF). As MAF flight schedules are extremely full and as there is always an extremely high demand for additional charter flights, the transportation of WATCH's entire survey team to and from the target areas required multiple flights that had to be spread over a series of days. This caused considerable delays in field data collection. Based on this experience project staff advises that in future, large teams of data collectors should use land vehicles, if land transportation is an option. Even though it will take longer to reach the target area, several vehicles can be chartered and thus the entire team could be assembled in the target area at roughly the same time.

#### **3.4 TOO MANY INDICATORS AND QUESTIONS**

Due to the wide range of project interventions, the surveys attempted to examine too many indicators. As a result the survey questionnaires were very long and many respondents found it quite onerous to answer all the questions. Furthermore, the sheer number of variables being considered made analysis of the data very complex and a lot of the data could not be processed directly through the EPI Info computer program as had been originally hoped.

#### **3.5 DOUBLING UP OF QUESTIONNAIRES**

For the sake of efficiency, respondents to the health questionnaire were also asked to respond to the community development questionnaire. Whilst this made the work of the data collectors much easier it was less advantageous to the respondents themselves. Being asked so many questions led many to become bored or

disinterested part way through the second questionnaire.

### **3.6 POOR DEMOGRAPHIC DATA**

The lack of accurate population data for the target areas made it extremely difficult to properly sample the target areas and also to accurately analyse results. This point is discussed in detail in section II / 3.1.1.

### **3.7 KMS CARDS BASED EVALUATIONS**

The survey team intended to cross check many of their results for various infant and maternal health activities using the health record cards (*KMS*) issued through the *posyandu* clinics. Unfortunately, many children had not been issued with *KMS* cards and many mothers who claimed that they did have *KMS* cards for their children did not bring them to the survey points. Even in cases where the cards could be examined by the survey team, *posyandu* workers had not always completed the cards properly. This mean that for certain variables such as child immunisation and growth monitoring practices, WATCH staff had to rely solely on the information provided by respondents.

### **3.8 COMBINING SURVEY TRIPS WITH OTHER INTERVENTIONS**

WATCH believes that the data collection visits should also have been used as an opportunity to distribute Vitamin A and Iron Tablets to the local midwives, train community development volunteers and to conduct other health consultations and provide curative assistance. Because the terrain in Jayawijaya is too rugged and the costs of transportation to the target areas too high, it is economically and logistically easier to combine the purposes of what would otherwise be separate journeys.

### **3.9 PROBLEMS WITH GENDER SURVEY METHODS**

The methods used to survey gender issues remained poor. It is extremely difficult to quantitatively measure gender problems because there is such a large cultural gap between the target communities and the survey team. In future, focus group discussions, in-depth interviews and other approaches need to be included in the overall surveying approach if gender issues are to be monitored and adequately evaluated in the annual surveys.

### **3.10 PARTICIPATORY LEARNING AND ACTION (PLA) AS A SURVEY TOOL**

PLA is an appropriate method for working in the New Guinea Highlands. The two way flow of ideas is important for gathering qualitative data for monitoring and evaluation purposes and also to allow villagers to talk about their hopes and needs. It is culturally sensitive to allow Jayawijayans the opportunity to speak and for others to listen. As we have noted, although PLA is designed for community capacity building, it can also be used for monitoring and evaluation purposes. However because PLA is an activity that needs to operate at the community's pace, project staff experienced some difficulties in using PLA as a part of the annual surveys, because time constraints meant that PLA activities either had to be rushed to fit them into the survey timeframe or allowed to run at their own momentum, which meant that results might not be available for inclusion in the survey results. We therefore recommend that PLA should be used as an essential part of the project monitoring and evaluation system but timeframes must be kept as flexible as possible.

**SECTION II.**  
**THE TARGET AREAS**  
**KANGGIME AND KEMBU-MAMIT SUB-DISTRICTS**

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## **1 GEOGRAPHY, ENVIRONMENT AND ECOLOGY**

The Sub-districts of Kanggime and Kembu-Mamit are situated in the north-western most corner of Jayawijaya District, between the latitudes of 3<sup>o</sup> and 4<sup>o</sup> South and the longitudes of 138<sup>o</sup> and 138<sup>o</sup> 40' East, on the northern slopes and foothills of the Snow Mountains or Central Ranges of New Guinea. Kanggime Sub-district incorporates approximately half of the upper watershed of the Toli or Swartz River, the other half being located in the neighboring Sub-district of Karubaga. Kembu-Mamit lies directly north of Kanggime and Karubaga and covers most of the Toli's mid and lower watershed as well as the watersheds of the Kembu (Doorman) River and several other minor tributaries of the lower Idenburg River.

To the north, the Kembu/Mamit Sub-districts are nominally bordered by the Idenburg and Rouffaer Rivers which converge at the northernmost point of Kembu-Mamit Sub-district to form the Mamberamo River. However, in practice the areas lying on the swampy plains to the south of the Idenburg and Rouffaer Rivers are beyond the control of the administration in Jayawijaya and communities living in these areas are serviced and administered from Jayapura District.

To the west of Kanggime and Kembu-Mamit lies Ilu Sub-district in Puncak Jaya District. Located in the Yamo or upper Rouffaer River Watershed that was, up until 1996, a part of the former Nabire District. The adjacent areas of Puncak Jaya are both geographically and culturally very similar to Kanggime and Kembu / Mamit Sub-districts and social and economic ties between the communities remain strong.

