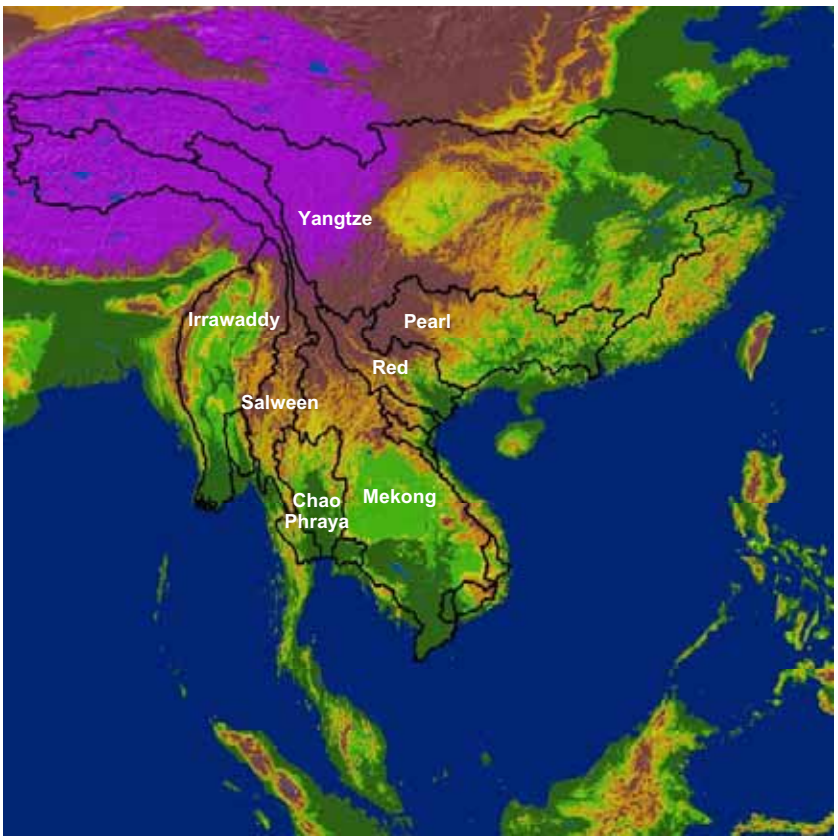
Comparative assessment of resource and market access of the poor in upland zones of the Greater Mekong Region



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Acronyms

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BAAC	Bank for Agriculture and Agricultural Cooperatives, Thailand
BMN	Basic minimum needs indicators, Thailand
CDD	Community Development Department, Thailand
CED	Communes in extreme difficulties, Vietnam
CEO	Chief executive officer
CGIAR	Consultative Group for International Agricultural Research
CIESIN	Center for International Earth Science Information Network (Columbia University)
CIFOR	Center for International Forestry Research
CMU	Chiang Mai University
CSI	Crop suitability index
DEM	Digital elevation model
DLD	Department of Land Development (same as LDD), Thailand
DNP	Department of National Parks, Wildlife & Plant Conservation, Thailand
DOAE	Department of Agricultural Extension, Thailand
DSSARMS	Decision support system for agricultural resource management and services
EC-JRC	European Commission Joint Research Centre
EPS	Electrical pumping station
ESRI	Environmental Systems Research Institute
FAO	Food and Agriculture Organization of the United Nations
FGT	Foster, Greer, Thorbecke family of poverty measures
FRA	Forest Resource Assessment (FAO)
GATT	Global Agreement on Tariffs and Trade
GDP	Gross domestic product
GIS	Geographic information system
GISTDA	Geo-Informatics and Space Technology Development Agency, Thailand
GLCF	Global Land Cover Facility
GMO	Genetically modified organism
GMR	Greater Mekong Region
GMS	Greater Mekong Subregion
GPP	Gross provincial product
GRP	Gross regional product
GRUMP	Global rural-urban migration project
GTZ	German technical cooperation agency
HEPR	Hunger eradication and poverty reduction program, Vietnam
HH	Household
HUAF	Hue Univeristy of Agriculture and Forestry, Vietnam
ICRAF	World Agroforestry Centre (formerly International Centre for Research in Agororestry)
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development, London
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
Lao PDR	Lao People's Democratic Republic
LAOPA	Lao PDR poverty assessment
LDD	Land Development Department, Thailand
LECS	Lao expenditure and consumption survey
LMU	Land mapping units
LNTA	Lao National Tourism Authority
MAF	Ministry of Agriculture and Forestry, Lao PDR
MARD	Ministry of Agriculture and Rural Development, Vietnam
masl	meters above sea level
MCDM	Multi-criteria decision making approach
MMSEA	Montane mainland Southeast Asia
MOLISA	Ministry of Labor, Invalid & Social Affairs, Vietnam
MONRE	Ministry of Natural Resources and Environment
MOP	Ministry of Planning, Cambodia
MSEA	Mainland Southeast Asia

NAFRI	National Agriculture and Forestry Research Institute, Lao PDR
NASA	United States National Aeronautics and Space Administration
NECTEC	National Electronics and Computer Technology Center, Thailand
NESDB	National Economic and Social Development Board, Thailand
NGO	Non-government organization
NGPES	National growth & poverty eradication strategy, Lao PDR
NOAA	National Oceanic and Atmospheric Administration
NOMAFSI	Northern mountain agriculture and forestry science institute, Vietnam
NPA	National protected area
NRD2C	National rural development committee village-level database, Thailand
NSC	National statistics center, Lao PDR
NSEC	North-South economic corridor (GMS project)
NTFP	non-timber forest product
OAE	Office of Agricultural Economics, Thailand
ONEP	Office of Natural Resources Policy and Planning, Thailand
PCED	Poor communes with extreme difficulties in mountainous and remote areas, Vietnam
PPP	Purchasing power parity
PRA	Participatory rural appraisal
PVC	Poly-vinyl chloride (type of plastic)
RBO	River basin organization
RDViet	Rural development and environment of Vietnam project
RFD	Royal Forest Department, Thailand
RID	Royal Irrigation Department, Thailand
RPF	Royal Project Foundation, Thailand
RRIT	Rubber Research Institute of Thailand
RSBO	River sub-basin organization
RTSD	Royal Thai Survey Department
SAE	Small area estimates
SAREC	Swedish Agency in Research and Education Cooperation
SDI	Spatial Data Initiative of the CGIAR
SEDAC	Socioeconomic Data and Applications Center (Columbia University)
Sida	Swedish International Development Agency
SLU	Swedish University of Agricultural Sciences, Uppsala
SOP	Stages of Progress method
SRTM	Space shuttle reconnaisance terrain mission
SWOT	Strengths, weaknesses, opportunities, threats analysis method
TAO	Tambon Administration Organization, Thailand
TAT	Tourism Authority of Thailand
THB	Thai baht
TRF	Thailand Research Fund
UMIACS	University of Maryland Institute for Advanced Computer Studies
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Economic, Social and Cultural Organization
UNSD	United Nations Statistical Division
UPB	Upper Ping Basin
USD	United States dollars
USDA	United States Department of Agriculture
USER	Unit for Social and Environmental Research, CMU Faculty of Social Sciences
USGS	United States Geological Survey
VBARD	Vietnam Bank for Agriculture and Rural Development
VBSP	Vietnam Bank for Social Policy
VCCI	Vietnam Chamber of Commerce and Industry
VCF	Vegetation continuous fields datasets
VND	Vietnamese dong
WCMC	World Conservation Monitoring Center
WCPA	World Commission on Protected Areas
WFP	World Food Programme
WRI	World Resources Institute
WTO	World Trade Organization
WWF	World Wildlife Fund

1. Introduction & Overview

Efforts to reduce rural poverty in disadvantaged upland zones of the Greater Mekong Region (GMR) are taking place in the context of evolving regional trends toward greater restrictions on upland land use induced by environmental concerns, generally more pluralistic and participatory multi-level governance (despite periodic setbacks), and an increasingly globalized economy. Indeed, national and regional development policies emphasize investments in infrastructure that are expected to bring upland rural communities into the growing market economy. Many skeptics, however, are concerned that poor minority communities cannot effectively engage in production for globalizing markets, that national and local institutions will not be able to provide appropriate governance and information, and that market economics will only bring additional hardship and deterioration of environmental services. How to address these concerns is one of the greatest development challenges in the region today.

The World Agroforestry Centre (ICRAF) and colleagues at Chiang Mai University have joined with researchers working in upland areas of Thailand, Lao PDR, Vietnam and Yunnan, China in formulating and implementing a project that has sought to advance how we try to understand and address these issues. The Rockefeller Foundation has kindly provided funding support for these efforts.

As described in this report, the project has sought to build on promising innovative efforts in the region to combine livelihood approaches with modern information systems technologies, in order to improve understanding of how upland households and communities have responded to and been affected by market opportunities. In the process, we have sought to provide examples of how emerging spatial information systems can be extended and adapted to help address particular conditions and problems faced by small upland farmers and enterprises. We have also explored alternative future scenarios related to current debate about directions development should take in the region, in order to more dispassionately assess likely impacts on patterns of livelihood opportunities and landscape transformation.

Major methods and information systems include a regional-level spatial and statistical database constructed from a variety of global and national sources, and a regional-level collection of secondary materials. At more specific local levels, we have built on previous and current work in the Upper Ping river basin of northern Thailand, as well as coordinated complementary case studies at sites in Vietnam, Laos and Yunnan, China, and secondary materials on each country. These components have provided the basis for the preliminary comparative assessment of livelihood and landscape transformation processes, conditions and patterns presented in this report. We hope our preliminary work will contribute to strengthening studies of local change and interpretations of region-wide analyses, with the goal of further improving both livelihoods and landscapes in upland zones for the benefit of all in the region.

1.1 Uplands, markets and poverty in the GMR

One of the basic underlying hypotheses of this project has been that there are significant differences between upland and lowland zones of the area known as the Greater Mekong Region that relate to market and resource access of the poor. Thus, our initial framework re-

quired that we clearly identify the region and its upland zones, as well as key dimensions of regional economic change that have made market integration an issue.

1.1.1 General characteristics of upland mountain regions

We began at the broadest level with global definitions of upland mountain areas and widely recognized dimensions of their biophysical and socio-cultural characteristics that distinguish them from other parts of the world.

Biophysical dimensions of upland mountain regions

From a global biophysical point of view, mountains are seen as areas with steep slopes and high elevations in relation to their surroundings. They include all areas with elevations greater than 2,500 m.a.s.l., areas higher than 1,500 meters with slopes steeper than 2 degrees, and areas of any elevation with slopes of >5 degrees or >300 meters above their surroundings, including plateaus and valleys within mountainous terrain. Mountain habitats support living organisms, animals (including humans) and plants, and they cover about 24% of the earth's surface. Chapter 13 of Agenda 21(1992) established mountains as a significant habitat.[1]

Since slope, aspect, and altitude determine fundamental biophysical characteristics of upland habitats, topographic diversity results in small-scale variations in physical environment. And at broader scales, latitude (distance from the equator), continentality (distance from oceans), and topographic features (direction and altitude) affect climate and local weather patterns, rendering some mountains almost permanently wet, others dry, and yet others highly seasonal. Complex geological conditions add more diversity and influence soil development, soil type, erosion processes, and vegetative cover. With climates varying according to altitude and exposure, mountain uplands have greater species richness than the lowlands when comparing similar areas. This richness decreases with increasing altitude, but isolation and environmental extremes restrict species' habitats. Globally, there are 10,000 species of flowering plants in the alpine belt alone, representing 4 percent of all higher plant species, even though the alpine belt covers only 3 percent of the earth's land area [Körner 1995].

