

# **RURAL DEVELOPMENT IN SABAH**

## **-A STUDY OF NATURAL RESOURCE MANAGEMENT AND LIVELIHOOD STRATEGIES IN KAMPUNG SINULIHAN, SOOK SUB-DISTRICT**

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## **1. Introduction**

Since the end of the 1950's when Malaysia obtained independence, the country has experienced considerable economic growth and development. This has had profound consequences for the natural environment, not least in Sabah, one of the Eastern Malaysian states: Due to an increase in the logging industry as well as an expansion of agricultural activities – both shifting and settled cultivation – more than half of the original forest-cover in Sabah is estimated to have been removed (Sutton & McMorrow, 1998). These land use changes involve corresponding crucial changes of the livelihood strategies of the Sabahan people who are still by majority residing in rural areas.

The development of the agricultural sector and the rural areas, which is of primary importance to this report, has been an integrated part of the Malaysian government-policies for economic growth. Besides implementing large scale settlement schemes the aim of the authorities has been to modernize farming techniques and cropping patterns among small-holders (Sutton & McMorrow 1998, Brookfield et al. 1995).

By looking into the natural resource management and livelihood strategies of a farming-village the report will highlight which factors influence successful rural development. Dahlan (1991:51-52) states that rural development is generally considered to mean a greater involvement of the rural sector into the market economy, nationally as well as globally: The agrarian societies are to a higher degree to be interlinked with the surrounding society, e.g. the urban economy. More specifically rural development aims for farmers to become more productive, to grow cash crops and to rely on off-farm activities as an important source of income. According to Dahlan this integration of the farming societies into the national economy should enable them to prosper. Likewise Schutz (1964) uses the relative contribution of the various sectors of a national economy to measure a country's developmental stage, and he characterises a move from subsistence farming towards commercial farming, industrialization and finally a service-oriented economy as a sign of positive growth.

The research that the report bases its arguments on has been carried out in October 2001 in Kampung Sinulihan, a Dusun village located in the Sook area of Sabah. The main source of income of the village is agriculture, where cash-cropping seems to have a growing importance. Off-farm activities are also gradually becoming more important to the village-economy. Sinulihan is considered to be one of the most dynamic and developed villages in

the Sook area. Furthermore the village enjoys a high level of organization and it is chosen as a model village of the Malaysian Vision 2020. Located close to Sinulihan, and investigated by another SLUSE-group, is the village of Pauh which is considered to be poorer and less developed.

These two villages exemplify the fact that the governmental strategies for modernization and development of the agricultural sector have been received differently among the farming communities of Sabah. To investigate why these differences appear, this report will seek to answer,

*which factors constrain and which facilitate rural development?*

Supported by Degnbol-Martinussen & Engberg-Pedersen (2001), it will be argued that factors of highest importance are the level of organization and representation of institutions in the local rural community, including the presence of a dynamic and pro-development attitude among the people.

In order to answer this question on the basis of our locally founded research data, we will present our findings on the natural resource management and livelihood strategies of the people of Kampung Sinulihan in relation to a set of criteria. These criteria are selected because we find them to represent determining factors in rural development, and they will therefore function as our guideline for data-analysis.

The criteria are as follows:

- Health status
- Education
- Economic aspects
- Farming practices and access to resources
- Institutional and organizational framework in the village
- Attitude towards development

When analysing our data from Kampung Sinulihan we will compare our findings to those of the study carried out in the nearby Kampung Pauh. Through comparison in relation to the selected criteria we will seek to give possible explanations for the differences between the two villages and the consequences of the differences. This will enable us to understand what determines the present situation in Sinulihan; which prevailing conditions facilitate

the village's level of development as opposed to those corresponding factors that seem to be limiting development in Pauh.

## 1.1 Study area



Kampung Sinulihan is located on the Sook Plain, in the Sook sub-district, which is situated in the South Western interior part of Sabah. The climate of the area is humid-tropical and its natural vegetation is tropical rain forest. However not much of this original vegetation remains since a large part of the land has been cleared for farming and logging.

The Sinulihan community was established 30 years ago when a group of people from the Tuaran district migrated to the Sook area in search for new fertile land. They cleared a forested area which they have recently applied for land-title to. Their applications are currently in the process of being surveyed. Currently, the village consists of 49 households and 351 inhabitants. This census does not include the neighbouring settlements of Baru Jumpa and Tebobon, but when counted together – as is normally the case for official, administrative purposes – the three settlements consist of around 80 households and 650 inhabitants. The typical household of Sinulihan comprises two adults and 6 to 8 children. The main crops grown are hill rice, oil palm, rubber, yam and a variety of vegetables and fruits. Yam is the major cash crop and hill-rice the most important crop for subsistence-use. The village has three grocery shops and off-farm activities are generally increasing

their importance as a source of income generation. A primary school is located in the village.

As already mentioned Sinulihan is a well organized community that hosts a number of different institutions. As a model village of the Malaysian Vision 2020-program it is considered – and considers itself – a progressive and dynamic society. In this respect it stands in clear contrast to the neighbouring village of Pauh which is generally conceived of as one of the poorest communities in the Sook sub-district. In this neighbouring village, situated 5 km upstream of Sinulihan, the majority of the 30 households, comprising around 300 people, rely on subsistence farming of wet rice.

Whereas the population of the Sook area is traditionally Murut (as in Pauh) the people of Sinulihan are Dusun. The Dusun-term means ”people who are traditionally farmers” (Regis 1989:415) and was given to this group in colonial times by newcomers to the area. They are now also called Kadazan-Dusun. The Dusun are described by Appel and Harrison (1969) as being a culturally heterogenous population group, and apart from their farming traditions the different Dusun groups have only their related languages in common.

The majority of the native peoples of Sabah have converted to either Islam or Christianity. The Dusun people of Sinulihan are Muslims while the Murut people of neighbouring Pauh are Christians.

In Sinulihan, Islamic practices seem to be interwoven with the traditional Dusun practices: The traditional harvest festival is preserved, but also a village mosque has been built and Islamic prayers are carried out on an every day basis as well as during ceremonial gatherings in the village. Furthermore alcoholic drinks and eating of porc are prohibited.

## **1.2 Agricultural development and natural resource management in Sabah**

Malaysia has experienced a uniquely rapid development in its land use and agricultural sector since the 1950s and this has led to radical changes in the physical environment (Sani 1987). Peninsula Malaysia has been subjected to profound intensification in its agriculture resulting in the conversion of natural forests mainly into rubber and oil palm plantations. This has together with urban and infrastructural development led to rapid deforestation and thus profound changes in the environment (Barraclough & Ghimire 2000).

The trend has been somewhat similar in Sabah but on a smaller scale. Between 1973 and 1983, though, the area of undisturbed forest was halved in the region (Sutton &

McMorrow 1998) Logging, mining and rampant bush fires have been the main factors in the deforestation process.

The agricultural sector has accordingly expanded tremendously in terms of both small-scale subsistence farming and estate-type plantations. In this context, it has been a consistent policy of the respective regional and federal authorities to promote a broad-based commercial agricultural sector increasingly relying on intensive cash-cropping systems. Sabah has thus seen an introduction and spread of new crops like cocoa, coconut, rubber and oil palm; the latter currently being the most important economically and in acreage.

