

Figure 2.17 Zoning for Agricultural Development

Table 2.18(1) Land Utilization by Agricultural Zone

	Zone 1 Large-scale irrigation areas	Zone 2 Rain-fed paddy areas	Zone 3 Rain-fed upland crop areas	Zone 3 Phu Phan Mountain and hilly areas	Zone 5 Mekong River-side fertile areas
Location	Large-scale irrigated area in Sakon Nakhon and Kalasin	Rain-fed areas mainly in Nakhon Phanom, Sakon Nakhon and Kalasin	Inland areas mainly in Mukdahan and Kalasin	Phu Phan Mountains and other mountainous areas and their foot areas	The area along Mekong River
Soil	Low alluvium terraces, High alluvium terraces and fans Suitable for paddy and upland crops	Low alluvium terraces, High alluvium terraces and fans Suitable for paddy	Low alluvium terraces, High alluvium terraces and fans Suitable for paddy and upland crops	Hills and mountains Not suitable for cultivation	Flood plains of recent river alluvium Suitable for paddy, upland crops
Rainfall	Moderate 1100-1500 mm	Moderate 1100-1500 mm	High 1500 mm	High 1500 mm	High 2000 mm
Water Availability in Dry Season	Irrigation	Farm pond and shallow well	Medium- and small-scale irrigation farm pond and shallow well	No water	Pumping irrigation
Yield	High	Moderate	Low	Low	High
Diversification	Diversified	Mono-cultured	Mono-cultured	Mono-cultured	Diversified
Current Major Crops	Rice, vegetable, ground nuts	Rice	cassava, sugar cane, para-rubber	Cassava, fruits	Rice, vegetable, fruits, flowers, para-rubber
Agricultural Problems	Marketing Crop diversification Quality assurance and control of products	Water shortage Lower yield	Water shortage Lower yield	Conflict to natural conservation	Water resource management
Environmental Function		Water retention Drain off accumulated salt contents	Soil erosion Deforestation	Water resource Wildlife Water retention Deforestation	
Previous Typical Projects	Irrigation development projects Contract farming	Off-farming occupation program Mixed farming Livestock production	Off-farming occupation program Crop diversification	Reforestation Crop diversification	DEDP pumping projects Fishery promotion Mixed farming

Table 2.18(2) Land Utilization by Agricultural Zone

	Zone 1 Large-scale irrigation areas	Zone 2 Rain-fed paddy areas	Zone 3 Rain-fed upland crop areas	Zone 3 Phu Phan Mountain and hilly areas	Zone 5 Mekong River-side fertile areas
Agricultural Development Policy	Improvement of efficiency of production in the dry season	Mixed -farming	Crop conversion to para-rubber, vegetables and fruits	Conservation	Diversification and crop conversion
Possible crops	Fish culture Vegetables	Chicken Fish Vegetables and fruits	Livestock Vegetables and fruits	Forest products	Fish Vegetables and fruits Flowers
Constraints	Marketing	Technology transfer Water shortage in dry season	Technology transfer Water shortage in dry season	Public Participation	

(4) Urban Area

Urban economy is of importance to provide off-farm job opportunities in the NBR as well as to build a sound basis for inviting investment to the region. It also strengthens local markets for agricultural products. Therefore, fostering local urban centers is one of the most important tools of regional development. In relation to the Indochina East-West Corridor, there are several potentials to develop urban economy including transportation, trade and services, so that appropriate urban development is required in the long-term perspective.

For these purposes, existing urban areas of local cities should be expanded properly to prepare future urban population growth with adequate urban infrastructure. Since the existing cities are too small to initiate the development of the NBR, infrastructure-led urban development should be taken into account. Detailed discussions are made in Chapter 14.

(5) Network

To fully utilize local resources based on the urban economy, it is necessary to strengthen urban network with different levels. To strengthen internal urban linkage, "NBR urban alliance system" is proposed, while for strengthening external linkages, linkage to Khon Kaen, Bangkok/Eastern Seaboard, and Laos and Vietnam are proposed as shown in Figure 2.18.