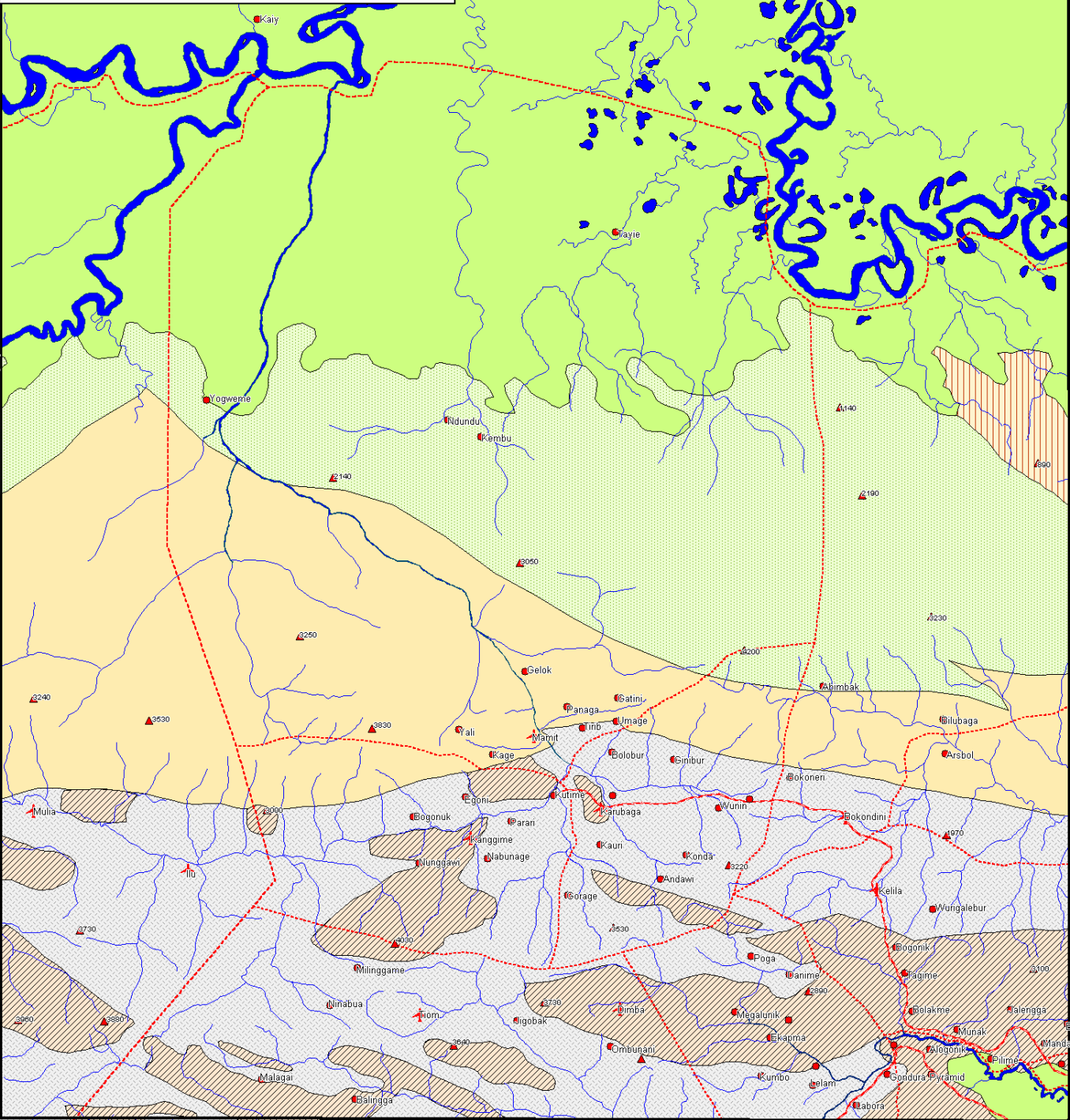
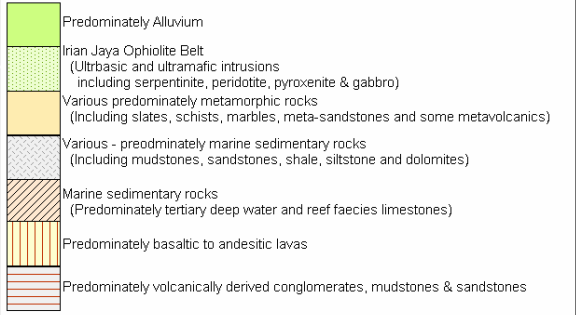
To the east of Kanggime and southeast of Kembu-Mamit lies Karubaga Sub-district. This sub-district is located around the Konda River Valley, which converges with the Toli River Valley near Mamit. Up until 1997 Kanggime, Kembu / Mamit and Karubaga were all administered as one sub-district with the sub-district headquarters located in Karubaga.

To the east of Kembu-Mamit (and north of Karubaga) lies the Bokondini Sub-district. This sub-district incorporates part of the watershed of the Upper Hablerifori River. Once again the communities living in Bokondini are linguistically, socially and economically quite closely related to the Toli Valley Communities.

To the south, the Kanggime Sub-District is separated from the Tiom Sub-district in the North Baliem River watershed by a ridge of major mountain peaks. Tiom, along with the Ilaga Valley in Puncak Jaya District are home to the largest populations of Lani people and form the heartlands of the ethnolinguistic group.



**MAP VI.**  
**GEOLOGY OF THE TOLI VALLEY WATERSHED**  
**KANGGIME, KEMBU-MAMIT & KARUBAGA**  
**SUB-DISTRICTS**



By Indonesian standards Kanggime and Kembu / Mamit are extremely large sub-districts having a total area of approximately 4,000 kilometres<sup>2</sup> or almost the size of the island of Bali. Kanggime Sub-district has an area roughly 550 km<sup>2</sup> whilst the area of Kembu-Mamit appears to cover over 3,400 km<sup>2</sup>. This area is an estimate because the northern boundary has poor delineation.

The Kanggime and Kembu / Mamit Sub-districts can be roughly divided into four distinct ecological zones, each of which is described below.

## **1.1 MAMBERAMO LAKES PLAIN ECOLOGICAL ZONE**

The Mamberamo Lakes Plain Ecological Zone lies along the northern boundary of Kembu / Mamit Sub-district. It runs in a broad band about 25 km wide along the southern bank of the Idenberg and Rouffaer Rivers ending at the lower reaches of the Toli River. The Lakes Plain also extends for hundreds of miles to the east and west along both banks of the Idenberg and Rouffaer Rivers and north along the Mamberamo River. This zone ranges in altitude from between 100 meters to 250 meters above sea level and is characterized by freshwater swamps that intersect with numerous slow moving rivers. Almost the entire zone is still covered in tropical lowland rainforest. Average daily temperatures in this zone range between about 20°C and 35°C and the relative humidity is invariably very high. In this zone the rainfall is very high throughout the year as there is only a limited dry season.

In general the soils in this zone are alluvial and thus very fertile however agricultural production is limited because most soils are either permanently or intermittently inundated with water. The main crops in this area are wild cultivated sago (*Metroxylon sagu*), swamp taro and plantain banana. Hunting and fishing also provide a large proportion of the diet of the inhabitants of this zone.