Socio-cultural dimensions of upland mountain regions in Asia

The complex physical geography of upland mountain regions also promotes cultural diversity in languages, belief systems, architecture, settlement patterns, land use and livelihood practices. People have adapted in ways that demonstrate their intimate relationship with the environment and knowledge about plants, wildlife, vegetation, and ecosystems. The mountains provide them with environmental services (water, biodiversity, climate modulation, and carbon storage) and useful products (food, medicine, other non-timber forest products, rock building materials, etc.). Twelve percent (or about 720 million) of the global human population lives in mountain regions, and half of them are in the Asia-Pacific region. Of the 10 percent living above 2,500m, almost all – over 70 million – live in poverty and are vulnerable to food insecurity and mountain hazards, vulnerabilities, and risks [Jodha 2005].

[1] http://www.un.org/esa/sustdev/agenda21chapter13.htm

Different people interpret upland or mountain regions in different ways. Some see them as shrouded in mystery, a kind of frightening dungeon, with primitive people living in a wilderness. Others, such as the British author James Hilton [1933], describe a fictional Himalayan paradise, Shangri-la, which has become a myth and a synonym for Utopia in many languages and cultures. In reality, however, our knowledge of mountains is still far from complete and our understanding of relationships between human beings and the uplands, as well as between upland and lowland regions remains rife with misconceptions.

Landscapes in upland and mountain regions are generally mosaics of forests, home gardens, wetlands, crop lands, and alpine pastures: a range of habitats for many life forms and a diversity of livelihoods, from shifting cultivation to agropasture in high elevations, from rice terraces to tea gardens, from orchards to rubber plantations. Ecological complexity within and among different elevation zones leads to diverse survival systems and earning patterns as upland people rely on the overall landscape and its products for their livelihoods.

Over the centuries, people have used barter systems to exchange goods and services, maintaining genetic diversity and food security within the parameters of their traditional cultures. Merchants from Yunnan traveled the Tibetan plateau, Southeast Asia and South Asia for a thousand years. Caravans served as market structures and formed a socio-cultural network among upland and lowland communities. Mountains were as much pathways of migration and trade as barriers between uplands and lowlands.

Nevertheless, historical upland-lowland linkages have been shaped by political ideologies about land use and property rights developed in lowland areas. In the past, uplands were perceived by lowland people as sources of strategic resources for lowland development such as hydropower, timber, non-timber forest products, and minerals. Logging, mining, and power generation have been developed and operated by state-owned enterprises. Construction of large reservoirs has directly caused loss of biodiversity and resulted in many negative social impacts. Millions have been resettled or displaced from their original homes, and it may take generations for resettled people to adapt to their new environment. Thus, upland people are further marginalized and impoverished, while large state and private enterprises receive government resource concessions for real estate, resorts, and plantations.

1.1.2 Where are the upland zones of the Greater Mekong Region?

Upland zones of what is being called the Greater Mekong Region have also become collectively known as Montane Mainland Southeast Asia (MMSEA). Efforts to characterize MMSEA usually focus on its diversity, both in terms of the ecological patterns in its mountainous terrain, and the ethno linguistic composition of its inhabitants. MMSEA has also been witness to a long and complex history of geo-political dynamics dominated by waxing and waning empires centered primarily on lowland areas where irrigated paddy rice production could flourish. Often serving as a buffer zone between lowland empires, as a safe haven for those with different cultures or ideas, or as a refuge for those out of favor with or displaced by growing empires [Thongchai 1994; Wyatt 2003], MMSEA and its mountain forests have long provided livelihoods for its inhabitants through a considerable range of agroforestry techniques that evolved through centuries of local experience enriched by informa-

tion that flowed along trade routes, through kinship networks, or with evolving settlement patterns. In many parts of the MMSEA domain, ethnic groups settled into different altitude zones where their agroecosystems became adapted to local ecological characteristics and patterns of biodiversity distribution. While their livelihoods usually centered on self-reliance, diverse characteristics among their local domains also allowed them to identify products with value for trade or tribute through networks of social interaction that spanned the region. Thus, efforts to understand processes in MMSEA must of necessity explore relationships that span all relevant zones in the region.

Our explorations of the recent and current outcomes of these complex processes in the region have employed a regional database of mainland Southeast Asia developed under this project and a companion project conducted in collaboration with the East-West Center with funding support from the U.S. National Science Foundation. Particular focus in this database is on information that can help us understand important characteristics and major driving forces associated with change over space and time. This has helped us clarify and refine key terms used in our analytical framework:

While the terms "uplands" and "lowlands" are very commonly used in discussions and debate about a wide range of issues in this region, specific definition of these areas is often elusive. Our assessments under this project suggest that considerable clarification can be achieved through definitions based on a quite simple set of altitude zones. Since our approach seeks to move beyond the simple binary "upland-lowland" dichotomy, we have articulated the following zones. General relationships among them are depicted diagrammatically in Figure 1-1.

Lowland Zone. We define the lowland zone to include all areas with elevation below 300 m.a.s.l. And in order to capture some of the important variation within this zone, we go on to define two major subunits:

Coastal lowland zone. This zone is comprised of all areas below 100 m.a.s.l., which includes all major river delta areas, as well as adjacent low-lying areas that extend inland for considerable distances in major river valleys – to the tip of southern Laos in the Mekong, and to the border of Yunnan in the Red River Valley. These areas include the central base for many of the dominant empires in regional history, as well as the most widely-known "rice bowl" production areas for irrigated paddy rice. They are also susceptible to major flooding events, and especially areas nearest the coast are now of major concern regarding impacts of rises in sea level expected to be associated with global climate change.

Upper lowland zone. Areas between 100 to 300 m.a.s.l. are classified into this zone. While widespread production of paddy rice has also become a prominent feature of this zone, there are often more constraints associated with insufficient availability of irrigation water or more difficult soil conditions. At the same time, however, various naturally highly productive valley bottom lands also fall into this zone in more inland areas of the region;

Montane Zone. This zone includes all areas with elevations falling between 300 and 3,000 m.a.s.l. Our assessments confirm the relevance of this altitude range for defining the domain of "Montane Mainland Southeast Asia (MMSEA)" [Thomas 2002], which

also includes areas most commonly referenced as "uplands". However, we also believe it is important to further articulate this broad zone into three major sub-units:

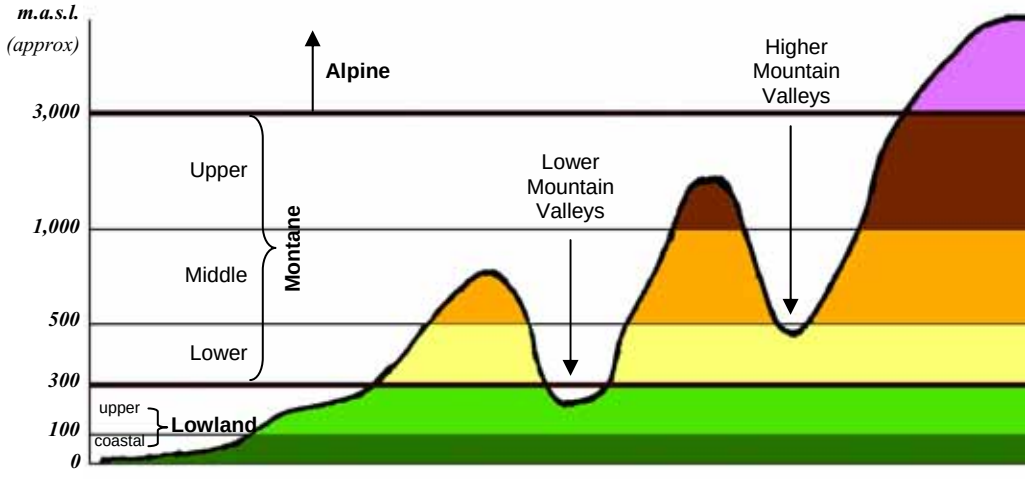
Lower montane zone. Areas in this zone fall between 300 to 500 m.a.s.l. This includes most areas commonly referred to as "uplands" in reference to "foothill" lands situated immediately above those developed into irrigated paddy. In some cases, various types of irrigation systems have sought to bring parts of these areas under paddy production, but constraints and costs are often high. More commonly, such areas are considered more appropriate for rainfed production of field or orchard crops, or for irrigated crops using systems other than bunded flooding.

Middle montane zone. This zone includes areas located between 500 to 1,000 m.a.s.l. These are usually in areas of more steeply sloping terrain, often with only small areas of valley bottom land where establishment of paddy rice is feasible. Many of the region's "composite swidden" agroecosystems evolved in this zone, often within minority cultures. Dominant lowland societies frequently view such types of systems as primitive and "inappropriate" forms of land use.

Upper montane zone. This zone includes areas between 1,000 to 3,000 m.a.s.l. Significant change in natural ecological conditions is found in this zone relative to lower altitude zones, which is associated with temperature and rainfall patterns. Land is often steeply sloping, and variations are frequently found in ethnic composition and the types of agroecosystems that were developed in these areas. Dominant lowland societies tend to believe that forest cover should be maximized in these areas in order to maintain regular stream flow patterns upon which lowland systems depend.

Alpine zone. This zone includes all areas above 3,000 m.a.s.l. Another ecological shift occurs in this zone, with coniferous forest becoming more prominent initially, above which large areas are located above the timberline for natural forest. Open shrublands, peat swamps and snowpack are major features of landscapes in this zone.

Figure 1-1. Generalized relationships among elevation zones



In order to help visualize the overall spatial patterns of these altitude zones, Figure 1-2 maps the zones across an area of 40 degrees longitude (85 to 125 degrees east) by 40 degrees latitude (0 to 40 degrees north), which is the maximum domain of our regional spatial database. As indicated in the map, the amount of spatial variation across this large region that is captured by this simple set of altitude zones is quite striking.

