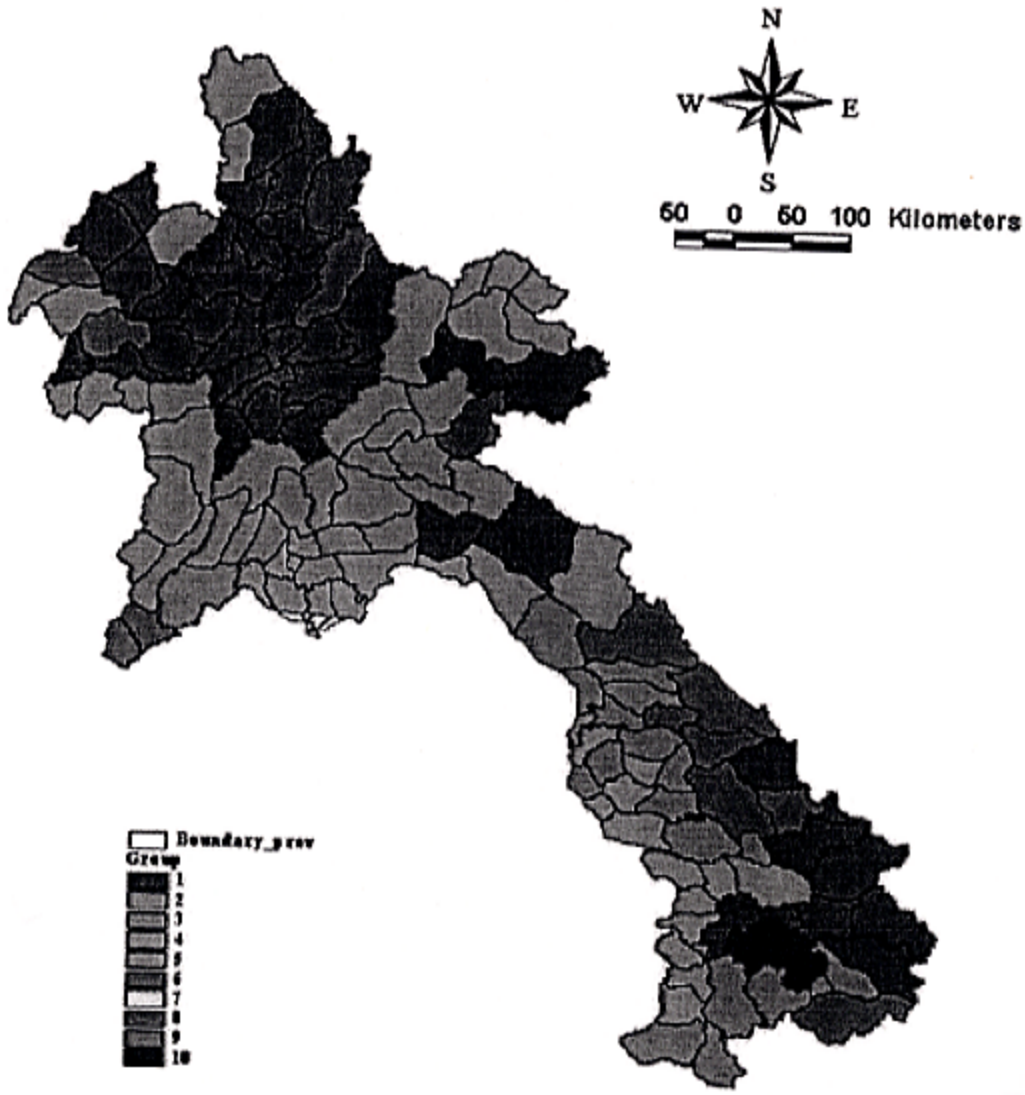
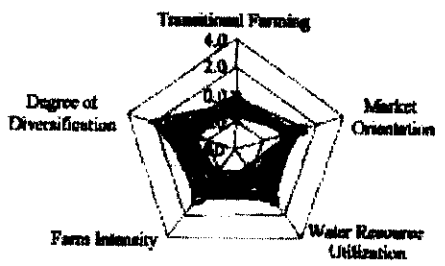
Grouping of Districts



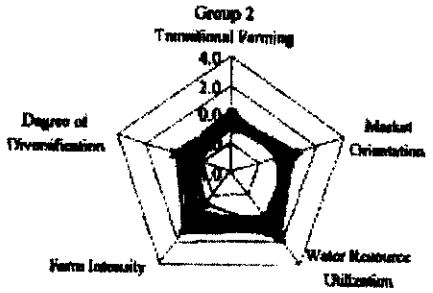
Based on the Principal Compenents Analysis of the Agricultural Census Data 1999

