GOVERNMENT OF MALAYSIA

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

Volume 5-13

State Report - Sarawak

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Sarawak

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Japan International Cooperation Agency

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

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State Report - Sarawak

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APPENDIX

1. INTRODUCTION

This is the State Report - Sarawak, Volume 5-13, 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 Sarawak.

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

Sarawak is the largest state in terms of physical area in Malaysia. It is situated in the northern part of the island of Borneo and shares its southern boundary with Indonesian Kalimantan. To the northwest it adjoins Sabah, and in the same direction Brunei forms a two-pronged enclave in the State. The total area covers 124,449 km^2 and is divided into 27 administrative districts. The estimated population was 1,554,300 persons in 1985 and 1,682,400 persons in 1988. The population density in 1988 was 14 person/km^2. Rural population ratio was 81% in 1985 and 80% in 1988. The proportion of population by ethnic group in 1987 was 70% for Bumiputera, 29% for Chinese and 1% for Indian and others.

In Sarawak, GDP in 1988 amounted to M$6,040 million of which 32% was originated from the mining sector. The agriculture sector was the next contributing to 22% followed by the manufacturing sector of 16% per capita GDP slightly increased from M$3,413 in 1986 to M$3,552 in 1988 both of which were a little lower compared with the nation's average of M$3,551 in 1986 and M$3,858 in 1988. The number of poor households declined from 90,100 in 1984 to 74,300 in 1987 according to the Household Income Surveys. The incidence of poverty was also improved from 31.9% of the total of 282,400 households to 24.7% of 300,800 households in total during the same period. The mean monthly income rose from M$1,033 in 1984 to M$1,141 in 1987.

As of 1985, the service coverage was 49.3% by electricity, 95.0% by urban piped water supply and 33.0% by rural piped water supply. The road network had a total length of 4,620 km with its density of 40 m/km^2 and per capita length of 2,990 m every 1,000 population. The registered number of motor vehicles was 111 per 1,000 population. There were 2.6 doctors and 1.7 acute care hospital

beds per 1,000 population. Each health center took care of 132,800 rural people. The infant mortality rate was 1.2 per 1,000 population.

The Federal Government and NFPEs allocated M$2,811 million as the revised development expenditure under 5MP. This amount accounted for 9.0% of the total development expenditure to all the States. The main government agency for developing the State is the Sarawak Economic Development Corporation (SEDC). The projects under SEDC fall into two broad categories, namely, commercial and socio-economic. In addition, the Bintulu Development Authority (BDA) is responsible for developing industrial estates in its region. The Sarawak Land Development Board functions as a governmental agency to play a leading role in new land development for growing oil palm.

2.2 Present Agriculture

In Sarawak, there exists paddy field of 143,900 ha including dry paddy field. Planted areas of tree crops are 32,100 ha for oil palm, 207,900 ha for rubber, 58,100 ha for coconut and 350 ha for cocoa. The State produced wet and dry paddy of 178,300 tons, oil palm of 90,000 tons as FFB, rubber of 22,300 tons and dried cocoa beans of 350 tons in 1987.

2.3 Present Situation of Non-granary Irrigation Schemes

In Sarawak, there exists paddy field of 143,900 ha including dry paddy field. Planted areas of tree crops are 32,100 ha for oil palm, 207,900 ha for rubber, 58,100 ha for coconut and 350 ha for cocoa. The total irrigable paddy field is 15,136 ha and fully demarcated as non-granary irrigated areas.

- Number of schemes : 38
- Total irrigable area : - main season = 15,136 ha
  - off season = 2,387 ha
- Type of schemes : gravity; 3 pump; 9

controlled drainage; 26

- Irrigation water resources availability by scheme (except controlled drainage scheme)
  : - sufficient for double cropping; 10
- Average cropping intensity (paddy + upland crops) for previous three years
  : - main season = 41%
  - off season = 4%
- Average cropping intensity (paddy only) for previous three years
  : - main season = 38%
  - off season = 1%
- Utilization of scheme
  - main season paddy cropping intensity of more than 50%; 14
  - main season paddy cropping intensity of less than 50%; 21
  - fully idle; 3

In Sarawak, most schemes are located in swamp areas along the coast. Control drainage schemes distributed in peat swamp areas manage water level on the paddy field using tidal gates. Only traditional rice varieties are suitable for such field condition and those yield levels are very low. Paddy production can meet home consumption and local demand of the surrounding areas. In the Samarahan river basin, crop diversification has been gradually performed in non-granary irrigation schemes by the influence of the Samarahan IADP promoting oil palm and cocoa planting.