Figure 1-2. Key altitude zones of MSEA

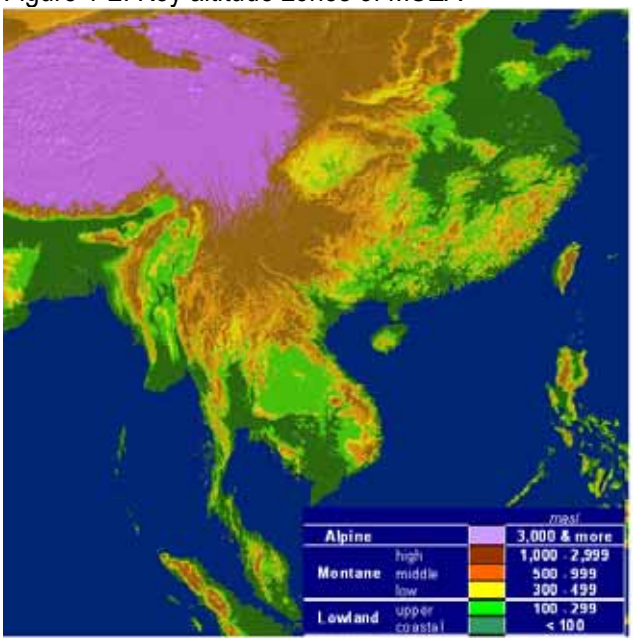


Figure 1-3. Major river basins of MSEA

Data: NASA SRTM, Processing: CGIAR-SDI
Interpretation: D. Thomas – Xu Jianchu

The term "Greater Mekong Region" implies that river basins are important for the region, and that there is some central role played by the Mekong River. Thus, having identified the altitude and spatial domains of montane and neighboring zones, we then turned to the role of major river basins in the region. The boundaries of the seven largest river basins contained in the window of our regional spatial database are displayed in Figure 1-3. These major basins can be grouped into two basic categories:

The "Big 3" river basins include the Yangtze, the Mekong and the Salween (Figure 1-3). These are by far the longest rivers in the region, and all have their upper origins in adjacent areas of the Tibetan Plateau. The basic consequence of this characteristic is that river flows are influenced by the slow release of water stored in the ice, snow and peat swamps of Tibet. Although the proportion of the total stream flow contributed by this source may be quite small for the Yangtze and especially for the Mekong, it can be of strategic importance for downstream ecosystems and populations, and especially for the period of low flows that occurs during the dry season of their strongly monsoonal climate.

These three river basins are also quite different. Since the Yangtze is a huge basin that covers about 2 million square kilometers, although source areas in the alpine altitude zone are large,

they contribute only about 25 percent of total catchment area. Another 30 percent of the area is located in large lowland zone areas, while the rest is fairly evenly distributed among the three levels of montane altitude zones.

The Mekong is more skewed toward the lowlands, with only about 10 percent of its catchment area in the alpine zone, and about half located in lowland zones. Land area of the Salween river basin is skewed in the opposite direction, with about two-thirds located in the alpine zone, and only about 2 percent in lowland zones.

While the Yangtze is a huge and hugely complex basin, its entire area is located within the borders of China. And while the Salween river spans parts of three countries, its share of populations is quite small.

The "Middle 4" river basins also cover very significant and strategically important parts of the terrain and human populations of the region (Figure 1-3). While the Irrawaddy and Pearl basins cover almost as much area as the Salween, only a tiny proportion of the Irrawaddy extends into the alpine zone. The Pearl, Red and Chao Phraya basins do not extend beyond the upper montane zone. In terms of distribution of land among altitude zones, the Chao Phraya represents one end of the spectrum, with only about 6 percent of its area in the upper montane zone, and about 58 percent in lowland zones. While all have large and important lowland areas, more than 20 percent of the Pearl and Irrawaddy basins, and more than half of the Red River basin, are in the upper montane zone.

Since their source areas are limited to montane zones, seasonal river flows in these basins are more strongly influenced by seasonal variations in the monsoon climate. The same is true for remaining areas of the region, which are located in various small basins and coastal drainage areas that are even more vulnerable to local variations in climatic conditions. One consequence is that large downstream areas have become increasingly concerned about land use in montane zones, which they believe can have serious impacts on water resources that feed their large irrigated paddy-centered agricultural production systems.

But boundaries of the Greater Mekong Region are not defined by river basins. Rather, it is the reality of human social organization based on nation states and their administrative subunits that matter in this regard. Figure 1-4 overlays boundaries of nation states and nearby provinces of China onto altitude zones.

The Greater Mekong Region – or the Greater Mekong Sub-region (GMS) as it is known under programs supported by the Asian Development Bank (ADB) – is widely recognized as the grouping of Vietnam, Lao PDR, Cambodia, Thailand and Myanmar together with the Yunnan Province of China. Boundaries of this grouping are shown in Figure 1-5 along with the boundaries of the Mekong Basin. Although the Chinese province of Guangxi has recently joined various ADB infrastructure programs for the GMS, its land area does not intersect with the Mekong Basin and it is not included in our analysis.

The GMS label for this grouping is somewhat of a misnomer. The GMS does not include the entire area of the Mekong River Basin, and yet it does include extensive areas located in other river basins. But the GMS name is accepted because of its symbolic nature. This symbolism follows from the fact that the Mekong Basin is the one biophysical feature that all six of the member units have in common, as well as from the fact that its effective management requires cooperation and collaboration among all the members. Since cooperative and collaborative programs are the central focus of activities conducted under the GMS banner, the symbolism is appropriate and the name has stuck.

Figure 1-4. GMS states and nearby countries and Chinese provinces

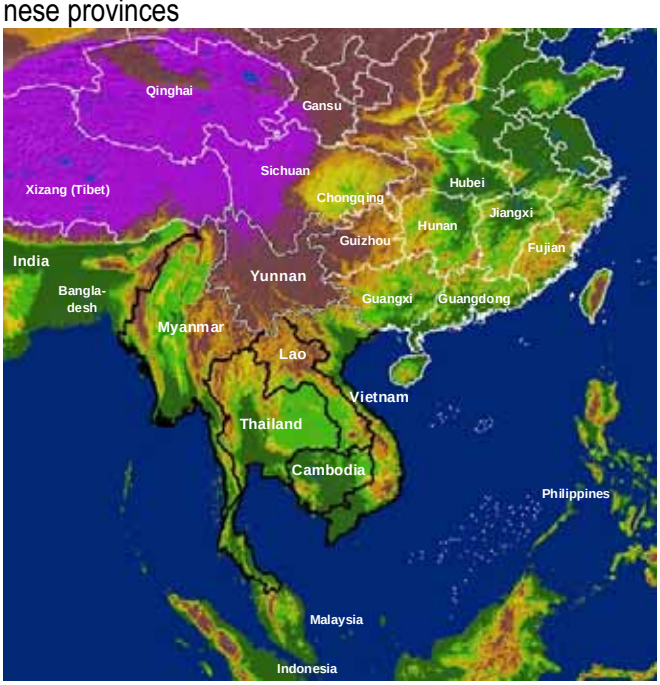
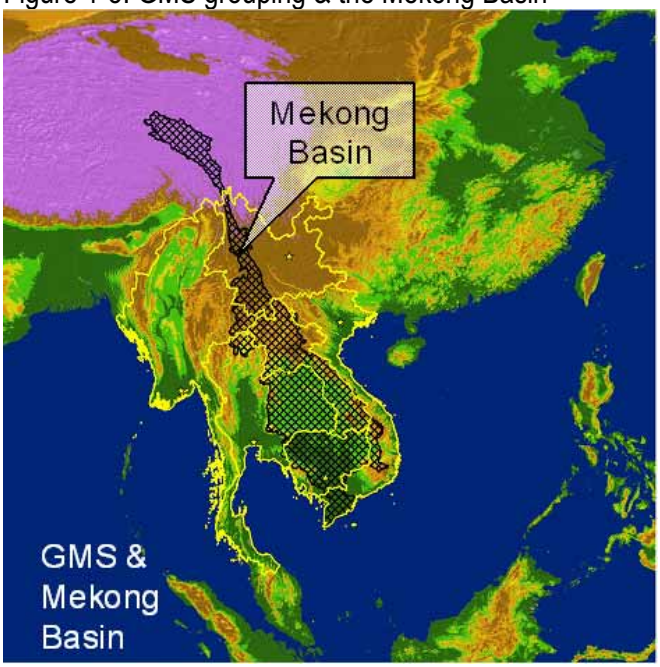


Figure 1-5. GMS grouping & the Mekong Basin



GMS member states provide the political context for decisions about resource and economic policies, and their perspectives on montane regions are reflected in the outcome. In order to help provide some insight into their respective points of view, the distribution of land area among altitude zones in each of the GMS country domains is displayed in Table 1-1. With nearly 90 percent of its land area in the lowland zone, it is not surprising that Cambodia has been considered a quite minor player in issues related to the MMSEA domain. At the other extreme is Yunnan which, with more than 90 percent of its area in montane zones (and almost all the rest in the alpine zone) is the area where MMSEA issues could be expected to play a very important role. Indeed, the relative "lowlands" of Yunnan are in the middle montane zone, while its "highlands" are in the alpine zone. Remaining countries provide a gradient of relative proportions in montane zones in the order of Thailand (31%), Vietnam (46%), Myanmar (54%), and the Lao PDR (75%). For all of these countries, MMSEA-related issues could be expected to be important, but heavy weight is likely to be placed on interactions between

lowland and montane zones – and all have political and economic systems dominated by lowland-centered societies. And even in the case of Yunnan, many political and economic issues are decided in larger national contexts where, again, lowland society is dominant.

Table 1-1. Percentage distribution of altitude zones in GMS country domains

		Cambodia	Thailand	Vietnam	Myanmar	Lao PDR	Yunnan	GMS
Alpine		-	-	0	1	-	8	2
Montane	upper	1	4	10	21	22	83	24
	middle	5	15	23	21	40	8	18
	lower	5	13	14	12	14	0	10
Lowland	upper	26	41	17	26	24	0	23
	coastal	64	28	36	20	1	0	22
	TOTAL	100	100	100	100	100	100	100

1.1.3 Change in the Valley World and implications for the uplands

After identifying montane zones and their relative importance on an area basis within regional and national contexts, we then turned to key underlying forces of demographic and economic change that have made market integration an issue in the GMS.

One important dimension of demographic change has been population growth. Change in the total number of people living in the GMS during 1970 to 2005 is charted in Figure 1-6, with contributions by each state. The regional population grew by more than 100 million people during this 35 year period, driving a huge increase in demand for resources to support livelihoods of people living in the GMS. While national population growth rates in each country are now low or rapidly decreasing (Table 1-2), Vietnam, Cambodia and the Lao PDR will have significantly higher population levels over the next few decades.

