

GOVERNMENT OF MALAYSIA

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

Volume 5-5

State Report - Selangor

October 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

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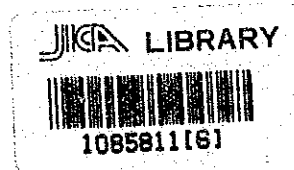
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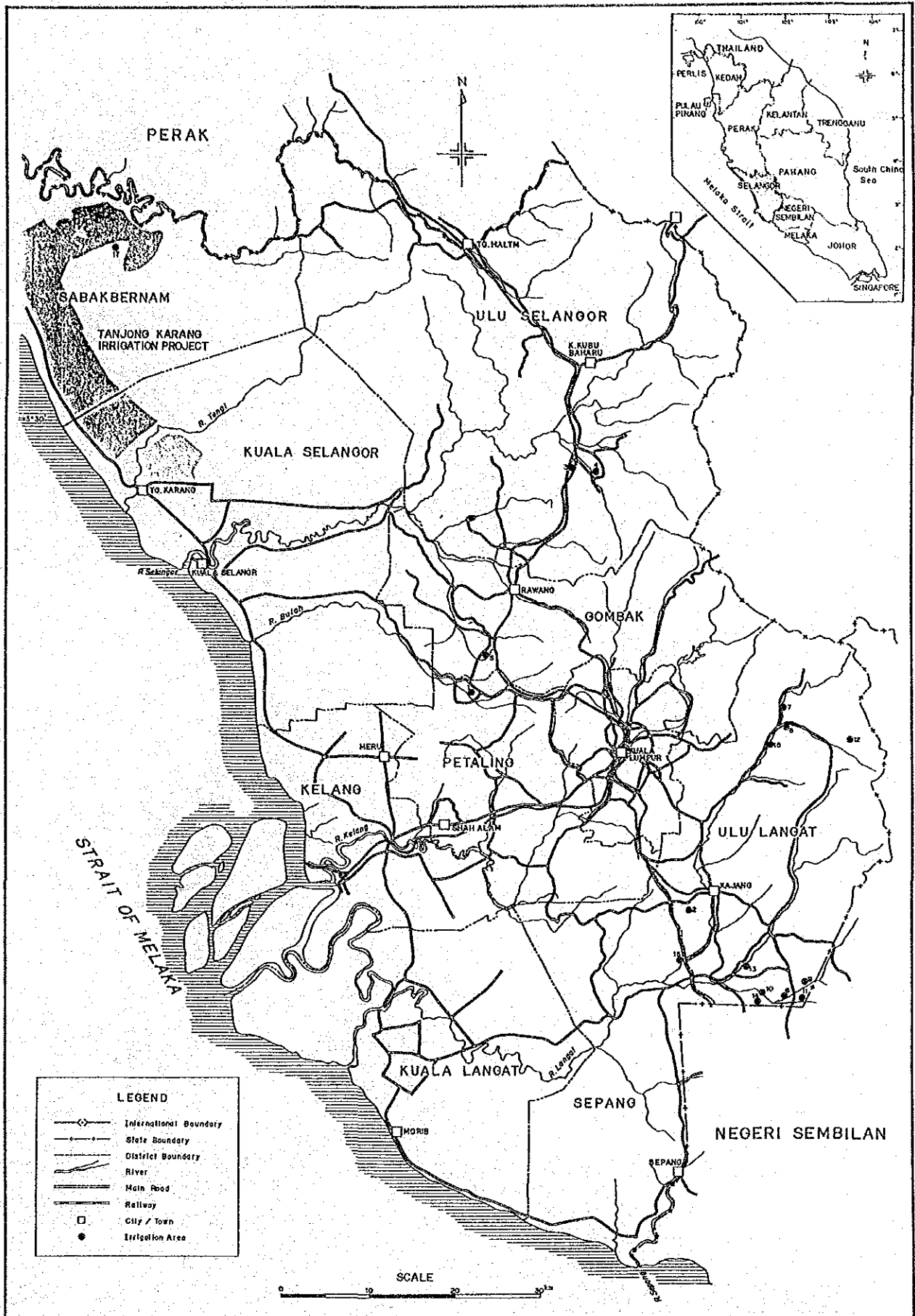
*Feasibility Study on Rationalization and Crop Diversification
in Non-granary Irrigated Areas in Malaysia*

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Location of Non-granary Irrigation Schemes
Selangor

FEASIBILITY STUDY ON RATIONALIZATION AND CROP DIVERSIFICATION IN NON-GRANARY IRRIGATED AREAS IN MALAYSIA
 Japan International Cooperation Agency

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

Volume 5-5

State Report - Selangor

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RESULTS OF EVALUATION FOR CROP DIVERSIFICATION POTENTIAL

1. INTRODUCTION

This is the State Report - Selangor, Volume 5-5, 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 Selangor.

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

Selangor is separated in the north from Perak by the Bernam river, in the south by the Sungai Sepang from Negeri Sembilan and in the east by the Main Range from Pahang, and facing to the west the Straits of Melaka. The State has a physical area of 7,956 km² and nine administrative districts. The population estimated was 1,831,900 persons for 1985 and 2,034,600 persons for 1988. The population density in 1988 was 256 person/km². Rural population ratio declined from 54% in 1985 to 52% in 1988. The proportion of population by ethnic group in 1987 was 46% for Bunitera, 36% for Chinese 17% for Indian and less than 1% for others.

In the State of Selangor, GDP in 1988 amounted to M\$11,674 million at 1978 constant prices. The largest contributor is the manufacturing sector with the share of 49%, while the agriculture sector's contribution is only 9%. Per capita GDP increased from M\$5,051 in 1986 to M\$5,682 in 1988 exceeding over the national average by M\$1,500 in 1986 and M\$1,824 in 1988. The results of the Household Income Surveys revealed that poor households were 31,000 in number and covered 8.6% of the total households of 360,500 in 1984, while those increased to 40,800 in number and 8.9% of the total of 458,400 in 1987. The mean monthly income went down from M\$1,590 in 1984 to M\$1,558 in 1987 but far above Peninsular Malaysia's mean income of M\$1,095 in 1984 and M\$1,074 in 1987.

As for social infrastructures in 1985, the service coverage was 81.0% for electricity, 94.5% for urban piped water supply and 73.0% for rural piped water supply. The road network length was 4,300 km in total with the density of 540 m/km² and per capita length of 2,340 m every 1,000 population. There were 287 registered motor vehicles per 1,000 population. In the State, 2.9 doctors and 0.9 acute care hospital beds were available for 1,000 population and every one

health center served 27,000 rural people. The infant mortality rate was 1.0 per 1,000 population.

Under the revised 5MP, M\$4,093 million were allocated as development expenditure by the Federal Government and NFPEs, accounting for 13.1% of the total expenditure to all the States. As in other States, the leading role in promoting development is taken by the Selangor State Development Corporation (PKNS). Its main efforts are focussing upon housing, industry and commerce. The State Government has identified several rural areas with potential to be developed into commercial-scale agricultural and animal projects. These areas are in the Districts of Sepang, Ulu Langat and Petaling.

2.2 Present Agriculture

In the State, agricultural land covers about 345,400 ha or 43% of the total land. There exist paddy field of 21,850 ha and tree crop field of 301,070 ha. Among tree crops, oil palm is predominant and its coverage has increased to 124,100 ha. The next is rubber having declined to 37,360 ha by continuous conversion to oil palm planting. Another 33,850 ha are covered with coconut. Mixed planting of cocoa with coconut has been encouraged in the coast area of Selangor resulting in sharp increase of planted area to around 27,000 ha in the recent year. Durian is a common miscellaneous crop in the State with a coverage of 3,150 ha. Banana and rambutan are also broadly grown amounting to 3,110 ha in total. Another 63 miscellaneous crops are planted in 5,730 ha as a whole. In 1987, the State produced paddy of 94,900 tons, oil palm of 1.74 million tons as FFB, rubber of 91,900 tons and cocoa of 4,400 tons.

According to FAMA's projection for 1989, the total demand for food crops, vegetables, fruits and freshwater fishes is shown below.

Produce	Net Consumption (ton)	Outflow to Other States (ton)	Post-harvest Loss (ton)	Total Demand (ton)
Food crops	6,494	0	1,624	8,118
Vegetables	173,348	3,603	44,239	221,190
(Leafy)	(55,258)	(432)	(13,923)	(69,613)
(Fruit)	(71,560)	(3,171)	(18,683)	(93,414)
(Root)	(24,839)	(0)	(6,210)	(31,049)
(Other)	(21,691)	(0)	(5,423)	(27,114)
Fruits	92,157	8,047	25,051	125,255
Freshwater fishes	1,424	0	356	1,780

Local supplies to consumers are projected to be 10,895 tons for food crops, 14,622 tons for vegetables and 17,422 tons for fruits. Of these supplies, maize is expected to cover the whole demand in the State. Thus, its market potential could be found in the outside of Selangor. The projected market potential is summarized below.