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 the specific conditions of Sarawak taking into due consideraton insufficiency of basic data required for the evaluation. Since many non-granary irrigation schemes are located in remote areas where soil conditions are principally in narrow range of crop selection, one or two potential categories can be identified for each scheme. Table 1 shows a list of recommendable crops with the priority order. Table 2 shows the summary of crop diversification potential which is made category by category for each scheme. The process of evaluation is attached to this Volume 5 as Appendix in a form of scheme-by-scheme description sheet.

Among 38 non-granary irrigation schemes as shown in Table 2, the first priority is given to the Category 7 in 37 schemes and the Category 2 in one scheme. If the poor accessibility to the existing marketing channel is improved to a large extent, crop diversification can be promoted in six schemes under the Category 1 and seven schemes under the Category 2. There is a possibility of converting to brackish water fish culture pond in coastal areas. In this connection, seven schemes are selected from the viewpoint of those locations which are expected for brackish water resources availability. A total of five schemes can be expected to be incorporated into the on-going Samarahan river basin and Karaka-Saribas IADPs to promote crop diversification with provision of improved agricultural infrastructures.

Tables & Figures

Table 1 Priority Order of Selected Crops for Each Scheme

State : Sarawak (1/2)

Code No.	Scheme	Annual Crops	Perennial Crops
SK001	Bako	SP	FC**
SK002	Kali Kaba	SP	IADP
SK003	Lubok Nibong	SP	IADP
SK004	Sebubok Engkala	SP	
SK005	Skrang	SP	
SK006	Tg. Bijat	SP	
SK007	Tg. Saduru	SP	
SK008	Tg. Sebukut	SP	IADP
SK009	Lebaan Bawang Assan	SP	FC**
SK010	Bungai Mummon	SP	
SK011	Pujut Lopeng		CN
SK012	Daro Padi	SP, VG*	PL*, FC**
SK013	Paloh Bangau	SP, VG*	PL*, FC**
SK014	Loba Balu	SP	CN, FC**
SK015	Daro Pilot	SP	FC**
SK016	Sadong/Krang	SP	
SK017	Mid-Sadong, Stage I	SP, VG*	PL*
SK018	Mid-Sadong, Stage II	SP	
SK019	Mid-Sadong, Stage III	SP, VG*	PL*
SK020	Banting	SP	
SK021	Benawa	SP	
SK022	Nanga Merit	SP	
SK023	Pandaruan	SP	
SK024	Paya Selanyau I	SP, VG*	PL*, FC*
SK025	Paya Selanyau II	SP	

Remarks: Priority order is shown from left to right for each crop group.
*; Needs for regional marketing promotion
SP; Single cropping of paddy
VG; Vegetables
CN; Cashewnut
PL; Pineapple
FC**; Location expected for brackish water resources availability
IADP; Possible for incorporation into IADP

Table 1 Priority Order of Selected Crops for Each Scheme

State : Sarawak (2/2)

Code No.	Scheme	Annual Crops	Perennial Crops
SK026	Paya Payang	SP	FC*
SK027	Sg. Renan	SP	
SK028	Tg. Purun	SP	
SK029	Entebu Kupang	SP, VG*	PL*
SK030	Lubuk Buntin	SP	
SK031	Merapok	SP	
SK032	Sg. Entulang	SP	
SK033	Sg. Gran	SP	
SK034	Sg. Semalau	SP	CN, FC**
SK035	Sg. Sunga	SP	
SK036	Lower Samarahan	SP	IADP
SK037	Sebandi	SP	
SK038	Sekuduk/Chupak	SP	IADP

Remarks: Priority order is shown from left to right for each crop group.
*; Needs for regional marketing promotion
SP; Single cropping of paddy
VG; Vegetables
CN; Cashewnut
PL; Pineapple
FC**; Location expected for brackish water resources availability
IADP; Possible for incorporation into IADP