Figure 1-6. Population Growth in the GMS 1970 - 2005

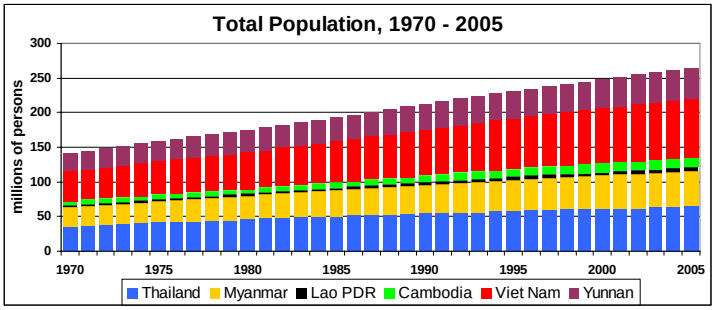


Figure 1-7. Population Densities in the GMS, 1970-2005

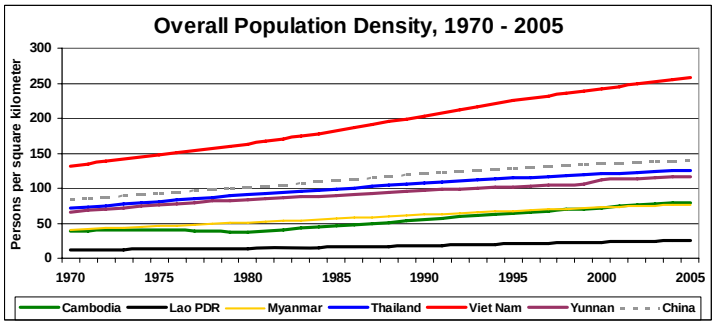


Table 1-2. Population Growth Rates, 1955 – 2005

percent per year

	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005
Cambodia	2.2	2.3	2.5	2.4	0.5	-1.0	3.7	3.6	3.2	2.3	1.8
Lao PDR	2.7	2.6	2.5	2.5	2.6	1.3	2.5	3.0	2.8	2.1	1.6
Myanmar	2.0	2.1	2.2	2.3	2.5	2.2	2.0	1.7	1.4	1.2	0.9
Thailand	2.8	3.0	3.1	2.9	2.5	2.1	1.6	1.3	1.2	1.1	0.8
Viet Nam	1.9	2.3	2.5	2.4	2.2	2.0	2.2	2.3	2.1	1.5	1.4
China	1.9	1.5	2.1	2.6	2.2	1.5	1.3	1.5	1.1	0.9	0.7

source: UN Population Division's quinquennial estimates and projections

Overall population density is one indicator of increased pressure on resources in the region. Change in population densities at the national level during 1970 to 2005 are charted for each GMS member state in Figure 1-7. While increases in density have occurred everywhere, the groupings of density patterns are instructive. The Lao PDR is by itself at the lowest level of population density. While Cambodia passed through an era of unusual demographics during its period of political turmoil, it has now become quite closely paired with Myanmar in terms of overall density levels, which are still quite modest by regional standards, but Cambodia's current growth rate is much higher. Similarly, Yunnan and Thailand are quite closely paired at middle levels of population density, not too far below the density level of China at the overall national level. While there has been substantial increase in density levels during this 35-year period, population growth rates in China and Thailand have dropped to very low levels (Table 1-2), as reflected in the decreasing slope of their population density curves.

The clear exception to this story is Vietnam, which is in its own class of overall population density that far exceeds levels elsewhere in the GMS. Although growth rates have dropped dramatically since 1990, the many implications of the large population and very high population density levels in Vietnam will be seen in various components of the analysis presented in this report.

Figure 1-8. Economic Growth in the GMS, 1970 - 2005

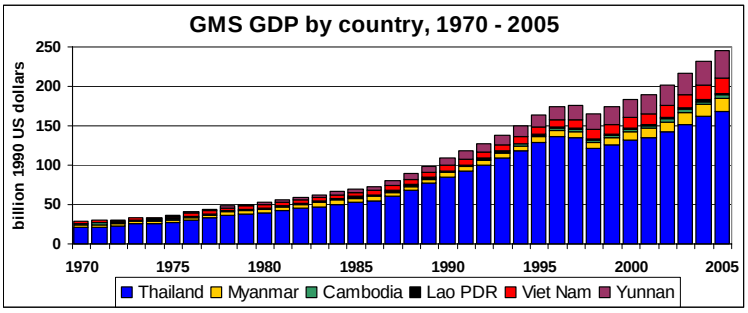
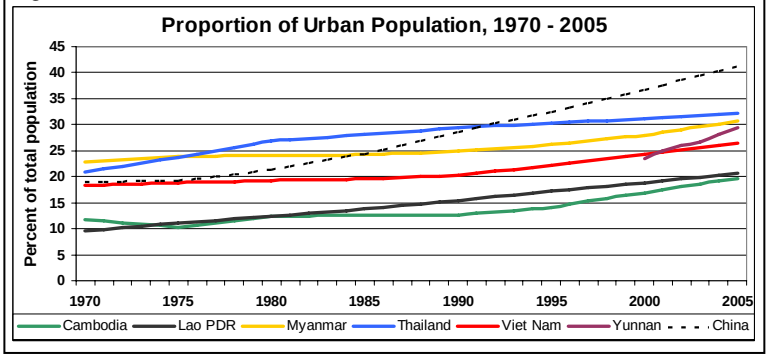


Figure 1-9. Urbanization in the GMS, 1970 - 2005



Demographic change during this period, however, cannot be understood apart from drives in GMS states toward economic restructuring and urbanization. Thus, GDP levels of GMS states during 1970-2005 are charted in Figure 1-8, based on constant 1990 US dollars that reflects change in real value.

Since Thailand began serious economic development plans and programs in 1960, its economy has been dominant at the GMS level throughout this period. It is also clear, however, that rapid economic growth became a much more widespread process in the region during the 1980's, and that growth in Yunnan and Vietnam is now faster than in Thailand. Overall effects of the 1997 "Asian Economic Crisis" can also be seen in this chart, with the greatest impact occurring in Thailand.

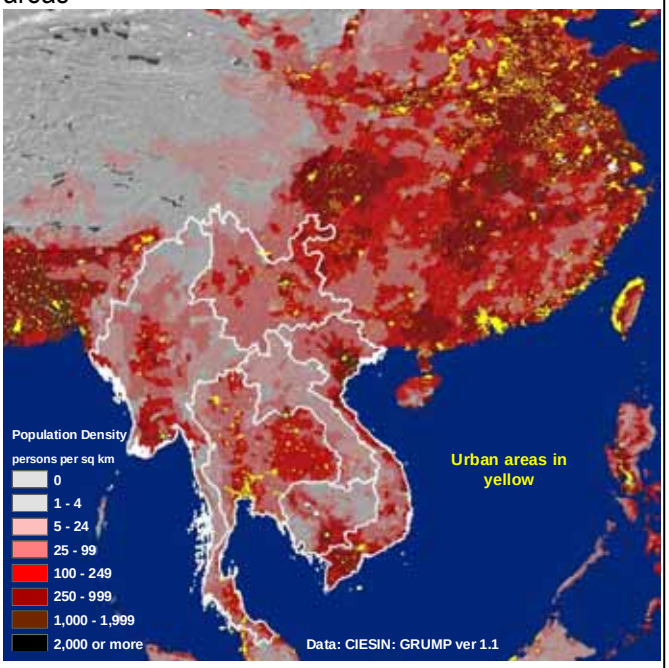
This type of rapid economic growth has only been possible as countries restructured their economies away from a primary focus on agriculture into greater emphasis on industrial and service sectors, along with increased economic integration with international and global levels. As economic change has penetrated rural areas, it has brought increasing commercialization of agriculture and emphasis on production of export crops. In order to facilitate this type of production, there has also been rapid expansion and upgrading of transportation and communications infrastructure, along with rapid growth in additional private and public sector investments and production arrangements.

Economic growth has been most rapid, however, in industrial and service sector activities that are largely focused in or near urban centers. This has stimulated a second level of demographic change that is concentrating greater proportions of GMS populations in urban areas. Official levels of urbanization for each GMS state are charted in Figure 1-9. Again, Thailand was the first to experience a period of very rapid urbanization during the 1970's. Rapid urban growth at the overall national level in China began during the 1980's and continues unabated. While urbanization in montane Yunnan probably began somewhat later, data are incomplete due to changes in the way statistics are compiled. Recent data indicates, however, that current rates of urban growth parallel the rapid rates in China overall. While urbanization in Vietnam, Myanmar and Cambodia was more modest during most of this period, they all appear to be experiencing more rapid rates during the last 15 years. Change in the Lao PDR appears to have been fairly constant throughout this period. All these data are probably fairly conservative, since all GMS states have registration issues that tend to underestimate urban populations. Indeed one recent study suggests Thailand's urban population may actually already exceed 50 percent of the total [Pramote Prasartkul 2007].

Economic change and urbanization are also associated with changing lifestyles that affect consumption patterns, as well as demographic patterns related to household size and composition. And in GMS states like Yunnan and Thailand, low population growth is bringing still another wave of demographic change as populations undergo aging transitions.

These processes suggest spatial distributions of populations in GMS states are uneven and changing. Spatial distribution of population density and major urban areas are displayed in Figure 1-10 for GMS states in the context of the entire window of our regional spatial database. Overall densities in the GMS – except for Vietnam – appear relatively modest in comparison with the huge densely populated areas of northeast China and South Asia, but relatively high compared to the very sparsely populated Tibetan Plateau. Within GMS states, as across the broader region, highest population densities are concentrated in large lowland zones, and in valley floors in areas dominated by montane zones. Distributions in Vietnam are again most dramatic since its high overall density is largely concentrated in very densely settled lowland zones in the Red and Mekong river deltas and the narrow band of lowlands along its coast. It is also important to note that distributions everywhere in this map reflect the distribution of intensity of demands for natural resources, as well as distributions of relative political and economic power. Comparison with Figure 1-4 makes the overall dominance of lowland zones very clear.

Figure 1-10. Distribution of population density & urban areas



As a result of these processes of change, people in montane zones have been affected in many ways, resulting in transformations of both livelihoods and landscapes. Population growth increases the number of people seeking livelihoods from their local natural resource base. The pool of opportunities from which local people construct their livelihoods changes with commercialization and linkages with production input, output and wage labor markets. Transportation and communications infrastructure increases interaction with lowland society. Merchants introduce many new consumption opportunities. Various public and private organizations bring new forms of social and economic arrangements, as well as new types of services that require cash payment. Mass media and education bring in new ideas and information, attracting many to try to emulate lowland and urban lifestyles or actually migrate, either temporarily or permanently, to those areas. Government land use policies are bringing new opportunities for land security or ownership in some areas. But policies are also bringing widespread restrictions on how land can be used in montane zones, and establishing protected forest areas where local people are excluded from access to resources. New opportunities are also beginning to emerge in the services sector, such as tourism, but participation requires radical change in livelihoods, new forms of knowledge and information, and new types of social and economic linkages with people and organizations outside the montane zone.

Many of these changes in constraints and access to opportunities tend to pull or push people in different – and often conflicting – directions. Many new opportunities also require access to investment capital, and many may involve substantial risk. And in some areas that the lowland-centered urbanizing world finds particularly attractive, there may be strong competition from knowledgeable, well-endowed, and well-connected outsiders seeking control over or ownership of local natural resources. Other barriers to access and effective participation can relate to monopoly control or high "transaction costs".

1.1.4 Importance of market integration and poverty issues

Access to these new opportunities, as well as impacts of new constraints, are not evenly distributed across all areas of GMS states. And where new opportunities emerge, some are willing and able to develop new livelihood activities and thrive, whereas some will try and fail; others may hesitate, and still others may not be able to participate because they lack basic resources or skills. Some may also face ethnic prejudice or other constraints.

Thus, while governments are increasingly recognizing the futility of trying to "micro-manage" these complex processes of change, they are also recognizing the need to understand the overall impacts of change. Clearly, they place high priority on stimulating economic growth through increased market integration. And more recently they have begun placing more emphasis on needs to manage natural resources in ways that can help maintain the longer-term sustainability of their economic systems.

Poverty. But to various degrees, GMS governments also recognize the importance of eliminating, or at least minimizing poverty and perceived inequities in their societies. Such recognition tends to be based on some combination of three lines of reasoning:

- *Moral.* Poverty can be a moral or ideological issue, and most governments engage in extensive rhetoric about how their programs will help everyone in society to meet their basic needs and pursue prosperity.
- *Economic.* Reducing or eliminating poverty can be an economic issue because of the cost of government programs to help poor people, at least in times of crisis. And, because as people move above poverty levels they will produce and consume more, reducing poverty can also help stimulate the domestic economy.
- *Security.* Poverty can also be a national security issue because of the potential threat to political stability that can arise when significant components of the population are not able to meet their basic needs, or feel they are being excluded from access to prosperity. One element of current political problems in Thailand, for example, relates to perceptions of a political division between urban elites in upper and middle classes, and people in relatively poor rural areas.