The Mamberamo Lakes Plain is recognized as having amongst the highest incidence of malaria in the world and the people there are commonly afflicted with other conditions such as diarrhea, dysentery, tropical ulcers and skin conditions. The extremely high incidence of disease found in this area is to some extent countered by the fact that people living in this zone generally have a quite high protein intake due to the ready availability of fish.

The WATCH staff have not really targeted their health interventions in this region as many of the project activities are aimed at highland communities and are therefore of little relevance to communities living in the Mamberamo basin. Furthermore, whilst this area is nominally administered from the sub-district headquarters at Mamit, because of its remoteness from Mamit and the lack of boats with which to travel around this area, communities in this zone tend to be serviced and administered out of Jayapura District. Even still Lani people from Kanggime and Kembu-Mamit continue to visit this area on a fairly regular basis in order to hunt, gather or otherwise acquire commodities unavailable in the highlands. Such commodities include black palm wood (*Caryotta sp.*) for the production of high quality bows, medicinal cinnamon bark (*Cinnamomum sp.*) and other lowland plant and animal resources. They also visit this area to trade pigs and other commodities from the higher altitude areas. It seems likely that such trade would on occasion include the trading of pigs or other

commodities for lowland brides<sup>2</sup>. Visits to the Mamberamo basin seems to contribute to the high incidence of malaria in the highland areas of Kanggime and Kembu-Mamit.

## **1.2 FOOTHILLS / LOWER MONTANE ECOLOGICAL ZONE**

Immediate south of the Mamberamo Lakes Plain Zone the terrain changes to hilly country that rises up to the central ranges of New Guinea. This zone lies between approximately 250 meters and 1,000 meters above sea level and much of it is still covered in foothill and lower montane rainforest.

Rainfall levels in this zone are also high throughout most of the year. Although the average temperature and relative humidity is generally somewhat lower than in the Mamberamo Lakes Plain Zone, most of this zone is still very hot and humid.

Geologically, most of the foothill / Lower Montane Zone in Kembu-Mamit is dominated by a formation known as the Irian Jaya Ophiolite Belt. This formation is largely made up of intrusive serpentine and ultrabasic rocks that have been pushed up from deep under the Earth's surface and can contain extremely high concentrations of heavy metals such as copper and Zinc. As a result of the presence of these heavy metals in the soils many soil nutrients required for healthy plant growth may be locked up. The wild vegetation growing on such soil types has adapted to the conditions of low nutrient availability however, most agricultural crops will perform relatively poorly under such conditions. Due to a lack of accurate data concerning soil types and agricultural production for this area it is not possible to determine to what extent local soil conditions throughout this zone affect agricultural production and population sizes.

Foothill and lower montane areas throughout Irian Jaya are noted for their extremely poor health conditions. This is has been linked to the fact that at such altitudes lowland diseases such as malaria, ulcers and skin diseases are still endemic however as they do not live in a swamp, people who live directly south of the Mamberamo Lakes Plain Zone do not have as much access to fish and thus they lack an adequate source of protein.

## **1.3 TOLI RIVER VALLEY ECOLOGICAL ZONE**

The Toli River Valley Ecological Zone is located in the upper watershed of the Toli River and its main tributaries. It is a system of divaricating V shaped valleys which begins in the southern part of the Kembu / Mamit Sub-districts and extends across the Kanggime as well as the neighbouring Karubaga Sub-district. This zone lies at altitudes between approximately 800 and 2,500 metres above sea level. Ecologically the Toli River Valley Ecological Zone is fairly similar to other intra-montane valley systems throughout the central highlands

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2 Amongst those living in the highlands fringe it is popular to trade for a bride from lowland communities. The lower customary bride prices amongst lowland communities offsets the desire for a wife from the highlands as highlands women are considered to make better wives. This practice may be significant for a project like WATCH because non-highlands women who have married into highlands groups may find themselves more isolated and in need of outside assistance than local women.

of New Guinea (i.e. the Baliem, Swartz, Ilu, Beoga and Ilaga Valley Systems). The native vegetation in this zone has experienced a high level of disturbance due to the extensive clearing of the forest for agriculture. Yet scattered throughout this zone are patches of remnant mid-montane rainforest and many patches of forest regrowth and planted groves of trees. This zone is fairly mild with an average daily temperature range of 13°C - 29°C. This average is based on measurements from the district headquarters of Kanggime, approximately 1,400 metres above sea level. Particularly at higher altitudes, it is common for fog to shroud much of the area until mid morning and for low cloud to settle on the peaks and ridges during the early afternoon, often bringing with it afternoon showers. Due to the effects of higher altitudes the relative humidity in the Toli Valley is much lower than in the Mamberamo Lakes Plain and the Foothill / Lower Montane Zones and rainfall levels are also slightly lower due to the rain shadow effects caused by the surrounding mountain peaks. Although the months between November and April are normally the wettest, there is still no significant dry season in this zone.

The Toli River Valley Ecological Zone cuts through two major geological formations. In Kembu / Mamit sub-district the valley dissects a belt of metamorphic rocks including slates, schists and marbles whereas in Kanggime Sub-district it cuts through a formation of sedimentary rocks including mudstones, sandstones and shales. Limestone outcrops and karst (cavernous limestone) terrain also occur in a number of places in this zone, most notably around Kuttime (located on a small limestone plateau) and the area south of the Toli Valley and west of Kanggime Airstrip. Most soils on the valley floors are deep black sandy loams with high humus content. These soils are very fertile, if somewhat deficient in potassium, and consequently this zone has the highest agricultural productivity and population levels in Kanggime and Kembu / Mamit Sub-districts. The gardens built in the valley floors, however, are susceptible to periodic flooding. The slopes of these valleys are fertile too yet the soils are often poorer and thinner than those found on the valley floors and erosion is a constant concern. The whole area is tectonically active and minor earthquakes are, on average, recorded several times per year.

Consistent with the belief that malaria is not generally transmitted at altitudes in excess of 1,500 meters, malaria is much less common in this zone than at lower altitudes. People living at higher altitudes in Kanggime and Kembu / Mamit are likely to get malaria when they travel to lower altitude areas from time to time. In addition, malaria continues to constitute a serious health risk for people living in this zone because the altitude at which malaria can be transmitted will vary somewhat depending upon prevailing weather conditions (as happened during the 1997 - 1998 ENSO drought). The incidence of diarrhea and dysentery in this zone is also somewhat lower due to the fact that people in this zone live in closer proximity to the main water catchments than their downstream neighbors. Respiratory tract infections are the most significant health problem in this region and this it seems is due to the cooler conditions and the smokiness of indigenous housing.