Table 2 Crop Diversification Potential for Each Scheme

State : Sarawak

Code	Scheme	Category 1	2	3	4	5	6	7	8
SK001	Bako	.	.	.	.	*4	.	*1	.
SK002	Kali Kaba	.	.	.	.	.	.	*1	.
SK003	Lubok Nibong	.	*3	.	.	.	.	*1	.
SK004	Sebubok Engkala	.	*3	.	.	.	.	*1	.
SK005	Skrang	.	.	.	.	.	.	*1	.
SK006	Tg. Bijat	.	.	.	.	.	.	*1	.
SK007	Tg. Saduru	.	.	.	.	.	.	*1	.
SK008	Tg. Sebukut	.	*3	.	.	.	.	*1	.
SK009	Lebaan Bawang Assan	.	.	.	.	*4	.	*1	.
SK010	Bungai Mummon	.	.	.	.	.	.	*1	.
SK011	Pujut Lopeng	.	*1	.	.	.	.	.	.
SK012	Daro Padi	*2	*2	.	.	*4	.	*1	.
SK013	Paloh Bangau	*2	*2	.	.	*4	.	*1	.
SK014	Loba Balu	.	*2	.	.	*4	.	*1	.
SK015	Daro Pilot	.	.	.	.	*4	.	*1	.
SK016	Sadong/Krang	.	.	.	.	.	.	*1	.
SK017	Mid-Sadong, Stage I	*2	*2	.	.	.	.	*1	.
SK018	Mid-Sadong, Stage II	.	.	.	.	.	.	*1	.
SK019	Mid-Sadong, Stage III	*2	*2	.	.	.	.	*1	.
SK020	Banting	.	.	.	.	.	.	*1	.
SK021	Benawa	.	.	.	.	.	.	*1	.
SK022	Nanga Merit	.	.	.	.	.	.	*1	.
SK023	Pandaruan	.	.	.	.	.	.	*1	.
SK024	Paya Selanyau I	*2	*2	*2	.	*2	.	*1	.
SK025	Paya Selanyau II	.	.	.	.	.	.	*1	.
SK026	Paya Payang	.	.	.	.	*2	.	*1	.
SK027	Sg. Renan	.	.	.	.	.	.	*1	.
SK028	Tg. Purun	.	.	.	.	.	.	*1	.
SK029	Entebu Kupang	*2	*3	.	.	.	.	*1	.
SK030	Lubuk Buntin	.	.	.	.	.	.	*1	.
SK031	Merapok	.	.	.	.	.	.	*1	.
SK032	Sg. Entulang	.	.	.	.	.	.	*1	.
SK033	Sg. Gran	.	.	.	.	.	.	*1	.
SK034	Sg. Semalau	.	*2	.	.	*4	.	*1	.
SK035	Sg. Sunga	.	.	.	.	.	.	*1	.
SK036	Lower Samarahan	.	*3	.	.	.	.	*1	.
SK037	Sebandi	.	.	.	.	.	.	*1	.
SK038	Sekuduk/Chupak	.	.	.	.	*2	.	*1	.

*1	**Super category**	.	**1**	.	.	.	.	**37**	.
*2	needs of regional marketing promotion	6	7	1	.	3	.	.	.
*3	possible for incorporation into IADP	.	5	.	.	.	.	.	.
*4	location expected for brackish water resources availability	.	.	.	.	7	.	.	.