Radar Charts of Each Group

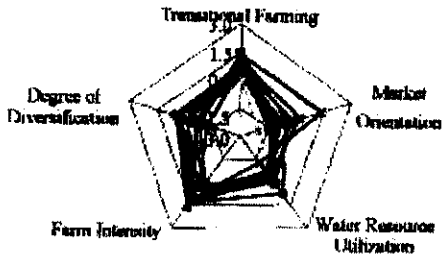
Group 1



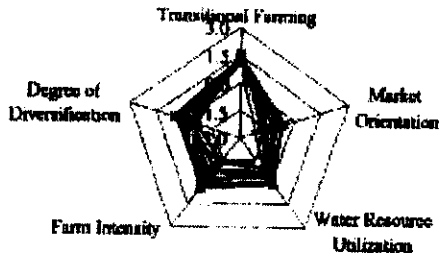
Group 2



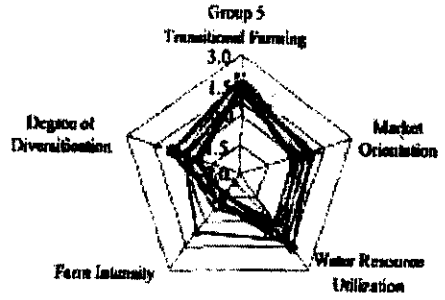
Group 3



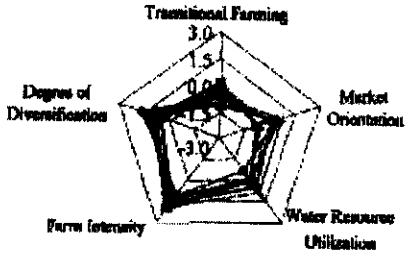
Group 4



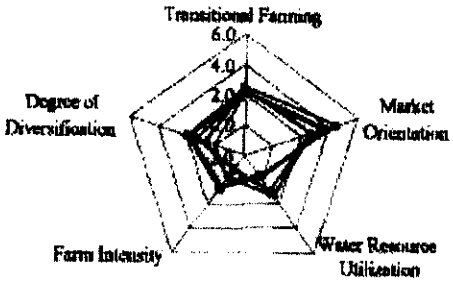
Group 5



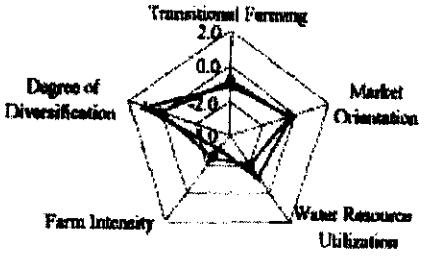
Group 6



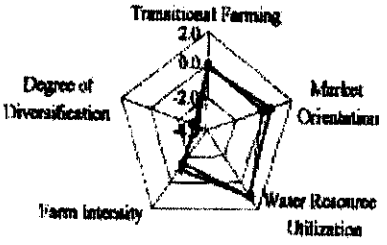
Group 7



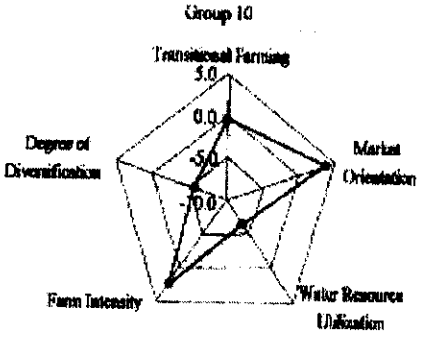
Group 8



Group 9



Group 10



Assessment of Agricultural Potential in Lao PDR

The objective of agriculture potential assessment is to identify the agriculture potenti Lao PDR in terms of lowland rice, upland crops, tree crops and grazing land **at preliminary level** . The assessment has been carried out using existing digital data, na forest cover and land use, soil, climatic condition, topographic condition, and unexpl ordnance (UXO).

The assessment suggests that the total potential area for annual and perennial crops is ar 3.1 million ha comparing to 1.0 million ha of existing agriculture land as specified in the Agriculture Statistics, 1975-2000. It is therefore judged that the further expansion o million ha is possible in terms of annual and perennial crop cultivation.

The following files present the details of GIS assessment of agricultural potential.

Assessment of Agricultural Potential in Lao PDR

Analytical Procedure

1. Introduction

As a first step of the assessment, the present land use is classified into potential are agriculture and grazing land. Secondly, the agriculture potential area is classified into potential area for lowland rice, upland crops and tree crops taking into consideration of data, slope conditions and climatic condition. Finally, the UXO data is overlaid on the a potential areas to analyze the relationship between UXO risk and agriculture potential. these steps, the geological information system (GIS) using a software of "Arc View Ve 3.2" has been applied. The detailed methodology including classification criteria and fin are explained below.