#### **1.4 UPPER MONTANE / SUB-ALPINE ECOLOGICAL ZONE**

The Upper-Montane and Sub-Alpine Ecological Zone comprises of the rugged mountain terrain in the Kanggime and Kembu / Mamit Sub-districts. This zone starts at an altitude of around 2,000 - 2,500 meters above sea level and extends to the summits of the highest peaks in excess of 4,000 meters above sea level. This zone is still largely covered with native vegetation including oak and conifer forests in the upper montane areas

and tree fern savannahs, Rhododendron shrubberies and stunted Aelfin@ woodlands in the sub-alpine areas. The rainfall patterns in this zone are very high and the temperatures range from cool to cold with areas above 3,000 meters above sea level experiencing frost and snow on a fairly regular basis.

Geologically the northern part of this zone is characterized by metamorphic rocks including slates, schists and marbles whereas the southern areas are made up of a range of marine sedimentary rocks including mudstones, sandstones, shales etc. This area also features outcropping limestones particularly around the highest mountain peaks. The geomorphology is quite complex and includes small moraines and glacial valleys formed during previous ice ages and various karst or cavernous limestone features including dolines, sink holes, karst pinnacles, caves and underground rivers.

Soil types too vary considerably throughout this zone. While there are fertile soils here, high altitudes, cold conditions and rugged terrain severely restricts agricultural activity in this zone. The main exception to this is the extensive stands of Pandanus nut trees (*Pandanus conoides* & *P. julianettii*) along the forest fringes (between 2,000 and 2,600 meters above sea level). These Pandanus groves occur naturally but are maintained and harvested by local people. Hunting of tree kangaroos, cuscus, native rats, mountain cassowary, bats and birds and the collection of various other materials and foodstuffs from these areas are main human activities in this zone. In the past much of this zone was considered sacred or taboo by local people and this functioned to preserve the quality of water flowing from this zone into the more heavily populated Toli Valley as well as providing a sanctuary where wild game can breed with little or no human disturbance.

## **1.5 CLIMATIC PATTERNS AND ENSO EFFECTS**

In 1997-1998 much of Jayawijaya was severely afflicted by a drought linked to the phenomenon known as the El Nino Southern Oscillation (ENSO). In many areas agriculture was seriously disrupted by the drought and its associated frosts and wildfires and many people had difficulty locating clean drinking water. Development workers noted how at this time there was a significant increase in the incidence of a wide range of diseases. Research has shown that the 1997-1998 drought was not an isolated incident. Indeed there is evidence of a number of similar droughts effecting areas across Irian Jaya and neighboring Papua New Guinea in 1914/15, 1941/42, 1972/73 and 1982/83 (Ballard, 1999). Evidence regarding the severity of these various droughts in Irian Jaya is very limited yet based on experiences during the 1997 - 1998 drought as well as historical accounts from local people, missionaries and others it appears that there is a fairly predictable pattern of drought severity in Irian Jaya. The pattern that emerges is that droughts in Irian Jaya are most severe on the south face of the central ranges and increase in severity from west to east with the worst affected areas being around Ok Sibil and Langda (on the south face of the range close to the PNG border). It seems that karst or cavernous limestone terrain and particularly steep terrain have increased the severity of drought by increasing the rate of surface run off. For those settlements lying above 2,200 meters altitude, drought leads to heavy frosts, destroying sweet potato crops.

Kanggime and Kembu / Mamit Sub-districts would seem to be only minimally affected by these types of ENSO related weather patterns for a number of reasons. Firstly, being located on the north face of the central ranges and approximately 400 kilometers west of the PNG border, Kanggime and Kembu / Mamit lie outside the range of the most severe ENSO related climatic drying. Furthermore, terrain in the more heavily populated areas is, by Papuan standards, gentle and the main areas of karst in these sub-districts are located beyond the range of human habitation in the Upper-Montane / Sub-Alpine Ecological Zone. Finally, human habitation patterns in Kanggime and Mamit are generally restricted to areas below 2,200 meters above sea level. This means that few if any gardens were destroyed by frost as was reported to have happened in settlements at higher altitudes such as Kwiyawagi and Yogosem (in Jayawijaya District) and Ilaga and Agadugume (in Puncak Jaya District).

The fact that agricultural production in Kanggime and Mamit was not as adversely affected by the 1997 - 1998 drought as many other areas in Jayawijaya were is attested by the fact that during the height of the drought villagers from Kanggime, Kembu / Mamit and other areas along the northern edge of the central ranges continued to bring small amounts of produce to the market at Wamena. In contrast, other areas to the south and east were reported to be experiencing famine. This is not to say that the people of Kanggime and Kembu / Mamit Sub-districts did not suffer as a result of the drought. In fact, agricultural production was severely reduced and the local people experienced a range of problems including malnutrition, a considerable increase in the incidence of malaria, diarrhoea and other diseases and brush fires which destroyed gardens, houses, Pandanus trees and forest resources.

## **1.6 EARTHQUAKES AND LANDSLIDES**

The other major environmental risk facing the inhabitants of Kanggime and Kembu-Mamit, as well as most other communities in Jayawijaya is that of earthquakes and landslides. The Central Cordillera of New Guinea is still being rapidly uplifted by a collision between the Australian and Pacific crusts and consequently the whole area is very seismically active. Whilst there are no reports of significant seismic activity in the target areas in the recent past, it is only a matter of time before such disturbances do affect the area. During the 1990s at least two major earthquakes affected communities around Soba and Angguruk. Whilst few people were actually injured in these earthquakes, the ensuing landslide caused many deaths, damage to property and malnutrition. The government's response to these disasters has been to distribute emergency relief and to encourage community members to relocate to areas along the Trans-Irian Road. This itself caused further hardship as community members who did relocate were cut off from other relatives, found that the agricultural productivity of their new land was quite low and suffered a considerably increased incidence of malaria. Whilst earthquakes obviously cannot be prevented, development planner and practitioners should be aware of their likelihood and try to help communities to become better prepared for such eventualities. Furthermore, the high level of seismic activity in the target areas is likely to have some impact upon community attitudes towards ideas such as more permanent forms of architecture or gardening systems. .

## **2. HISTORY OF CONTACT**

### **2.1 PRECONTACT HISTORY**

Due to the non-literate nature of highland Papuan communities and the perishing effects of the climate, almost nothing is known about the history of the Toli Valley Lani or for that matter about most other highland communities in Jayawijaya.