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

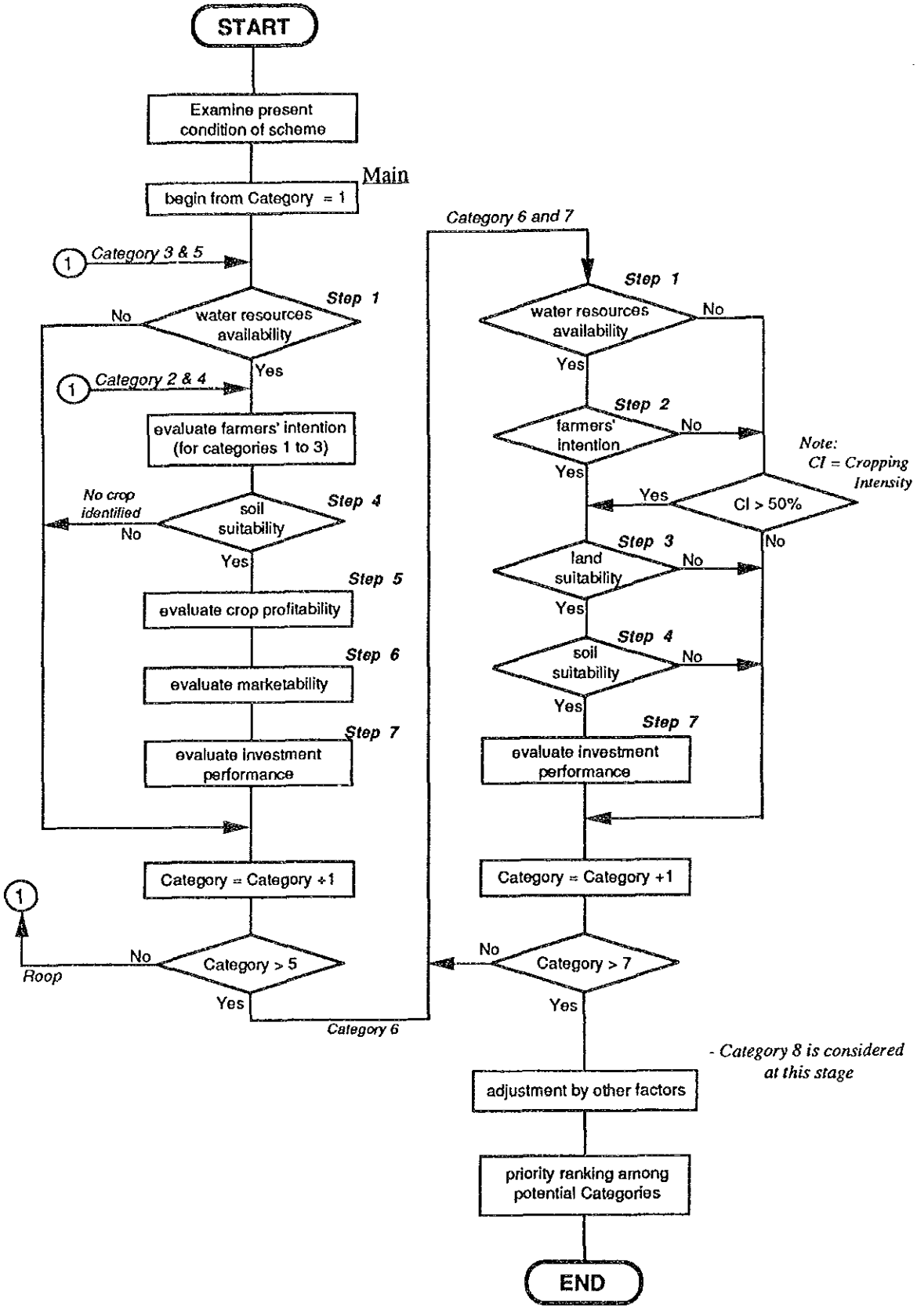


Fig. 2

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 SK001

Code Number : SK001 Name of Scheme : Bako
State : Sarawak District : Kuching
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 4ws

Irrigable area (ha) Main : 240 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	*	*	*	Coconut	B	-	A		1,051
				Sago	A	-	A		2,160
3									
4	*	*	*	Pasture	B	-	A		
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 SK002

Code Number : SK002 Name of Scheme : Kali Kaba
State : Sarawak District : Kalaka
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 729 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	*	*	*	Sago	C	-	A		6,561
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 SK003

Code Number : SK003 Name of Scheme : Lubok Nibong
State : Sarawak District : Kalaka
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 5sa

Irrigable area (ha) Main : 196 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	*	*	*					
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 SK004

Code Number : SK004 Name of Scheme : Sebubok Engkala
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 239 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	*	*	*	Sago	C	-	A		2,151
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 SK005

Code Number : SK005 Name of Scheme : Skrang
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 89 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	*	*	*	Sago	C	-	A		801
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 SK006

Code Number : SK006 Name of Scheme : Tg. Bijat
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 1060 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	*	*	*	Sago	C	-	A		9,540
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 SK007

Code Number : SK007 Name of Scheme : Tg. Saduru
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 172 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	*	*	*	Sago	C	-	A		1,548
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 SK008

