GOVERNMENT OF MALAYSIA

FEASIBILITY STUDY ON RATIONALIZATION AND CROP DIVERSIFICATION IN NON-GRANARY IRRIGATED AREAS IN MALAYSIA

Volume 5-12

State Report - Sabah

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JAPAN INTERNATIONAL COOPERATION AGENCY

MALAYSIA : FEASIBILITY STUDY ON RATIONALIZATION AND CROP DIVERSIFICATION

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1. INTRODUCTION

This is the State Report - Sabah, Volume 5-12, of the Final Report for Feasibility Study on Rationalization and Crop Diversification in Non-granary Irrigated Areas in Malaysia. This report includes the criteria, procedure and results of evaluation of crop diversification potential of non-granary irrigation schemes in the State of Sabah.

Detailed information on the criteria and procedure for evaluation is presented in Volume 2 of the Final Report, and the results of evaluation of crop diversification potential for each scheme are given in the Appendix attached to this Volume.

2. GENERAL CONDITIONS

2.1 Socio-economic Situation

Sabah is situated in the northeastern part of the island of Boruneo. It is bounded by Brunei and Sarawak to the west and by Indonesia Kalimantan to the south. It has a coastline of 1,440 km in length and the second largest area in Malaysia. The physical area amounts to 73,711 km^2 and is divided into 23 administrative districts. The estimated population was 1,297,200 persons in 1985 and 1,442,900 persons in 1988. The population density in 1988 was 20 person/km^2. Rural population ratio declined from 77% in 1985 to 68% in 1988. The proportion of population by ethnic group in 1987 was 84% for Bumipetra, 15% for Chinese and 1% for Indian and others.

In Sabah, GDP in 1988 was M$5,975 million. The agricultural sector contributed to 41%. Other major contributors were the mining sector of 20%, the service sector of 15% and the construction sector of 11%. Per capita GDP was M$3,778 in 1985 and M$4,091 in 1988, both of which were slightly above the nation's average of M$3,551 in 1985 and M$3,858 in 1988. According to the Household Income Surveys, there were 76,000 poor households occupying 33.1% of the total household of 229,600 in 1984. The situation of poverty incidence became worse in 1987 indicated by 89,000 poor households in number and 35.3% in poverty incidence against the total of 252,100 households. The mean monthly income was M$1,212 in 1984 and M$1,116 in 1987.

The infrastructure service coverage as of 1985 was 48.0% by electricity, 100% by urban piped water supply and 38% by rural piped water supply. The road network had a total length of 7,555 km, a density of 100 m/km^2 and per capita length of 5,900 m every 1,000 population. There were 117 registered motor vehicles. The State kept 1.6 doctors and 2.3 acute care hospital beds per 1,000 population. One health center served its health care to 11,500 rural people on an average. The infant mortality was 2.2 per 1,000 population.

Under the revised 5MP, M$4,141 million were allocated as development expenditure by the Federal Government and NFPEs and the share was 13.2% of the total development expenditure to the all States. There are 12 State Departments and agencies involved in development activities. These are the Ministry of Industrial Development, the Department of Industrial Development and Research, the Sabah Economic Development Corporation (SEDCO), the Project Investment Unit (PIU), the Rural Development Corporation (KPD), the Sabah Foundation (Yayasan Sabah), Korporasi Serbaguna Sanya Berhad (KOSAN), the Sabah Land Development Board (SLDB), the Sabah Forest Development Authority (SAFODA), the Sabah Rubber Fund Board, KO-Nelayan and the Sabah Fish Marketing Authority (SAFMA). Among these, KPD, SLDB and the Sabah Rubber Fund Board are involved in agricultural development, while KO-Nelayan is playing a leading role of fishery development in Sabah. As for KPD, its priority is given to ventures with quick cash returns particularly based on production of profitable crops and agro-industries. To date, SLDB has established 34 settlements, six palm oil mills and three bulking installations.

2.2 Present Agriculture

In Sabah, a total of 660,600 ha is under crops accounting for 9% of the State's territory. Some 50,100 ha are paddy field and another 596,400 ha are grown with tree crops. The coverage of tree crops is of oil palm for 228,100 ha, rubber for 80,300 ha coconut for 58,600 ha and cocoa for 196,900 ha. Among the miscellaneous crops, tapioca covers 5,090 ha followed by maize of 4,300 ha. Vegetables are grown in total area of 2,300 ha, while fruits covers 16,900 ha as a whole. In 1987, main crop production was wet and dry paddy of 95,500 tons, oil palm of 1.14 million tons as FFB, rubber of 29,200 tons and dry cocoa beans of 78,040 tons.

2.3 Present Situation of Non-granary Irrigation Schemes

In Sabah, total of 660,600 ha is under crops accounting for 9% of the State's territory. Some 50,100 ha are paddy fields and another 596,400 ha are grown with tree crops. The coverage of main tree crops is of oil palm for 228,100 ha, rubber for 80,300 ha coconut for 58,600 ha and cocoa for 196,900 ha. Among the miscellaneous crops, tapioca covers 5,090 ha followed by maize of 4,300 ha. The irrigable paddy fields amount to 17,163 ha fully designated as non-granary irrigated areas.

- Number of schemes : 56
- Irrigable area : - main season = 17,163 ha
  - off season = 7,774 ha
- Type of schemes : gravity; 23 pump; 26
  gravity/pump; 2
  controlled drainage; 4
- Irrigation water resources availability by scheme (except controlled drainage and other schemes)
  : - sufficient for double cropping; 45
  - insufficient for off season presaturation; 2
  - under reconfirmation; 4
- Average cropping intensity (paddy + upland crops) for previous three years
  : - main season = 73%
  - off season = 15%
- Average cropping intensity (paddy only) for previous three years
  : - main season = 73%
  - off season = 15%
- Utilization of scheme
  - main season paddy cropping intensity of 100%; 11
  - main season paddy cropping intensity of more than 50%; 29

- main season paddy cropping intensity of less than 50%; 8
- fully idle; 8

Most schemes are centered to in the Padas river basin and flat areas in the northern part of the State. As history of paddy cultivation under irrigation in Sabah is relatively short, farmers' concerns are usually given about production of paddy for their self-sufficiency purposes. Despite of available water resources enough to meet irrigation water requirement for double cropping of paddy, a few farmers in the northern part grow paddy twice a year. The pressing need of paddy cultivation in Sabah is to increase paddy production to the level of self-sufficiency within the State. For this, it is prerequisite to strengthen extension services for promoting utilization of irrigation facilities in an effective manner.

3. EVALUATION OF CROP DIVERSIFICATION POTENTIAL FOR NON-GRANARY IRRIGATION SCHEMES

This section presents a general concept, criteria and procedure of evaluation in order to facilitate understanding of the results of the evaluation of potential for crop diversification by scheme attached in Appendix of this volume. A detailed explanation of the evaluation is given in Volume 2.

3.1 Basic Considerations for Evaluation

The intended shift from paddy cultivation to diversified crops in non-granary irrigated areas would invariably require investigations on a range of issues such as the selection of the appropriate crops based on agronomic and economic factors, institutional support systems, and additional investments for providing new or upgrading of facilities. Since the areas concerned are both extensive and widespread, it is only proper that a coordinated study be carried out in order to evaluate the prevailing scheme conditions and to prepare crop diversification strategies including the selection of the suitable crops.

To prepare crop diversification options for revitalization of the non-granary irrigation schemes with a wide range of constraints, the potential for crop diversification in each scheme area has to be evaluated and then indicated as the crop diversification patterns. Such procedure is to be defined as evaluation of resource potential for crop diversification. Its outcome will provide indications of the crop diversification patterns being a basis for formulating development plans and programs.

For non-paddy crops, irrigation has recently become an important input for crop production in Malaysia like irrigation for paddy. In order to a accommodate crop diversification in the existing rice-based irrigation systems, special considerations are required for

the differences between paddy and non-paddy crops as well as paddy farmers behavior in addition to basic parameters such as soil-plant-water relations, water resources, climate, geographic, economic and social.