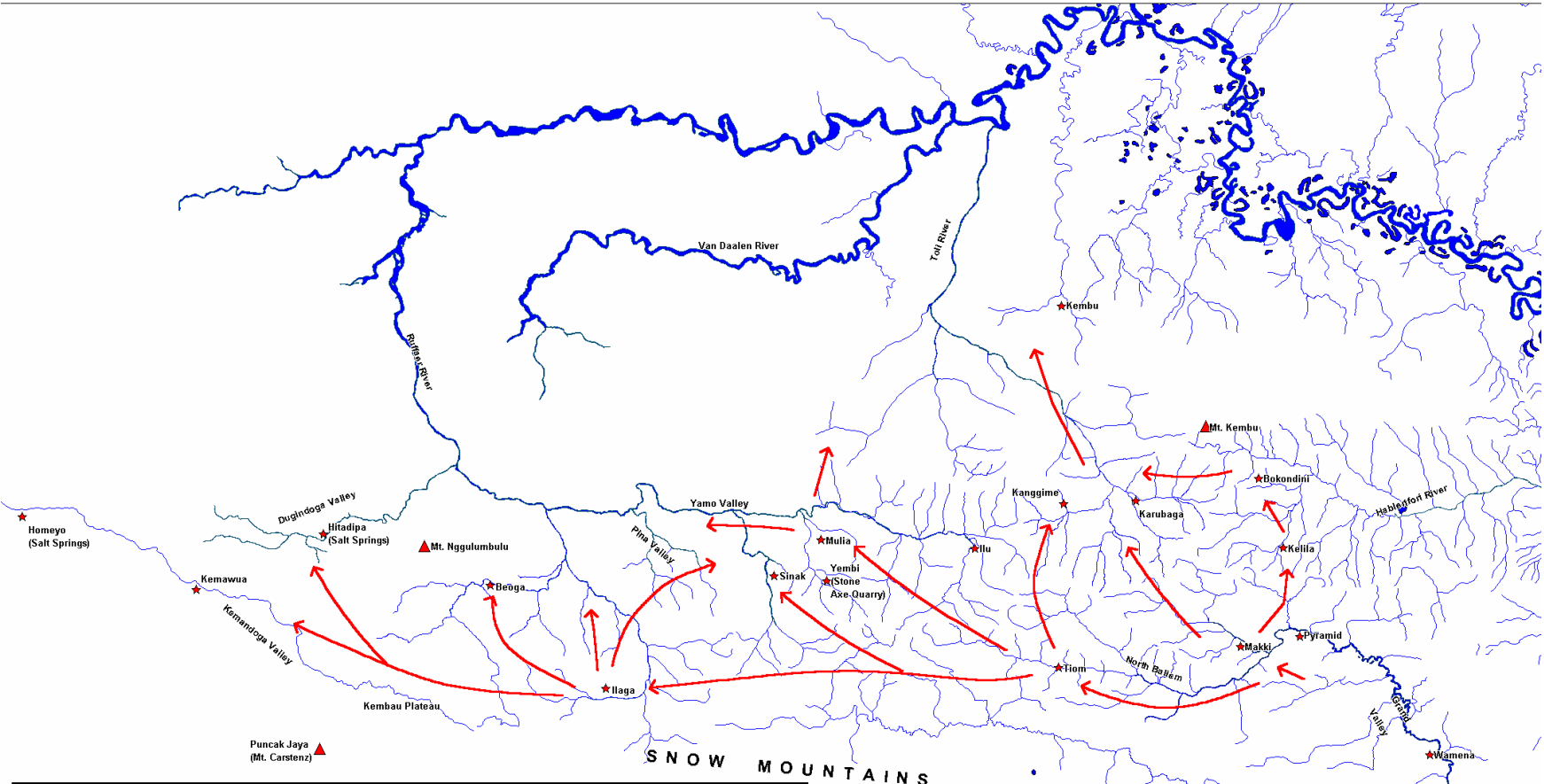
A number of academics<sup>3</sup> believe that the Lani ethnolinguistic group descend from a group, or more probably from several groups, of Grand Valley Dani who were only relatively recently driven from the Grand Valley area but whose culture and language have since diversified. Larson in particular has attempted to map the net migration flows of the Lani over the last century and the relationship of these migrations to cycles of warfare (see map VII). According to Larson's analysis the Toli Valley has been settled in fairly recent times by groups of Lani moving in from the Tiom / North Baliem area to the north and also from the Bokondini and Kelila areas in the Upper Hablerifori River area to the east. These people had themselves been forced out of the Upper Grand Valley area by warfare resulting from social or population pressures. Larson's theory is supported by the results of O'Brien's research. She argues that most of her informants from the Jikwa clan who live around Karubaga had, migrated to the area from the Upper Grand Valley via the Upper Hablerifori some time between 1913 and 1922. Her other informants had recognised themselves as being descended from relatively recent émigrés from the heavily populated Tiom area in the North Baliem Watershed. If Larson's theory is correct then the Toli Valley represents a point of convergence for two separate migratory flows away from the Grand Valley and the culture and language of the Toli Valley communities would be a mix of two divergent strains. Patterns of variations and similarities between the four main accounts of the Lani in the Toli, Ilaga, Mulia and Bokondini areas support this idea as they portray the Toli area as sharing many linguistic and conceptual elements of both the North Baliem-Ilaga-Jamo areas and the Upper Hablerifori cultures (which Larson regards as being the most linguistically aberrant of the people classified as Lani). This theory of exodus from the fertile Grand Valley has also been linked to what Ploeg (1969) has described as 'societal intensification due to environmental stress' (see section II / 4.1.5).

### **2.2 FIRST CONTACTS**

Members of an expedition lead by L.A.C.M. Doorman first glimpsed the valleys of the Toli River catchment in 1914. The objective of this expedition was to ascend the highest peak in the area, a peak the expedition named Doorman Top and the locals call Mt. Kembu. Although members from this expedition did not make contact with any Lani, they did report seeing what appeared to be quite large human populations inhabiting the valleys immediately south of Mt. Doorman / Kembu.