Code Number : SK008 Name of Scheme : Tg. Sebukut
State : Sarawak District : Saribas
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 255 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	*	*	*	Sago	C	-	A		2,295
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 SK009

Code Number : SK009 Name of Scheme : Lebaan Bawang Assan
State : Sarawak District : Sibu
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 624 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	*	*	*	Sago	C	-	A		5,616
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 SK010

Code Number : SK010 Name of Scheme : Bungai Mummon
State : Sarawak District : Sibuti
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 5sa

Irrigable area (ha) Main : 200 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	*	*	*					
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 SK011

Code Number : SK011 Name of Scheme : Pujut Lopeng
State : Sarawak District : Miri
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 4fw

Irrigable area (ha) Main : 120 Off : 0
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	211
				Coconut	B	-	A		526
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 SK012

Code Number : SK012 Name of Scheme : Daro Padi
State : Sarawak District : Matu/Daro
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 04gf

Irrigable area (ha) Main : 3052 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	*	*	*	Vegetable	B	A	-	6.9	54,020
2	*	*	*	Pineapple	B	A	-	1.0	73,248
				Sago	A	-	A		27,468
3									
4	*	*	*	Fodder grasses	B	-	A		
				Pasture	B	-	A		
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 SK013

Code Number : SK013 Name of Scheme : Paloh Bangau
State : Sarawak District : Sarikei
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 04gf

Irrigable area (ha) Main : 956 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	*	*	*	Vegetable	B	A	-	6.9	16,921
2	*	*	*	Pineapple	B	A	-	1.0	22,944
				Sago	A	-	A		8,604
3									
4	*	*	*	Fodder grasses	B	-	A		
				Pasture	B	-	A		
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 SK014

Code Number : SK014 Name of Scheme : Loba Balu
State : Sarawak District : Matu/Daro
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 4fw

Irrigable area (ha) Main : 911 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	1,603
				Coconut	B	-	A		3,990
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 SK015

Code Number : SK015 Name of Scheme : Daro Pilot
State : Sarawak District : Matu/Daro
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 118 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	*	*	*	Sago	C	-	A		1,062
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 SK016

Code Number : SK016 Name of Scheme : Sadong/Krang
State : Sarawak District : Simunjan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 457 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	*	*	*	Sago	C	-	A		4,113
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 SK017

Code Number : SK017 Name of Scheme : Mid-Sadong, Stage I
State : Sarawak District : Simunjan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 04gf

Irrigable area (ha) Main : 118 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	*	*	*	Vegetable	B	A	-	6.9	2,089
2	*	*	*	Pineapple	B	A	-	1.0	2,832
				Sago	A	-	A		1,062
3									
4	*	*	*	Fodder grasses	B	-	A		
				Pasture	B	-	A		
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 SK018

Code Number : SK018 Name of Scheme : Mid-Sadong, Stage II
State : Sarawak District : Simunjan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 71 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	*	*	*	Sago	C	-	A		639
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 SK019

Code Number : SK019 Name of Scheme : Mid-Sadong, Stage III
State : Sarawak District : Simunjan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 04gf

Irrigable area (ha) Main : 88 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	*	*	*	Vegetable	B	A	-	6.9	1,558
2	*	*	*	Pineapple	B	A	-	1.0	2,112
				Sago	A	-	A		792
3									
4	*	*	*	Fodder grasses	B	-	A		
				Pasture	B	-	A		
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 SK020

Code Number : SK020 Name of Scheme : Banting
State : Sarawak District : Sri Aman
Type of Scheme : Pump
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 285 Off : 285
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	*	*	*	Sago	C	-	A		2,565
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 SK021

Code Number : SK021 Name of Scheme : Benawa
State : Sarawak District : Marudi/Baram
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 05go

Irrigable area (ha) Main : 131 Off : 131
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	*	*	*	Sago	C	-	A		1,179
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 SK022

Code Number : SK022 Name of Scheme : Nanga Merit
State : Sarawak District : Kapit
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 159 Off : 159
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	*	*	*	Sago	A	-	A		1,431
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 SK023

Code Number : SK023 Name of Scheme : Pandaruan
State : Sarawak District : Limbang
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 05go

Irrigable area (ha) Main : 119 Off : 119
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	*	*	*	Sago	C	-	A		1,071
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 SK024