The strategy for modernisation of Sabah's agricultural sector has involved the foundation of large settlement schemes in an attempt to increase rural development and crop diversification (Sutton & McMorrow 1998) – the Sabah Rubber Fund and the Federal Land Development Authority being the main implementing agencies. Another part of the strategy has been to improve the existing small-scale farming sector by introducing new cash-crops and providing training, seedlings, fertilizers etc on the village level – the main agencies involved are the Department of Agriculture and the Rural Development Corporation (KPD). The resettlement schemes have now generally been halted whereas the local level development schemes are still being actively used.

In conjunction with the Vision 2020 strategy, the state of Sabah have put forward a new proposal for further development of the agricultural sector – the end result being a fully developed intensive and commercial farming sector (Second Sabah agricultural policy, 1999-2010). This is to be achieved through strategies for optimal utilization of agricultural resources and promotion of agro-based industries, research and efficient marketing systems. Interestingly, sustainable development is also an integrated part of the policy.

### **1.3 The Malaysian Vision 2020**

Malaysia is recognized as a middle income country. For many years, the country has experienced rapid economic growth and development and has been characterized by a low inflationary rate, almost full employment and high national savings; e.g. the annual average growth rate from 1990 to 1997 was 8%. The per capita GDP (2000) is estimated at 3200 US\$ and this is reflected in the quality of life index which has shown a positive

development between 1980 and 2000. Within this period, incidence of poverty has been reduced from 32% in 1980 to about 5% in the year 2000 (Danced 2001).

The Vision 2020 is the overall national development strategy for Malaysia. The major objective of this strategy which is part of the "New Development Policy" is to turn Malaysia into a fully developed country by the year 2020 (Brookfield et al. 1995:49).

Economic growth is emphasized as the main parameter for the success of the development plan but also political, cultural and psychological dimensions are important aspects according to the speech "Vision 2020. The Way Forward", held by the Malaysian Prime Minister. Moreover the vision-plan, which is similarly found in other newly industrialized countries, acknowledges the preservation of natural resources and the need for "environmentally sustainable development" as a condition for long term growth (Danced 2001:8).

Among other keywords in the visionary plan are concepts like industrialisation, liberalisation of the economy, urbanisation, modernity, capitalism etc. The plan was presented in 1991 and nine challenges were listed which must be addressed and if resolved will bring a "...united, psychologically liberated, democratic, moral and ethical, liberal and tolerant, scientific, caring, economically just and prosperous society." (Johari 1992: 354). The nine challenges incorporate mainly three topics; nationbuilding, industrialisation and economic growth. In order to achieve the economic objectives of the plan, Malaysia must have an annual real growth rate of at least 7% starting from 1990. At this rate Malaysia's GDP in 2020 should have expanded at least eight times of the nation's GDP in 1991. Kampung Sinulihan has been chosen as a model village of the "Garakan Desa Wawasan", the vision village program – a selection this report will investigate further.

## **2. Methodologies**

As stated in our synopsis, the overall assignment of our study was to assess the natural resource management and livelihood strategies in Sinulihan. Our more specific objectives aimed to survey the human and physical environment and to investigate farming practices, environmental issues and government support. Following these objectives, we decided to use a range of research methods during our stay in Sinulihan. These were social scientific as well as natural scientific methods, all chosen in co-operation with our Malaysian

counterparts. To facilitate comparison between the conditions in the villages of Sinulihan and Pauh an attempt was also made to harmonize our choice of methods with that of group 2. In this section we will briefly argue for choosing the methods and present our experiences using them; what were the advantages and which problems we had when carrying out the research. Also to be covered are the adjustments made to our methodologies following our initial experiences in the field.

### **2.1 Collaboration with Malaysian counterparts**

As this is an interdisciplinary project one of the major challenges is to cooperate among different scientific disciplines. But SLUSE is also an internationally based study program and therefore another great challenge is to cooperate with different nationalities. The fact that we had to coordinate our synopsis and choice of methods with our Malaysian fellow students meant that a lot of communication via e-mail took place before we actually met in Sabah. This was both a source of useful information and frustrating misunderstandings but most of all, a means of getting acquainted with each other.

During our fieldwork we realized that different academic traditions meant that what seemed to be a Danish preference for qualitative social scientific methods had to compromise with a Malaysian preference for quantitative research-strategies. Furthermore students of social science had to acknowledge the importance of data derived from natural science and vice versa.

This meeting between different cultures – scientific as well as national – was a fruitful experience and an exercise into the art of tolerance and compromise. In retrospect we can say that we did manage to function as one integrated group during our fieldwork.

### **2.2 Working with translators**

Carrying out a fieldwork in a place where we as Danish and Ghanaian students did not know the language put certain limits to our use of especially the social scientific methods. All communication with the people in Sinulihan had to be mediated either by one of our Malaysian fellow students or by one of the two interpreters since no one, except for the secretary of the JKKK, spoke English. This meant that we rarely engaged in non-planned

informal conversation, but had to make arrangements for interviews when we knew an interpreter would be available. This was a limitation for us since it is often through such informal conversation or "chit-chatting" that interesting information is revealed and formal interview-statements are challenged.

Another disadvantage is that much information may be lost or "filtered out" in the process of translation; details such as body language or the informant's use of words that can tell a lot on their perception of things are lost when the translator is there as a third part. (Larsen 1995:97). However, our translators spoke good English, and we are confident that they did the translations as precisely as possible.

Luckily though, our Malaysian colleagues were able to engage in informal communication with the villagers and shared their information with us.

### **2.3 Questionnaire**

In Sinulihan we carried out a household survey in the form of a questionnaire that contained questions on household and family composition, economic matters and farming practices (see appendix 1). Also included was a section of statements to clarify the respondent's attitude towards certain matters, among these the surrounding environment, infrastructure, government support etc. The intention of this survey was to provide us with an overview of the village, its demographic and socio-economic characteristics. In order to obtain quantifiable data suitable for statistic analysis the questions posed to the respondents were identical and closed, i.e. answers had to fall into predefined fixed categories (Casley & Kumar 1988:54-56).

Since the village of Sinulihan counts 49 households we initially thought that given our limited time frame it would be impossible to cover all these and we therefore selected 50% of the households using a simple random sampling strategy. But because the villagers were very willing to cooperate and because the secretary of JKKK put a big effort into informing and gathering them we were actually able to do a full census.

Before initiating the survey we tested the questionnaire on several villagers and found that it had to be shortened and that it contained questions that the villagers were not able to answer. This led to adjustments: Problematic questions were eliminated and the remaining ones were grouped according to topics. The investigation of the tourism-potential of a

nearby waterfall was also left out since the waterfall turned out to be placed in a rubber plantation and on land not belonging to Sinulihan.

Even though we adjusted the questionnaire upon several preliminary testings some of the questions still posed difficulties for the villagers – something which calls for precautions when analysing the data obtained. First of all it was difficult for the villagers to give accurate estimates of the acre-size of the different crops they grow, partially because intercropping is the most common cropping pattern but also the people interviewed can have different perceptions of the acre-measurements. As Casley & Kumar (1988) point to, standard terms and definitions are necessary in a structured survey. Valuing inputs and outputs for each crop was also difficult since most of the crops are cultivated for subsistence use and therefore not weighed.

Another problem was the sensitive questions on income, expenditures and saving patterns – something people were reluctant to answer particularly in the presence of other villagers, and since the questionnaires were carried out in one of the bigger village houses other people were always present.

When asked to move the interviewing to their respective homes the villagers were reluctant for reasons unknown to us. This also meant that the household-belongings checklist could not be ticked of by us but had to be asked to people. The gathering of the villagers in one of the bigger village-houses was arranged by the JKKK-secretary and it occurred to us that people had also been requested to give prearranged, identical answers to certain questions, e.g. the sensitive ones on income and the ones on the size of their land which were difficult to estimate.