2. Data Used in the Assessment

The following data were collected from various concerned agencies and applied t assessment of agriculture potentials.

GIS Data Used for the Agriculture Potential Assessment

Data Type	Description of Data	Data Source	Data Form
Basic meteorological data	Annual and monthly precipitation at 42 meteorological and 38 hydrological stations. Monthly temperature data at 42 meteorological stations.	Meteorological and Hydrological Department	GIS point dat
Elevation and slope	Digital Elevation Model (DEM) of 50 and 250 m grid in all Laos Slope of 50 and 250 m grid in all Laos	NAFRI JICA S.T.	GIS grid data
Forest cover and land use	Forest cover and land use in 30 classifications including shifting cultivation of 1993 and 1997 Land use (NOFIP) in 16 classifications of 1992 Land cover change between 1993 and 1997 by district (forest cover, agricultural land, shifting cultivation, grassland)	NAFRI JICA S.T.	GIS grid data GIS polygon data
Administrative boundary of provinces and districts	District boundary containing 141 districts Province boundary containing 18 provinces	National Geographical Department	GIS polygon data
Soil Map	42 classifications according to the FAO criteria Each polygon has pH, nutrients, soil texture, soil depth	SSLCC	GIS polygon data
Unexploded Ordnance	Villages which have high risk of unexploded ordnance	UXO Lao	GIS point dat

3. Assessment Methodology

(1) Identification of Agriculture Potential Area

The forest cover and land use map prepared in 1997 is applied for GIS analysis of pr land use. A total of 30 classifications in the map are reclassified into five categories, na forest area, agriculture area, sifting cultivation area, shrub & grassland, and other lan The agriculture potential for crop production and grazing land is examined in the above categories based on the following criteria.

1) Forest area:Basically no potentials for agriculture
2) Agriculture Area:Potential area for crop production.
3) Shifting Cultivation:Potential area for crop production. However, if the slope is more 75% it
was excluded.
4) Shrub and Grassland:Potential area for grazing land. However, if the slope is more 75% it
was excluded.
5) Other land use (Built up area, swamp area, river and water body etc.):
Basically no potentials for agriculture

After the above assessment, the following factors are examined for identificatio potential area
of each crop group, namely: lowland rice, upland crop and tree crops.

1) Climactic Condition:annual mean rainfall and temperature
2) Topographic Condition:slope
3) Soil:texture of top soil, soil depth and pH

Using above factors, the identification criteria for potential area of each crop gro established based on previous studies and after discussions with NAFRI staff.

Criteria of Identification of Potential Area by Crop Groups

Item	Lowland Rice	Upland Crops	Tree Crops
Temperature (□)F	More than 18□□ and Less than 35 □□	<35 □□	<35 □□
Rainfall (mm)	>800	>500	>500
pH	4.5-8.0	4.5-8.5	4.5-8.5
Soil Survey Result	Area occupied by rock shall be excluded.		
Soil Depth (cm)	> 30 cm	> 30 cm	> 100 cm
Soil Texture of Top Soil	All except LS (Loamy Sand)	All except HC (Heavy Clay)	All except HC (Heavy Clay)
Slope Classification (Degree)	Less than 4.5 degree (8%)	Less than 16.5 degree (30%)	Less than 37 degree (75%)

(2) Assessment of UXO Risk
UXO LAO Operations Section processed UXO risk data. The map represents UXO risk combination of Level One (General) survey results and historical records of bombardment provided by the U.S. Department of Defense, Office of Humanit Assistance and De-mining.

Level One Survey:
UXO Program Office has conducted Level One Survey in 15 of 18 provinces. Level Survey was not conducted in Oudomxay (04), Bokeo (05), and Sayabury (08) province the Level One Survey, Comprehensive village interviews were conducted in 93 of districts. Based on the result of the Level One Survey, cells that are within five (5) kilo distance from a village reporting UXO impact (high, moderate, or low) have been assign value of one (1). All other cells have been assigned a value of zero (0).

One (1) = UXO Impact in Village (5 km radius)
Zero (0) = no UXO Impact in Village

Air Bombardment:
Derived from historical records of air bombardment provided by the U.S. Departme Defense, Office of Humanitarian Assistance and De-mining. A density map of bombardment was created from the vector (point) data of U.S. historical records. The de map shows the number of bombing records per square kilometer.