3.1.1 Differences between paddy and non-paddy crop

Paddy is very tolerant to fully saturated or flooded conditions, which is the main reason for it being planted in flood prone areas with heavy soils and poor drainage conditions. Non-paddy crops on the other hand need non-saturated and well aerated soils for healthy growth. Therefore poorly drained areas as found in most of the schemes can seriously affect growth and yields of non-paddy crops.

Sensitivity to water stress varies between their growth stages and also crop types. Cultural practices and production systems can be vastly different between types and varieties and the produce also tend to be more perishable than paddy.

These basic differences need some general criteria for the system design to be established. Irrigation for paddy is designed for continuous supply and drainage adequate for excess surface flow. Whereas for non-paddy, supply is intermittent since demand depends on available soil water storage and evapotranspiration rate. Besides irrigation, water is also required for fertilizer and pesticide application for non-paddy crops. Its drainage design will need to consider both surface and subsurface flows.

3.1.2 Paddy farmers' behavior

Paddy areas have a very long history of mono-cropping, and traditions and culture have evolved around paddy. Most paddy farmers are usually experienced and knowledgeable only in paddy production. Thus, diversification will require changes to deep-rooted life styles, values and technology of paddy farmers. On the other hand,

diversification will also require appropriate adjustments on its part to match with their behavior.

In this connection, a Socio-economic Sample Survey was performed in all non-granary irrigation scheme areas to identify paddy farmers' intentions and local community opinion leaders' view towards crop diversification. The results of the Socio-economic Sample Survey are presented in Appendix B for farmers' intentions and Appendix C for the leaders' opinions.

3.1.3 Determination of categories

In deciding options for crop diversification, it is apparent that there exists various possibilities for diversifying land utilization such as double cropping of paddy, combination of the main season paddy with short-term crops in the off-season, mix-farming, perennial tree crop cultivation, freshwater aquaculture, and cattle grazing ground. Any one of these taken singly on in combination with any other option can be a category. Taking into consideration the purpose of the evaluation under the Study, the following eight categories are to be made:

Category 1 : Schemes to be converted to high value crop cultivation under irrigated condition,

Category 2 : Schemes to be converted to tree crop cultivation;

Category 3 : Schemes to introduce two-cropping system planting paddy during the main season and short-term annual crops during the off-season;

Category 4 : Schemes to be converted to animal feeding crop cultivation or cattle raising fields;

Category 5 : Schemes to be converted to freshwater fish culture ponds;

Category 6 : Schemes to be positively maintained as mini-granary areas;

Category 7 : Schemes to be maintained as paddy cultivation areas within a definite period of time for social welfare purposes and thereafter to be further categorized; and

Category 8 : Schemes to be converted to housing/industrial and other uses.

3.2 Criteria for Evaluation

3.2.1 General

Inevitably, crop diversification involves the question of which crop or crops to be recommended based on a variety of factors. In the process to evaluate potential for crop diversification, each non-granary irrigation scheme is subjected to a screening process on a variety of factors. For this purpose, seven main factors are taken into account.

- Water resources availability,
- Farmers' intention towards continuation of paddy cultivation and introduction of crop diversification,
- Land suitability for carrying out direct seeding and mechanized plowing and harvesting for growing paddy,
- Soil and climatic suitability and limitations for the cultivation of specific crops,
- Crop profitability,
- Crop marketability, and
- Investment performance with regard to crop diversification.

3.2.2 Water resources availability

The evaluation of water resources in quantitative and qualitative terms is based on the information collected during the Scheme Inventory Survey. Reconfirmation of water resources availability is carried out through supplementary investigations on rainfall data, catchment characteristics, river discharges, reference on the existing hydrological procedures, and previous study reports on the availability of water resources on a specific catchment. The criteria for evaluating water availability of each non-granary irrigation scheme is expressed in the following four terms:

A. Irrigation water is sufficient for double cropping of paddy;

B. Sufficient for supplying irrigation water to the main season paddy cultivation but insufficient for meeting presaturation water requirement for the off season paddy cultivation;

C. Limited to single cropping of the main season paddy and upland crop cultivation; and

D. Insufficient for paddy cultivation but no limitation to grow upland crops for the main season.

The detailed information on water resources evaluation for the various non-irrigation schemes is compiled in Appendix A of Volume 2.

3.2.3 Farmers' intention towards continuation of paddy cultivation and introduction of crop diversification

This factor is important as the success of the crop diversification program is depended on farmers' willingness to participate and also their attitude and preference to move towards a more diversified cropping pattern. To evaluate this factor, the Socio-economic Sample Survey results are referred to in respect to paddy farmers' intention towards continuation of paddy cultivation and introduction of crop diversification.

The evaluation criteria established are based on the proportion of respondent farmers who strongly intend to continue the present paddy cultivation pattern among the total sample farmers and that of paddy planted area for the last three years (1985-1987) against the irrigable area of each scheme. The evaluation method is to identify the State in which more than half of the respondent farmers show intentions towards continuation of paddy cultivation and to screen out the scheme with paddy cropping intensity of more than 50%.

- Schemes possible for promoting double cropping of paddy in case that the proportion of intended farmers against the total samples in each State is over 50%. Also, possible for promoting double cropping of paddy if the scheme-by-scheme planted area for the last three years is more than 50% every year in case of the State with the above proportion of less than 50%.

- Schemes impossible for promoting intensive paddy cultivation when the above proportion on the State basis is less than 50% and the cropping intensity is below 50%.

3.2.4 Land suitability for mechanized farming practices

This factor is optionally evaluated to clarify suitability of undertaking modern farming practices of paddy cultivation in case of schemes where intensive double cropping of paddy can be promoted. To evaluate this factor, special attention is paid to soil physical characteristics, size of scheme, availability of mechanical service centers and distance between schemes and available service sources. The evaluation criteria is established taking into account soil physical characteristics among others as below.

- Schemes suitable for mechanized farming practices are expressed in terms of the existence of alluvial soils.
- Schemes not suitable for mechanized farming practices are indicated by inappropriate soil physical conditions derived from peat soils and organic mac soils which are featured by low bearing capacity for using tractors and harvesters commonly used in Malaysia.

The detailed information is presented in Appendix D of Volume 2.

3.2.5 Soil and agro-climatic suitability and limitations for the cultivation of specific diversified crop

These factors are the basis to identify crops suitable for each scheme from the agronomic viewpoints. In identifying suitable crops, soil criteria for optimum crop growth is prepared for the following 28 crop groups referring to documents such as "Soil-Crop Suitability Classification for Peninsular Malaysia" prepared by the Department of Agriculture (DOA), "The Land Capability Classification" collected from DOA, Sabah and "Sarawak Land Capability Classification and Evaluation for Agricultural Crops" issued by DOA, Sarawak.

Short-term food crops:

maize, sorghum, wet paddy and upland rice as food crops, and ginger, groundnut and vegetables as vegetable crops,

Fruits:

mango/durian, guava, banana, cashewnut, papaya, citrus, pineapple and watermelon,

Perennial industrial crops:

coconut, oil palm, cocoa, rubber, sago palm, coffee, tea, clove, tobacco, sugarcane and pepper,

Feeding crops:

fodder grasses and pasture.

As the basic information to evaluate soil suitability and limitations, soil services that distribute in each scheme are identified referring to the available reconnaissance soil maps and those limitations to growth of each of 28 crops are evaluated on the basis of the soil criteria. The evaluated limitations are expressed in the farm of soil suitability classed with a symbol indicating the specific limitation such as acid sulphate layer, depth to compacted layer, drainage, nutrient imbalance, organic horizon, salinity, and texture and structure. The followings are the grade of limitations to crop growth.

Class 1 soils with no limitation or only minor limitations to crop growth are suitable for the widest range of crops.

Class 2 soils with moderate limitations to crops growth are suitable for a narrower range of crops than Class 1 soils. Minor management practices according to limitations are required.

Class 3 soils with one serious limitation to crop growth are restricted to an even narrower range of crops. Necessary management practices involve moderate expenses.

Class 4 soils with more than one serious limitation to crop growth are suitable for a very narrow range of crops with provision of major amelioration measures.

Class 5 soils with at least one very serious limitation to crop growth are least suitable for crop growth.