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3 See O'Brien (1969), Ploeg (1989), Larson (1989) & Hayward (1992)



**MAP VII.**  
**LANI MIGRATION PATTERNS**

← Net Lani Population Flows (1870s - 1970s)

★ Major Population & Trade Centres

0 10 20 30 40 50 60 70  
 Scale in Kilometres

Adapted from Larson (1987)

In 1920 a Dutch expedition led by A.A.J. van Overeem attempted to approach Mt. Wilhelmina / Mt. Trikora from the north via the Toli Valley<sup>4</sup>. The expedition only managed to travel as far as the lower Toli River before being forced to turn back. Van Overeem named the river the Swartz after one of the expedition's backers. This expedition reported contact with two tribal groups whom were referred to as the Oeringoep and the Timorini. Whilst SIL has ascribed both of these names as referring to the Lani ethno-linguistic group (Grimes, 1996), Denise O'Brien states that these two names were meaningless to her Lani informants in the Konda and Toli Valleys (O'Brien, 1969: 7).

The first confirmed contact between the Toli Valley Lani and the outside world occurred in 1921-1922 when the Kremer expedition passed through the area on its way to and from Mt. Trikora. This expedition traveled southeast from the confluence of the Idenburg and Rouffaer Rivers across the swampy plains to the Kambu River. The Kambu was then followed upstream and the expedition scaled Mt. Doorman (Mt. Kambu) before descending into the Toli Valley to the south. Part of the expedition including an ethnologist remained in the Panaga area near Mamit for a period of about two months<sup>5</sup> while the rest pushed on through the upper Toli Valley and across the North Baliem to Mt. Trikora before returning via the same route. This was not only the first confirmed contact between any Lani group and Europeans, but also the first contact with people from islands in modern western Indonesia as the expedition employed Dayaks from Borneo and Malays as porters.

Shortly after the Kremer expedition an epidemic of what was probably dysentery seems to have swept through the Toli Valley Lani populations. This epidemic fuelled fears that the newcomers were spirit men and it initiated discussion as to where and why the spirit men hid their women and why they had suddenly arrived and then just as suddenly disappeared again. O'Brien writes of a common story whereby the white men were believed to be concealing their women in the canisters which they carried with them. When they released them from their canisters the women appeared as snakes to the Lani but as women to the spirit men. Larson too tells a story from the Ilaga Valley, a place that had no contact with the Kremer Expedition or any other until 1951, with snake imagery. Here it is said that the sudden departure of the spirit men and the following epidemics was a result of the accidental killing of one of these snake women by a Lani man. Both of these tales are linked to Lani origin myths that revolve around the outcome of a race between an ancestral bird and snake. Because the bird won the Lani are descended from the mortal birds whilst the spirit men are the descendants of the immortal snakes who left the highlands to live on the north coast. It is interesting that both Larson and O'Brien express surprise that subsequent contact with the Toli Valley Lani was not more violent given that first contact seems to have caused such widespread suffering and had such a profound impact.

After the Kremer expedition the Toli Valley Lani have had no reported contact with the outside world until some 45 year later when the first missionaries arrived in the area. A number of other expeditions, most notably the 1926 Stirling Expedition<sup>6</sup>, which contacted Lani Groups in the Jamo Valley area, and the 1938-39 Archbold

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4 See Bijlmer (1922) and Le Roux (1950).

5 See Kremer (1922-23), Wirz (1924) and Le Roux (1950).

6 See Stirling (1943).

Expedition<sup>7</sup>, which is credited with discovery of the Grand Baliem Valley, did travel into the Jayawijaya Highlands and make contact with other highland communities during this period but none of them passed through the Toli watershed. However during the American occupation of Hollandia in World War II, Toli Valley communities were startled by military aircraft that occasionally passed overhead.

## 2.3 MISSIONS

After World War II Australian, American and European missionaries began to explore and rapidly establish a network of mission posts and grass airstrips across the highlands. The first phase of missionary exploration and expansion in the highlands of Irian Jaya used the government and mission station at Enarotali some 300 km to the west of the Toli Valley as a base. This station was established prior to the war and evacuated in 1941 before the Japanese advance into the area. After the cessation of hostilities the post was quickly reopened and both Catholic and Protestant missionaries began to evangelise the neighbouring Ekari, Moni and other local ethnic groups. During the early 1950s several parties of missionaries penetrated into the Lani territory yet they did not travel further east than the Ilaga Valley in modern Puncak Jaya District<sup>8</sup>. During this period corn seems to have spread from its initial point of introduction at Enarotali as far east as Pyramid on the western end of the Grand Baliem Valley.

The second phase of missionary exploration and expansion in the highlands of Irian Jaya commenced with the founding of Wamena in the mid 1950's. Using a seaplane to land on the Baliem River, in 1954 missionaries from the Christian and Missionary Alliance (CAMA) established the first mission post in Jayawijaya at Hitigima in the Lower Grand Baliem Valley. From this new base Protestant Missionaries began to rapidly establish a network of posts and airstrips across Jayawijaya. In 1956 a government post was established at Wamena just 10 km north of Hitigima and in 1958 the Catholic Church also established a mission station at Wamena.

In 1956 a mission post was built in Bokondini and in April 1957 a group of two American's from the Regions Beyond Missionary Union (RBMU) and several labourers from the north coast set out on foot from Bokondini to establish the first post in the Toli Valley watershed. This group seems to have encountered few problems with the local community and by June 1957 they had completed the construction of an airstrip at Karubaga in the Konda Valley. Shortly after the completion of this airstrip several mission families, including the first foreign women and children they had ever seen, arrived in Karubaga by plane. Over the next few years the mission population at Karubaga fluctuated somewhat but it generally consisted of three to six adults and one to four children and included people of Canadian, Australian, British, Dutch and Greek extraction. During these first few years the RBMU missionaries principally engaged in the construction of the mission station, improving the airstrip and getting to know the local community. They also explored other part of the Toli watershed and established two further mission station, one at Kanggime in June 1960 and the other at Mamit in November of the same year.

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7 See Archbold, Rands & Brass (1944).

8 See Hitt (1962).

The establishment of missions in the Toli Valley appears to have caused massive economic dislocation amongst the Lani communities. After all, to build the mission stations and the airstrip as many as 400 Lanis were employed in a day and they were paid mostly in cowrie shells though trade goods such as axe heads were also used. The amount of cowrie shells distributed in the manner must have been quite staggering. A Swedish naturalist who visited the Karubaga Station during this period claimed that as many as 80,000 cowries had been distributed during the first eight months that the mission was in Karubaga<sup>9</sup>.