Our experiences with the questionnaire lead us to conclude that it is not an easy task to ask clear and simple questions, especially not when having to phrase these before actually knowing the setting of the survey site and without knowledge of the data processing program, SPSS. The most straightforward and well functioning part of the questionnaire was the statements-section, where the respondents were asked to give their opinion on certain issues on a scale from 1 to 4 (see appendix 1).

## **2.4 Semi-structured interviews**

To supplement the questionnaire-data, we carried out a number of qualitative interviews. These mostly took the form of topic-focused interviews with key informants who were

knowledgeable about certain issues. Prior to the interviews we formulated specific interview-guides (see appendix 2 for examples) which enabled us to control or guide the interview but at the same time these guides were sufficiently open to let the informant come up with topics that he or she found of particular importance. Contrary to the structured survey the qualitative interview is open-ended and can provide the interviewer with an insight into new unforeseen problems and areas of interest.

The strategy of the interview-guides was to initiate the interview with questions on the informants' background in relation to the topic to be covered and then subsequently move to more in-depth and sensitive issues. As interviewers we tried to stay as neutral as possible and expressed interest in the topic at stake. Notes were usually taken by one of us during the interview and afterwards a brief summary was written down in order to share the information with the other group members. These procedures are supported by Casley & Kumar (1988:11-16).

In Sinulihan we conducted semi-structured interviews with four farmers, the village headman and the chairman of JKKK. The farmer-interviews were centred on farming practices and cropping patterns whereas the two leading villagers were asked about village-organization and government funding. A planned interview with the headmaster of the primary school was cancelled because of his fear of sensitive issues and because we had not obtained an official permission from the educational department in Keningau and the local police. Instead one of our Malaysian counterparts was allowed to interview two school teachers.

The trouble we experienced with the headmaster stood in sharp contrast to the friendliness and co-operation the other villagers had shown us and it attracted our attention to the fact that the headmaster had come into conflict with other villagers over matters of government funding.

Interview-informants outside of Sinulihan consisted of administrative government-staff: The assistant district officer and the agricultural officer in Sook, the headmaster of the secondary school and the assistant nurse in nearby Tulid and in Kenigau we visited the department of Land and Survey and the Rubber Fund Board. Characteristic of these interviews was that they were carried out together with members of the other groups and therefore it was not always possible to obtain answers to the specific questions of interest to Sinulihan, e.g. the Vision 2020-program.

By using qualitative interviews that met the informants at their own premises we obtained into depth information on the village community we studied. Considerations to be made regarding this information are the impact that the interviewer might pose on the informant and the type of data he is willing to provide; the informant may want to please the interviewer by answering in a way he believes the interviewer desires (Casley & Kumar 1988:23). To what extent we influenced the answering of our informants is difficult to judge given our limited time frame; crosschecking information would require knowledge of the village-situation on a longer time span. Additionally the context of the interview matters, for example choosing to interview the farmers in their fields, as we did, made them feel comfortable and "on their own territory" (Hammersley & Atkinson 1993:150).

## **2.5 Participant observation**

This method, favoured particularly by anthropologists, can provide the researcher with into depth information about the studied community. In Sinulihan we had the opportunity to participate in the villagers' monthly communal working day where we assisted in the clearing of a piece of communal land for sheep-grazing and in the cleaning up of the village. Furthermore we were invited to participate in several ceremonies taking place in the village: One was the honouring of those that had passed away and another was the namegiving of a child. Although we spent less than two weeks in Sinulihan we believe that by interacting with the inhabitants we obtained insight knowledge of the internal relations of the village and experienced the life the people live; its sociocultural aspects and challenges.

Apart from the advantages of this method, described by Cohen (1984), there are also some precautions to be taken. Among these is the fact that when the researcher himself becomes an actor in the society he studies he cannot avoid influencing or even manipulating the social activities he participates in (Yin 1994:88-89). This is something we considered in relation to our participation in the village work day; did the people of Sinulihan in fact carry out this activity on a regular basis or was it a strategic tool in convincing us that they are a well organized and integrated community?

Finally it should be mentioned that participant observation can be a fruitful supplementary of other methods (Hammersley & Atkinson 1993:132): e.g. our participation in a JKKK-

meeting provided us with an insight as to how the village-organizations work and it thereby enabled us to prepare questions for our interview with the chairman of the JKJK.

## **2.6 Field observation**

Contrary to the method of participant observation the researcher will remain a passive observer during field observation (Yin 1994:86-89). On the first day of our stay in Sinulihan, after an introductory meeting with the village headman, we were taken on a walk around the village. This provided us with a visual impression of the village setting: its physical environment, facilities and infrastructure. Furthermore the qualitative interviews we carried out with four different farmers took place in their fields supplying us with concrete and in-situ knowledge of cropping patterns, field size, fertilizer-use etc. In this way the field observation method contains both natural and social scientific characteristics.

## **2.7 Mapping/GPS**

When we arrived in Kampung Sinulihan we did not have a map of the village, but fortunately the villagers were able to provide us with a map that the JKJK-secretary had drawn (appendix 3). It showed us which households were included in Kampung Sinulihan and which belonged to the neighbouring settlements of Baru Jumpa and Tebobon. This mapping of the village we could not have done ourselves since these settlements are situated close together and are not separated by physical boundaries. The reasons for the division between Sinulihan and its neighbouring settlements were explained to us as a) being religious, one settlement is Christian, and as b) a matter of origin, the other settlement consisting of people originating from another village than the Sinulihan inhabitants.

In taking this map as our point of departure this method can be seen as a participatory exercise: Even though we didn't request the making of the map, it can be seen as participatory in the way that it includes the villagers' perception of Kampung Sinulihan and tells about their definition of themselves as a bounded community in relation to others. Apart from providing us with a visual impression of the village, the map was also useful to us when we numbered the houses in order to make a simple random sample of the

households. This random sample was to be used for the questionnaire-survey (before we decided to do a 100%-census) and in this way the two methods supplemented each other. We also made our own map of the village-infrastructure by using the GPS to do a georeferencing of sample points. Apart from marking each house these points consisted of a number of waypoints of the village-roads. Via the computer we were able to combine the georeferenced map of the village-infrastructure with the topographic maps of the area. Finally, as a supplement to the soil and water tests, we marked the boundaries of each field with the GPS, enabling us to measure the size of each of the fields, and we registered the location of each watertest-site. Unfortunately the GPS measurements are somewhere on Borneo and is not available to us, and we have not been able to implement the data in the report.

## **2. 8 Natural Scientific Methods**

We collected soil and water samples with the immediate objective of receiving basic information on indicators in these environments.

We tested the following:

- Basic soil fertility and nutrient availability in Sinulihan by field, soil and crop analysis.
- The impact of agricultural practices on the soil fertility and land degradation in terms of plant nutrients and water quality.

In order to compare the data later, the Pauh and Sinulihan group attempted to conduct all the following methods in the same manner, and the section of the report was partly done in collaboration with group 2.

## **2.9 Soil and Field Analysis**

Field and soil analysis was performed on one hill rice plot of the five farming households with which we conducted semi-structured interviews (i.e. on five fields). We only chose to sample hill rice plots because of time and resource constraints and because this crop is common in both Sinulihan and Pauh. The analysis of the fields involved drawing rough sketches of the fields and their surroundings, including their topography, as well as noting if any intercropping existed. The sizes of the fields were measured using GPS.