Produce	Market Potential (ton)	Major Crops (ton)
Food crops	-2,777	Sweet potato (4,184), Taro (2,717)
Vegetables	206,568	
(Leafy)	(66,525)	Chinese kale (17,624), Cabbage (17,124)
(Fruit)	(85,152)	Chilli (14,083), Cucumber (13,905)
(Root)	(31,047)	Carrot (17,568)
(Other)	(23,844)	Garlic (13,716)
Fruits	107,833	Banana (31,152), Watermelon (17,153)
Freshwater fishes	1,780	Carp (476)

No crops are cultivated for commercial purposes in the Federal Territory of Kuala Lumpur, although there are about 5,500 ha of agricultural land and leafy and fruit vegetables are grown in very small by intensive farms. The biggest demand therefore needs to be fulfilled by the inflow of local produce from other States.

The FAMA's projection on the total demand for food crops, vegetables, fruits and freshwater fishes is summarized below.

Produce	Net Consumption (ton)	Outflow to Other States (ton)	Post-harvest Loss (ton)	Total Demand (ton)
Food crops	3,226	347	893	4,466
Vegetables	115,633	16,280	32,979	167,892
(Leafy)	(40,755)	(6,425)	(11,795)	(58,975)
(Fruit)	(42,613)	(8,405)	(12,755)	(66,773)
(Root)	(15,982)	(731)	(4,178)	(20,891)
(Other)	(16,283)	(719)	(4,251)	(21,253)
Fruits	48,682	3,849	13,133	65,664
Freshwater fishes	756	37	198	991

Regarding vegetables, a total of 2,606 tons is projected to be supplied by local produce. The Federal Territory has therefore a large market potential as indicated below.

Produce	Market Potential (ton)	Major Crops (ton)
Food crops	4,466	Sweet potato (2,083)
Vegetables	165,286	
(Leafy)	(56,404)	Cabbage (18,568), Chinese kale (14,063)
(Fruit)	(66,738)	Cucumber (19,078), Yard long bean (18,238)
(Root)	(20,891)	Carrot (11,918)
(Other)	(21,253)	Garlic (10,535)
Fruits	65,644	Banana (18,125), Watermelon (11,870)
Freshwater fishes	991	Carp (210)

2.3 Present Situation of Non-granary Irrigation Schemes

In the State, agricultural land covers about 345,400 ha or 43% of the total land. There exist paddy field of 20,662 ha and tree crop field of 301,070 ha. Among tree crops, oil palm is predominant and its coverage has increased to 124,100 ha. The next is rubber having declined to 37,360 ha by continuous conversion to oil palm planting. Another 33,850 ha are covered with coconut. Mixed planting of cocoa with coconut has been encouraged in the coast area of Selangor resulting in sharp increase of planted area to around 27,000 ha. Durian is a common miscellaneous crop with a coverage of 3,150 ha. Banana and rambutan are also broadly grown amounting to 3,110 ha in total.

Another 63 miscellaneous crops are planted in 5,730 ha as a whole. There exist irrigable paddy fields of 19,961 ha as a whole. The Northwest Selangor granary area covers 19,022 ha and non-granary irrigated areas amount to 939 ha.

- Number of schemes : 17
- Irrigable area : - main season = 939 ha
- off season = 486 ha
- Type of schemes : gravity; 15 pump; 1
controlled drainage; 1
- Irrigation water resources availability by scheme
(except controlled drainage scheme)
: - sufficient for double cropping; 16
- Average cropping intensity (paddy + upland crops)
for previous three years
: - main season = 47%
- off season = 40%
- Average cropping intensity (paddy only)
for previous three years
: - main season = 23%
- off season = 16%
- Utilization of scheme - main season paddy cropping
intensity of more than 50%; 6
- main season paddy cropping
intensity of less than 50%; 5
- Fully idle; 6

By the effect of urbanization, the areas where non-granary irrigation schemes are situated have been suffering from encroachment of farm land and outflow of young farm labor force to other industries. Under such situation, there is a very little possibility of promoting crop diversification and revitalization of idle paddy fields in most schemes.

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 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 or 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 form 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 in 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 agro-climatic factors, regional market demand for diversified crops and investment performance. The State of Selangor is divided into three agro-ecological zones, Regions 9 to 11. These regions have different advantages to the growth of perennial lowland crops as described in Appendix D of Volume 2. Taking into account the regional climatic suitability, recommendable crops are selected with the priority order as shown in Table 1 and some of crops judged as suitable in each step of the potential evaluation are deleted.

Special attention is paid to potential market demand and supply in Kuala Lumpur. If marketable crop output from one non-granary irrigation scheme exceeds over the local demand in an administrative district, its surplus amount is compared with the market demand of Kuala Lumpur in order to decide marketability of the specific crop.

As a result of the above process, the crop diversification potential is adjusted to the present situation category by category for each scheme. 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.

Out of 17 non-granary irrigation schemes as shown in Table 2, 10 schemes have the highest potential for crop diversification under the Category 2, while another seven schemes are retained as paddy cultivation areas under the Category 7. Good potential for freshwater fish pond culture can be expected in 14 gravity schemes with sufficient water resources throughout the year.

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Tables & Figures

Table 1 Priority Order of Selected Crops for Each Scheme

State : Selangor

Code No.	Scheme	Annual Crops	Perennial Crops
SG001	Sg. Buloh	SP	DM, RB, FC
SG002	Sg. Air Hitam		DM, RB, FC
SG003	Kg. Batu 30	SP	DM, RB, FC
SG004	Kg. Kalong Tengah	SP	DM, RB, FC
SG005	Kuang	SP	DM, RB
SG006	Jalan Enam Kaki	SP	RB, DM*, FC
SG007	Batu 19 3/4		RB, DM*, FC
SG008	Kuala Lui		RB, DM*, FC
SG009	Sesapan Bt Minangkabau	SP	RB, DM*, FC
SG010	Beranang II		RB, DM*, FC
SG011	Bukit Kepong	SP	RB, DM*, FC
SG012	Paya Lebar		RB, DM*, FC
SG013	Sg. Rinching Hilir	DP, VG*	PR, CN, SC, DM*, PL*
SG014	Kuala Pajam	SP	RB, DM*, FC
SG015	Sg. Merab	SP	DM, RB, FC
SG016	Bt. 17, Dusun Tua		RB, DM*, FC
SG017	Sg. Panjang	SP	PL*, FC

Remarks: *; Needs for regional marketing promotion
 DP; Double cropping of paddy
 SP; Single cropping of paddy
 VG; Vegetables
 DM; Durian/mango
 CN; Cashewnut
 RB; Rubber
 SC; Sugarcane
 PR; Pepper
 FC; Freshwater fish pond

Table 2 Crop Diversification Potential for Each Scheme

State : Selangor

Code	Scheme	Category							
		1	2	3	4	5	6	7	8
SG001	Sg. Buloh	.	*1	.	.	.	.	.	.
SG002	Sg. Air Hitam	.	*1	.	.	*2	.	.	.
SG003	Kg. Batu 30	.	*1	.	.	*2	.	*3	.
SG004	Kg. Kalong Tengah	.	*2	.	.	*3	.	*1	.
SG005	Kuang	.	*1	.	.	.	.	.	.
SG006	Jalan Enam Kaki	.	*2	.	.	*3	.	*1	.
SG007	Batu 19 3/4	.	*1	.	.	*2	.	.	.
SG008	Kuala Lui	.	*1	.	.	*2	.	.	.
SG009	Sesapan Bt Minangkabau	.	*2	.	.	*3	.	*1	.
SG010	Beranang II	.	*1	.	.	*2	.	.	.
SG011	Bukit Kepong	.	*2	.	.	*3	.	*1	.
SG012	Paya Lebar	.	*1	.	.	*2	.	.	.
SG013	Sg. Rinching Hilir	*4	*2	*4	.	*3	.	*1	.
SG014	Kuala Pajam	.	*2	.	.	*3	.	*1	.
SG015	Sg. Merab	.	*1	.	.	*2	.	.	.
SG016	Bt. 17, Dusun Tua	.	*1	.	.	*2	.	.	.
SG017	Sg. Panjang	.	*4	.	.	.	.	*1	.
*1	Super category	.	10	.	.	.	.	7	.
*2	2nd priority category	.	6	.	.	8	.	.	.
*3	3rd priority category	.	.	.	.	6	.	1	.
*4	5th priority category with needs of regional marketing promotion	1	1	1	.	.	.	.	.