The presence of the missions also altered population patterns because many people began to settle in more permanent and populous villages around the mission stations. Conversely, other people who were not so supportive of the missions, and subsequently the government when it established posts in the area, presumably moved further away from the population centres either to locations further up the mountains or further out into the lower montane and foothill areas on the north face of the Kambu-Ndudu ranges. This movement away from the missions may account for the current presence of Lani communities in the northern parts of Kambu-Mamit Sub-district when earlier expeditions report no Lani here.

Mission influence spread fairly rapidly throughout 1957 – 1959 and was boosted in March 1960 when communities across the Toli watershed were caught up in a wave of mass fetish burnings that had begun in Ilaga far to the west but had swept right across the Lani territory. Whilst the missionaries disapproved of the mass burnings, believing that they were based upon false interpretations of the gospel, they also capitalised on them by using the opportunity to bring a larger percentage of the local population to the Church<sup>10</sup>.

The missionary population in the Toli valley (Karubaga, Kanggime and Mamit) peaked during the late 1970s and early 1980s (there were about 10 families there) but by 1990 the last missionaries had left the area. When the missionaries were present a sizeable vegetable trade saw around 2000 kg of vegetables per week being sent from the region to missionaries in other parts of Irian.

The last major tribal battle in the Toli valley area is said to have occurred in April 1961. The cessation of tribal war seems to have come about fairly easily as a result of the mission's influence rather than through government or military coercion.

## **2.4 GOVERNMENT**

The first government station in the Lani territory was opened at Bokondini in March 1959. Only one Dutch Patrol Officer and a small detachment of native police attended the post up until October 1962. During this period only three government patrols visited the Toli Valley and none of these remained in the area for more than a few days. For the six months of United Nations Administration a Papuan from the north coast was placed in charge of the post. The post was taken over by Indonesian Officials in May 1963 though actual administrative policy remained similar to what it had been under the previous two administrations. That is

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<sup>9</sup> See Bergman (1961).

<sup>10</sup> See Hitt (1962), Hayward (1992), Larson (1987), O'Brien (1969) and Godschalk & Strelan (1989).

Indonesian Officials were not actively engaged in any sort of community development or other programs, they simply supported the work of the missions and maintained a presence.

Government presence and control over the Toli – Konda Valley area remained quite marginal until 1978 when a government post opened at Karubaga. This post, as well as many others established across Jayawijaya and Puncak Jaya at this time, was established in response to a period of civil unrest that spread across the Lani communities as well as some other closely linked groups. These disturbances alerted the government to the fact that they needed to take a much more active role in providing remote communities with access to health care, education and economic opportunities if such disturbances were to be avoided in the future. For the ensuing 20 years the areas now known as Karubaga, Kanggime and Kembu-Mamit were jointly administered as Karubaga Sub-district from the government post at Karubaga. For most of this time the missions remained the main providers of education and health services in the area but their role decreased sharply during the late-1980s and 1990s as the government took increasing responsibility for such services. In 1998 Karubaga Sub-District was divided into three sub-districts and new government posts were established at Kanggime and Mamit. At this time the former mission health centres at Kanggime and Mamit were also designated the status of government run community health centres (*puskesmas*).

## **2.5 WORLD VISION IN KANGGIME & KEMBU MAMIT**

World Vision International Indonesia (WVII – the implementing partner for the Jayawijaya WATCH Project) established their first development project in the Highlands of Irian Jaya in 1979. At this time they supported a PHC project run by the Unevangelised Fields Mission amongst Lani communities in the Mulia area of what is now the Puncak Jaya District. This collaboration resulted in the establishment of eighteen new village health posts within two hours walk from most villages. A total of 38 village health workers received two years training and a total of 67,000 patients were treated (an average of 2-3 treatments per person per project year). Ten maternal and child health and nutrition centres (*posyandu*) were built and 1,200 women participated in various health education programs. Clean water was supplied to 80 villages, hundreds of toilets were built, and a large percentage of the local children were immunised. A local management committee was also established and a fairly successful scheme for ongoing community financing of health programs was established. By 1985, with assistance from AusAID, the mission hospital at Mulia was graduating 20 nurses per year most who have since been employed by the government.

WVII's involvement was subsequently extended eastwards and in 1981-1982 three projects in Jayawijaya District were established. These included two projects in the Toli-Konda Valley area (what is now the Karubaga, Kanggime and Kembu-Mamit sub-districts) and another in the Tiom Area (North Baliem). These projects were similar to the Mulia Project as they worked with local missions and focused on the development of health infrastructure, the training of health workers and other curative oriented activities. After the completion of these projects in the mid-1980s WVII maintained support for community development activities in the area via their child sponsorship program. During the mid-1990s in Kanggime and Kembu-Mamit WVII established an Area Development Program (ADP) that aimed to implement an integrated package of PHC and community development interventions in a nine-year period.

Thus WVII has a long history of involvement with the communities in the target areas and has undoubtedly had considerable impact upon the lives of many. For the WATCH project, the history and precedents set by its parent / implementing organisation proved to have both positive and negative impacts on the project's implementation of PHC and community development activities.

## **3 THE HUMAN POPULATION**

### **3.1 POPULATION STATISTICS**

The most recent and reliable data regarding the human populations of Kanggime and Kembu / Mamit Sub-districts was collected as part of the 1996 government census. According to this source Kanggime Sub-district has a population of 15,382 including 8,095 males and 7,967 females in 2,507 households whereas Kembu Sub-district has a population of 11,613 people including 6,036 males and 5,477 females in 2,751 households (see tables 2 & 3 for a more detailed breakdown of this data).

#### **3.1.1 LIMITATIONS OF THE POPULATION DATA**

Although the data from this census is useful in indicating the size and gender breakdown of the target community, the validity of these statistics is weak. Government census data about sub-districts in a place like Jayawijaya must be treated cautiously because it is very difficult for census workers to collect data in remote and large sub-districts that have scattered populations and a very different culture to those who designed the survey and the data collectors themselves. WATCH staff experienced this need for caution when they worked on developing a better Health Information System (HIS). It appeared to them that in many instances the statistics sent by sub-district level census workers to the Indonesian Bureau of Statistics were guestimates or even fabrications. It has been suggested by some academics that a considerable percentage of the population of young adult males in Jayawijaya deliberately avoid being listed on the census<sup>11</sup>. Although it is difficult to test, if this were the case in Kanggime and Kembu-Mamit then not only would the population be larger, but the male to female ratio would be even more skewed than in the 1996 data. The highly skewed sex ratios and practices of preferential female infanticide reported in some other parts of Jayawijaya<sup>12</sup> lend support to this idea.