Through the identification and grading of limitations to crop growth for soil series which is identified in each non-granary irrigation scheme, soil suitability of 28 crops is classified into four groups such as suitable, marginally suitable, very marginally suitable and not suitable for promoting crop diversification.

The correlation between suitability grades and soil classes as follows:

Suitable:
Class 1 soils,

Marginally suitable:
Class 2 soils and partly Class soils of which limitations can be physically improved,

Very marginally suitable:
Class 3 soils with limitations of which limitations can be hardly graded up by direct physical measurements, and

Not suitable:
Classes 4 and 5 soils.

After evaluating soil suitability in the above procedure, identified crops with suitable to very marginally suitable grades are to be succeedingly confirmed from the agro-climatic viewpoint. For this purpose, two basic references are utilized, being "Agro-ecological regions in Peninsular Malaysia" and "Climatic and Agricultural Planning in Peninsular Malaysia" both prepared by the Malaysian Agricultural Research and Development Institute (MARDI). Among the identified crops, those which are not suited to regional climatic conditions in the specific scheme are eliminated from a list of suitable crops identified on the basis of soil conditions.

The detailed information is presented in Appendix D of Volume 2.

3.2.6 Crop profitability

To confirm the net income difference between paddy cultivation and other diversified crops, crop budget is computed based on average crop yield under normal farming practices, production cost and selling price. For this, "Guideline on Economic Viability of Selected Crops" prepared by the Ministry of Agriculture (MOA) is used as the basic reference. This includes crop budget data on 25 food crops and vegetables, 14 fruits and one industrial crop. With regard to other industrial crops, data on crop budgets are supplemented from MOA, DOA and agencies concerned. All the information is presented in Appendix E of Volume 2. The evaluation criteria is set up as below.

- Crop suitable for promoting diversified cropping are more profitable as compared with net income derived from the single cropping of paddy.
- Crops not suitable for incorporating in diversified cropping are less profitable in comparison with the net income obtained from the single cropping of paddy.

3.2.7 Crop marketability

This factor is also very important when crop diversification is promoted is specific areas, because most paddy farmers are aware that success of diversified cropping especially for short-term upland crops demand largely on availability of markets where they can expect to sell their produce at profitable price levels.

In terms of export-oriented perennial crops, the respective responsible agencies provide smallholder farmers with easy access to the existing marketing channel actively maintained. As for short-term upland crops, the Federal Agricultural Marketing Authority (FAMA) is responsible for promotion of marketing activities to encourage growers. Every year, FAMA gives a guideline for market potential in each State for about 30 varieties of vegetables and cash crops, 20 varieties of fruits and 15 kinds of freshwater fishes and livestock products. The data on market potential is compiled in Annex F of

Volume 2. By referring to this guideline, the crop marketability is evaluated in terms of quantified market potential on the administrative district-by-district bases. The evaluation criteria is set up as below.

- Crops suitable for promoting crop diversification have less marketable volume as compared with the demand of a specific administrative district where one particular scheme is located major market situated nearby or easily accessed from the scheme.

- Crops not suitable for promoting crop diversification have marketable quantity exceeding over more than twice of the demand in the specific administration district.

3.2.8 Investment performance with regard to crop diversification

This factor is evaluated for the purpose of judging the priority among categories and crops of which suitability to promote crop diversification are both identified. The evaluation procedure is based on economic viability indicated by net present value and benefit-cost ratio.

3.3 Procedure of Evaluation

3.3.1 General procedure

The potential of crop diversification for each non-granary irrigation scheme is evaluated category by category based on the following seven stepwise procedure as illustrated in Fig. 1.

Step 1 : Evaluation water resources availability,

Step 2 : Evaluation of farmers' intention towards continuation of paddy cultivation and introduction of crop diversification,

Step 3 : Evaluation of land suitability for carrying out direct seeding and mechanized plowing and harvesting in growing paddy,

Step 4 : Evaluation of soil and climatic suitability and limitations for the cultivation of specific crops,

Step 5 : Evaluation of crop profitability,

Step 6 : Evaluation of crop marketability, and

Step 7 : Evaluation of investment performance with regard to crop diversification.

The flow chart of evaluation procedure is illustrated in Fig. 2. In general, evaluation of factors in each Category starts from Step 1 and ends Step 7 for the respective schemes. As Step 3 is the optional gate to evaluate land suitability for conducting mechanized paddy cultivation practices, all Categories other than Category 6 jumps evaluation in Step 3. Before entering Step 1, the following two items are preliminarily checked to understand the present condition on how a scheme is utilized by beneficially farmers:

- Type of irrigation water intake facilities, and
- Planted area for the last three years.

3.3.2 Evaluation procedure for Category 1

In Step 1, one scheme has potential for promoting intensive short-term upland crop cultivation under irrigated condition if available water resources are enough for double cropping of paddy and short during the presaturation period of the off season. Upland crops can be grown maximum twice a year under irrigated condition in case that available water resources can meet irrigation water demand only for the main season paddy. Irrigated cropping of upland crops are limited to the main season if available water resources are insufficient for paddy cultivation. Therefore, each scheme can pass Step 1 with the exceptions of control drainage and inundation schemes.

In Step 2, schemes are evaluated as possible for promoting crop diversification and then go to Step 4. To provide information on technical and economical choice of upland crops if requested, other schemes also move down to Step 4 additionally.

In Step 4 after skipping Step 3, suitable upland crops are firstly identified through soil-crop-suitability assessment. Further, suitable varieties of upland crops are selected among the above crops identified paying special attention agro-climatic condition in lowland areas. If there is an identified and selected crop, schemes enter into the next step.

In Step 5, net income data of the selected crops are compared with that earned from single cropping of paddy. In case of higher net income expected, schemes shift to the next step.

In Step 6, marketability of upland crops confirmed its profitability are evaluated through comparison with the local demand in the District where schemes are located and in the local marketing centers. Usually, mono-cropping of the specific upland crop is very risky from the viewpoints of crop management and marketing. In this connection, crop production is estimated based on such assumed figures as the national average yield and the maximum planted area equivalent to 50% of the scheme's irrigable area for each of profitable crops.

In Step 7, economic viability is evaluated in terms of benefit-cost ratio and net present value. For this, benefit and cost are estimated on the basis of the assumption as below. The result is used for determining the priority among marketable upland crops and in comparison with other categories.

- Cost and benefit are estimated on the unit area basis,
- Cost required for upgrading drainage and access conditions is assumed to be M$8,000/ha and time required for constructing these on-farm service facilities is one year, and
- Benefit born before diversification depends on single cropping of paddy and after diversification comes from marketable upland crops in the same planted area of paddy. Crop budget figures refer to those used in evaluating crop profitability. Buildup period to reach the target yields of upland crops is also assumed to be five years.

3.3.3 Evaluation procedure for Category 2

In Step 1, consideration is given only to improve drainage and farm access conditions for evaluating potential for converting paddy fields to perennial crop fields. Thus, all the schemes except control drainage and inundation types go to the next step.

In Step 2, the same procedure taken for Category 1 is applied and therefore schemes jump Step 3 and enter to Step 4.

In Step 4, suitability of fruit and industrial tree crops is assessed from the viewpoint of soil-crop suitability relationship. Then, identified tree crops as suitable are evaluated on the basis of agro-climatic condition of each scheme. When a tree crop is identified and selected, schemes shift to the next step.

In Step 5, annualized net income is calculated according to the economic life of a tree crop and then compared with net income gained from single cropping of paddy. If the annualized income is higher, schemes enter into the next step.

In Step 6, profitable tree crops are evaluated to confirm those marketability as compared with local demand on the administrative district basis firstly and in major markets secondly. Crop production amount is equal to the annualized yield used for estimate of crop profitability.

In Step 7, the same procedure as taken for Category 1 is applied. Cost required for upgrading drainage and farm access conditions is assumed to be M$4,000/ha for scheme of which soils have marginally drainage limitation to crop growth and M$8,000/ha for the case of very marginally drainage limitation.

3.3.4 Evaluation procedure for Category 3

In Step 1, schemes with sufficient water resources for the main season paddy cultivation are identified as possible schemes where two cropping system can be promoted. While, schemes with water shortage problems during the main season are deleted from further evaluation in Step 2 and onward.