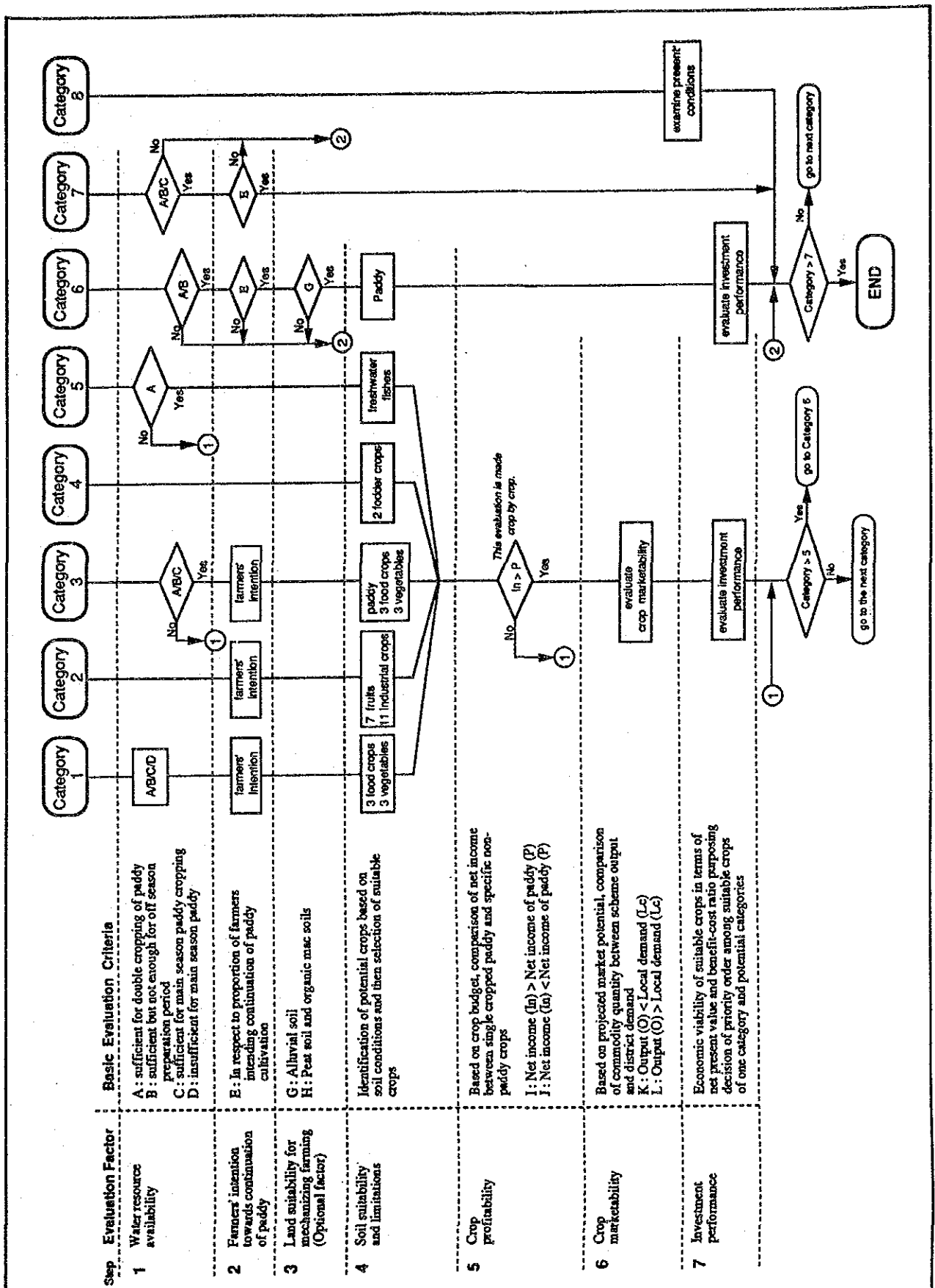


Fig. 1
Criteria and Procedure of Evaluation
for Crop Diversification Potential

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

Japan International Cooperation Agency

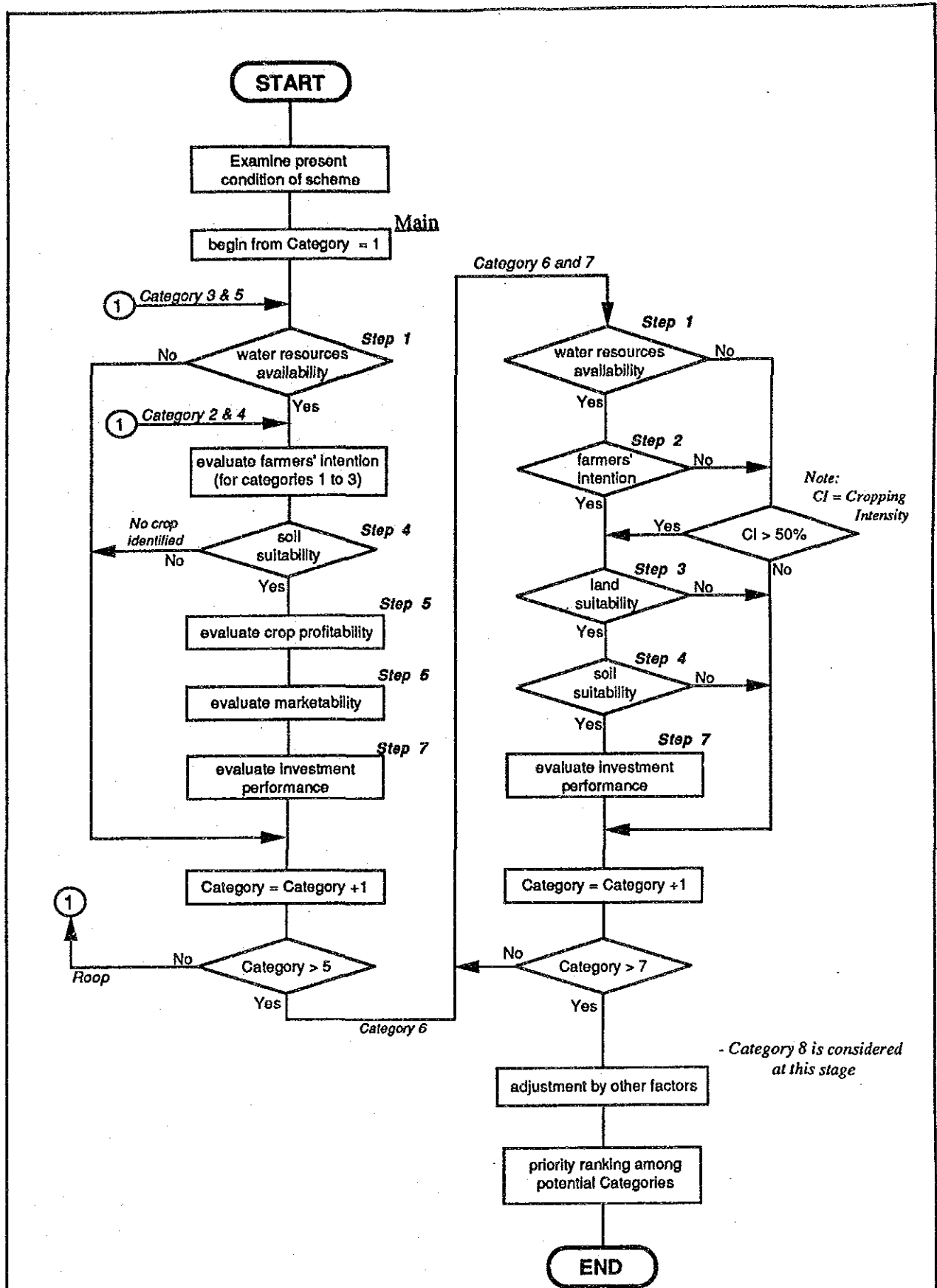


Fig. 2
General Flow of Evaluation
for Crop Diversification Potential

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Appendix

Results of Evaluation for Crop Diversification Potential

Remarks

Category

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

Evaluation Item in Each Step

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

- Note:
- If any item is examined, steps for the respective categories are indicated with a star mark "*".*
 - In step 7, BIC ratio at the interest rate of 10% is described.*