Code Number : SK024 Name of Scheme : Paya Selanyau I
State : Sarawak District : Sibuti
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 04gf

Irrigable area (ha) Main : 115 Off : 115
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	*	*	*	Vegetable	B	A	-	6.9	2,036
2	*	*	*	Pineapple	B	A	-	1.0	2,760
				Sago	A	-	A		1,035
3	*	*	*	Maize	B	-	-		374
				Sorghum	B	-	A		431
				Vegetable	B	A	-	6.9	2,036
4	*	*	*	Fodder grasses	B	-	A		
				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 SK025

Code Number : SK025 Name of Scheme : Paya Selanyau II
State : Sarawak District : Sibuti
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 05go

Irrigable area (ha) Main : 411 Off : 411
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	*	*	*	Sago	C	-	A		3,699
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 SK026

Code Number : SK026 Name of Scheme : Paya Payang
State : Sarawak District : Serian
Type of Scheme : Gravity
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 72 Off : 72
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	*	*	*	Sago	A	-	A		648
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 SK027

Code Number : SK027 Name of Scheme : Sg. Renan
State : Sarawak District : Kanowit
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 100 Off : 100
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	*	*	*	Sago	A	-	A		900
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 SK028

Code Number : SK028 Name of Scheme : Tg. Purun
State : Sarawak District : Lundu
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 140 Off : 140
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	*	*	*	Sago	A	-	A		1,260
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 SK029

Code Number : SK029 Name of Scheme : Entebu Kupang
State : Sarawak District : Kalaka
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 04gf

Irrigable area (ha) Main : 553 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	*	*	*	Vegetable	B	A	-	6.9	9,788
2	*	*	*	Pineapple	B	A	-	1.0	13,272
				Sago	A	-	A		4,977
3									
4	*	*	*	Fodder grasses	B	-	A		
				Pasture	B	-	A		
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 SK030

Code Number : SK030 Name of Scheme : Lubuk Buntin
State : Sarawak District : Simunjan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 113 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	*	*	*	Sago	C	-	A		1,017
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 SK031

Code Number : SK031 Name of Scheme : Merapok
State : Sarawak District : Lawas
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 04ga

Irrigable area (ha) Main : 298 Off : 298
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)
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 SK032

Code Number : SK032 Name of Scheme : Sg. Entulang
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 05go

Irrigable area (ha) Main : 107 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	*	*	*	Sago	C	-	A		963
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 SK033

Code Number : SK033 Name of Scheme : Sg. Gran
State : Sarawak District : Sri Aman
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 3wi

Irrigable area (ha) Main : 250 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	*	*	*	Sago	A	-	A		2,250
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 SK034

Code Number : SK034 Name of Scheme : Sg. Semalau
State : Sarawak District : Sarikei
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 4fw

Irrigable area (ha) Main : 369 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	649
				Coconut	B	-	A		1,616
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 SK035

Code Number : SK035 Name of Scheme : Sg. Sunga
State : Sarawak District : Sibu
Type of Scheme : Pump
Water source : Sufficient for double cropping
Soil series : 3wi

Irrigable area (ha) Main : 300 Off : 300
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	*	*	*	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 SK036

Code Number : SK036 Name of Scheme : Lower Samarahan
State : Sarawak District : Samarahan
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 3wi

Irrigable area (ha) Main : 1575 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	*	*	*	Sago	A	-	A		14,175
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 SK037

Code Number : SK037 Name of Scheme : Sebandi
State : Sarawak District : Lundu
Type of Scheme : Controlled drainage
Water source : Insufficient for main season paddy
Soil series : 3wi

Irrigable area (ha) Main : 87 Off : 0
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Construction completed in 1988

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		783
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 SK038

Code Number : SK038 Name of Scheme : Sekuduk/Chupak
State : Sarawak District : Kuching/Serian
Type of Scheme : Gravity
Soil series : 3wi

Irrigable area (ha) Main : 257 Off : 257
Trafficability of farm machinery : No good
Paddy planting for last 3 years : Construction completed in 1988

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*						
2	*	*	*	Sago	A	-	A		2,313
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