Market integration. All governments in the GMS region have proclaimed that increased market integration is a central component of their approach to poverty alleviation. There are many different views and variations on how this can or should be achieved, and many additional factors seen as important for promoting broader notions of improved well-being and quality of life. And while more immediate improvements in livelihoods and reduction of poverty are important, sustainability of change needs to be understood in the context of generational change. Nevertheless, promotion of broad effective participation in globalizing market economies is a key element of their approach, and action programs are being designed and implemented.

In this study, the term 'market integration' is given a broad definition to encompass a range of inter-related processes occurring at multiple levels. In previous sections we have already seen that the recent period of rapid economic change has been set in motion largely through change in economic policy at national levels.

- One key dimension of this change has been outward integration of national economies and markets with those of other nations through international trade and investment, which we will explore in more detail in a subsequent chapter.
- A closely related and equally important dimension has been inward integration of economic activity at more local levels into national economies and markets, as well as related

national administrative, political and social systems. A range of investment policy tools have been used to help induce this change, including expansion of infrastructure and support services aimed at building capacity for market-oriented economic activity. While initial efforts focused largely on major lowland agricultural and urban centers, many efforts have expanded over time to increase penetration into upland zones.

- Thus, another important dimension of this change has been integration of households and communities in formerly remote rural upland areas into participation in economic markets that link local upland areas through this hierarchy to markets at international levels. These linkages introduce new options and opportunities for changes in production, consumption, and other livelihood alternatives such as non-farm or off-farm employment, as well as changes in lifestyles and aspirations. But whether and how local households and communities choose to participate in these market integration processes is closely related to their capacities to participate and to constraints they face. Constraints can be those placed on previous livelihood activities that 'push' them toward market integration, or constraints serving as barriers that prevent them from being 'pulled' into participation in market activities. In any event, livelihood strategies are likely to change.
- And yet another relatively more recent dimension of this change is impacts of processes of globalization and the multi-dimensional types of connectivity with which it is associated, on market integration processes at all of the above levels. This newest wave of change underscores the uncertainties, risks and potential rewards associated with integration into today's increasingly complex and dynamic market systems, as well as the types of new approaches and skills that are likely to become even more important in the future.

1.2 Study research strategy

Our overall research strategy is best explained in terms of our research objectives, the five major questions our research has sought to address, and the multi-level structure of our investigations in the region.

1.2.1 Research objectives

The broad goals of this research project have been: (a) To increase knowledge of how production for commercial markets does and can affect poverty and natural resource management in uplands of the region. (b) To develop spatial information systems and alternative future scenarios to help identify types of products, technologies, and policies that respond to markets, reduce poverty, and assure agroforestry landscape sustainability.

Specific objectives of this exploratory project have been:

(1) To assess how upland households, livelihoods and land use patterns in north Thailand are being affected by commercial production, by access to information on technologies, products and markets, and by public development and land use policies.

(2) To extend capacity of a pilot spatial information system developing in north Thailand to identify current and potential distributions of conditions where market opportunities and

technologies are most likely to be profitable and policy-consistent, and to learn from key actors at different levels how to improve access to such knowledge and information.

(3) To explore and compare assessments piloted in north Thailand with complementary analyses of conditions and experience in Vietnam, Lao PDR, and Yunnan, China, in order to identify key elements of variation in commercialization processes and impacts, and help inform and facilitate further analyses of Mekong Region uplands.

1.2.2 Major research questions

In order to achieve these objectives, our research project formulated five major research questions, and identified key components of investigation that would be required to address each question. This provides a framework for integrating our complex set of research activities.

- ***Where and who are the poor?***

  Response to this question requires exploration of various ways in which poverty is conceived, identified and measured by different people and for different purposes. It further requires regional and more local level spatial assessments to help determine where different types of poverty are located and the manner in which they are linked to issues associated with market integration in upland zones.

- ***How have market opportunities changed?***

  Response to this question requires exploration of regional patterns of economic change and their links with meso-level conditions associated with sites of more local level studies. It further requires more specific examination of local examples of change in market opportunities, including key actors, technologies, institutional arrangements, production chains, or other relevant factors.

- ***What strategies have been used to respond and adapt to changes in opportunities?***

  This question requires explorations to identify and classify upland household livelihood response strategies in relation to their engagement with market opportunities that have emerged. It also requires further examination of household livelihood asset and response capacities associated with different strategies, as well as information on household perceptions regarding intentions, intended trajectories and constraints they face in responding to alternative opportunities.

- ***How might larger transitions in society affect opportunities and responses?***

  Response to this question requires explorations of trends and uncertainties regarding future trajectories of change at multiple levels within which local upland areas are nested. Assessments of plausible alternative future scenarios at multiple nested scales could suggest how characteristics and patterns would vary according to different trajectories of change.

- ***What are the implications of state policies for market opportunities and access for the poor?***

  Response to this question requires exploration of major areas of policy concern in the region, including the nature of policy impacts at more local levels in relation to factors found to be important in influencing local response to new market opportunities. Particular em-

phasis should be on policy impacts that have helped strengthen or weaken local response capacities, and on those that have increased or reduced constraints on response. Special attention needs to be given to impacts on the poor

An overall synthesis of responses to these five research questions is our primary means for achieving project objectives and goals. Our synthesis is presented in this report.

1.2.3 Case studies in a regional context

Investigations under the project to explore and address these five research questions were conducted at two levels. At a broader level, investigations were based on regional overviews from previous research studies, and secondary sources that in various cases included spatially explicit data that could be used in quantitative and qualitative assessments of regional distributions of characteristics and their relationships with upland mountain zones.

The second level of investigation consisted of local case studies conducted at a set of sites across the region by colleagues collaborating under this project in Thailand, Vietnam, Yunnan and the Lao PDR. Studies are from a mix of activities conducted under support from this project and from a closely linked project managed by the East-West Center and supported by the U.S. National Science Foundation. Parts of our analysis also draw on information and data gathered through surveys and studies by project researchers under previous or parallel studies they have conducted. In aggregate, these more detailed investigations conducted under specific local conditions provided our research with much more depth by giving us windows into real-world behavior and perceptions that are often masked in broad regional analysis. They also provide us with at least some evidence about how local conditions and processes may be similar or may vary across different parts of the region.

By combining these two levels of investigation, we were able to develop a synthesis that responds to each of our five research questions. These are presented in this report in the context of our overall synthesis under this research project.

1.3 Overview of study sites

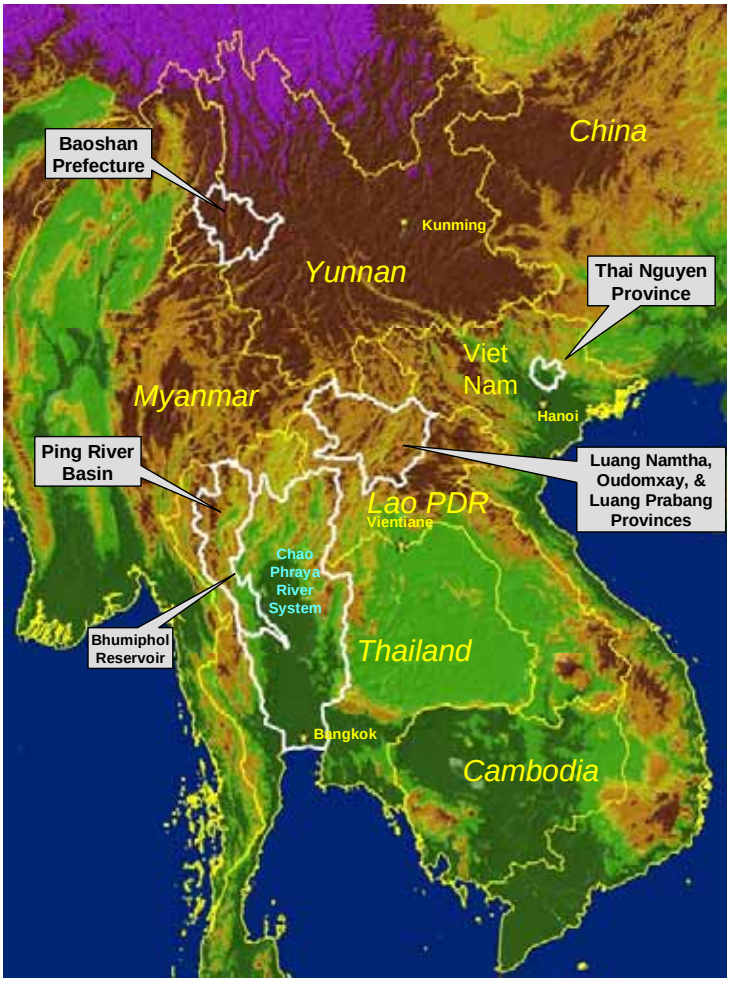
This section provides a brief introduction to the locations of the local case studies conducted in countries of the region that have contributed to analyses conducted under this project.

1.3.1 Study sites in their regional context

We must first locate our study sites in the context of the Greater Mekong Region. The regional spatial database developed in association with this project has already been introduced in section 1.1.2. It is constructed from data from a considerable range of sources at national, regional and global levels, most of which are already in the public domain or available upon request for non-profit research.

Employing our study's operational definitions of uplands in terms of montane zones, Figure 1-11 locates the meso-level outlines of our study areas in the Greater Mekong Region. In

Figure 1-11. Locations of study areas in regional context



Thailand, the Ping River Basin is shown in its context as a major tributary in the larger Chao Phraya River System, which includes both Bangkok and the lowland 'rice bowl' agricultural production area of the Central Plains. The location of the Bhumiphol reservoir is also indicated, in order to demarcate the boundary of the Upper Ping Basin which is the main focus of our studies. These boundaries also reflect the river basin and watershed context that characterizes much of our work in this area.

In the Yunnan province of China, our case studies have largely focused at sites in Baoshan Prefecture, located in West Yunnan near the border with Mynmar. In Vietnam, our case studies have focused on the northern province of Thai Nguyen, which is seen in relation to the lowlands of the Red River Valley and Hanoi. Case studies in the Lao PDR have been at several locations nested within the three adjacent northern provinces of Luang Namtha, Oudomxay and Luang Prabang. Together, these sites span a quite large range of locations and conditions in the uplands of the Greater Mekong Region.

1.3.2 Thailand study sites: the Upper Ping Basin

Since our sites in Thailand have been the basis for a major part of studies under this project, our introduction is considerably more detailed than for our sites in neighboring countries. Thus, we introduce here the river basin and watershed framework used in many of our studies in the Upper Ping Basin, as well as areas where more local studies were conducted, and some characteristics of the physical environmental setting, most of which are fairly similar in neighboring upland areas in the region.