Evaluation Results of Each Scheme

CONTENTS

	<u>Page</u>
SG001 Sg. Buloh	1
SG002 Sg. Air Hitam	2
SG003 Kg. Batu 30	3
SG004 Kg. Kalong Tengah	4
SG005 Kuang	5
SG006 alan Enam Kaki	6
SG007 Batu 19 3/4	7
SG008 Kuala Lui	8
SG009 Sesapan Bt Minangkabau	9
SG010 Beranang II	10
SG011 Bukit Kepong	11
SG012 Paya Lebar	12
SG013 Sg. Rinching Hilir	13
SG014 Kuala Pajam	14
SG015 Sg. Merab	15
SG016 Bt. 17, Dusun Tua	16
SG017 Sg. Panjang	17

Crop Diversification Potential for SG001

Code Number : SG001 Name of Scheme : Sg. Buloh
 State : Selangor District : Petaling
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 89 Off : 0
 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	*	*	*	Ginger	C	A	A		1,335
				Groundnut	C	A	A		233
				Vegetable	C	A	A		1,575
2	*	*	*	Durian/Mango	C	A	A	11.0	606
				Guava	C	A	A	3.1	2,136
				Banana	C	A	A	0.7	934
				Cashewnut	C	A	A		157
				Papaya	C	A	A		2,225
				Citrus	C	A	A		934
				Pineapple	C	A	A	0.5	2,136
				Coconut	A	-	A		390
				Oilpalm	C	A	A	0.9	1,708
				Cocoa	C	A	A	0.6	277
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>123</u>
				Coffee	C	A	A		79
				Tea	C	A	A		116
				Clove	C	A	A		27
Tabacco	C	A	A		801				
Sugarcane	C	A	A		1,780				
Pepper	C	A	A		264				
3	*	*	*	Maize	C	-	A		291
				Sorghum	C	-	A		335
				Ginger	C	A	A		1,335
				Groundnut	C	A	A		233
				Vegetable	C	A	A		1,575
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG002

Code Number : SG002 Name of Scheme : Sg. Air Hitam
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2DT

Irrigable area (ha) Main : 26 Off : 26
 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	*	*	*	Ginger	C	A	-		390
				Groundnut	C	A	A		68
				Vegetable	C	A	-		460
2	*	*	*	Durian/Mango	C	A	-	11.0	177
				Guava	C	A	-	3.1	624
				Banana	C	A	-	0.7	273
				Cashewnut	C	A	A		46
				Papaya	C	A	-		650
				Citrus	C	A	-		273
				Pineapple	C	A	-	0.5	624
				Coconut	A	-	A		114
				Oilpalm	C	A	A	0.9	499
				Cocoa	C	A	A	0.6	81
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>36</u>
				Coffee	C	A	A		23
				Tea	C	A	A		34
				Clove	C	A	A		8
Tabacco	C	A	A		234				
Sugercane	C	A	A		520				
Pepper	C	A	A		77				
3	*	*	*	Maize	C	-	-		85
				Sorghum	C	-	A		98
				Ginger	C	A	-		390
				Groundnut	C	A	A		68
				Vegetable	C	A	-		460
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG003

Code Number : SG003 Name of Scheme : Kg. Batu 30
 State : Selangor District : Ulu Selangor
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 30 Off : 0
 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	*	*	*	Ginger	C	A	-		450
				Groundnut	C	A	A		78
				Vegetable	C	A	A		531
2	*	*	*	Durian/Mango	C	A	A	11.0	204
				Guava	C	A	-	3.1	720
				Banana	C	A	A	0.7	315
				Cashewnut	C	A	A		53
				Papaya	C	A	-		750
				Citrus	C	A	A		315
				Pineapple	C	A	-	0.5	720
				Coconut	A	-	A		131
				Oilpalm	C	A	A	0.9	576
				Cocoa	C	A	A	0.6	93
				<u>Rubber</u>	A	A	A	1.1	41
				Coffee	C	A	A		26
				Tea	C	A	A		39
				Clove	C	A	A		9
				Tabacco	C	A	A		270
Sugarcane	C	A	A		600				
Pepper	C	A	A		89				
3	*	*	*	Maize	C	-	-		98
				Sorghum	C	-	A		113
				Ginger	C	A	-		450
				Groundnut	C	A	A		78
				Vegetable	C	A	A		531
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG004

Code Number : SG004 Name of Scheme : Kg. Kalong Tengah
 State : Selangor District : Ulu Selangor
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 71 Off : 71
 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	*	*	*	Ginger	C	A	-		1,065
				Groundnut	C	A	A		185
				Vegetable	C	A	A		1,257
2	*	*	*	Durian/Mango	C	A	-	11.0	483
				Guava	C	A	-	3.1	1,704
				Banana	C	A	A	0.7	746
				Cashewnut	C	A	A		125
				Papaya	C	A	-		1,775
				Citrus	C	A	-		746
				Pineapple	C	A	-	0.5	1,704
				Coconut	A	-	A		311
				Oilpalm	C	A	A	0.9	1,363
				Cocoa	C	A	A	0.6	220
				<u>Rubber</u>	A	A	A	1.1	91
				Coffee	C	A	A		62
				Tea	C	A	A		92
				Clove	C	A	A		22
Tabacco	C	A	A		639				
Sugarcane	C	A	A		1,420				
Pepper	C	A	A		209				
3	*	*	*	Maize	C	-	-		231
				Sorghum	C	-	A		266
				Ginger	C	A	-		1,065
				Groundnut	C	A	A		185
				Vegetable	C	A	A		1,257
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG005

Code Number : SG005 Name of Scheme : Kuang
 State : Selangor District : Gombak
 Type of Scheme : Controlled drainage
 Water source : Insufficient for main season paddy
 Soil series : 2Dt

Irrigable area (ha) Main : 47 Off : 0
 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	*	*	*	Ginger	C	A	A		705
				Groundnut	C	A	A		122
				Vegetable	C	A	A		832
2	*	*	*	Durian/Mango	C	A	A	11.0	320
				Guava	C	A	A	3.1	1,128
				Banana	C	A	A	0.7	493
				Cashewnut	C	A	A		83
				Papaya	C	A	A		1,175
				Citrus	C	A	A		494
				Pineapple	C	A	A	0.5	1,128
				Coconut	A	-	A		206
				Oilpalm	C	A	A	0.9	902
				Cocoa	C	A	A	0.6	146
				<u>Rubber</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>1.1</u>	<u>64</u>
				Coffee	C	A	A		41
				Tea	C	A	A		61
				Clove	C	A	A		15
Tabacco	C	A	A		423				
Sugarcane	C	A	A		940				
Pepper	C	A	A		138				
3									
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	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 SG006

Code Number : SG006 Name of Scheme : Jalan Enam Kaki
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 41 Off : 28
 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	*	*	*	Ginger	C	A	-		615
				Groundnut	C	A	A		107
				Vegetable	C	A	-		726
2	*	*	*	Durian/Mango	C	A	-	11.0	278
				Guava	C	A	-	3.1	984
				Banana	C	A	-	0.7	430
				Cashewnut	C	A	A		72
				Papaya	C	A	-		1,025
				Citrus	C	A	-		430
				Pineapple	C	A	-	0.5	984
				Coconut	A	-	A		180
				Oilpalm	C	A	A	0.9	788
				Cocoa	C	A	A	0.6	127
				<u>Rubber</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>1.1</u>	<u>56</u>
				Coffee	C	A	A		37
				Tea	C	A	A		53
				Clove	C	A	A		13
Tabacco	C	A	A		369				
Sugarcane	C	A	A		820				
Pepper	C	A	A		122				
3	*	*	*	Maize	C	-	-		133
				Sorghum	C	-	A		154
				Ginger	C	A	-		615
				Groundnut	C	A	A		107
				Vegetable	C	A	-		726
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG007

Code Number : SG007 Name of Scheme : Batu 19 3/4
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 20 Off : 20
 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	*	*	*	Ginger	C	A	-		300
				Groundnut	C	A	A		52
				Vegetable	C	A	-		354
2	*	*	*	Durian/Mango	C	A	-	11.0	136
				Guava	C	A	-	3.1	480
				Banana	C	A	-	0.7	210
				Cashewnut	C	A	A		35
				Papaya	C	A	-		500
				Citrus	C	A	-		210
				Pineapple	C	A	-	0.5	480
				Coconut	A	-	A		88
				Oilpalm	C	A	A	0.9	384
				Cocoa	C	A	A	0.6	62
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>27</u>
				Coffee	C	A	A		18
				Tea	C	A	A		26
				Clove	C	A	A		6
Tabacco	C	A	A		180				
Sugarcane	C	A	A		400				
Pepper	C	A	A		59				
3	*	*	*	Maize	C	-	-		65
				Sorghum	C	-	A		75
				Ginger	C	A	-		300
				Groundnut	C	A	A		52
				Vegetable	C	A	-		354
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG008