110° 111° 112° 113°

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

Location of Non-granary Irrigation Scheme

Sarawak

N

List of Scheme

Code	Name	Irrigable area (ha)	
		Main season	Off season
Kalaka			
SK002	Kali Kaba	729	0
SK003	Lubok Nibong	196	0
SK029	Entebu Kupang	553	0
Kanowit			
SK027	Sg. Renan	100	100
Kapit			
SK022	Nanga Merit	159	159
Kuching			
SK001	Bako	240	0
SK038	Sekuduk/Chupak	257	257
Lawas			
SK031	Merapok	298	298
Limbang			
SK023	Pandaruan	119	119
Lundu			
SK028	Tg. Purun	140	140
SK037	Sebandi	87	0
Marudi/Baram			
SK021	Benawa	131	131
Matu/Daro			
SK012	Daro Padi	3052	0
SK014	Loba Balu	911	0
SK015	Daro Pilot	118	0
Miri			
SK011	Pujut Lopeng	120	0
Samarahan			
SK036	Lower Samarahan	1575	0
Saribas			
SK008	Tg. Sebukut	255	0
Sarikei			
SK013	Paloh Bangau	956	0
SK034	Sg. Semalau	369	0
Serian			
SK026	Paya Payang	72	72
Sibu			
SK009	Lebaan Bawang Assan	624	0
SK035	Sg. Sunga	300	300
Sibuti			
SK010	Bungai Mummon	200	0
SK024	Paya Selanyau I	115	115
SK025	Paya Selanyau II	411	411
Simunjan			
SK017	Mid-Sadong, Stage I	118	0
SK018	Mid-Sadong, Stage II	71	0
SK019	Mid-Sadong, Stage III	88	0