River basin and watershed context

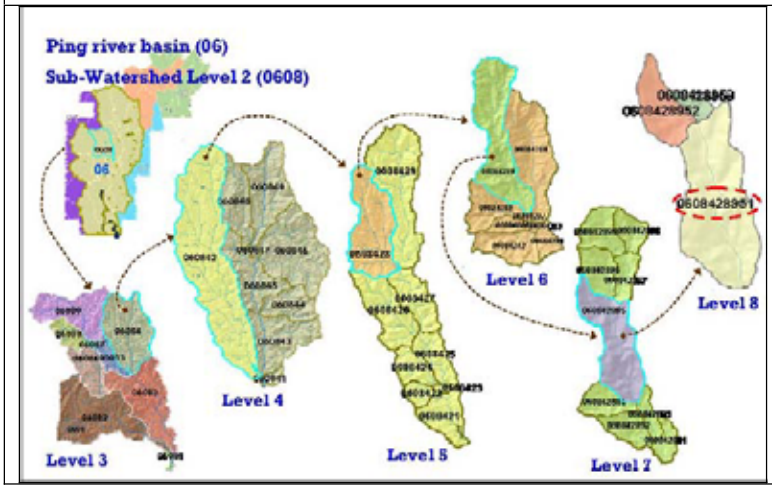
Our primary set of case study sites is located in the upper portion of the Ping River Basin above the Bhumiphol Reservoir. This area is commonly known as the Upper Ping Basin (UPB), which is the name used in this report. The UPB includes the Chiang Mai Valley and

its highly commercialized agricultural areas and urbanizing centers, as well as various more remote upper tributary watershed areas with characteristics more similar to what can be found in many parts of montane mainland Southeast Asia (MMSEA).

Analyses at this type of level, which is intermediate between our broad regional spatial database and very local village-oriented data, are usually very difficult to conduct. Fortunately, however, this project was developed in partnership with colleagues at CMU who have been working for several years on building pilot provincial-level spatial information and decision support systems in this area. Thus, we have been able to draw heavily on their analytical tools and databases in conducting the UPB analyses in this report. By using these tools, we have also been able to transcend various constraints imposed by often arbitrary boundaries of government administrative units. At the same time, this allows much of our spatial analysis to remain more consistent with our overall river basin and watershed approach in the UPB.

The Upper Ping Basin (UPB) covers an area of about 25,203 sq.km and includes most of the land in Chiang Mai and Lumphun provinces. For spatial analysis, the overall extent of the UPB is too large to capture significant variations among key biophysical and socioeconomic variables that underlie the opportunity and constraints of people's livelihood systems. But within the UPB, sub-watersheds may be nested into various levels. Characteristics such as terrain, transportation networks, and resources availability for major production systems vary with space and time among sub-watersheds of the UPB. These spatial variables also play important roles in determining the effectiveness of agricultural resource utilization and services such as access to resources (land, water and bio-resources), and access to market and agricultural services. Drought, flood, debt, landlessness, markets, resource policy, trade agreement, and local administration are among the many dynamic factors which contribute to productivity, food security, and poverty of the population in this area.

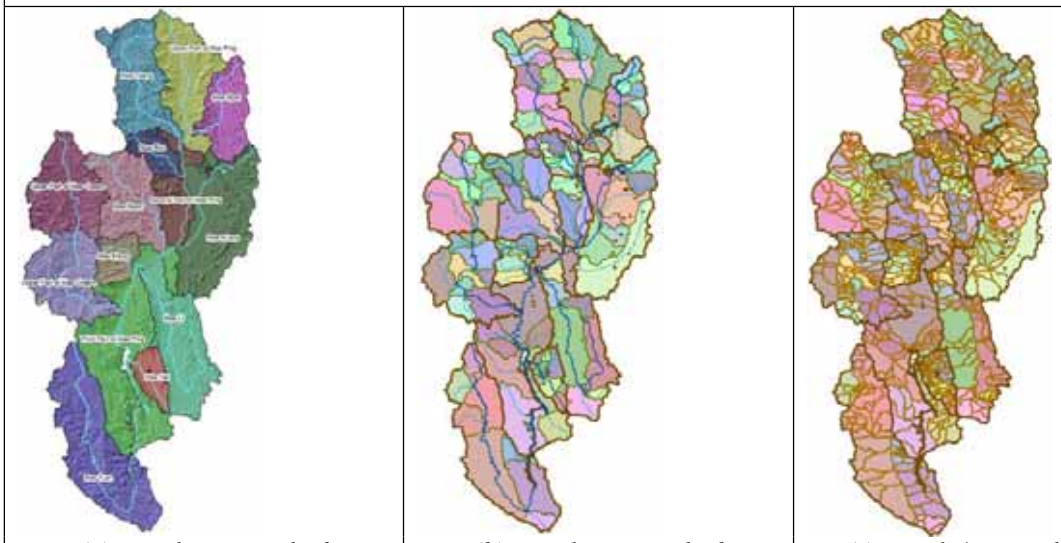
Figure 1-12. Upper Ping river basin & its sub-watersheds using Pfafstetter coding system



Thus, to facilitate analysis and discussion of these types of factors, we have delineated the UPB into hierarchical levels using Pfafstetter's method and assigning appropriate codes to each watershed [Verdin & Virdin 1999]. This was accomplished by a tool developed to work with ArcGIS [ESRI 2002] and described by Pinpetch and Methi [2005]. A feature dataset was designed to store polygon feature class data representing boundaries of sub-watersheds as generated from Pfafstetter's method. The Pfafstetter's codification system and hierarchical level of watersheds is illustrated in Figure 1-12. This coding system is useful in tracking the hierarchical level as well as the position of any particular watershed in the network.

The UPB is considered to be a group of Level 3 watersheds (the Ping itself is Level 2, and the Chao Phraya is Level 1). Within the UPB, sub-watersheds may be delineated and codified to the smallest area. For our purposes, delineation of sub-watersheds was done down to level 4. At this level sub-watersheds can be matched and named after streams labeled on topographic maps and size is small enough for local watershed management purposes. The full extent of the UPB as expressed in sub-watershed levels 2, 3 and 4 is shown in Figure 1-13.

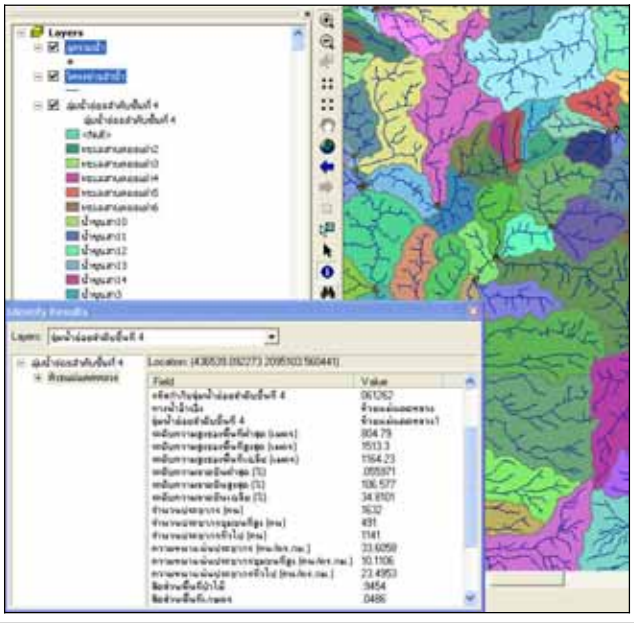
Figure 1-13. Nested Upper Ping Basin and watersheds at level 2, level 3 and level 4



(a) Level 2 watersheds *(b) Level 3 watersheds* *(c) Level 4 watersheds*

In this project, level 4 sub-watersheds have been used to summarize biophysical and socioeconomic data in order to capture spatial variation of key variables. Once data are summarized they can be linked to each polygon that represents the level 4 sub-watershed with which it is associated, and may be displayed in GIS as a map of the attributes. Figure 1-14 illustrates a map that displays level 4 sub-watersheds and their biophysical and socioeconomic attributes. Such maps can be intersected with other spatially explicit data in conducting further quantitative and qualitative analyses.

Figure 1-14. Characteristics of a sub-watershed stored in a geodatabase



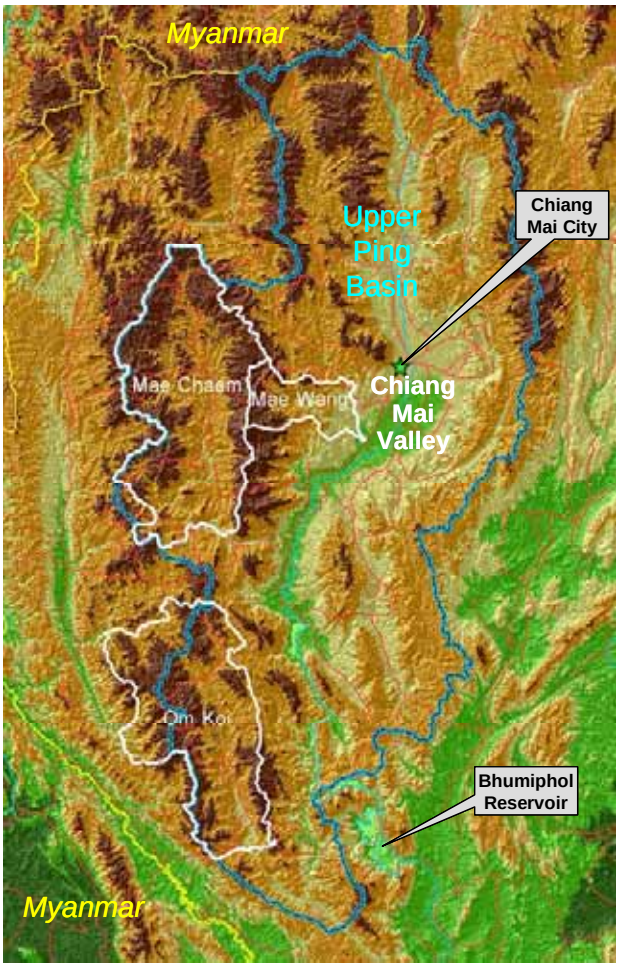
Chiang Mai Valley, Mae Wang, Mae Chaem, and Omkoi

Major locations of the various more local case studies that have contributed are shown in Figure 1-15 in the context of the Upper Ping Basin.

Chiang Mai Valley. It is particularly important to note the location of Chiang Mai City and adjacent areas of the Chiang Mai Valley that are located in the upper lowland zone. The important role of the valley and its urbanizing areas will be explored in considerable detail in subsequent chapters, as well as the influences these areas have on more remote upland areas in upper tributary watersheds.

Mae Wang. The name of Mae Wang is used for both a watershed and a district near the western border of the Chiang Mai Valley. Mae Wang watershed is a tributary of the larger Mae Khan sub-basin, and the Mae Wang area obtained full district status in 1995. This area represents a gradient from the upper lowland zone of the Chiang Mai Valley floor with convenient connections to Chiang Mai City, to upper montane zones in the ridge of mountains that contains the highest peak in Thailand. Not surprisingly, lowland areas are mainly ethnic Northern Thai, with increasing numbers of ethnic minorities found at higher elevations. Since its location and this combination of biophysical and cultural characteristics provide a basis for a new line of non-farm local enterprise associated with day-trips from Chiang Mai for ecotourism, in addition to farming livelihoods.