Code Number : SG008 Name of Scheme : Kuala Lui
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 11 Off : 11
 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	*	*	*	Ginger	C	A	-		165
				Groundnut	C	A	A		29
				Vegetable	C	A	-		195
2	*	*	*	Durian/Mango	C	A	-	11.0	75
				Guava	C	A	-	3.1	264
				Banana	C	A	-	0.7	116
				Cashewnut	C	A	A		19
				Papaya	C	A	-		275
				Citrus	C	A	-		116
				Pineapple	C	A	-	0.5	264
				Coconut	A	-	A		48
				Oilpalm	C	A	A	0.9	211
				Cocoa	C	A	A	0.6	34
				<u>Rubber</u>	A	A	A	1.1	15
				Coffee	C	A	A		10
				Tea	C	A	A		14
				Clove	C	A	A		3
				Tabacco	C	A	A		99
Sugarcane	C	A	A		220				
Pepper	C	A	A		32				
3	*	*	*	Maize	C	-	-		36
				Sorghum	C	-	A		41
				Ginger	C	A	-		165
				Groundnut	C	A	A		29
				Vegetable	C	A	-		195
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG009

Code Number : SG009 Name of Scheme : Sesapan Bt Minangkabau
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 160 Off : 160
 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	*	*	*	Ginger	C	A	-		2,400
				Groundnut	C	A	A		418
				Vegetable	C	A	-		2,832
2	*	*	*	Durian/Mango	C	A	-	11.0	1,088
				Guava	C	A	-	3.1	3,840
				Banana	C	A	-	0.7	1,680
				Cashewnut	C	A	A		282
				Papaya	C	A	-		4,000
				Citrus	C	A	-		1,680
				Pineapple	C	A	-	0.5	3,840
				Coconut	A	-	A		701
				Oilpalm	C	A	A	0.9	3,072
				Cocoa	C	A	A	0.6	496
				<u>Rubber</u>	A	A	A	1.1	219
				Coffee	C	A	A		141
				Tea	C	A	A		208
				Clove	C	A	A		50
Tabacco	C	A	A		1,440				
Sugarcane	C	A	A		3,200				
Pepper	C	A	A		472				
3	*	*	*	Maize	C	-	-		520
				Sorghum	C	-	A		600
				Ginger	C	A	-		2,400
				Groundnut	C	A	A		418
				Vegetable	C	A	-		2,832
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG010

Code Number : SG010 Name of Scheme : Beranang II
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 23 Off : 20
 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	*	*	*	Ginger	C	A	-		345
				Groundnut	C	A	A		60
				Vegetable	C	A	-		407
2	*	*	*	Durian/Mango	C	A	-	11.0	156
				Guava	C	A	-	3.1	552
				Banana	C	A	-	0.7	242
				Cashewnut	C	A	A		40
				Papaya	C	A	-		575
				Citrus	C	A	-		242
				Pineapple	C	A	-	0.5	552
				Coconut	A	-	A		101
				Oilpalm	C	A	A	0.9	442
				Cocoa	C	A	A	0.6	71
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>32</u>
				Coffee	C	A	A		20
				Tea	C	A	A		30
				Clove	C	A	A		7
Tabacco	C	A	A		207				
Sugarcane	C	A	A		460				
Pepper	C	A	A		68				
3	*	*	*	Maize	C	-	-		75
				Sorghum	C	-	A		86
				Ginger	C	A	-		345
				Groundnut	C	A	A		60
				Vegetable	C	A	-		407
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG011

Code Number : SG011 Name of Scheme : Bukit Kepong
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 23 Off : 22
 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	*	*	*	Ginger	C	A	-		345
				Groundnut	C	A	A		60
				Vegetable	C	A	-		407
2	*	*	*	Durian/Mango	C	A	-	11.0	157
				Guava	C	A	-	3.1	552
				Banana	C	A	-	0.7	241
				Cashewnut	C	A	A		41
				Papaya	C	A	-		575
				Citrus	C	A	-		241
				Pineapple	C	A	-	0.5	552
				Coconut	A	-	A		100
				Oilpalm	C	A	A	0.9	441
				Cocoa	C	A	A	0.6	71
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>31</u>
				Coffee	C	A	A		20
				Tea	C	A	A		30
				Clove	C	A	A		7
Tabacco	C	A	A		207				
Sugarcane	C	A	A		460				
Pepper	C	A	A		68				
3	*	*	*	Maize	C	-	-		75
				Sorghum	C	-	A		87
				Ginger	C	A	-		345
				Groundnut	C	A	A		60
				Vegetable	C	A	-		407
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG012

Code Number : SG012 Name of Scheme : Paya Lebar
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 27 Off : 27
 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	*	*	*	Ginger	C	A	-		405
				Groundnut	C	A	A		70
				Vegetable	C	A	-		478
2	*	*	*	Durian/Mango	C	A	-	11.0	184
				Guava	C	A	-	3.1	648
				Banana	C	A	-	0.7	284
				Cashewnut	C	A	A		48
				Papaya	C	A	-		675
				Citrus	C	A	-		284
				Pineapple	C	A	-	0.5	648
				Coconut	A	-	A		118
				Oilpalm	C	A	A	0.9	518
				Cocoa	C	A	A	0.6	84
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>37</u>
				Coffee	C	A	A		24
				Tea	C	A	A		35
				Clove	C	A	A		8
Tabacco	C	A	A		243				
Sugarcane	C	A	A		540				
Pepper	C	A	A		80				
3	*	*	*	Maize	C	-	-		88
				Sorghum	C	-	A		101
				Ginger	C	A	-		405
				Groundnut	C	A	A		70
				Vegetable	C	A	-		478
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG013

Code Number : SG013 Name of Scheme : Sg. Rinching Hilir
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2dt

Irrigable area (ha) Main : 69 Off : 69
 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	*	*	*	Ginger	B	A	-	2.5	1,035
				Groundnut	A	A	A	0.9	180
				Vegetable	A	A	-	13.8	1,221
2	*	*	*	Durian/Mango	C	A	-	11.0	469
				Guava	C	A	-	3.1	1,656
				Banana	C	A	-	0.7	725
				<u>Cashewnut</u>	A	A	A	<u>8.7</u>	<u>121</u>
				Papaya	B	A	-	0.6	1,725
				Citrus	B	A	-	2.9	725
				Pineapple	A	A	-	9.5	1,656
				Coconut	A	-	A		302
				Oilpalm	C	A	A	0.9	1,325
				Cocoa	C	A	A	0.6	214
				Rubber	B	A	A	0.6	95
				Sago	C	-	A		621
				Coffee	A	A	A	0.7	61
				<u>Tea</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>10.4</u>	<u>90</u>
Clove	B	A	A	1.1	21				
Tabacco	B	A	A	0.7	621				
<u>Sugarcane</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>3.3</u>	<u>1,380</u>				
<u>Pepper</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>16.4</u>	<u>204</u>				
3	*	-	*	Maize	A	-	-		224
				Sorghum	A	-	A		259
				Ginger	B	A	-	2.5	1,035
				Groundnut	A	A	A	0.9	180
				Vegetable	A	A	-	13.8	1,221
4	*	*	*	Fodder grasses	A	-	A		
				Pasture	A	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG014

Code Number : SG014 Name of Scheme : Kuala Pajam
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 32 Off : 32
 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	*	*	*	Ginger	C	A	-		480
				Groundnut	C	A	A		84
				Vegetable	C	A	-		566
2	*	*	*	Durian/Mango	C	A	-	11.0	218
				Guava	C	A	-	3.1	768
				Banana	C	A	-	0.7	336
				Cashewnut	C	A	A		56
				Papaya	C	A	-		800
				Citrus	C	A	-		336
				Pineapple	C	A	-	0.5	768
				Coconut	A	-	A		140
				Oilpalm	C	A	A	0.9	614
				Cocoa	C	A	A	0.6	99
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>44</u>
				Coffee	C	A	A		28
				Tea	C	A	A		42
				Clove	C	A	A		10
				Tabacco	C	A	A		288
Sugarcane	C	A	A		640				
Pepper	C	A	A		94				
3	*	*	*	Maize	C	-	-		104
				Sorghum	C	-	A		120
				Ginger	C	A	-		480
				Groundnut	C	A	A		84
				Vegetable	C	A	-		566
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG015