In Step 2, schemes that are evaluated as possible for promoting crop diversification and intensive double cropping of paddy go to Step 4. In case of schemes with no possibility of improving the present paddy cultivation pattern, further evaluation in Step 4 and onward is made to get information on suitable crops with those profitability and marketability as reference data.

In Step 4 after skipping Step 3, short-term upland crops suitable for the off season cultivation are identified resulting from assessment of soil-crop-suitability. Then, crop selection is made after confirming crop adaptability to agro-ecological situation in each scheme. If there is identified and selected crop, schemes move to the next step.

In Step 5, net income of the main season paddy is estimated taking into account increase in average unit yield from 2.25 ton/ha to 3.5 ton/ha through improvement of farming practices. The off season upland crops have the same yield level of Category 1.

In Step 6, evaluation of marketability is made for the off season upland crops by applying the similar method to Category 1.

In Step 7, additional investment requirement is assumed to be M$4,000/ha. Benefit estimate and economic viability confirmation are made following the same procedure employed for Category 7.

3.3.5 Evaluation procedure for Category 4

In Step 1, no attention is paid to availability of water resources so that all the schemes can pass this step.

In Steps 2 and 3, no evaluation of these two factors is made as possibility of introducing this Category is examined from the technical and economical viewpoints.

In Step 4, soils with excessively drained feature are evaluated as possible for converting paddy fields to animal grazing land. In case of growing animal feeding crops, those suitability is assessed from the soil-crop-suitability assessment. When both results indicate as suitable for conversion of paddy fields for the livestock purpose, schemes go to the next step.

In Step 5, profitability is evaluated focussing upon the contribution of both grazing and feeding practices to livestock outputs. For this purpose, the average annual income is estimated based on beef production value obtained from unit yield of animal feeding crops. If the profit is higher than that derived from single cropping of paddy, schemes enter into the next step.

In Step 6 and , marketability is evaluated with the same procedure of Category 1.

In Step 7, additional investment cost is assumed to be M$500/ha for the use of paddy fields to rear animals and M$4,000/ha for growing animal feeding crops. Benefit is estimated referring to the result of profit evaluation.

3.3.6 Evaluation procedure for Category 5

In Step 1, special attention is paid to availability of sufficient water resources to meet daily freshwater requirement. If the available water resources are enough to grow paddy twice a year, schemes enter into the next step. For the case of control drainage schemes located along the coast in Sarawak, intake of brackish water is evaluated according to topographic condition.

In Steps 2 and 3, all the schemes with sufficient water resources skip these two steps with the same reason of Category 4.

In Step 4, soils with heavy texture are prerequisite to convert paddy fields to fish ponds. From the agro-climatic viewpoints, schemes with no effect of flooding are recognized as possible for promoting freshwater fish pond culture. Schemes that can pass these two checking points move to the next step. In case of brackish water fish culture, flooding or excess inundation problem is only assessed.

In Step 5, profitability is evaluated on the basis of annualized net income earned from carp, freshwater shrimp and brackish water prawn cultures by in excavated fish pond with modern practices. If higher profit is expected as compared with single cropping of paddy, schemes shift to the next step.

In Step 6, the evaluation procedure of marketability is the same as Category 1.

In Step 7, required cost for excavating fish pond is assumed to be M$10,000/ha. Benefit is estimated by referring to the profitability evaluation results.

3.3.7 Evaluation procedure for Category 6

In Step 1, supply of irrigation water for the off season is the most important key factor for this category. Schemes pass this step if available water resources can meet the normal irrigation water demand for the off season paddy.

In Step 2, schemes evaluated as possible for promoting double cropping of paddy enter into the next step.

In Step 3, land suitability for performing mechanized farming practices is evaluated. Schemes identified as suitable pass this step and go to the next step.

In Step 4, soil and agro-climatic suitabilities are reconfirmed and schemes with no limitation shift to the next step.

In Step 5, assumption is made in terms of increase in unit yield of paddy from 2.25 ton/ha to 3.5 ton/ha per one season. Schemes pass this step.

In Step 7 after skipping Step 6, cost is assumed to be M$4,000/ha to improve on farm-service facilities matching with undertaking of mechanized farming practices. Benefit estimate is made referring the results of profitability evaluation.

3.3.8 Evaluation procedure for Category 7

Evaluation of potential for the Category 7 is to be made in case that a scheme is presently used for the paddy cultivation purpose and no potential use for the Categories 1 to 6 is identified.

In Step 1, schemes with available water resources for the main season paddy cultivation goes to the next step.

In Step 2, schemes shift the next step if identified as impossible for promoting crop diversification from the social viewpoint.

In Step 4 after skipping Step 3, soil limitations to growth of paddy are reconfirmed. If schemes have poorly drained soils caused by frequent flooding and stagnant water problems, these are deleted from further evaluation. In this connection, inundation and controlled drainage schemes can be taken into consideration only for the case that more than half of the irrigable area is grown with paddy for the last three years. All the schemes that pass this step are identified as Category 7 without further evaluation of factors in Step 5 and onward.

3.3.9 Evaluation procedure for Category 8

If no crop diversification potential is found through evaluation for the Categories 1 to 7, the following factors are to be evaluated. These are water availability and soil limitation to crop growth. Schemes with no available water resources and unsuitable soils for crop growth are defined as Category 8.

4. RESULTS OF EVALUATION

The evaluation results of crop diversification potential are adjusted to investment performance. However, there are insufficient data on agro-climatic factors in relation to crop growth and demand and supply situation of foods in local markets in the State of Sabah. In this regard, special attention is paid to classify each scheme into either the Category 6 or the Category 7 based on such conditions as scheme size of more than 100 ha and main season paddy planted area covering more than the half of irrigable area in each scheme.

As a result of the above process, the crop diversification potential is adjusted to the present condition category by category for each scheme. Table 1 indicates a list of recommendable crops for 56 non-granary irrigation schemes. Table 2 shows the summary of crop diversification potential evaluation. The process of evaluation is attached to this Volume 5 as Appendix in a form of scheme-by-scheme description sheet.

Among 56 non-granary irrigation schemes, as shown in Table 2, 16 schemes are given with the Category 1 as the super category. Another three scheme have the highest potential for crop diversification under the Category 2, while 32 schemes are grouped into the Category 7 due to less possibility of introducing other crops. If market demand for freshwater fish is confirmed through systematic survey, good development potential for freshwater fish pond culture can be expected in 22 gravity schemes throughout the State.

Tables & Figures

Table 1 Priority Order of Selected Crops for Each Scheme

State : Sabah (1/3)

Code No.	Scheme	Annual Crops	Perennial Crops
SA001	Tempasuk North	SP	CN, FC*
SA002	Tempasuk South	SP	CN
SA003	Kawang-Kawang/Pandasan	SP	CN, FC*
SA004	Tamu Darat	SP	FC*
SA005	Tambulian Laut	DP	
SA006	Jawi Jawi	SP	CN, FC*
SA007	Lubok Moyoh	SP	CN
SA008	Gaur	SP	
SA009	Tambulian Ulu	DP	
SA010	Tambilaung	SP	CN
SA011	Pekan Kota Belud	DP	FC*
SA012	Bingkor	DP	FC*
SA013	Tambunan	SP	
SA014	Lagut Sebrang	SP	
SA015	Apin-Apin	DP	FC*
SA016	Transpegalan Phase I	DP	FC*
SA017	Kuala Tomani	DP	FC*
SA018	Tulid	SP	FC*
SA019	Biah	SP	CN
SA020	Nambayan	SP	
SA021	Marais	SP	FC*
SA022	Tandek	SP	
SA023	Kota Marudu	DP	FC*
SA024	Timbang Batu	SP	
SA025	Membakut	DP	FC*

Remarks: Priority order is shown from left to right for each crop group.