On each field we marked five roughly equally spaced  $1 \times 1$  m subplots along a diagonal transect reaching from one corner across to another in order to get the most complete picture of the field. We extracted soil samples roughly from the middle of each subplot down to rooting/plough depth (app. 40 cm) using a standard auger and the topsoil was separated. Soils were subsequently dried back in the village.

We analysed the soils using a soil laboratory kit based on colour charts, after carefully sieving the soils and thoroughly mixing them with soils of the same depth. This gave us ten soil samples to analyse, two from each farm/field, which we subsequently analysed with three replications of each. Analysis included pH, conductivity (EC) and nutrient analysis for ammonium (NH<sub>4</sub>), nitrate (NO<sub>3</sub>), phosphorous (P) and potassium(K).

Certain precautions should be taken in respect to the sampling procedure. The relatively small sampling size is probably not sufficient to give a representative picture given the very heterogeneous soil structure of tropical soils (Ahn, 1993). Moreover, due to possible misunderstandings and lack of communication, the two groups had slightly different approaches to the sampling strategy. Group 3 measured the topsoil according to the height of the organic matter layer whereas group 2 did fixed measurements (20 cm). This somewhat disrupts a direct comparison.

## **2.10 Crop sampling and analysis**

We sampled the youngest fully emerged leaf (suggested by Reuter *et al.* (1986) in order to insure tissue of similar maturity) of five rice plants on each subplot. After sun-drying the

samples, all the blades from one field were then packed into plastic bags and taken to Denmark. We also bought rice grains from last years harvest from all the farmers whose fields we investigated. Analysis of the rice blades and grains for N (Kjeldahl), P (colourimetrically using an autoanalyser), K and Ca (atomic absorption spectrometre) was conducted at the Department of Plant Nutrition, the Royal Veterinary and Agricultural University of Denmark.

## **2.11 Water Quality**

Changes in stream water quality may be caused by several factors such as sediments contributed by soil erosion, and waste water discharges from various point and non-point sources such as the residential and commercial areas, and agriculture activities. To assess the impacts, sampling stations were set up at appropriate points along the Sook river, one upstream of Kpg. Sinulihan and another on the downstream side and another two at the nearby tributaries.

The objective of the study is to receive readable information on the pollution level of the river given its importance as a water resource to the village and possibly to determine the main sources of pollution. BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), DO (Dissolved Oxygen) together with counts of faecal and total coliform bacterial levels are indirect but reliable measures of water pollution levels (EEA,1994 & WHO,1984).

A multi- hydro-lab was applied in the field for measurements of dissolved oxygen, temperature and pH. Filtering and incubation for the measurements of BOD and COD were conducted in the lab (see synopsis). NO<sub>3</sub> and NH<sub>3</sub> are among the main soil nutrients and are causes of eutrofication (Lindegaard & Jensen;1996), and were measured with aid of a colorimeter (see synopsis). For a full list of the measured water quality indicators see appendix 4.

Fluctuations in physical parameters like stream flow, dissolved sediments and rainfall will influence the results and so possibly more measurements are needed to get a full picture of the water quality situation (Keith, 1988). However, this was not possible keeping in mind the various tasks to be addressed in the study.

### **3. Results: Analysis and discussion**

#### **3.1 Health status**

There are five village clinics throughout the Sook-area including one in Tulid and a bigger one in Sook, but there is only one doctor to serve the entire district. Treatment is free of charge for locals but outsiders must pay 1 RM for treatment. If there are certain cases the clinic cannot handle the patients will be transferred to the clinics in Sook or Keningau.

Even though the clinic face constraints regarding funding and equipment (according to the staff nurse) the respondents in our survey are generally satisfied with the clinic. More than 80% agree or strongly agree to the statement: “We have sufficient medical assistance from the nearest clinic”. The most common diseases include upper respiratory track infection, gastro intestinal, tuberculosis, worms and rash. The latter is, according to the staff nurse in Tulid, a result of logging activities upstream causing pollution to the river, and because the river is used for bathing throughout the year rash is very common in the area.

It is according to the staff nurse crucial that the water supply in the area should be improved. The water supply in Kpg. Sinulihan consists of a government funded gravity water supply which is not functioning satisfactorily. In the dry season it cannot supply the village with a sufficient amount of water, which means that the villagers must find other sources of water (usually river water). This surface water from this water source can easily be polluted with faeces from animals since the river is not protected with a fence as suggested by WHO (WHO 1984: 21f). According to the questionnaire approximately 85% of the respondents disagrees or strongly disagrees to the statement “We can drink the water directly from the river”, and generally the respondents are worried of the general condition of the river eg. the low amount of fish and occurrence of human faeces in the river. 75% of the respondents disagree or strongly disagree to the statement “We are satisfied with the water quality and quantity”, but still 87% see the river as an important watersource. Our water tests show that the water source used for drinking water does not contain a high amount of coli bacteria neither does it contain any faecal coli and the total amount is 20 counts of total coliform pr. 100 ml. This is within the guidelines suggested by WHO, but the problem is the insufficient supply from this water source which leads to the use of alternative water sources such as the nearby river. The river contains rather high amounts of both faecal coli and total coli. The average faecal coli in our tests is approximately 1000

counts of faecal coli and the average total count of coli is approximately 1350 (see appendix 4). According to WHO drinking must not contain faecal coli at all, and the total counts of coli must not exceed 10 for un piped water. Especially the high amount of faecal coli is disturbing, and as a consequence it is not advisable to use the river water for drinking water, which is in accordance with the villagers perception of the water quality.

Malaria seems to be under control because of DDT spraying (maybe it has other effects on the health status – not to be discussed any further) and government supported mosquito nets. The mosquito nets can be bought at the clinic at RM 5, and this is a very efficient and cheap way to control malaria. According to the staff nurse most households in Kpg. Sinulihan have mosquito nets.

Besides the clinic offers health education to the schools in the area. This "School-team" visits each school once a year to examine the health-status of the pupils. They give BCG-vaccines and worm treatment to the pupils, and they educate the pupils in matters regarding health. This is not, however, functioning in an optimal manner. The pupils, and the public in general, do not listen and learn from the health education, and this results in a lower level of health. According to the staff nurse at the health clinic in Tulid the most important factor for a good health status is education – awareness of health, and this requires co-operation between the schools and the health clinic. The clinic has a "School-team" which visits each school in the area once a year. The purpose of the school team is to give basic information about health, give the pupils BCG vaccinations and worm treatment and to detect malnourished pupils.

He is also pointing to the general level of education as a parameter for good health. According to him the general education level in Kpg. Sinulihan is higher than in Kpg. Pauh, and this has a positive effect on the overall health status in Kpg. Sinulihan (cf. discussion later in this section).

Another important factor is the level of organisation in each village. The staff nurse points out Kpg. Sinulihan as a splendid example of a village with a high level of organisation, and this a positive effect on the overall health status.

### 3.2 Education

There is one primary school in Kpg. Sinulihan currently with 216 pupils, where approximately 65% are Muslim pupils. The school was established as a result of a collective effort from the villagers. The school was build with financial assistance from the government, but the expenses for running the school was paid by the villagers. Today the school receives money from the government to cover expenses for furniture, food, books and renovation of the school, but the villagers still have to pay for school uniforms (interview with teacher at Sinulihan Primary school 25<sup>th</sup> October 2001).