1) Internal Urban Linkage

The NBR has no core urban centers, resulting in the lack of adequate markets, urban services, investment funds and entrepreneurs. Although Sakon Nakhon is the center of education and administration while Nakhon Phanom and Mukdahan are the center of industry and border trade, there is no city having the potential of being an adequate size of urban agglomeration to lead the region in the future. Instead of fostering a single large urban center in the NBR, an “NBR urban alliance system,” which is a group of urban centers with different functions with special economic and social linkages, is proposed. Sakon Nakhon will be developed as the center of human resource development and research and development, Mukdahan will be developed as the center of border trade and distribution center and Nakhon Phanom will be developed as industrial and tourism center. These cities will be linked by a highway and advanced telecommunication network (by optic fiber cable). Certain public services should be integrated to provide services such as public health referral system and community development experts system.

2) Linkage to Khon Kaen

Due to its proximity to Khon Kaen, Kalasin belongs to Khon Kaen economic zone. Therefore, Kalasin should be positioned in the Khon Kaen economy. Kalasin has an advantageous location on the East West Corridor with plenty of agricultural products and cheaper land cost, so that Kalasin will be the industrial relocation center and agro-processing center to Khon Kaen.

3) Linkage to Bangkok and the Eastern Seaboard (ESB)

To strengthen linkage to Bangkok and the ESB, in particular transportation and physical distribution aspects, a highway connecting Mukdahan and Bangkok/the ESB should be developed on schedule.

4) Linkage to Lao and Vietnam

Mukdahan and Nakhon Phanom will be the main gateway to Laos and Vietnam, and 4 minor crossing points will be developed across the Mekong River.