*; Needs for regional marketing promotion
DP; Double cropping of paddy
SP; Single cropping of paddy
CN; Cashewnut
FC; FC;
NA; Non-agricultural land

Table 1 Priority Order of Selected Crops for Each Scheme

State : Sabah (2/3)

Code No.	Scheme	Annual Crops	Perennial Crops
SA026	Sindumin	SP	CN
SA027	Tunggul Tinggi		CN
SA028	Bundu		NA
SA029	Limbawang		NA
SA030	Pulaimanang	SP	CN
SA031	Lingkungan	SP	CN
SA032	Papar/Benoni	SP	CN
SA033	Bongawan	SP	CN, FC*
SA034	Tuaran I	DP	
SA035	Tuaran II	DP	
SA036	Bantayan	DP	
SA037	Penampang	SP	CN
SA038	Ramaya	SP	CN
SA039	Merungin	DP	FC*
SA040	Kimolohing	DP	FC*
SA041	Sinarul	DP	FC*
SA042	Nalapak	DP	FC*
SA043	Trusan Sapi	SP	
SA044	Bukit Garam		CN
SA045	Ulu Tungku		NA
SA046	Pitas Hilir	DP	
SA047	Bawing	SP	FC*
SA048	Sikuati	SP	CN, FC*
SA049	Liu	SP	FC*
SA050	Torongkongan		NA

Remarks: Priority order is shown from left to right for each crop group.
- *; Needs for regional marketing promotion
- DP; Double cropping of paddy
- SP; Single cropping of paddy
- CN; Cashewnut
- FC; FC;
- NA; Non-agricultural land

Table 1 Priority Order of Selected Crops for Each Scheme

State : Sabah (3/3)

Code No.	Scheme	Annual Crops	Perennial Crops
SA051	Dampirit	SP	
SA052	Rokom	SP	
SA053	Buanog	SP	
SA054	Suangpai	SP	CN, FC*
SA055	Kawang Kawang/Bugaron	SP	CN
SA056	Sekoli	SP	CN

Remarks: Priority order is shown from left to right for each crop group.

*; Needs for regional marketing promotion
DP; Double cropping of paddy
SP; Single cropping of paddy
CN; Cashewnut
FC; FC;
NA; Non-agricultural land

Table 2 Crop Diversification Potential for Each Scheme

State : Sabah (1/2)

Code	Scheme	Category 1	2	3	4	5	6	7	8
SA001	Tempasuk North	.	*2	.	.	.	.	*1	.
SA002	Tempasuk South	.	*2	.	.	.	.	*1	.
SA003	Kawang-Kawang/Pandasan	.	*2	.	.	.	.	*1	.
SA004	Tamu Darat	.	.	.	.	.	.	*1	.
SA005	Tambulian Laut	.	.	.	.	.	*1	.	.
SA006	Jawi Jawi	.	*2	.	.	.	.	*1	.
SA007	Lubok Moyoh	.	*2	.	.	.	.	*1	.
SA008	Gaur	.	.	.	.	.	.	*1	.
SA009	Tambulian Ulu	.	.	.	.	.	*1	.	.
SA010	Tambilaung	.	*2	.	.	.	.	*1	.
SA011	Pekan Kota Belud	.	.	.	.	.	*1	.	.
SA012	Bingkor	.	.	.	.	.	*1	.	.
SA013	Tambunan	.	.	.	.	.	.	*1	.
SA014	Lagut Sebrang	.	.	.	.	.	.	*1	.
SA015	Apin-Apin	.	.	.	.	.	*1	.	.
SA016	Transpegalan Phase I	.	.	.	.	.	*1	.	.
SA017	Kuala Tomani	.	.	.	.	.	*1	.	.
SA018	Tulid	.	.	.	.	.	.	*1	.
SA019	Biah	.	*1	.	.	.	.	*2	.
SA020	Nambayan	.	.	.	.	.	.	*1	.
SA021	Marais	.	.	.	.	.	.	*1	.
SA022	Tandek	.	.	.	.	.	.	*1	.
SA023	Kota Marudu	.	.	.	.	.	*1	.	.
SA024	Timbang Batu	.	.	.	.	.	.	*1	.
SA025	Membakut	.	.	.	.	.	*1	.	.
SA026	Sindumin	.	*2	.	.	.	.	*1	.
SA027	Tunggul Tinggi	.	*1	.	.	.	.	.	.
SA028	Bundu	.	.	.	.	.	.	.	*1
SA029	Limbawang	.	.	.	.	.	.	.	*1
SA030	Pulaimanang	.	*2	.	.	.	.	*1	.
SA031	Lingkungan	.	*2	.	.	.	.	*1	.
SA032	Papar/Benoni	.	*2	.	.	.	.	*1	.
SA033	Bongawan	.	*2	.	.	.	.	*1	.
SA034	Tuaran I	.	.	.	.	.	*1	.	.
SA035	Tuaran II	.	.	.	.	.	*1	.	.
SA036	Bantayan	.	.	.	.	.	*1	.	.
SA037	Penampang	.	*2	.	.	.	.	*1	.
SA038	Ramaya	.	*2	.	.	.	.	*1	.
SA039	Merungin	.	.	.	.	.	*1	.	.
SA040	Kimolohing	.	.	.	.	.	*1	.	.

Table 2 Crop Diversification Potential for Each Scheme

State : Sabah (2/2)

Code	Scheme	Category 1	2	3	4	5	6	7	8
SA041	Sinarul	·	·	·	·	·	*1	·	·
SA042	Nalapak	·	·	·	·	*4	·	·	*1
SA043	Trusan Sapi	·	·	·	·	·	·	*1	·
SA044	Bukit Garam	·	*1	·	·	·	·	·	·
SA045	Ulu Tungku	·	·	·	·	·	·	·	*1
SA046	Pitas Hilir	·	·	·	·	·	*1	·	·
SA047	Bawing	·	·	·	·	·	·	*1	·
SA048	Sikuati	·	*2	·	·	·	·	*1	·
SA049	Liu	·	·	·	·	·	·	*1	·
SA050	Torongkongan	·	·	·	·	·	·	·	*1
SA051	Dampirit	·	·	·	·	·	·	*1	·
SA052	Rokom	·	·	·	·	·	·	*1	·
SA053	Buanog	·	·	·	·	·	·	*1	·
SA054	Suangpai	·	*2	·	·	·	·	*1	·
SA055	Kawang Kawang/Bugaron	·	*2	·	·	·	·	*1	·
SA056	Sekoli	·	*2	·	·	·	·	*1	·
*1	**Super category**	·	3	·	·	·	16	32	5
*2	2nd priority category	·	17	·	·	·	·	1	·
*3	3rd priority category	·	·	·	·	·	·	·	·
*4	4th priority categroy with needs of regional marketing promotion	·	·	·	·	1	·	·	·