We also need to be skeptical of the accuracy of government census data because they are collected in line with government defined categories such as grouping people according to *Desa* (administrative villages) lines. WATCH staff found that *Desa* boundaries in Jayawijaya rarely correspond with local patterns of social organisation and, in the absence of a strong government presence, the *Desa* structure holds little or no meaning for the local people. Similarly, collecting data about families according to the ideal of a nuclear family leads to invalid data in a region where nuclear families are rare indeed.

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11 See Elmslie (1995).

12 See Godschalk (1992); Schiefenhoovel (1984, 1988 & 1989) & Butt (1994).

It is also unclear if the breakdown of population data according to household heads refers to the population of a *silimo* or to the members of a nuclear family. The average figures given appear to be too low to represent the population of individual hamlets / *silimos* when we compare them to Denise O'Brien's (1969) figures. She claims that individual hamlets / *silimos* are rarely home to less than 8 or more than 20 individuals. We must therefore conclude that the census data refers to individual families. However, it is possible that the survey team collected data based on a combination of nuclear families and hamlet populations. If this was the case then we would expect actual family sizes to be slightly smaller than that reported in the 1996 data. Alternatively, if the average family size had been concluded by counting the number of household heads (Kepala Keluarga) and dividing the population by this number, then we might expect that family size could also be underestimated as many Lani men are likely to describe themselves as family leaders, even if this is not really the case.

From this data it is also difficult to determine the ethnolinguistic mix of people living in the two sub-districts. Based on the data provided by the Summer Institute of Linguistics (SIL) Kanggime is entirely populated by Lani people (see section 3) whilst Kembu-Mamit has a mixed population comprised principally of Lani people but also including several Lowland Papuan groups. Based on SIL data we can estimate that the number of lowland Papuans who live or regularly draw sustenance from parts of the Mamberamo Basin in Kembu-Mamit is between 500 and 1,000 people. Yet in the 1996 census data it is unclear whether the nominal lowland Papuan population are included in the population data for Kembu-Mamit, whether they have been considered to be from Jayapura District, or even whether they have been recorded altogether. In any case it seems safe to presume that there are 11,000 or more Lani people and up to 1,000 non-Lani people living in Kembu-Mamit.

The lesson here is that it would be far more useful and meaningful for projects like WATCH to collect data according to locally appropriate social structures such as along the lines of confederacies and sub-confederacies, church parishes (which are themselves often based on the confederacy or sub-confederacy), and on hamlets and *silimo* (housing compound).

However, given that other estimates place the population of the entire Toli Valley watershed (including Karubaga Sub-district) at around 40,000 people (see Hayward 1992 p.10), a figure of 27,675 people living in Kanggime and Kembu-Mamit does not seem immediately unrealistic. In any case, this data is the most recent and reliable data available and, lacking any alternative, it has been used as the baseline population data for establishing health care coverage targets during the WATCH Kanggime extension.

**TABLE 2. POPULATION DATA FOR KANGGIME SUB-DISTRICT**

| <b>LOCATION<br/>BY<br/>DESA<br/>(OFFICIAL VILLAGE)</b> | <b>INHABITANTS</b> | <b>PERCENTAGE<br/>OF TOTAL<br/>POPULATION</b> | <b>MALE<br/>INHABITANTS</b> | <b>PERCENTAGE<br/>OF<br/>INHABITANTS<br/>MALE</b> | <b>FEMALE<br/>INHABITANTS</b> | <b>PERCENTAGE<br/>OF<br/>INHABITANTS<br/>FEMALE</b> | <b>NUMBER OF<br/>HOUSEHOLDS</b> | <b>AVERAGE<br/>NUMBER OF<br/>PEOPLE PER<br/>HOUSEHOLD</b> | <b>OUTSIDE<br/>AREA</b> |
|--|--------------------|---|-----------------------------|---|-------------------------------|---|---------------------------------|---|-------------------------|
| KANGGIME   | 871                | 5.42%   | 446                         | 51.21%  | 425                           | 48.79%  | 172                             | 5.06  | 49                      |
| NABUNAGE   | 1361               | 8.47%   | 700                         | 51.43%  | 661                           | 48.57%  | 276                             | 4.93  | 49                      |
| KUPARA / PARARI  | 1782               | 11.09%  | 900                         | 50.50%  | 882                           | 49.50%  | 212                             | 8.41  | 83                      |
| KUMBUR   | 1405               | 8.75%   | 685                         | 48.75%  | 720                           | 51.25%  | 182                             | 7.72  | 96                      |
| WULUK  | 899                | 5.60%   | 450                         | 50.06%  | 449                           | 49.94%  | 104                             | 8.64  | 80                      |
| NUNGGAWI   | 1407               | 8.76%   | 694                         | 49.32%  | 713                           | 50.68%  | 213                             | 6.61  | 64                      |
| YALIWAK  | 1212               | 7.55%   | 644                         | 53.14%  | 568                           | 46.86%  | 202                             | 6.00  | 61                      |
| PABA / PABANDO   | 834                | 5.19%   | 423                         | 50.72%  | 411                           | 49.28%  | 125                             | 6.67  | 65                      |
| MARTELO / YITTELO                                      | 1280               | 7.97%   | 657                         | 51.33%  | 623                           | 48.67%  | 196                             | 6.53  | 96                      |
| LUGUWI / ABERA   | 1052               | 6.55%   | 551                         | 52.38%  | 501                           | 47.62%  | 193                             | 5.45  | 77                      |
| BOGONUK  | 1206               | 7.51%   | 521                         | 43.20%  | 685                           | 56.80%  | 195                             | 6.18  | 67                      |
| KOKONDAO /<br>YINGGUGA                                 | 1121               | 6.98%   | 565                         | 50.40%  | 556                           | 49.60%  | 202                             | 5.55  | 109                     |
| EGONI  | 1632               | 10.16%  | 859                         | 52.63%  | 773                           | 47.37%  | 245                             | 6.61  | 128                     |
| <b>TOTAL</b>   | <b>16,062</b>      | <b>100.00%</b>                                | <b>8,095</b>                | <b>50.39%</b>                                     | <b>7,967</b>                  | <b>49.61%</b>                                       | <b>2,517</b>                    | <b>6.38</b>   | <b>1,024</b>            |

Source : Sensus kecamatan Kanggime, BPS, 1996