Code Number : SG015 Name of Scheme : Sq. Merab
 State : Selangor District : Sepang
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 32 Off : 0
 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	*	*	*	Ginger	C	A	A		480
				Groundnut	C	A	A		84
				Vegetable	C	A	A		566
2	*	*	*	Durian/Mango	C	A	A	11.0	218
				Guava	C	A	A	3.1	768
				Banana	C	A	A	0.7	336
				Cashewnut	C	A	A		56
				Papaya	C	A	A		800
				Citrus	C	A	A		336
				Pineapple	C	A	A	0.5	768
				Coconut	A	-	A		140
				Oilpalm	C	A	A	0.9	614
				Cocoa	C	A	A	0.6	99
				<u>Rubber</u>	A	A	A	1.1	44
				Coffee	C	A	A		28
				Tea	C	A	A		42
Clove	C	A	A		10				
Tabacco	C	A	A		288				
Sugarcane	C	A	A		640				
Pepper	C	A	A		94				
3	*	*	*	Maize	C	-	A		104
				Sorghum	C	-	A		120
				Ginger	C	A	A		480
				Groundnut	C	A	A		84
				Vegetable	C	A	A		566
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	A	<u>2.0</u>	
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 SG016

Code Number : SG016 Name of Scheme : Bt. 17, Dusun Tua
 State : Selangor District : Hulu Langat
 Type of Scheme : Gravity
 Water source : Sufficient for double cropping
 Soil series : 2Dt

Irrigable area (ha) Main : 88 Off : 0
 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	*	*	*	Ginger	C	A	-		1,320
				Groundnut	C	A	A		230
				Vegetable	C	A	-		1,558
2	*	*	*	Durian/Mango	C	A	-	11.0	598
				Guava	C	A	-	3.1	2,112
				Banana	C	A	-	0.7	924
				Cashewnut	C	A	A		155
				Papaya	C	A	-		2,200
				Citrus	C	A	-		924
				Pineapple	C	A	-	0.5	2,112
				Coconut	A	-	A		385
				Oilpalm	C	A	A	0.9	1,690
				Cocoa	C	A	A	0.6	273
				<u>Rubber</u>	A	A	A	<u>1.1</u>	<u>121</u>
				Coffee	C	A	A		77
				Tea	C	A	A		114
				Clove	C	A	A		27
				Tabacco	C	A	A		792
Sugarcane	C	A	A		1,760				
Pepper	C	A	A		260				
3	*	*	*	Maize	C	-	-		286
				Sorghum	C	-	A		330
				Ginger	C	A	-		1,320
				Groundnut	C	A	A		230
				Vegetable	C	A	-		1,558
4	*	*	*	Fodder grasses	C	-	A		
				Pasture	C	-	A		
5	*	*	*			A	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 SG017

Code Number : SG017 Name of Scheme : Sg. Panjang
 State : Selangor District : Sabah Bernam
 Type of Scheme : Pump
 Soil series : 3t(d)

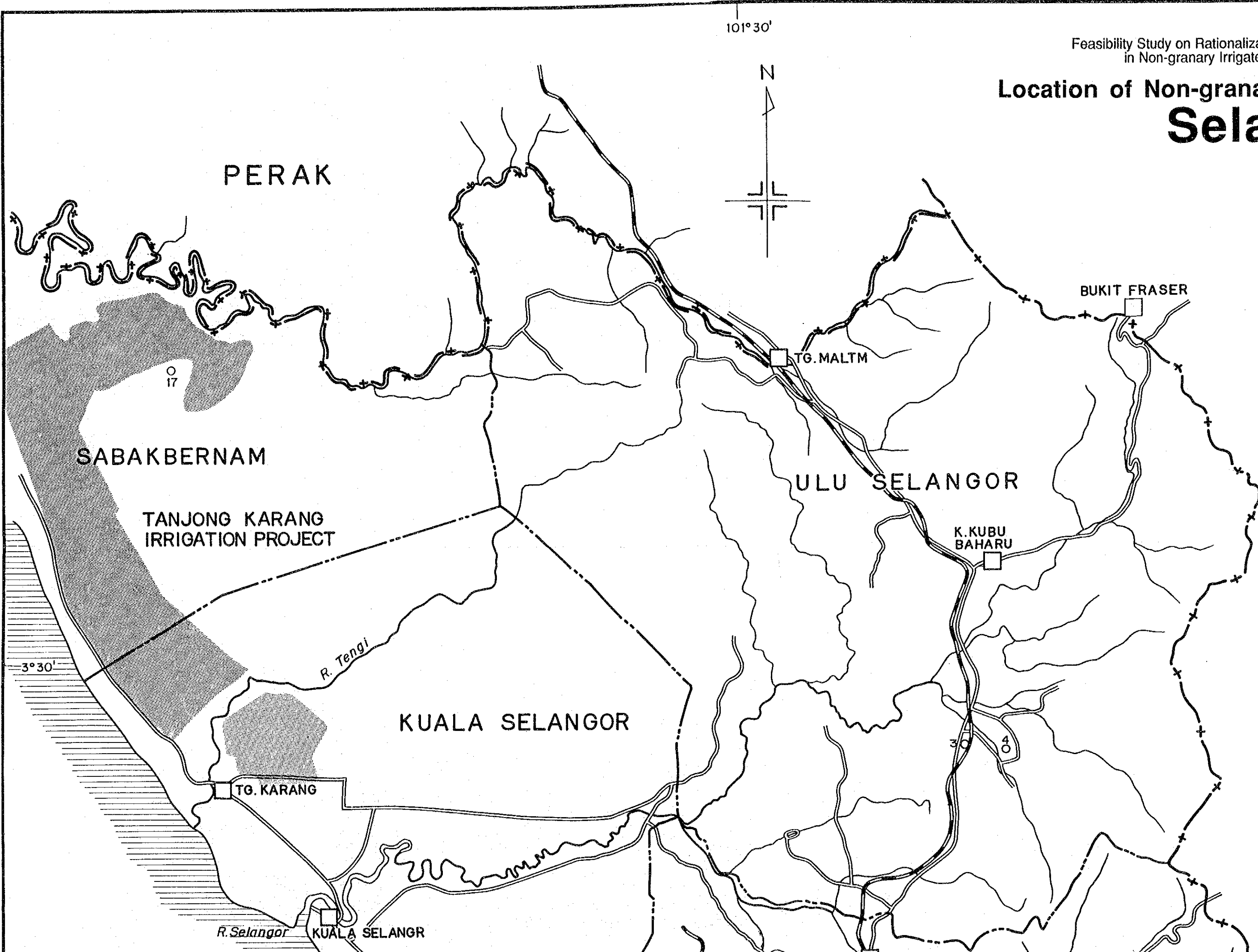
Irrigable area (ha) Main : 150 Off : 0
 Trafficability of farm machinery : No good
 Paddy planting for last 3 years : Less than 50% of irrigable area

Category	Step 1	Step 2	Step 3		Step 4	Step 5	Step 6	Step 7 (B/C)	Production (ton)
1	*	*	*	Vegetable	C	A	-		2,655
2	*	*	*	Cashewnut	C	A	A		264
				Pineapple	A	A	-	9.5	3,600
				Coconut	C	-	A		657
				Sago	C	-	A		1,350
				Coffee	A	A	A	0.7	132
3	*	*	*	Sorghum	A	-	A		563
				Vegetable	C	A	-		2,655
4	*	*	*	Fodder grasses	A	-	A		
				Pasture	A	-	A		
5	*	*	*			A	A	<u>2.0</u>	
6	*	*							
7	*	*	*		*	*	*		
8									

NOTE Underline : Crops with highest potential (Class A) in terms of crop suitability, profitability, marketability and invest performance (B/C > 1).