Fig. 1

Criteria and Procedure of Evaluation for Crop Diversification Potential

FEASIBILITY STUDY ON RATIONALIZATION AND CROP DIVERSIFICATION IN NON-GRANARY IRRIGATED AREAS IN MALAYSIA

Japan International Cooperation Agency

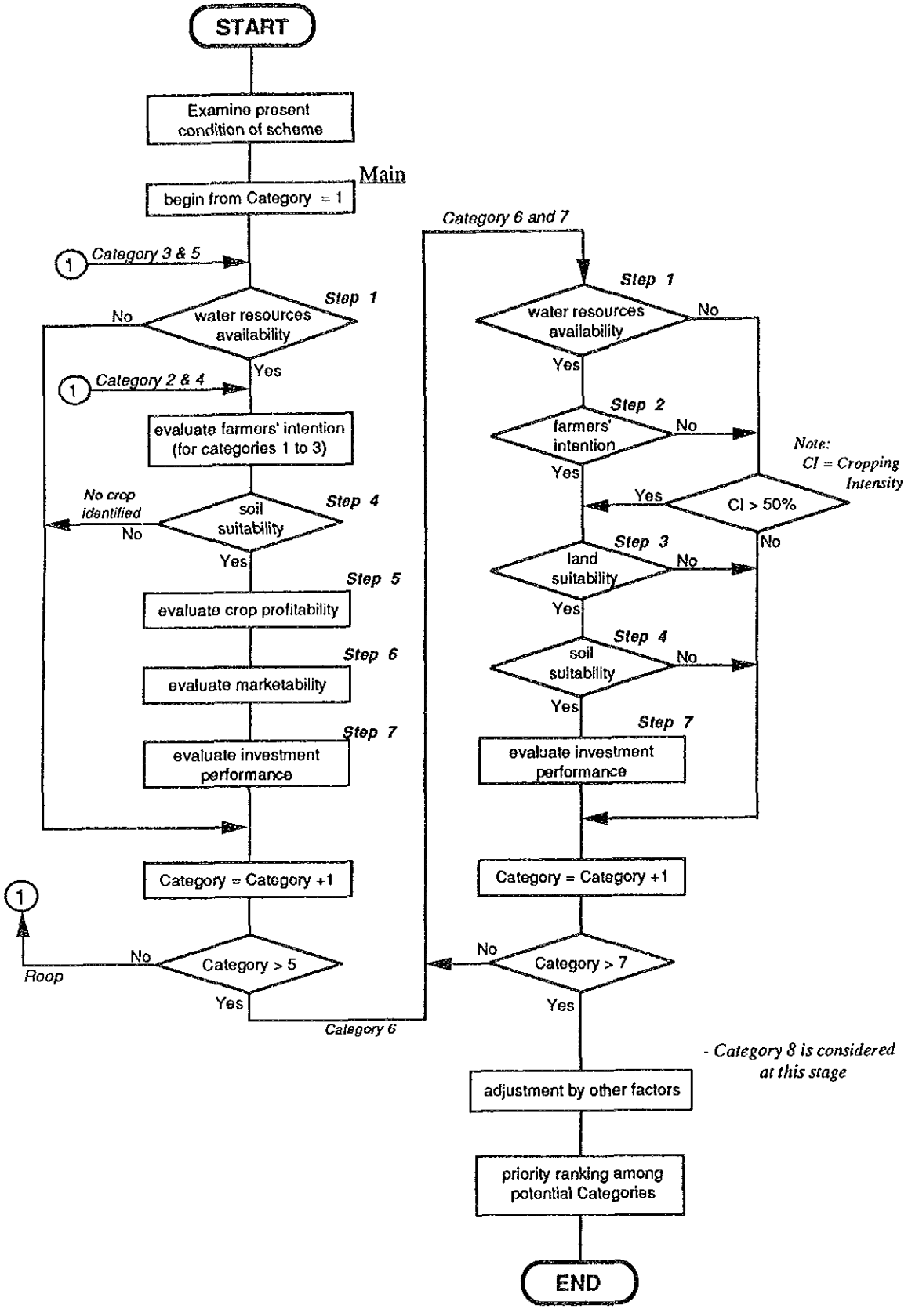


Fig. 2

General Flow of Evaluation for Crop Diversification Potential

FEASIBILITY STUDY ON RATIONALIZATION AND CROP DIVERSIFICATION IN NON-GRANARY IRRIGATED AREAS IN MALAYSIA

Japan International Cooperation Agency

Appendix

Results of Evaluation for Crop Diversification Potential

Remarks

Category

Category 1	*Schemes to be converted to high value crop cultivation under irrigated condition*
Category 2	*Schemes to be converted to tree crop cultivation*
Category 3	*Schemes to introduce two-cropping system planting paddy during the main season and short-term annual crops during the off-season*
Category 4	*Schemes to be converted to animal feeding crop cultivation or cattle raising fields*
Category 5	*Schemes to be converted to freshwater fish culture ponds*
Category 6	*Schemes to be positively maintained as mini-granary areas*
Category 7	*Schemes to be maintained as paddy cultivation areas within a definite period of time for social welfare purposes and thereafter to be further categorized*
Category 8	*Schemes to be converted to housing/industrial and other uses*

Evaluation Item in Each Step

Step 1	*Available irrigation water quantity*
Step 2	*Farmers' intention towards paddy cultivation*
Step 3	*Land suitability for mechanized farming practices*
Step 4	*Soil suitability and limitations to diversify crops*
Step 5	*Crop profitability*
Step 6	*Crop marketability*
Step 7	*Investment performance*

Note:

a. *If any item is examined, steps for the respective categories are indicated with a star mark "*".*
b. *In step 7, B/C ratio at the interest rate of 10% is described.*

Evaluation Results of Each Scheme

CONTENTS

Crop Diversification Potential for SA001

Code Number : SA001 Name of Scheme : Tempasuk North
State : Sabah District : Kota Belud
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 2079 Off : 665
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	3,659
				Coconut	B	-	A		9,106
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA002

Code Number : SA002 Name of Scheme : Tempasuk South
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 938 Off : 300
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	1,651
				Coconut	B	-	A		4,108
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA003

Code Number : SA003 Name of Scheme : Kawang-Kawang/Pandasan
State : Sabah District : Kota Belud
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 81 Off : 40
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	143
				Coconut	B	-	A		355
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8			-						

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : *Marginal suitable due to limited factors other than drainage conditions*
- : Not suitable

Crop Diversification Potential for SA004

Code Number : SA004 Name of Scheme : Tamu Darat
State : Sabah District : Kota Belud
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4ws

Irrigable area (ha) Main : 182 Off : 91
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Coconut	B	-	A		797
				Sago	A	-	A		1,638
3	*	*	*						
4	*	*	*	Pasture	B	-	A		
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA005

Code Number : SA005 Name of Scheme : Tambulian Laut
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 165 Off : 82
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,485
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA006

Code Number : SA006 Name of Scheme : Jawi Jawi
State : Sabah District : Kota Belud
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 162 Off : 81
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	285
				Coconut	B	-	A		710
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA007

Code Number : SA007 Name of Scheme : Lubok Moyoh
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 71 Off : 44
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	125
				Coconut	B	-	A		311
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA008

Code Number : SA008 Name of Scheme : Gaur
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4ws

Irrigable area (ha) Main : 61 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Coconut	B	-	A		267
				Sago	A	-	A		549
3	*	*	*						
4	*	*	*	Pasture	B	-	A		
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA009

Code Number : SA009 Name of Scheme : Tambulian Ulu
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		540
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA010

Code Number : SA010 Name of Scheme : Tambilaung
State : Sabah District : Kota Belud
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	106
				Coconut	B	-	A		263
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA011

Code Number : SA011 Name of Scheme : Pekan Kota Belud
State : Sabah District : Kota Belud
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 30 Off : 15
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		270
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA012

Code Number : SA012 Name of Scheme : Bingkor
State : Sabah District : Keningau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 1200 Off : 100
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		10,800
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA013

Code Number : SA013 Name of Scheme : Tambunan
State : Sabah District : Tambunan
Type of Scheme : Gravity & Pump
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 800 Off : 800
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		7,200
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA014

Code Number : SA014 Name of Scheme : Lagut Sebrang
State : Sabah District : Tenom
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 324 Off : 324
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		2,916
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA015

Code Number : SA015 Name of Scheme : Apin-Apin
State : Sabah District : Keningau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 214 Off : 107
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,926
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA016

Code Number : SA016 Name of Scheme : Transpegalan Phase I
State : Sabah District : Keningau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 116 Off : 58
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,044
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA017

Code Number : SA017 Name of Scheme : Kuala Tomani
State : Sabah District : Tenom
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 102 Off : 50
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		918
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA018

Code Number : SA018 Name of Scheme : TULID
State : Sabah District : Keningau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 48 Off : 24
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		432
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA019

Code Number : SA019 Name of Scheme : Biah
State : Sabah District : Keningau
Type of Scheme : Gravity & Pump
Water source : Sufficient for double cropping
Soil series : 4fm

Irrigable area (ha) Main : 40 Off : 24
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	<u>Cashewnut</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>8.7</u>	<u>70</u>
				Pineapple	C	A	-	0.5	960
				Coconut	C	-	A		175
3	*	*	*						
4	*	*	*	Pasture	C	-	A		
5	*	*	*			A	-	2.0	
6	*	*	*						
7	*	*	*		*	*	*		
8									

NOTE <u>Underline</u> : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA020

Code Number : SA020 Name of Scheme : Nambayan
State : Sabah District : Tambunan
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 30 Off : 15
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		270
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA021

Code Number : SA021 Name of Scheme : Marais
State : Sabah District : Tenom
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 32 Off : 10
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		288
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA022