Figure 1-15. Locations of Mae Wang, Mae Chaem, and Omkoi in the UPB



Mae Chaem. The name Mae Chaem also applies to both a district (the boundary shown in Figure 1-15) and a watershed, which in this case is a sub-basin that is so large (about 4,000 sq. km.) that government officials have arbitrarily divided it into 'upper' and 'lower' Mae Chaem sub-basins. Mae Chaem district includes 10 sub-districts (tambon). Mae Chaem lies to the west of Mae Wang and the Chiang Mai Valley, separated by an important mountain ridge that includes Inthanon, the tallest mountain in Thailand. Thus Mae Chaem has long been considered a remote upper tributary area, with very small flat valley floor areas, and extensive sloping areas in middle and upper montane zones. Ethnic minorities, and especially ethnic Karen, make up a substantial majority of the population. Traditional agroecosystems were based small pockets of paddy land where terrain allows, and much larger areas of rota-

tional forest fallow shifting cultivation systems. Forest cover is extensive, and protected forest areas have expanded greatly. Its upper montane zones areas have been a major site for opium crop substitution programs. All these issues and their relationship with market integration and livelihood change will be explored much further in subsequent chapters.

Omkoi. Located to the south of Mae Chaem, Omkoi is one of the most remote and sparsely populated districts in Chiang Mai province. Its population of about 48,000, 80 percent of whom are ethnic Karen, is scattered over 2,094 km^2 most of which, like Mae Chaem, is national reserve forests and wildlife sanctuaries. Omkoi district town lies 180 km southwest of Chiangmai city. Its only main road was paved in 1986 and followed by introduction of cash crops. There are six tambons (sub-districts), 95 administrative villages and 232 hamlet settlements in the district, and while most can be reached by 4-wheel-drive vehicles, about 50 villages can only be reached by foot. Omkoi remains one of the poorest districts in Thailand.

The majority of Karen villagers still adhere to traditional family and kin-based economic organization, although some household activities have been modernized as a result of new knowledge associated with cash cropping. A comfortably well-off household utilizes tacit based knowledge to produce rice in upland swidden fields and learns through the suppliers' network about how to produce cabbages and tomatoes. The two knowledge systems are overlain with little conflict or hybridization. Savings from any successful cash cropping are invested in free range cattle or a vehicle. More influential members of a village with enough cash and available labour may experiment with crops suggested through their network of private or government contacts.

Physical environmental setting

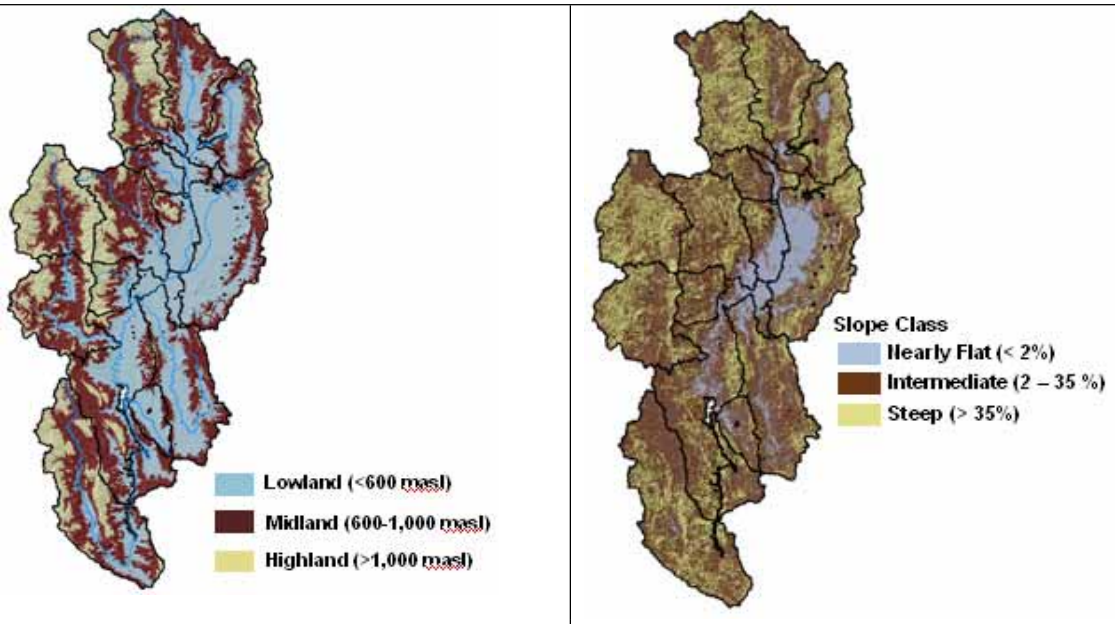
In order to complete our introduction to the Upper Ping Basin, this section provides very brief descriptions of the spatial variation of differences in terrain, climate and soils.

- ***Terrain.*** The landscape of the UPB is characterized by mountainous area and valleys of different sizes. The elevation ranges from 191 masl in Chiang Mai valley to 2,569 masl on Inthanon, the highest peak in Thailand. Using categories commonly used by agencies in Thailand, the lowlands (< 600 masl) and midlands (600-1,000 masl) equally occupy about 38 percent of the total area while the highlands (> 1,000 masl) form the rest of the area (Figure 1-16a). Part of the lowlands is nearly flat with land slope of < 2% (Figure 1-16b), which allows surface irrigation to be conveniently implemented. Large portions of the highlands are associated with steep land with an average slope of more than 35%. The steep land is much more difficult for cultivation and its soil surface is vulnerable to soil erosion and degradation.

- ***Climate.*** Spatial distributions of climatic data were achieved by spatial interpolation using daily rainfall and temperature records of about 250 weather stations in and around UPB and the digital elevation model (DEM).

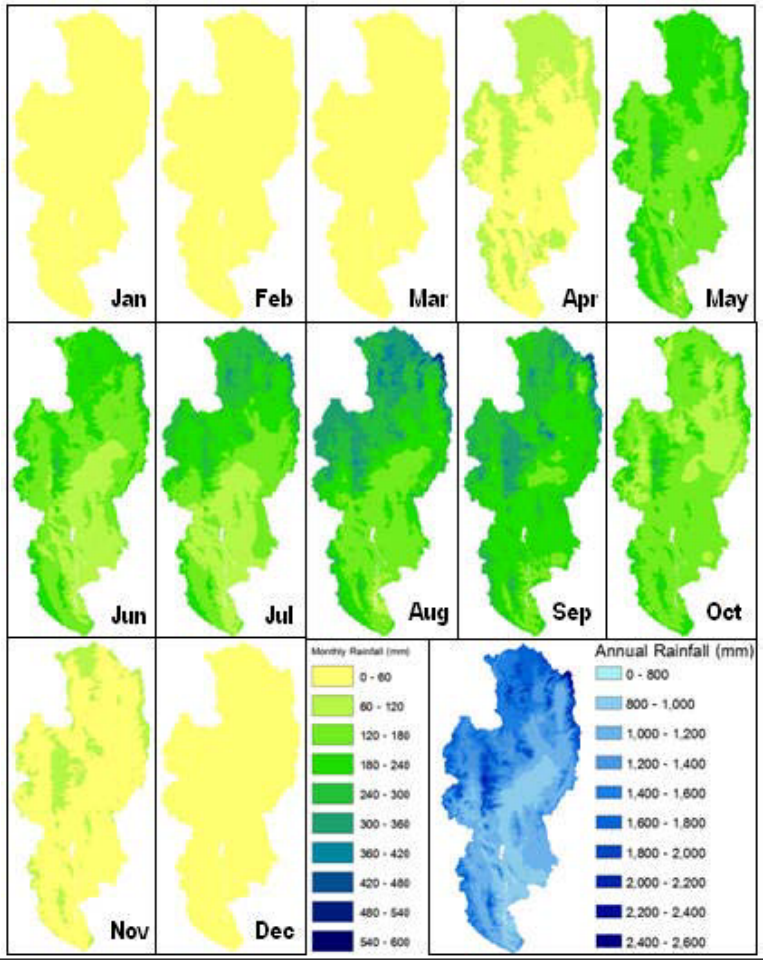
  Rainfall starts in April in the highlands and upper parts of UPB (Figure 1-17). The amount of rain is adequate for upland crops cultivation in the early part of May on the highlands and late May in the midlands and lowlands. Farmers have to wait until late July or early August for rainfall amounts to accumulate enough for paddy cultivation.

Figure 1-16. Elevation zones and major slope classes of the Upper Ping Basin



(a) Elevation zones *(b) Major slope classes*

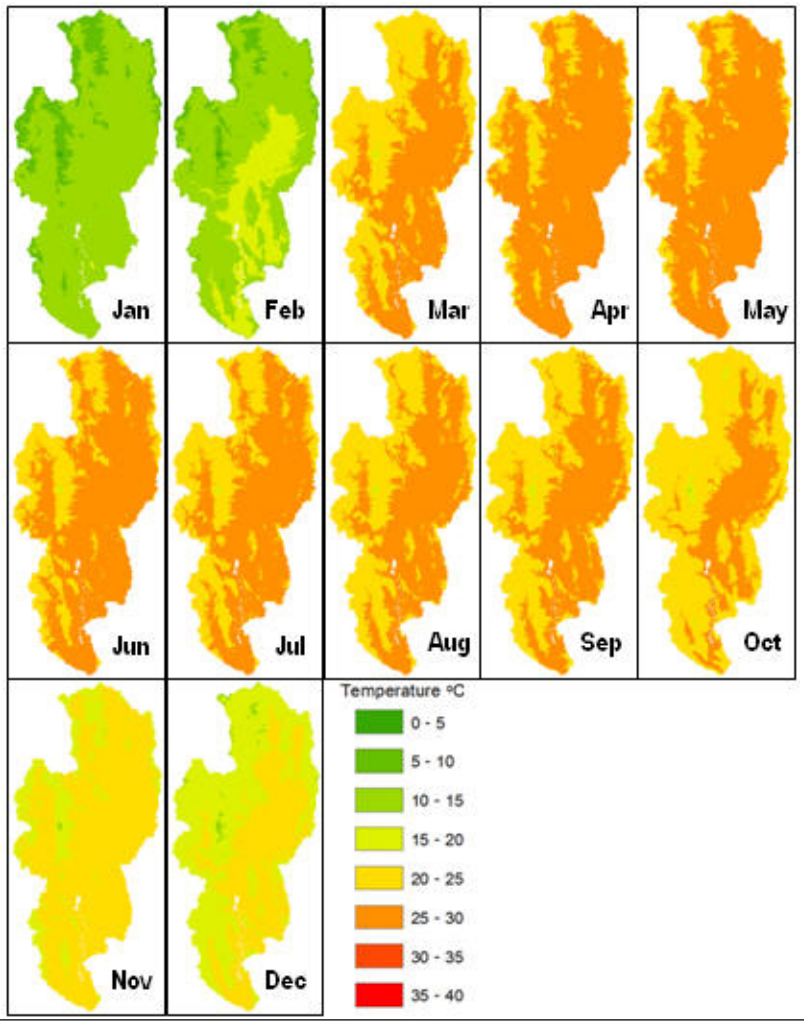
Figure 1-17. Spatial distribution of mean monthly and annual rainfall



In some highland areas, second cropping without irrigation may be possible where rainfall is prolonged until early November and soil is deep enough to store good amounts of residual soil moisture. Distribution of annual rainfall indicates that higher amounts of rainfall are generally found in the highlands and midlands, and ranging from 800 to 1,200 mm in the lowlands.