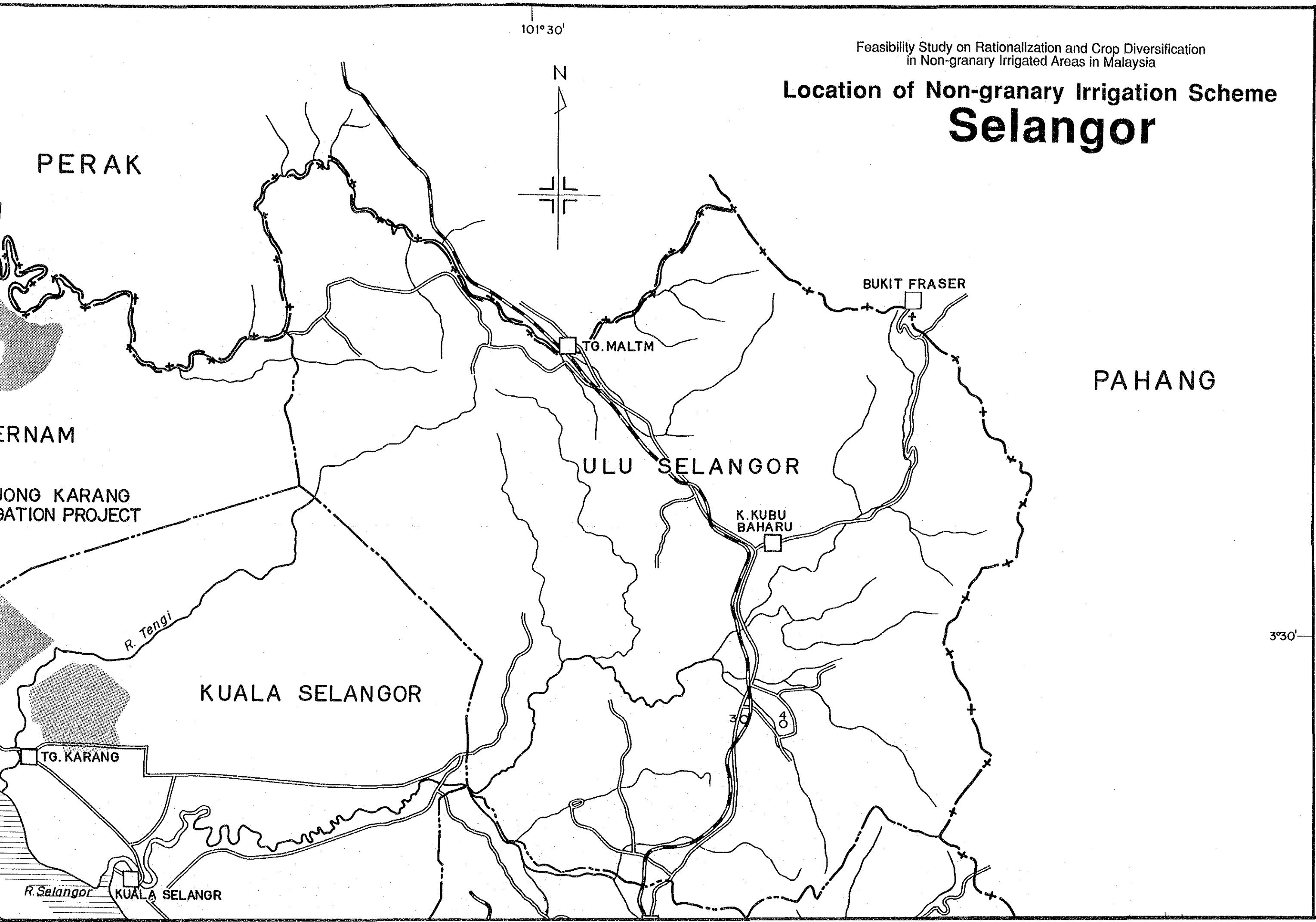
* : Potential categories
 A : Suitable
 B : Marginal suitable due to lack of drainage facilities
 C : Marginal suitable due to limited factors other than drainage conditions
 - : Not suitable

Location of Non-granary Irrigation Selangor



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

Location of Non-granary Irrigation Scheme Selangor



PERAK

NERAM

JONG KARANG
IRRIGATION PROJECT

R. Tenggi

KUALA SELANGOR

TG. KARANG

R. Selangor

KUALA SELANGOR

101°30'