Code Number : SA022 Name of Scheme : Tandek
State : Sabah District : Kota Marudu
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 1000 Off : 500
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		9,000
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA023

Code Number : SA023 Name of Scheme : Kota Marudu
State : Sabah District : Kota Marudu
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 900 Off : 450
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		8,100
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA024

Code Number : SA024 Name of Scheme : Timbang Batu
State : Sabah District : Kota Marudu
Type of Scheme : Pump
Soil series : 3wi

Irrigable area (ha) Main : 300 Off : 150
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		2,700
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA025

Code Number : SA025 Name of Scheme : Membakut
State : Sabah District : Beaufolt
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 900 Off : 450
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		8,100
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA026

Code Number : SA026 Name of Scheme : Sindumin
State : Sabah District : Sipitang
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 650 Off : 325
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	1,144
				Coconut	B	-	A		2,847
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA027

Code Number : SA027 Name of Scheme : Tunggul Tinggi
State : Sabah District : Sipitang
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 250 Off : 125
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	440
				Coconut	B	-	A		1,095
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA028

Code Number : SA028 Name of Scheme : Bundu
State : Sabah District : Kuala Penyu
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 5sa

Irrigable area (ha) Main : 125 Off : 125
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*					
2	*	*	*					
3								
4	*	*	*					
5								
6								
7								
8	*	*	*	*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA029

Code Number : SA029 Name of Scheme : Limbawang
State : Sabah District : Beaufort
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 60 Off : 36
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		540
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
\- : Not suitable

Crop Diversification Potential for SA030

Code Number : SA030 Name of Scheme : Pulaimanang
State : Sabah District : Beaufort
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	106
				Coconut	B	-	A		263
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA031

Code Number : SA031 Name of Scheme : Lingkungan
State : Sabah District : Beaufort
Type of Scheme : Pump
Soil series : 4fw

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	106
				Coconut	B	-	A		263
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA032

Code Number : SA032 Name of Scheme : Papar/benoni
State : Sabah District : Papar
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 2215 Off : 720
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	3,898
				Coconut	B	-	A		9,702
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA033

Code Number : SA033 Name of Scheme : Bongawan
State : Sabah District : Papar
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 180 Off : 180
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	317
				Coconut	B	-	A		788
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA034

Code Number : SA034 Name of Scheme : Tuaran I
State : Sabah District : Tuaran
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 688 Off : 360
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		6,192
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA035

Code Number : SA035 Name of Scheme : Tuaran II
State : Sabah District : Tuaran
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 301 Off : 100
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		2,709
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : *Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).*
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
\- : Not suitable

Crop Diversification Potential for SA036

Code Number : SA036 Name of Scheme : Bantayan
State : Sabah District : Tuaran
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 101 Off : 50
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		909
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA037

Code Number : SA037 Name of Scheme : Penampang
State : Sabah District : Penampang
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 606 Off : 150
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	1,067
				Coconut	B	-	A		2,685
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA038

Code Number : SA038 Name of Scheme : Ramaya
State : Sabah District : Penampang
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	106
				Coconut	B	-	A		263
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA039

Code Number : SA039 Name of Scheme : Merungin
State : Sabah District : Ranau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 283 Off : 100
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		2,547
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA040

Code Number : SA040 Name of Scheme : Kimolohing
State : Sabah District : Ranau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 189 Off : 108
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,701
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA041

Code Number : SA041 Name of Scheme : Sinarut
State : Sabah District : Ranau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 202 Off : 90
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,818
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA042

Code Number : SA042 Name of Scheme : Nalapak
State : Sabah District : Ranau
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 21 Off : 10
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		189
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA043

Code Number : SA043 Name of Scheme : Trusan Sapi
State : Sabah District : Labuk & Sugut
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3w

Irrigable area (ha) Main : 400 Off : 400
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		3,600
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA044

Code Number : SA044 Name of Scheme : Bukit Garam
State : Sabah District : Sandakan
Type of Scheme : Other
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 81 Off : 40
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	143
				Coconut	B	-	A		355
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA045

Code Number : SA045 Name of Scheme : Ulu Tungku
State : Sabah District : Lahad Datu
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 61 Off : 30
Trafficability of farm machinery : Good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		549
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7									
8	*	*	*		*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA046

Code Number : SA046 Name of Scheme : Pitas Hilir
State : Sabah District : Pitas
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 150 Off : 75
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		1,350
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*	*		A	A	A		
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA047

Code Number : SA047 Name of Scheme : Bawing
State : Sabah District : Pitas
Type of Scheme : Gravity
Soil series : 5sa

Irrigable area (ha) Main : 101 Off : 50
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*					
2	*	*	*					
3	*	*	*					
4	*	*	*					
5	*	*	*		A	-	2.0	
6	*							
7	*	*	*	*	*	*		
8								

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA048

Code Number : SA048 Name of Scheme : Sikuati
State : Sabah District : Kudat
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 4fw

Irrigable area (ha) Main : 60 Off : 30
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	106
				Coconut	B	-	A		263
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA049

Code Number : SA049 Name of Scheme : Liu
State : Sabah District : Pitas
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 5sa

Irrigable area (ha) Main : 56 Off : 28
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*					
2	*	*	*					
3	*	*	*					
4	*	*	*					
5	*	*	*		A	-	2.0	
6	*							
7	*	*	*	*	*	*		
8								

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA050

Code Number : SA050 Name of Scheme : Torongkongan
State : Sabah District : Kudat
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 5sa

Irrigable area (ha) Main : 48 Off : 24
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Idle

Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*					
2	*	*	*					
3								
4	*	*	*					
5								
6								
7								
8	*	*	*	*	*	*		

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA051

Code Number : SA051 Name of Scheme : Dampirit
State : Sabah District : Kudat
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 5sa

Irrigable area (ha) Main : 40 Off : 20
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*					
2	*	*	*					
3	*	*	*					
4	*	*	*					
5	*	*	*		A	-	2.0	
6	*	*						
7	*	*	*	*	*	*		
8								

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA052

Code Number : SA052 Name of Scheme : Rokom
State : Sabah District : Kudat
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 3wi

Irrigable area (ha) Main : 29 Off : 14
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		261
3									
4	*	*	*						
5									
6									
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA053

Code Number : SA053 Name of Scheme : Buanog
State : Sabah District : Kudat
Type of Scheme : Gravity
Water source : Insufficient for main season paddy
Soil series : 3wi

Irrigable area (ha) Main : 29 Off : 14
Trafficability of farm machinery : Good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		261
3									
4	*	*	*						
5									
6									
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA054

Code Number : SA054 Name of Scheme : Suangpai
State : Sabah District : Kudat
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 4fw

Irrigable area (ha) Main : 20 Off : 10
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	35
				Coconut	B	-	A		88
3									
4	*	*	*						
5									
6									
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA055

Code Number : SA055 Name of Scheme : Kawang Kawang/Bugaron
State : Sabah District : Kota Belud
Type of Scheme : Pump
Soil series : 4fw

Irrigable area (ha) Main : 61 Off : 0
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	107
				Coconut	B	-	A		267
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*								
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

Crop Diversification Potential for SA056

Code Number : SA056 Name of Scheme : Sekoli
State : Sabah District : Tuaran
Type of Scheme : Pump
Soil series : 4fw

Irrigable area (ha) Main : 81 Off : 0
Trafficability of farm machinery : No good
Paddy planting for last 3 years : More than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Cashewnut	B	A	A	4.2	143
				Coconut	B	-	A		355
3	*	*	*						
4	*	*	*						
5	*	*	*			A	-	2.0	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).
* : Potential categories
A : Suitable
B : Marginal suitable due to lack of drainage facilities
C : Marginal suitable due to limited factors other than drainage conditions
- : Not suitable