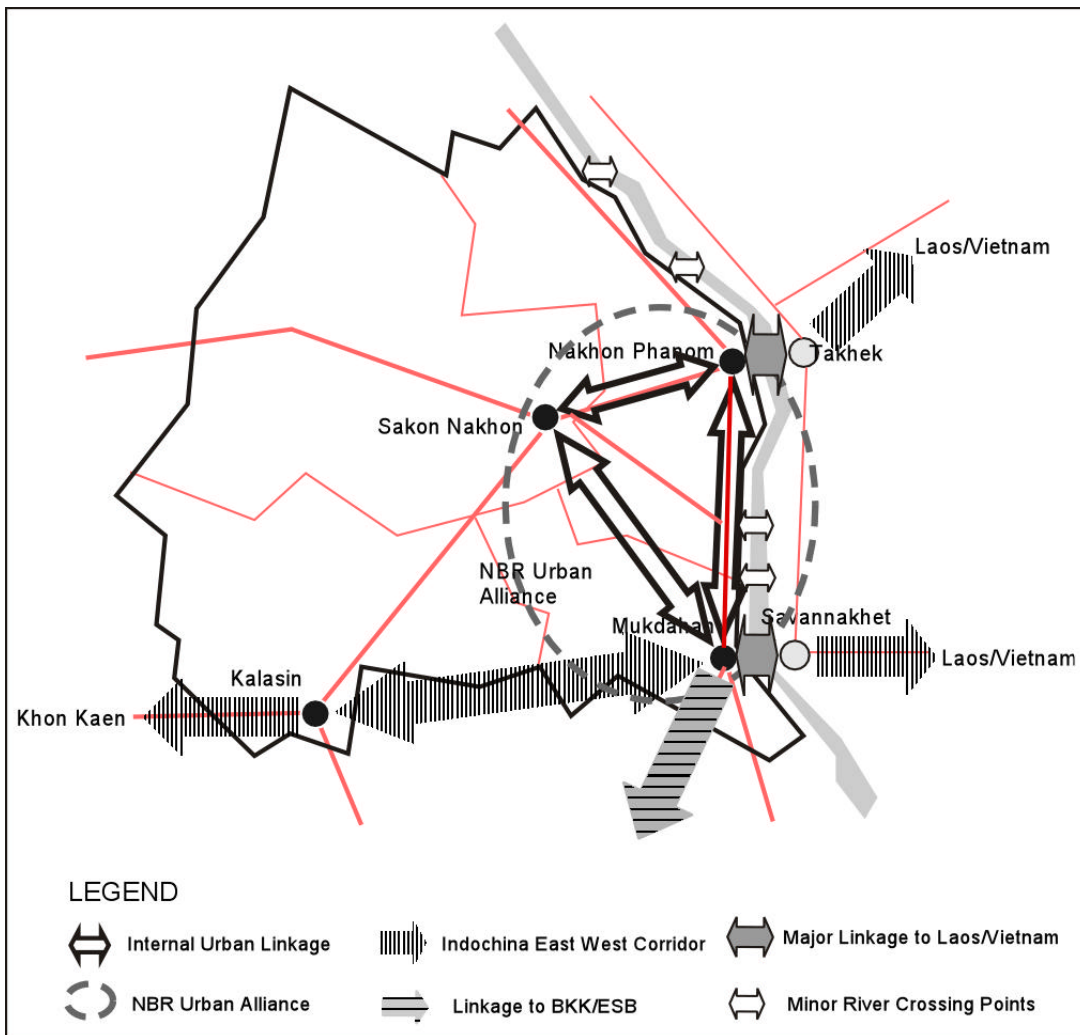


Figure 2.18 Concept of Urban Networking for the NBR Development

2.6.2 Proposed Land Use in 2020

(1) Proposed Land Use

Figure 2.19 shows proposed future land use plan based on the land use concept described in 2.6.2.

10,500 Km² or 40.6% of the total area of NBR is designated as paddy field including mixed farming and intensive farming to maintain the basis of self-reliance life style. Para-rubber, vegetables and fruits areas increasingly expand to 231 Km² and 540 Km², respectively to diversify the products of the NBR, while upland crops area is limited to 2,328 Km². Grassland for livestock, including fodder areas and ranches, will be 1,340 Km².

In accordance with urban population growth, 950 Km² of the land is allocated for the built-up areas including urban area and roads etc.

Table 2.19 Future Land Use Composition in 2020

Land Use	Area (km ²)	%
Paddy (including mixed farming and intensive farming)	10,584	40.6
Upland crops	2,328	8.9
Para-rubber	231	0.9
Vegetables and Fruits	540	2.1
Forest (including conservation area)	9,345	35.8
Grass land (for livestock)	1,340	5.1
Built-up area	950	3.7
Water bodies	768	2.9
Total	26,086	100.0

(2) Land Use Changes

Table 2.20 shows land use changes between current land use and future land use in 2020. Crop conversion and diversification is promoted in the Rain-fed areas to cultivate para-rubber, vegetables & fruits, other crops and community forests. Agricultural diversification is also promoted in Mekong Riverside fertile area.

In large-scale irrigation area, intensive farming including crop diversification is promoted. Integrated (mixed) farming system is promoted in paddy field in rain-fed paddy area, based on paddy production.

Table 2.20 Land Use Changes between 2000 and 2020

Agricultural Zoning	Land Use in 2000		Land use in 2020				
1 Large Scale Irrigation Area	Paddy etc	1,154	4.4%	Intensive farming (diversified farming)	1,154	4.4%	
2 Rain-fed Paddy Area	Paddy	9,470	36.3%	Mixed Farming (based on paddy)	9,430	36.1%	
3 Rain-fed Upland Area	Field crops Uncultivated land	4,670	17.9%	Crop Diversification and Conservation	4,629	17.7%	
		3,560	13.6%		Cassava	464	1.8%
		1,110	4.3%		Sugarcane	246	0.9%
			0.0%		Para-rubber	231	0.9%
			0.0%		Veg & Fruits	195	0.7%
			0.0%		Other crops	1,423	5.5%
4 Phu Phan Mountains and Hilly Area	Forest Grass land	8,615	33.0%	Community Forest	1,471	5.6%	
		6,894	26.4%	Conservation	599	2.3%	
		1,721	6.6%	Conservation and Agro-Forestry	8,615	33.0%	
			0.0%	Ordinal Forst	2,032	7.8%	
			0.0%	Community Forest	1,527	5.9%	
5 Mekong River-side Fertile Area	Built-up Area (urban and roads)	560	2.1%	Buffer Forest	875	3.4%	
		849	3.3%	National Parks, Reserve	4,181	16.0%	
	Water	768	2.9%	Livestock (grass land)	1,340	5.1%	
	Total	26,086	100.0%	Veg & Fruits, Fishery, Paddy	540	2.1%	
				Built-up Area (urban and roads)	950	3.6%	
				Water	768	2.9%	
				Total	26,086	100.0%	