After primary school the pupils proceed to secondary school, wich can be in either Sook or Tulid. The secondary school in Tulid has 800 pupils, and it is "fed" by 20 different primary schools in the Sook-area. The secondary school in Sook faces a variety of problems. These problems range from lack of motivation from pupils, lack of funding, pupils fail to show up for classes, and lack of teachers. These problems are all limiting the quality of education and as a consequence the level of education is below optimal (interview with headmaster in Sook, Oct. 1.st).

The chairman of the JKKK in Kpg. Sinulihan gives very high priority to offering the children a good education. By raising the educational level of the village children he hopes to bring future development to Kpg. Sinulihan. The respondents in the questionnaire have a very positive attitude towards education and the current quality of the school system. 95% of the respondents agree or strongly agree to the statement: "Our children are assured a quality education" and 90% agree or strongly agree that the school has produced many bright students the last five years, and they also display satisfaction with number of textbooks and the physical surroundings around the school. The positive attitude towards education is also emphasised by the fact that 85% agree or strongly agree to the statement: "I will send my children to school even though it needs high expenditure".

The importance that the villagers put into education can also be seen by the commitment the villagers put into establishing the primary school 20 years ago. This was an initiative from the villagers, and it shows the importance that the villagers put into education. He believes that the young people with a good education will come back to the village after finishing their education and contribute to the development of the village (Interview with chaiman of JKKK 21<sup>st</sup> October). The teacher at the primary does, however, disagree on

this matter. The well-educated students must because of work commitment stay in some of the bigger nearby towns (typically Sook, Keningau or even Kota Kinabalu), but they still feel possess a kind of belonging to Kpg. Sinulihan, and many still contribute to the household-economy (interview with teacher at Sinulihan Primary school 25<sup>th</sup> October 2001).

### 3.3 Economic aspects

In Sinulihan the main source of income and employment is agriculture which employ about 70% of the working population (See figure 3.3.1). Out of this cash cropping in the form of rubber, yam and tobacco forms a very high percentage of the total agricultural activities compared to their neighbours in Pauh, which rely basically on subsistence Agriculture for livelihood.

Off farm activities are of more significance in Sinulihan compared to Pauh although it is still minimal. 2% are in trade basically as middlemen and shop keepers, 8% in the public sector like teaching and nursing, and 2% are drivers. In Pauh 79% of the population is employed within farming.

Although unemployment seems to be very high, this figure includes full time house wives. Some of these help their husbands and other family members in the farms.

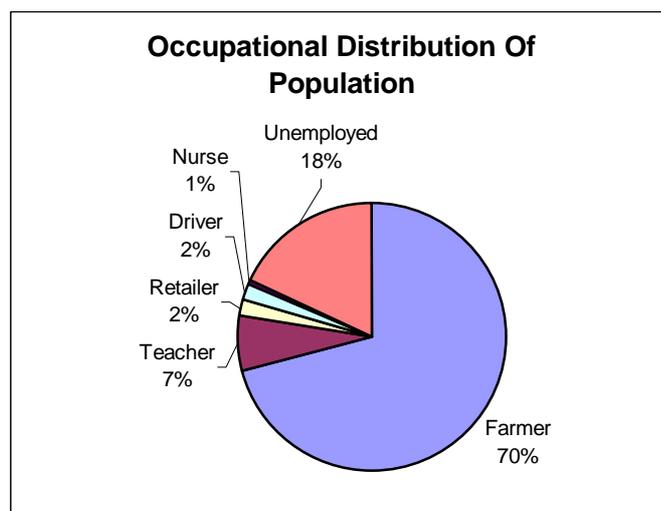


Figure 3.3.1

Marketing of agricultural products like yam is in the hands of middlemen who purchase it from the farmers and sell them in the nearby cities of Sook, Keningau and Kota Kinabalu. The Rubber fund board is the main procurement agency of Rubber. According to our studies, it was found that about 90% of the farmers were satisfied with the existing chain of marketing systems and prices for their products.

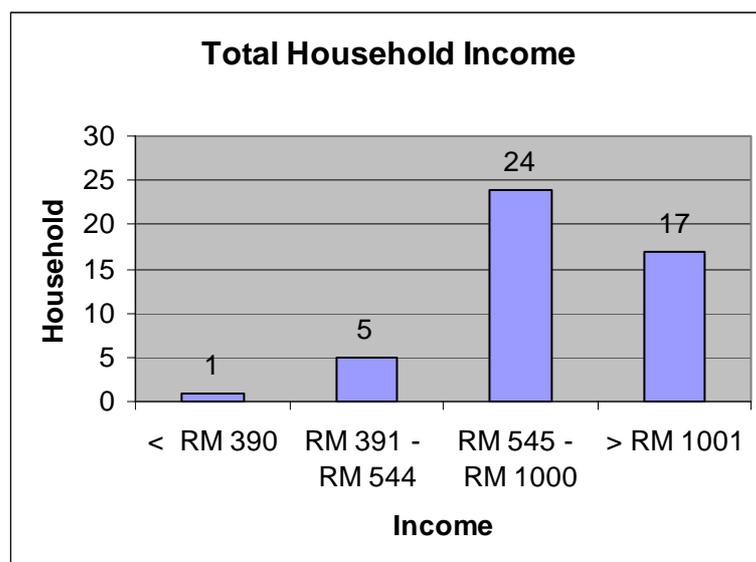


Figure 3.3.2

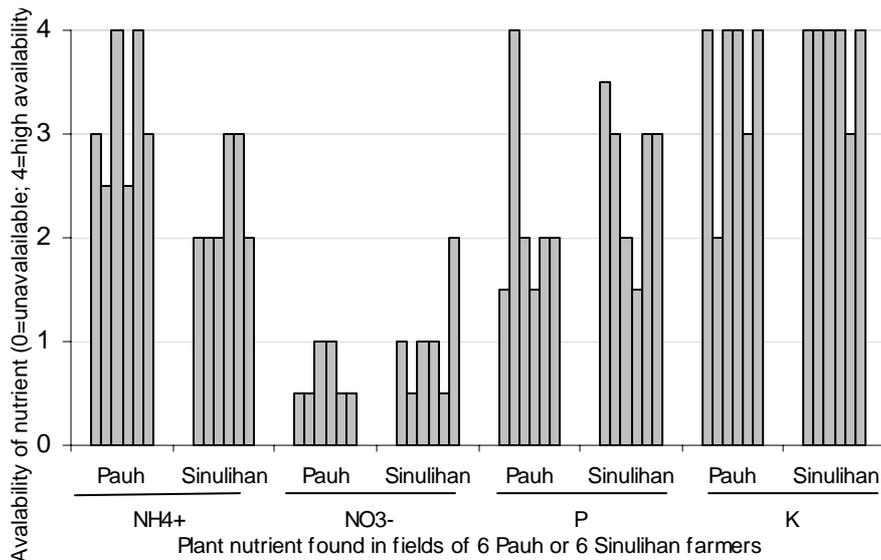
The figure shows the total household income per month and it is based on the information from the questionnaire. The reason for the intervals is that RM 390 was the poverty line in Sabah in 1990 and RM 544 is the poverty line in Sabah in 2000. According to the questionnaire 12,8% of the households in Sinulihan fall below the poverty line from 2000. Based on the occupational distribution and the total household income we can conclude that Sinulihan is heavily relying on the agricultural production which is still, by far, the most important contributor to the overall income and employment.