One (1) = density greater than 0.25 bombing records per km.sq.
Zero (0) = density less than 0.25 bombing records per km.sq.

These two values were combined to produce a national map of UXO Risk. UXO Ri depicted on a scale from zero (0) to two (2) as follows:

Two (2):UXO Risk is high, UXO clearance will be required prior to development
One (1):UXO Risk is probable, UXO clearance is strongly recommended
Zero (0): UXO Risk is minimal, but UXO survey is recommended

4. Outputs of Assessment for Agriculture Potential
Based on the above process, the agriculture potential maps with UXO risk for lowland upland crops, tree crops and grazing land are illustrated in Figures of

- Potential for Lowland Rice;
- Potential for Upland Crops;
- Potential for Tree Crops;
- Potential for Grazing Land;

The extent area of each potential and UXO risk is summarized as follows:

Extent of Agriculture Potential Area for Each Crop Group and Grazing Land

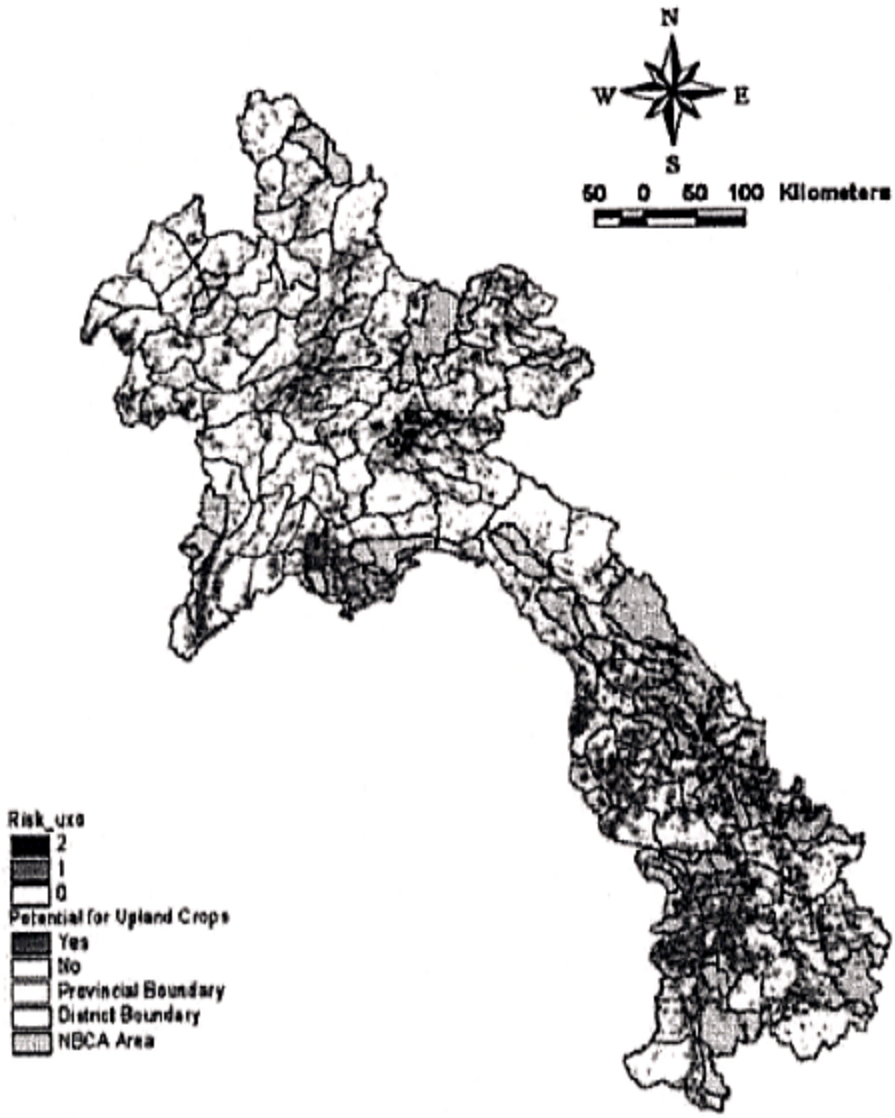
	Area ('000 ha)	Proportion (
Potential Area for Crops	3,120	13.2
- For Lowland Rice & Upland Crops & Tree Crops	1,583	6.7
- For Lowland Rice & Upland Crops	360	1.5
- For Lowland Rice & Tree Crops	695	2.9
- For Lowland Rice Only	92	0.4
- For Upland Crops Only	195	0.8
- For Tree Crops Only	195	0.8
Potential Area for Grazing Land	1,093	4.6
Less Agriculture Potential Area	19,467	82.2
Total	**23,680**	**100.0**