N

BUKIT FRASER

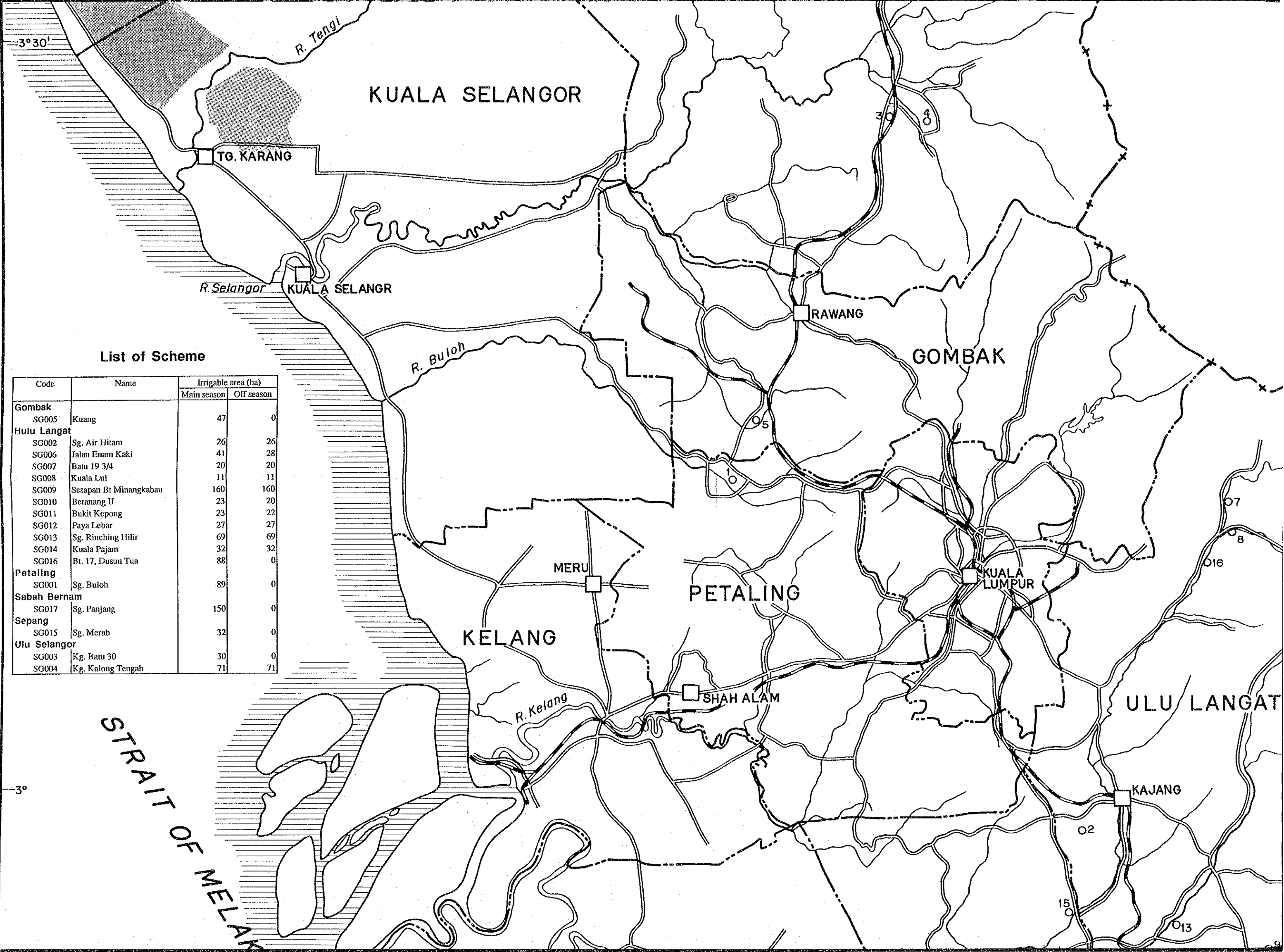
TG. MALTM

ULU SELANGOR

K. KUBU
BAHARU

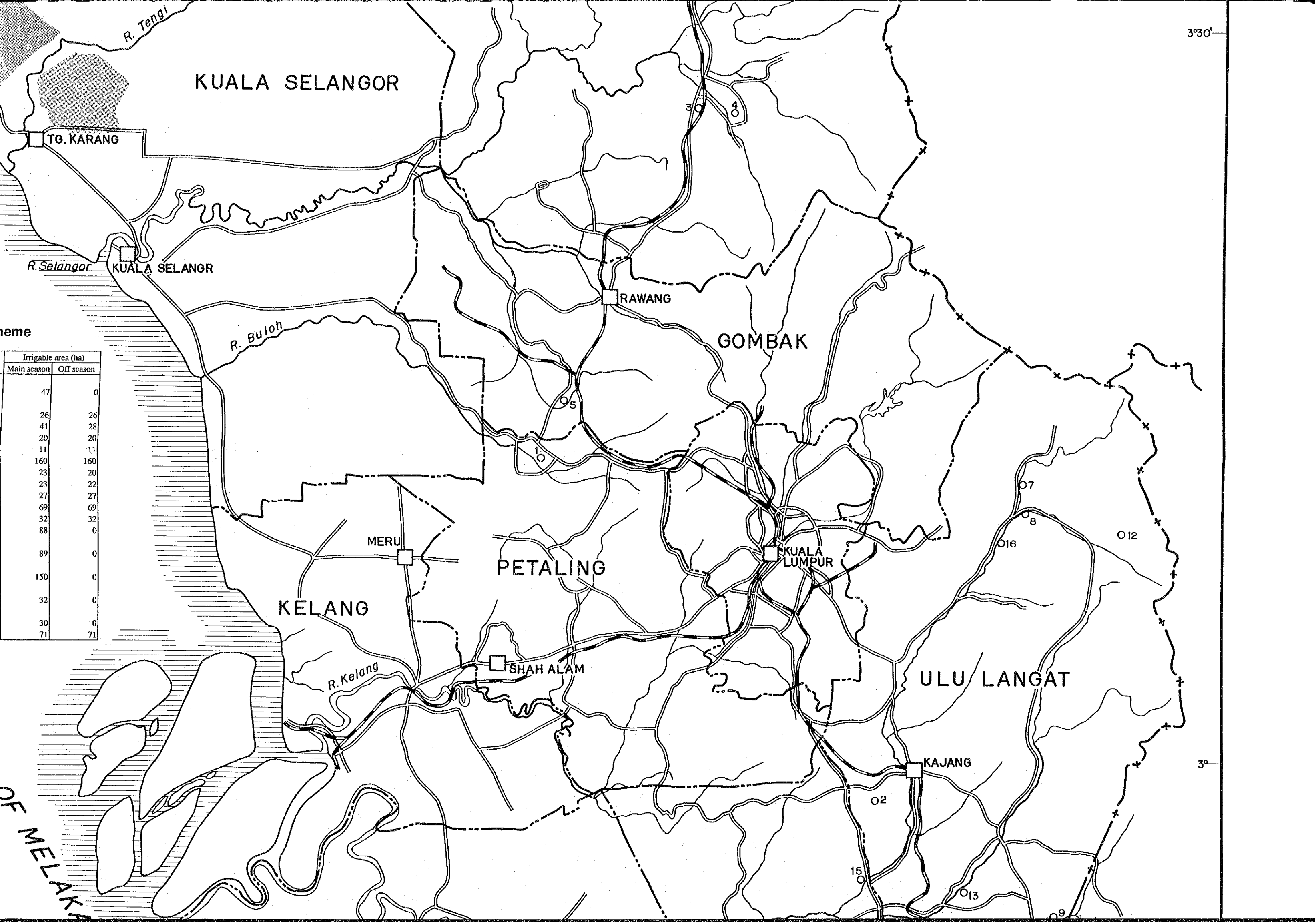
PAHANG

3°30'



List of Scheme

Code	Name	Irrigable area (ha)	
		Main season	Off season
Gombak			
SG005	Kuang	47	0
Hulu Langat			
SG002	Sg. Air Hitam	26	26
SG006	Jalan Enam Kaki	41	28
SG007	Batu 19 3/4	20	20
SG008	Kuala Lui	11	11
SG009	Sesapan Bt Minangkabau	160	160
SG010	Beranang II	23	20
SG011	Bukit Kepong	23	22
SG012	Paya Lebar	27	27
SG013	Sg. Rinching Hilir	69	69
SG014	Kuala Pajam	32	32
SG016	Bt. 17, Dusun Tua	88	0
Petaling			
SG001	Sg. Buloh	89	0
Sabah Bernam			
SG017	Sg. Panjang	150	0
Selangor			
SG015	Sg. Merab	32	0
Ulu Selangor			
SG003	Kg. Bau 30	30	0
SG004	Kg. Kalong Tengah	71	71



3°30'

KUALA SELANGOR

TG. KARANG

R. Selangor KUALA SELANGOR

RAWANG

GOMBAK

R. Buloh

name

name	Irrigable area (ha)	
	Main season	Off season
	47	0
	26	26
	41	28
	20	20
	11	11
	160	160
	23	20
	23	22
	27	27
	69	69
	32	32
	88	0
	89	0
	150	0
	32	0
	30	0
	71	71

MERU

PETALING

KUALA LUMPUR

KELANG

SHAH ALAM

R. Kelang

ULU LANGAT

KAJANG

3°

OF MELAKA

SG015	Kg. Meriam	72	
Ulu Selangor			
SG003	Kg. Batu 30	30	0
SG004	Kg. Kalong Tengah	71	71

STRAIT OF MELAKA

KELANG

ULU LANGAT

SHAH ALAM

KAJANG

KUALA LANGAT

SEPANG

NEGERI SE

MORIB

SEPANG

R. Kelang

R. Langat

R. Sepang

O2

15

O13

14









O10

6

O9

11

LEGEND

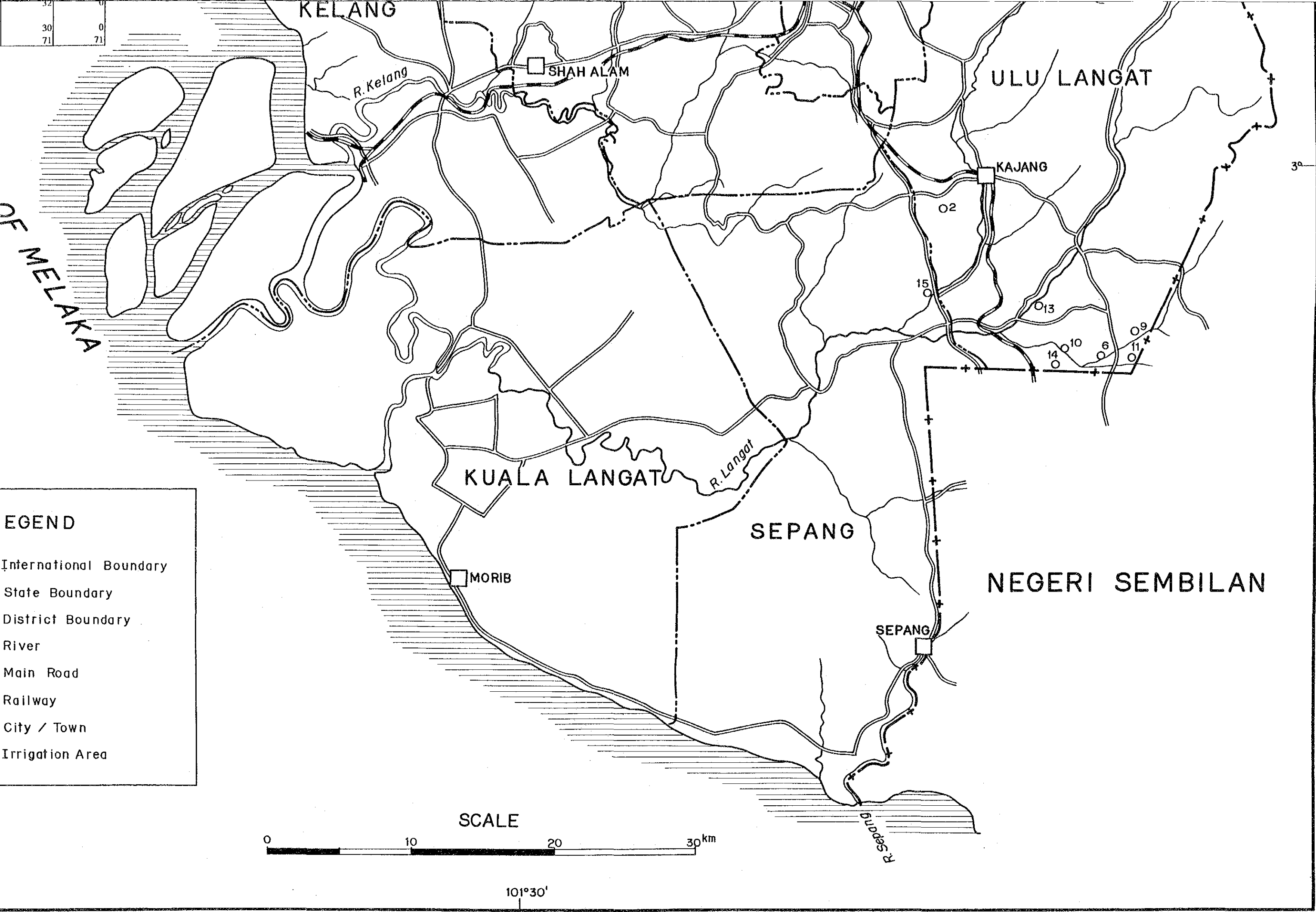
-  International Boundary
-  State Boundary
-  District Boundary
-  River
-  Main Road
-  Railway
-  City / Town
-  Irrigation Area

SCALE



101°30'

3°



KELANG

SHAH ALAM

ULU LANGAT

KAJANG

KUALA LANGAT

SEPANG

NEGERI SEMBILAN

MORIB

SEPANG

SCALE



101°30'

3°

NE MELAKKA

EGEND

- International Boundary
- State Boundary
- District Boundary
- River
- Main Road
- Railway
- City / Town
- Irrigation Area

JICA