### 3.4 Farming practices and soil analysis

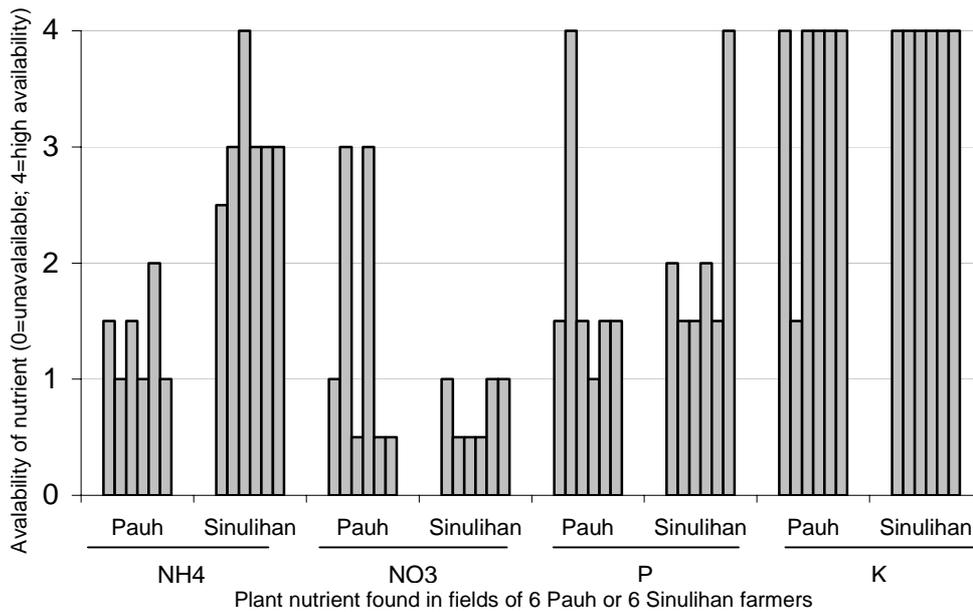
The data do not point to the existence of significant differences between the immediate nutrient availability of Pauh and Sinulihan. Furthermore, the data show the variability to be higher among the fields of each village than between the two villages.

The profound differences in field history, topography and crop maturity between the fields as well as the generally high heterogeneity of tropical soils should provide readable explanations as to why this pattern is observed (Ahn,1993;Wolf, 1999).

The ammonium levels seem to be slightly higher in the top soils of Sinulihan than those of Pauh while for the sub soils the opposite seem to be the case. The fact that top soils from Sinulihan were taken from the nutrient rich top layer whereas those from Pauh were taken from the top 20 centimetres is the most obvious reason as to the appearance of this pattern rather than it being a reflection of a genuine difference. Ammonium is the first product in the nitrogen mobilisation process and is thus found at a high level in the organic matter rich top layer (Killham, 1994). Moreover, if the values are averaged for the top and sub soils of the two villages the differences become insignificant - giving further support to differences in methodology as the main source of explanation.



Top soil



Sub soil

The soil kit applied in the study do not provide satisfactory information on soil nutrient levels and can not alone be used as a measure of soil fertility and productivity. First of all the data is non-parametric which makes it difficult to use statistically. Secondly, the data show only immediate nutrient levels which fluctuate according to physical factors like rainfall etc. Thirdly, other factors like soil organic matter contents, available and total P, cation exchange capacity as well as soil texture an structure should be taken into consideration when determining soil fertility. However, studies of these parameters were not feasible due to time and work constraints.

In spite of these reservations, the parameters we have measured do give some valuable indications to the fertility and productivity of the soil.

Soil pH has a strong influence on crops mainly indirectly by affecting nutrient availability. Low soil pH (typically below 5,0) tend to increase the solubility of carbonates, phosphates and sulfates which in humid climates potentially can lead to leaching of essential nutrients; toxic levels of aluminium is another possible effect of low soil pH (Wolf, 1999). The observed pH for the paddy fields in Sinulihan is between 6,0 and 7,0 which is considered favourable to most crops but is still slightly higher than the optimal range for rice, 5,0-6,5

(Wolf, 1999). However, the optimal pH is somewhat dependant on soil organic matter and clay contents as well as soil type.

Conductivity can be applied as a rough estimate of soil nutrient levels (Barber, 1995). The measured values from 0,2 to 1,4 mmhos/cm in the hill rice fields of Sinulihan indicate high variability from low to high nutrient levels (according to Wolf, 1999). This is expected given the differences in field history and crop maturity and is also reflected in the direct nutrient measures. However, the data do not indicate any immediate lack of nutrients and the salinity levels are not critical to rice growth (injury at mmhos/cm > 6, Wolf, 1999).

The nutrient analysis of rice leaves and grains provides us with information on possible deficiencies (or toxic levels) of vital nutrients like N, P, K and Ca which is an indicator of potential low soil fertility or restrictions in nutrient availability and uptake (Dobermann, 2000). The measured values do not indicate critical deficiencies and for the vast majority of the samples, the values lie within the optimum ranges (Dobermann, 2000).

All in all, the data at our disposal do not seem to give indications as to the existence of low soil fertility and restricted plant nutrient availability - at least not for the hill rice fields. However, given the limited input use of fertilizers and the fact that the replenishment of nutrients to the soils are dependant on the application of fallow periods, a potential soil fertility problem do exist. At least, if yields are to be boosted the use of either fertilizer or manure is an imperative (Dobermann, 2000).

The loss of nutrients through leaching and soil erosion is known to have impacts on the fertility and productivity of rice cropping systems, and could potentially be a problem in a low nutrient input farming system as the one observed in our study area but whether it in reality constitutes a genuine problem is difficult to say based on the available data (Dobermann, 2000). This is partly dependant on soil characteristics of which some have been measured and on the distribution of precipitation as well as the topography. The fact that the soils generally are quite sandy could form the basis for a potential erosion or leaching problem. However, the arable land in Sinulihan is quite flat so at least erosion seem to be of minor importance (leaching could still be a problem - still, the soil and crop data don't point to this).

### 3.5 Agricultural Practices in Sinulihan

Small-scale farming based on family labour is the prevalent land use in Kampung Sinulihan. The major crops are rice, yam, rubber, tobacco and oil palm. Hill rice is solely for own consumption whereas yam constitutes the main cash crop. Rubber is widespread in the village but not on a larger plantation scale and many of the trees are too old for tapping. Oil palm does exist but seem to be of less importance. Tobacco as a cash crop was expected to be of greater significance, however, being of low quality, it is mainly for local sale. Some few farmers, though, are on contract with Rothmans. In addition, many varieties of vegetables and fruits are produced of which the majority is for own consumption.

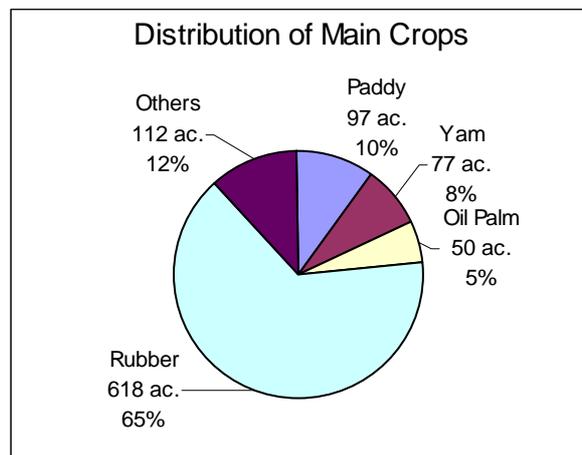


Figure 3.5.1

The figure reflects the distribution of crops in Sinulihan based on the information from the questionnaire. Rubber occupies 65% of the total area, but this is not necessarily an indicator of rubber contributing with 65% of the total income.