115°

116°

117°

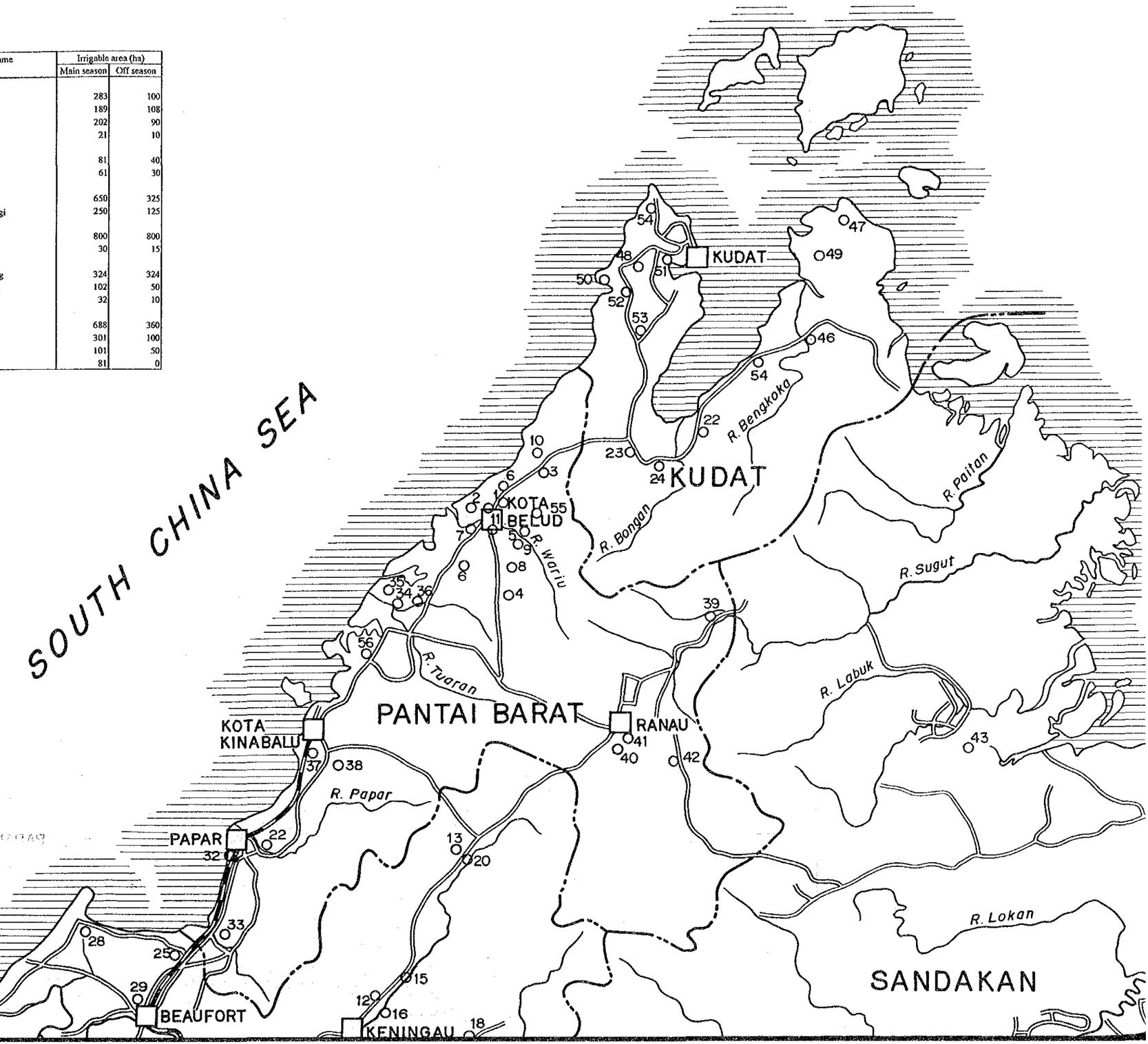
7°

6°

List of Scheme

Code	Name	Irrigable area (ha)	
		Main season	Off season
Beaufort			
SA025	Membakut	900	450
SA029	Limbawang	60	36
SA030	Pulaimanang	60	30
SA031	Lingkungan	60	30
K.Marudu			
SA022	Tandek	1000	500
Keningau			
SA012	Bingkor	1200	100
SA015	Apin-Apin	214	107
SA016	Transpegalan Phase I	116	58
SA018	Tulid	48	24
SA019	Biah	40	24
Kota Belud			
SA001	Tempasuk North	2079	665
SA002	Tempasuk South	938	300
SA003	Kawang-Kawang/Pandasan	81	40
SA005	Tambulian Laut	165	82
SA006	Jawi Jawi	162	81
SA007	Lubok Moyoh	71	44
SA008	Gaur	61	30
SA009	Tambulian Ulu	60	30
SA010	Tambilaung	60	30
SA011	Pekan Kota Belud	30	15
SA055	Kawang Kawang/Bugaron	61	0
SA004	Tamu Darat	182	91
Kota Marudu			
SA023	Kota Marudu	900	450
SA024	Timbang Batu	300	150
Kuala Penyu			
SA028	Bundu	125	125
Kudat			
SA048	Sikuati	60	30
SA050	Torongkongan	48	24
SA051	Dampirit	40	20
SA052	Rokom	29	14
SA053	Buanog	29	14
SA054	Suangpai	20	10
Labuk and Sugut			
SA043	Trusan Sapi	400	400
Papar			
SA032	Papar/Benoni	2215	720
SA033	Bongawan	180	180
Penampang			
SA037	Penampang	606	150
SA038	Ramaya	60	30
Pitas			
SA046	Pitas Hilir	150	75
SA047	Bawing	101	50
SA049	Liu	56	28

Code	Name	Irrigable area (ha)	
		Main season	Off season
Ranau			
SA039	Merungin	283	100
SA040	Kimolohing	189	108
SA041	Sinarut	202	90
SA042	Nalapak	21	10
Sandakan			
SA044	Bukit Garam	81	40
SA045	Ulu Tungku	61	30
Sipitang			
SA026	Sindumin	650	325
SA027	Tunggul Tinggi	250	125
Tambunan			
SA013	Tambunan	800	800
SA020	Nambayan	30	15
Tenom			
SA014	Lagud Sebrang	324	324
SA017	Kuala Tomani	102	50
SA021	Marais	32	10
Tuaran			
SA034	Tuaran I	688	360
SA035	Tuaran II	301	100
SA036	Bantayan	101	50
SA056	Sekoli	81	0



Feasibility Study on Rationalization and Crop Diversification
in Non-granary Irrigated Areas in Malaysia

Location of Non-granary Irrigation Scheme

Sabah

117° 118° 119° 7° 6°

N

KUDAT
RANAU
SANDAKAN
KOTA BELUD
ARAT

R. Bengkoka
R. Paitan
R. Bongan
R. Wariu
R. Sugut
R. Labuk
R. Lokan
R. Kinabatangan
R. Segama

10 03 23 24 22 54 47 49 48 50 51 52 53 46 55 09 08 39 40 41 42 43 44

LEGEND

- International Boundary
- State Boundary
- Division Boundary
- River
- Main Road
- Railway
- City / Town
- Irrigation Scheme

SA037	Penampang	606	150
SA038	Ramaya	60	30
Pitas			
SA046	Pitas Hilir	150	75
SA047	Bawing	101	50
SA049	Liu	56	28

6°

5°

4°

115°

116°

117°

KOTA KINABALU

PANTAI BARAT

RANAU

PAPAR

BEAUFORT

KENINGAU

SANDAKAN

PEDALAMAN

SARAWAK

INDONESIA

R. Tuaran

R. Labuk

R. Papar

R. Lokan

R. Milian

R. Padas

R. Mengalon

R. Kuamut

R. Pensiangan

R. Kalabakan

R. Serudong

56 37 038 41 40 42 43 22 32 13 20 33 28 250 29 15 12 16 18 30 31 19 014 27 26 21 17

Main Road
Railway
City / Town
Irrigation Scheme

ARAT
RANAU
40
41
42
43
R. Labuk
SANDAKAN
R. Lokan
44
SANDAKAN
R. Kinabatangan
R. Segama
R. Milian
45
LAHAD DATU
R. Kuamut
TAWAU
R. Kalumpang
R. Kalabakan
R. Serudong
SEMPORHA
TAWAU
NESIA

SCALE
0 50 100 150 km

6°
5°
4°
117°
118°
119°