Extent of UXO Risk Area

UXO Risk	Area ('000 ha)	Proportion (%)
High	630	2.7%
Probable	3,260	13.8%
Minimal	19,790	83.6%
Total	23,680	100.0%

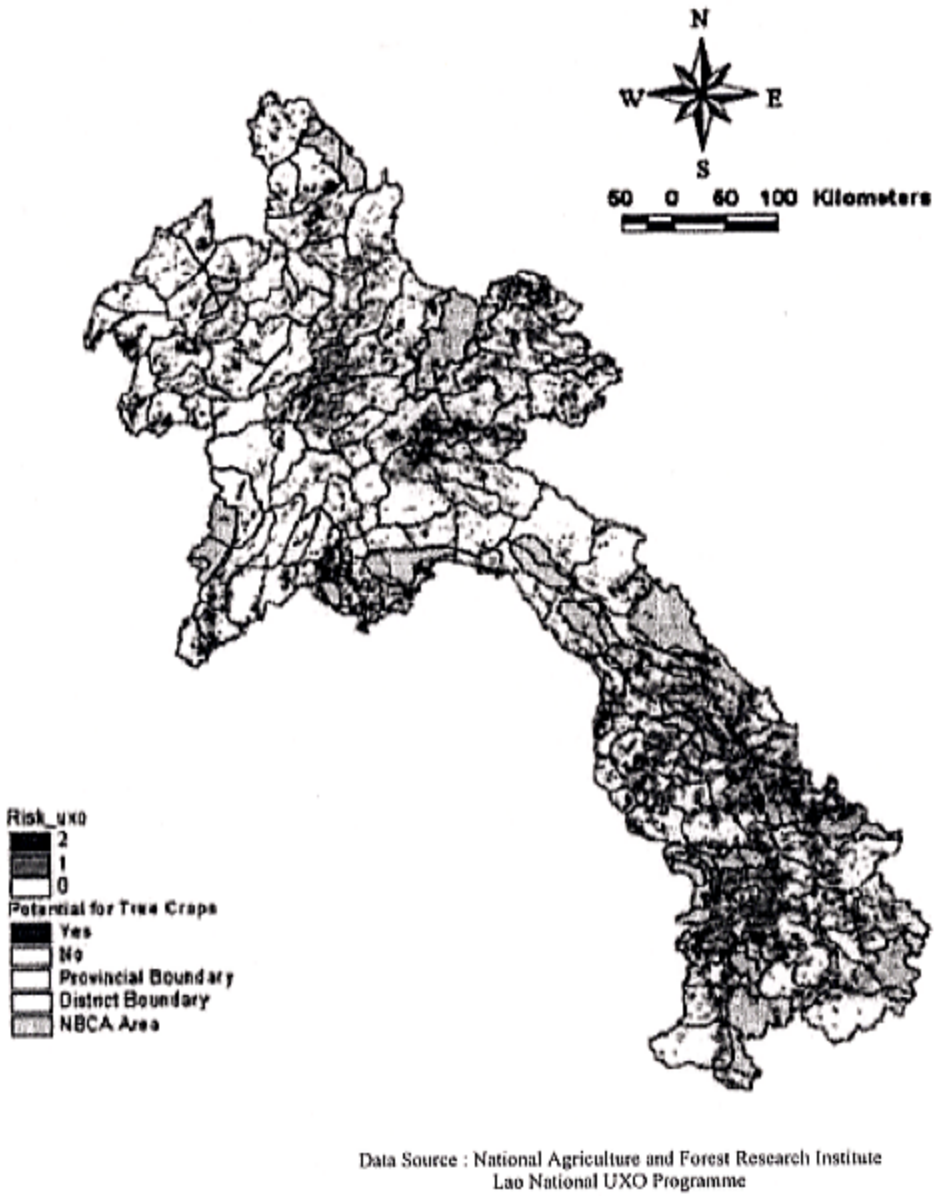
The above table shows that the total potential area for annual and perennial crops is ar 3.1 million ha comparing to 1.0 million ha of existing agriculture land as specified in the Agriculture Statistics, 1975-2000. It is therefore judged that the further expansion of million ha is possible in terms of annual and perennial crop cultivation. It is also noted the slope classification is very preliminary level using 250 m grid data and accordingly micro relief cannot be identified fully. Therefore, potential area of lowland rice mig over-estimation since lowland rice cannot be cultivated in the micro relief.

Potential for Upland Crops



Data Source : National Agriculture and Forest Research Institute
Lao National UXO Programme

Potential for Tree Crops



Data Source : National Agriculture and Forest Research Institute
Lao National UXO Programme