### 3.6 The Fields

Intercropping between yam and hill rice is widespread. Certain common farming practices are observed in this cropping system:

- No or only very little use of fertilizer and manure

- Herbicides (mainly glyphosate) are used before planting but rarely during the cropping face
- Use of shifting cultivation with fallow periods up to 7 years
- Rudimentary technology and general use of manpower (family labour) in the weeding and harvest process
- Slash-and-burn is common procedure

### **3.7 Governmental assistance and subsidy**

As previously mentioned it is a clear objective imbedded in the Agricultural policies of Sabah to secure the proliferation of cash-cropping and efficient farming techniques. On a regional level this authority lies with the Agricultural Department in Sook whose role it is to select target villages for the introduction of new crops and farming methods (e.g. yam-, coffee- cocoa schemes). Interestingly, it is a clear policy that this selection should favour those villages already considered dynamic and “well-organized” and not as one might think those that are less developed. The support is not given as direct funding, but by offering fertilizers, herbicides or seedlings to the farmers.

The initial stage of introducing yam to Sinulihan and training of the farmers can probably be attributed to the intervention and influence of the Agricultural Department. However, based on farmers accounts the support from the local authorities has been halted apart from basic advice on plant diseases and pest control. In fact, there seem to be conflicting views as to the degree of involvement by the Agricultural Department in the village. The villagers are possibly downplaying its role and the authorities the opposite.

### **3.8 Agriculture and water quality**

Intensive agriculture constitutes one of the main sources of pollution in river systems given its supply of pesticides as well as excess nutrients and organic matter (Lindegard & Jensen, 1996). The measured pollution levels could therefore provide indirect information as to the impact of farming practices on the environment and are dependent on the activities in the catchment area (EEA, 2000).

Our water data do give some clues as to the level of water pollution and eutrofication. The BOD, which is an indirect measure of the amount of organic pollutants, falls under the 5 mg O<sub>2</sub> per litre considered to show an human influence (EEA, 2000). Also low values of ammonium and nitrate, the main courses of eutrofication, could be an indication of a limited input of fertilizers to the river system and thus reflect the extensive nature of the farming practices prevailing in the area (EEA, 2000). However, to assess the main sources of pollution to the river, the activities upstream have to be taken into consideration, so the results cannot provide specific information on the contribution of pollutants from Sinulihan itself. Moreover, they do not differentiate between the inputs from farming and those from sewerage and wastewater. More in-depth analysis is thus needed.

### **3.9 Institutional and organizational framework in the village**

Kampung Sinulihan is one of the most well functioning villages in the Sook area, enjoying a high level of organization. Its most important institution is the JKKK, the village committee for development and safety, which has the village headman as one of its main figures. Others are the KPPP, a board for information on government legislation to the villagers, the "Sabah National Youth Association" and the "Unit Peladang", a farmers' association – the latter two currently not very active. Politically, UMNO which is the ruling Muslim Malay party is also represented in the village.

The data presented in this section are gathered during interviews with the chairman of the Sinulihan-JKKK, the assistant district officer in Sook (ADO) and our attendance at a JKKK-meeting in Sinulihan.

#### 3.9.1 JKKK – objectives and functions

This institution has been present in the village since it was established in 1970. Apart from its three leading members, the chairman, the secretary and the village headman, it consists of three secondary members who are to act as the spokesmen of the villagers. The chairman and the secretary are both educated and work as schoolteachers whereas the headman who has currently held this position for two years is a full-time farmer (the secretary also has some additional farmland). The members of the JKKK are elected for a

two-year period. All villagers aged over 18, including those in the neighbouring settlements of Baru Jumpa and Tebobon, can vote for this election.

According to the chairman the main objective and functions of the JKKK are to serve the villagers and to secure development and safety in the village (e.g. concerning water-supply, electricity and road-building). Furthermore the JKKK is there to ensure stability and harmony and to integrate all villagers into the social structure of the village. The chairman sees the JKKK as the bridge between the Sabah government and the village; depending on the needs of the villagers, JKKK applies for government funds for schooling and infrastructural projects. The JKKK holds a monthly meeting where all villagers are invited.

The Sinulihan-JKKK is very concerned about ensuring future development of the village and as a part of the strategy towards fulfilling the role as a model-village the villagers have been divided into four working-groups, each of them working on different development projects (e.g. building of small shelters/meeting-places around the village, clearing fields, and gathering of rubbish in the streets). Involving all villagers in the development of the village is a major priority with the Sinulihan-JKKK. Another priority is to ensure a high educational level among the children of the village. At the JKKK-meeting we participated in (20/10-2001) where around 30 villagers were present, the chairman spoke to the villagers about the importance of working hard and of having a “main target” to focus on in the struggle for further development and government recognition, he stressed that all villagers should be involved in this.

At the time of our stay in the village, the JKKK was planning a presentation of Sinulihan at an event termed Q-day (q for quality). This event is to take place in the nearby major city of Keningau in the near future. As the only village from the Sook sub-district Sinulihan has been selected to participate and the JKKK plans to make a video-presentation focusing on the village’s yam-production.

### 3.9.2 JKKK – government funding

Government funds are allocated to Sinulihan upon the applications formalized by the JKKK. Among the projects that have already received government support are: the concrete road and the community-hall of the village, the mosque and the SDA-church of

the Tebobon settlement. The prioritizing of the projects is settled by the JKKK or – in case of major disagreements between the villagers – by a village-voting.

Both the planning and the carrying out of projects are surveyed by government-officials: e.g. engineers are sent to the village to estimate budgets. Often the budget is then cut down which is why the JKKK often apply for more money than is actually needed. Where a project is in the interest of more than one village the different JKKKs can work together. Government funds are allocated between the different villages of the Sook sub-district upon applications from their JKKKs to the DDC, the district development committee. Therefore a well functioning village-JKKK with an ability to initiate projects that benefit the community as a whole, as well as a wish to develop, are preconditions for a village to receive funds. Only rarely are projects realized without any preliminary application from a village-JKKK, for the district-officials are not aware of all the problems that the individual villages deal with – the JKKKs have to speak up to attract attention! Bearing this in mind when analyzing the different situations in Sinulihan and Pauh, the former with and the latter without a well functioning JKKK to unite the villagers' wishes, it seems clear that Sinulihan is in a better situation to obtain funding and administrative support for village development projects.

According to the ADO the criteria for allocating funds upon an application from a village-JKKK are the following: whether a project is needed immediately, whether it is economically sound or “cost efficient” and whether it benefits the majority of a community's inhabitants. Furthermore previous projects and the villagers' management of these are evaluated and taken into consideration. In addition to these criteria for the allocation of funds comes the political factors: The ADO states that the political standpoint of a village influences the amount of support it receives, therefore it is an advantage to be in a village like Sinulihan where the leading political party, UMNO, is represented. Furthermore the two assembly men, the so-called YBs, (N28, N29) of the Sook sub-district are consulted by the decisionmakers of the DDC prior to any decisions regarding funding. The fact that one of these originates from Kampung Sinulihan is likely to enhance this village's possibilities of obtaining funds.

### 3.9.3 KPPP/K3P

“Kumpulan Pendengar, Pembacandan and Penonton” is the full name of this board, which is the only one of its kind in the Sook sub-district. The name means the group who listens, reads and watches, and the KPPP’s main function is to inform the villagers about government policies and legislation. It is assigned by the federal Ministry of Information whereas the JKKK is under the Sabah government.

According to the JKKK-chairman Sinulihan was chosen to have this board because of the active and progressive profile the village enjoys. In this respect it connects to the Vision 2020.