4°

3°

SOUTH CHINA SEA

BINTULU

Btg. Kemena

BIN

Btg. Balingian

Btg. Tatau

MUKAH

Btg. Mukah

Btg. Igan

Btg. Oya

O14

O12

112° 113° 114° 115°

5° 4° 3°

N

SABAH

BRUNEI

BRUNEI

LIMBANG

MIRI

MIRI

BINTULU

BINTULU

SOUTH CHINA SEA

Btg. Baram

Btg. Trusan

Sg. Limbang

Sg. Tutoh

Sg. Tinjar

Sg. Niah

Btg. Suai

Btg. Baram

Btg. Kemena

Belaga

Sg. Silat

Btg. Tatau

Btg. Balingian

Btg. Oya

Btg. Mukah

MIRI

MUKAH

BINTULU

31

23

11

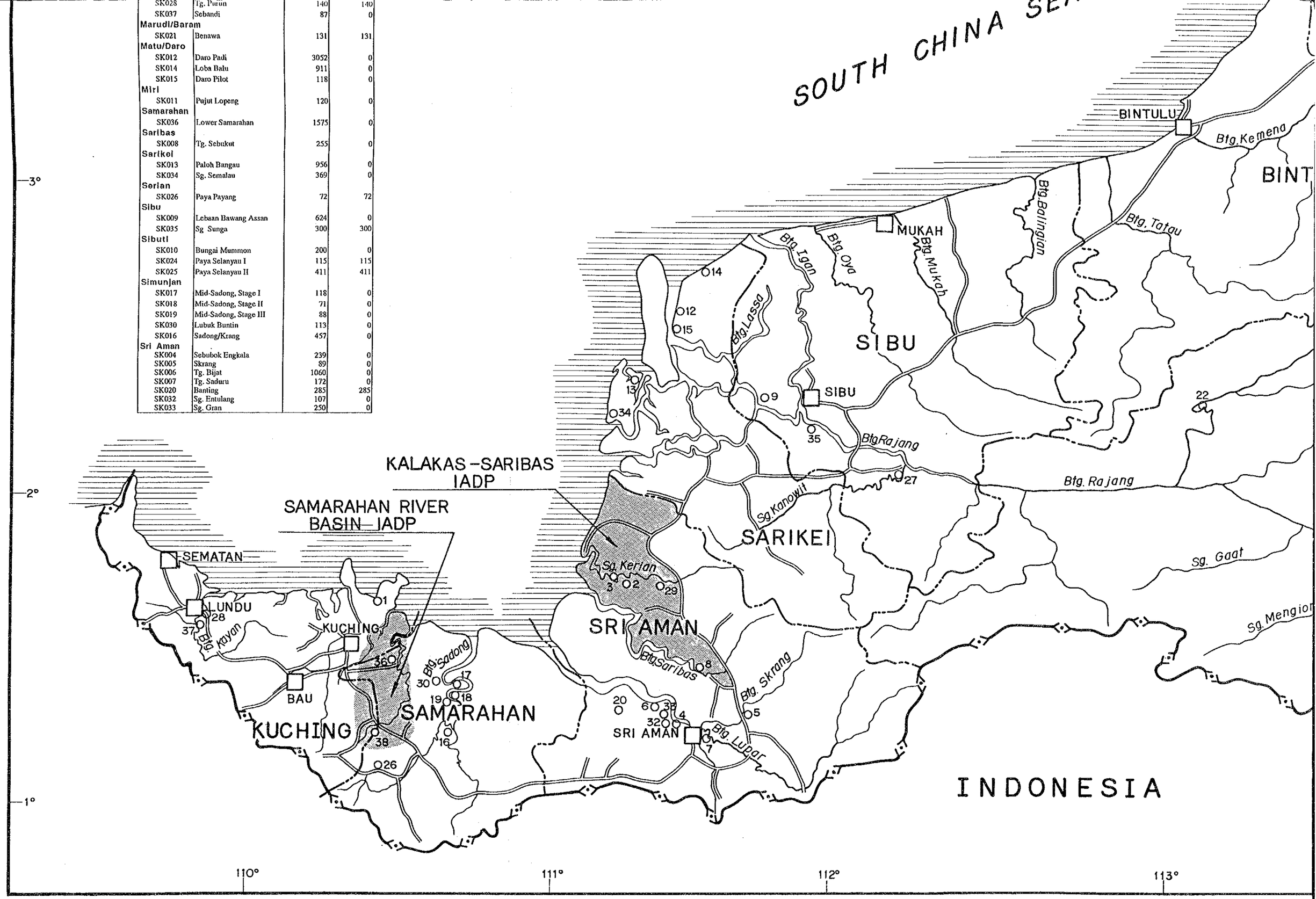
240

25

10

21

SK028	Tg. Puun	140	140
SK037	Sebandi	87	0
Marudi/Baram			
SK021	Benawa	131	131
Matu/Daro			
SK012	Daro Padi	3052	0
SK014	Loba Balu	911	0
SK015	Daro Pilot	118	0
Miri			
SK011	Pujut Lopeng	120	0
Samarahan			
SK036	Lower Samarahan	1575	0
Saribas			
SK008	Tg. Sebukut	255	0
Sarikei			
SK013	Paloh Bungau	956	0
SK034	Sg. Semalau	369	0
Serian			
SK026	Paya Payang	72	72
Sibu			
SK009	Lebaan Bawang Assan	624	0
SK035	Sg Sunga	300	300
Sibuti			
SK010	Bungai Mummon	200	0
SK024	Paya Selanyau I	115	115
SK025	Paya Selanyau II	411	411
Simunjan			
SK017	Mid-Sadong, Stage I	118	0
SK018	Mid-Sadong, Stage II	71	0
SK019	Mid-Sadong, Stage III	88	0
SK030	Lubuk Buntin	113	0
SK016	Sadong/Krang	457	0
Sri Aman			
SK004	Sebubok Engkala	239	0
SK005	Skrang	89	0
SK006	Tg. Bijat	1060	0
SK007	Tg. Saduru	172	0
SK020	Banting	285	285
SK032	Sg. Entulang	107	0
SK033	Sg. Gran	250	0




SOUTH CHINA SEA
MIRI
Btg. Suai
Btg. Baram
BINTULU
Btg. Kemena
BINTULU
Belaga
Sg. Silat
Btg. Tatau
Btg. Balingian
MUKAH
Btg. Oya
Btg. Mukah
SIBU
Sg. Danum
Sg. Linau
SIBU
22
Btg. Balui
KAPIT
Btg. Rajang
27
Btg. Rajang
Sg. Gaat
Sg. Mengiong
Btg. Baleh
INDONESIA
LEGEND
International Boundary
State Boundary
Division Boundary
River
Main Road
Railway
City / Town
Irrigation Area
SCALE
0 25 50 100 km
3°
2°
1°
112°
113°
114°
115°