The KPPP can organize activities that involve other villages but primarily it acts out its assignment in Sinulihan.

The board has 10 members, out of these five are also members of the JKKK and the chairman is the same. The 10 members are elected every two years by the villagers. The KPPP receives 2500 RM per year to conduct its activities.

### 3.9.4 Vision 2020 village program

The principle behind this federally initiated program, termed “Garakan Desa Wawasan” in Malay, is to select a village that already enjoys basic infrastructural and organizational facilities and assist its further development. Kampung Sinulihan fulfills these criteria by housing a school, a community hall and a few grocery shops, by having constructed concrete roads in the village and by taking up yam production. According to both the JKKK-chairman and the ADO, Sinulihan was chosen as a Vision 2020 model village in the beginning of the 1990s because the village is seeking to develop itself according to the strategies laid down in the national Vision 2020 plan.

By this selection Sinulihan is to be an example to be followed by the other villages in the Sook sub-district; for in keeping with the national ideals the inhabitants of Sinulihan are seeking the optimal educational level for their youth and show that they are able to organize and unite in their struggle for development and thereby better conditions of life. The JKKK-chairman believes that the fact that the young educated people of Sinulihan stay in the village, i.e. return after finished higher schooling in Keningau, and do not as in many other farming communities leave the rural area, has been crucial for the selection of

Sinulihan as a model village. Encouraging education is a major priority with the Sinulihan-JKKK.

The selection of Sinulihan as a model village can have a retrospective effect on the villagers: They were chosen because they were already "on the right track" but experiencing the acknowledgement of their efforts by federal authorities, the villagers are likely to be even more keen to work actively for developing their village further.

### **3.10 Attitude towards development**

#### 3.10.1 Land use in accordance with government-planning

According to official records, yam is to be promoted as the Sook sub-district's major crop and the ambition of the sub-district is to become Sabah's leading producer of yam. Many of the farmers in Sinulihan grow yam as their main cash crop, something which can be seen as a signal of the villagers' progressiveness and wish to participate in the development of the farming communities. Ten households in Sinulihan have teamed up in a yam-growing project in order to obtain future government funding – a strategic initiative since funds are only allocated for larger parcels of farmland.

The ADO of the Sook sub-district envisions a future establishment of a yam-processing industry in Sook, e.g. an ice-cream factory, to follow the increase in commercial yam-farming. By choosing to grow yam, the farmers of Sinulihan signal that they are heading for a part in this future development.

As mentioned, the JKKK also selected to promote the village in relation to the yam on the Q-day event, pointing out to the surrounding world that Sinulihan is keen to take part in the development of the farming communities as it is planned by the authorities. Accordingly the chairman of the JKKK stresses the importance of the village to follow the development-strategies laid down by the government, a strategy which should ensure the village of government funding. Dahlan (1991:52) supports this view by stating that the political masters and planners must share a common development strategy or vision with the ordinary people whose livelihoods are at stake. Without having the same wishes for future development success seems hard to achieve.

Dahlan hereby provides an explanation for the differences between the villages of Sinulihan and Pauh in relation to development and implementation of government-planning: For whereas the Sinulihan-inhabitants show progressiveness and initiative in

accordance with government-strategies, the people of Pauh seem to be reluctant to change and without wishes to follow the governmental development-strategy. This results in the general view of Sinulihan as a successful example of rural development and Pauh being considered a poor and non-dynamic community.

### 3.10.2 Hard working immigrants

The JKKK-chairman believes that Sinulihan has achieved its status as a progressive village because of the villagers' hard work and activity. His philosophy is that people receive the reward they have deserved according to the amount of work they have carried out, and the wealth of a village or a household is therefore a fair result of the work of its people.

Comparing Sinulihan to neighbouring Pauh the chairman concludes that Sinulihan is better off because the people there work harder than the Pauh-Muruts. He also relates the wealth of Sinulihan to the fact that this community shows a stronger social commitment in terms of being well organized and integrated than Pauh whose inhabitants are not formally organized.

It is not for us to judge whether the chairman is right in his comparison of the work-effort of the two villages. Nonetheless our data point to the fact that the level of organization and social integration in Sinulihan is high and that this factor facilitates the development of the village. In support of this King argues that in contrast to the large scale settlement schemes initiated by the Malaysian government, many of which have failed, the settlement projects organized on a voluntary basis by the migrating people themselves seem to have higher rate of succes. Sinulihan can be viewed as an example of the latter. King concludes that such migrating people are innovative and entrepreneurial; by having decided to move in search of a better natural resource base for living they are motivated to develop further and to continue the united struggle for optimal conditions of life (King 1999:80). Examples of the Sinulihan villagers working towards a common goal, are the Saturday clean up days which aim to improve the environment of the village and the yam-project with ten households joining forces to obtain government-funding.

With respect to the attitude towards development, our research shows that 98% of Sinulihan's residents are positive towards development and wish to participate in future developmental initiatives such as agricultural programmes, whereas in Pauh which is a

traditional village, native to the area, there seems to be a reluctance towards modernization and change, especially among the older people.

During our stay in the Sook area, several interview-informants such as the ADO and the Tulid clinic-nurse, told us that the Muruts of Pauh are lazy and drink alcohol, whereas the Sinulihan Dusuns work hard. However using King's line of thought, rather than being a difference of ethnic or cultural affiliation this could be explained as differences between peoples native to an area and immigrants.

#### **4. Concluding remarks**

In their book on poverty and development, Degnbol-Martinussen and Engberg-Pedersen (2001) highlight several factors as determining development of communities. These factors which the authors see as strategies for empowerment of people, can be understood as conditions that have to prevail for development to occur in a community. Among the factors are; the existence of educational and healthcare systems, the opportunity to engage in income-generating activities and the possibility for people to participate in democratic and political decision making. The latter includes the ability of people to organize themselves and to participate in matters of local development and the existence of an institutional framework to look after the interests of the members of the given community. In Degnbol-Martinussen (1994) it is concluded, in relation to the theory of basic needs, that all these factors are interrelated in the sense that they reinforce each other and thereby create chains of causality; e.g. the purchasing power of a household will inflict on the health status and educational level of its members which again will effect their productivity and the purchasing power of the household. Likewise Potter et al. (1999:125) state that "a healthy population is more able to contribute to development efforts and will also be better placed to benefit from the fruits of these efforts".

This report aims to determine which factors determine rural development, natural resource management and livelihood strategies in Sinulihan. Looking at the case of Sinulihan with the above mentioned theoretical framework in mind we can conclude that this village enjoys the basic conditions necessary for development: Sinulihan seems to be in a situation where the development-determining factors seem to be positively reinforcing each other.

In the report it is argued that Sinulihan enjoys a relatively high level of health and education. This is according to the theoretical framework a precondition for further development and they are at the same time interrelated. Moreover the high level of organisation in Sinulihan enables them to apply for development funds, and this has in the case of Sinulihan consequences for the natural resource management in the way that they strategically select the (cash) crops for which they hope to obtain government funding. By growing cash crops they will be more integrated into the national economy, and it can be expected that the productivity/intensity of the agricultural production will rise in the future. The current agricultural production is according to our findings relatively extensive due to eg. the low level of nitrate in the water analysis. What consequences an intensification of the agricultural production will bring to the sustainability of the agricultural production and to the livelihood strategies only time can show!

It can further be argued that Sinulihan is in a good circle which reinforces itself whereas Pauh seems to be caught in a vicious circle, and the main reason for this situation seems to be the differences in the institutional and organisational framework in the two villages.

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