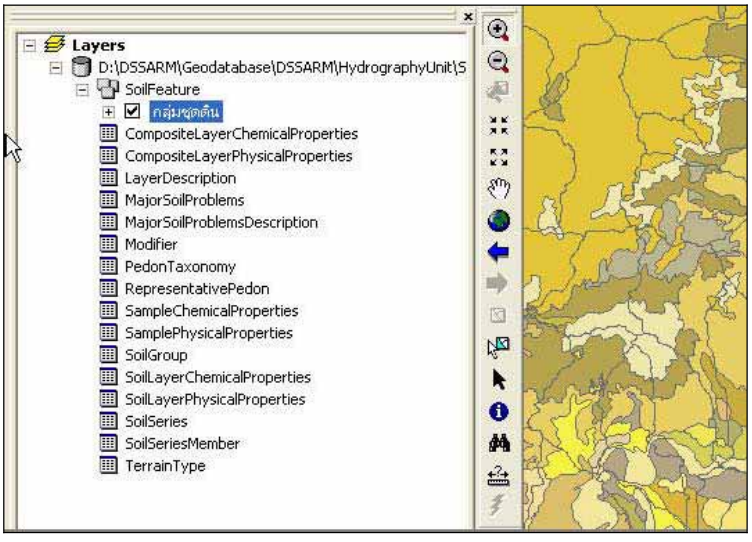
Spatial distribution of mean monthly temperature reveals rather stable temperatures around 25 to 35 C, an optimum temperature for most tropical crops including rice, during March

Figure 1-18. Spatial distribution of mean monthly temperature



to October in the lowlands (Figure 1-18). However, during November to February, mean monthly temperature is lower, in the range of 10 to 25 C; this permits some temperate cash crops such as onion, garlic, potato, tobacco and soybean to be grown after rice, providing there is enough water for irrigation in the lowlands. The mean monthly temperatures in the highlands and midlands are much lower than in the lowlands throughout the year. Mean monthly temperature during November to February in the highlands is less than 20 C and drops to less than 10 C in January to February, which is suitable for many temperate fruits and vegetables. Highland farmers take this opportunity to capitalize on cool climate during this time to produce commercial crops that have good demand in markets. As a result of climate variability in the UPB, agroecosystems are diverse both in space and time.

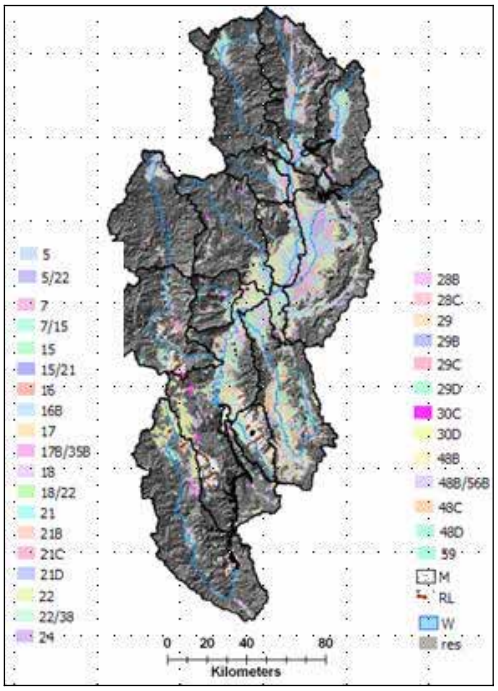
Figure 1-19. A schema of soil database



Soils. Spatial distribution of soil resources has been captured as soil maps in the past, and soil characteristics have been detailed separately in soil survey reports. The system is

difficult to use in responding to specific queries on soils in an area of interest, not to mention the very limited accessibility data required for land suitability assessment. In this project, a geodatabase [MacDonald, 2001] of soils was constructed to store spatial information and related attributes of soil groups.

Figure 1-20. Distribution of soil groups



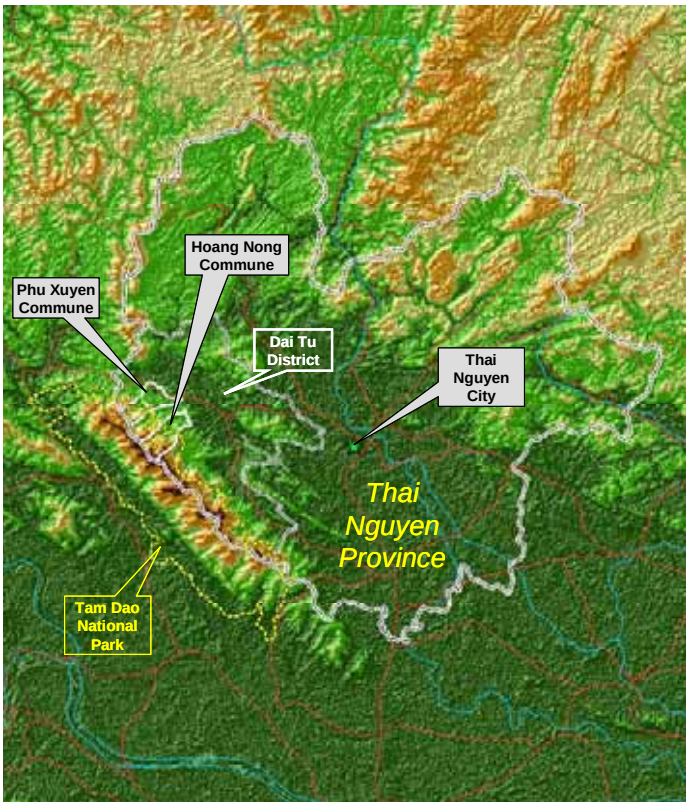
The soils geodatabase is based on data surveyed and published by Land Development Department (LDD). This geodatabase includes features which are used to represent soil group boundaries. Related tables (Figure 1-19) store different properties of soil groups, representative pedons and soil layers necessary for land suitability evaluation of major crops. Spatial distribution of soil groups in UPB is shown in Figure 1-20. It is important to note, as this figure indicates, that soil maps are available only in areas outside reserved forests and in the areas where slope of land does not exceed 35 percent. Most areas in middle and upper montane zones are designated only as 'slope complex', and no data on them are available.

Variation of soil groups across UPB results in variations in land quality in terms of supply of water and nutrients, which are necessary to effectively support production of major cash crops. In chapter 3, the spatial features of this map will be overlaid with other variables to generate Land Mapping Units (LMU), a minimum mapping unit from which land characteristics required for land evaluation processes have been linked. This information has been used in physical land evaluation to assess land suitability for major crops and will be discussed later in chapter three.

1.3.3 Vietnam study sites: Tea farmers in Thai Nguyen

Case studies in Vietnam focused on two communes (sub-districts) in Dai Tu District of Thai Nguyen Provence in North Vietnam, as shown in Figure 1-21. Thai Nguyen is located about 80 kilometers north of Hanoi, at the northern edge of the lowland zone of the Red River (Song Hong) Valley (Figure 1-11).

Figure 1-21. Location of Vietnam study area



Hoang Nong Commune and Phu Xuyen Commune are located at the western side of Dai Tu District along a small ridge of mountains that extends into the Red River Valley lowlands. Both communes have gradients of elevation zones that extend from upper lowlands to upper montane zones. Moreover, commune lands that are located in montane zones are also located within the boundary of the Tam Dao National Park, which was established in 1997. Thus, these communes are considered to be located in the park's 'buffer zone'.

More intensive study was in Hoang Nong commune, which consists of 18 villages, 1,145 house-holds and a population of 4,968. The population is composed of members of six ethnic groups including ethnic Kinh, Vietnam's dominant ethnic group. Ethnic Kinh migrated into the area during the 1960's in response to national 'new economic zone' policies.

As described in some detail in subsequent chapters, most households living in these communes currently get the majority of their incomes from agricultural activities, such as paddy farming, rearing cattle and tea cultivation. Many local farmers, especially poor households, also earn part of their living through forestry-related activities, such as hunting, trafficking in wild animals, exploiting medicinal trees, growing orchids, breeding cattle and especially acquiring firewood. Thus, park managers are also interested in ways in which households can both improve their livelihoods and decrease pressure on wildlife and plants in the park. The production of 'safe tea' is considered an important promising approach.

These studies were conducted in close collaboration with the Rural Development and Environment of Vietnam (RDViet) project funded by SAREC/Sida and coordinated at Hue University of Agriculture and Forestry (HUAF) and the Swedish University of Agricultural Sciences (SLU) in Uppsala, Sweden.

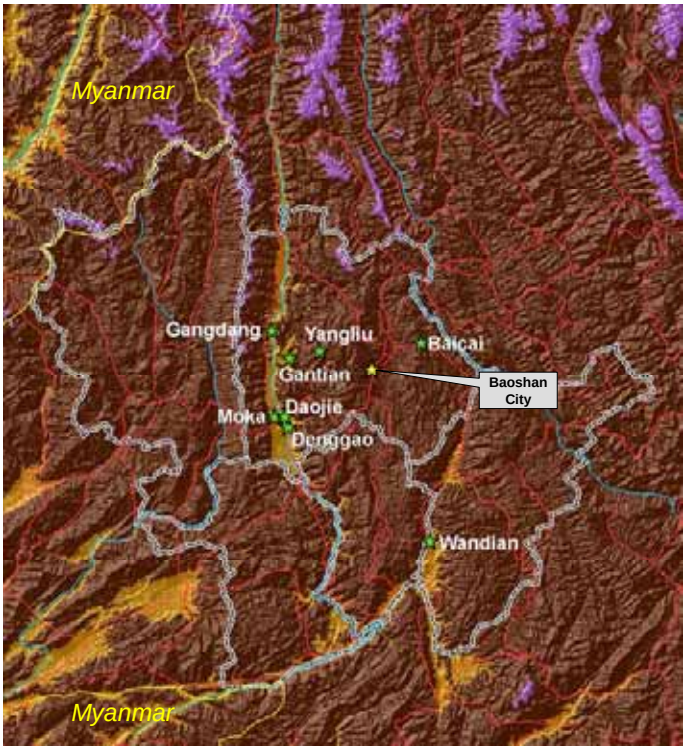
1.3.4 Yunnan study sites: Vegetable farmers in Baoshan

Our study site in Baoshan prefecture (Figure 1-22) represents conditions in higher mountain valleys as found in many parts of the Yunnan province of China, where valley floors are often located in lower to middle montane zone. Baoshan prefecture is located in western Yunnan, within the watersheds of the Lancang (Mekong) and Nu (Salween) Rivers (Figure 1-11). The total area covers 19,636 km^2, with a population of 2.5 million, of which around one-third live in the city proper. Around 10 percent of the population consists of ethnic minorities from thirteen of China's officially recognized minority groups.

The topography is highly variable, with elevation ranging from 645 to 3,655 masl. More than 90 percent of the landscape is classified as mountainous, which places constraints on land use options. As of 2005, official statistics identified nearly five times more forested land (often in the form of state-managed reserves) than farmland, and there continue to be projects encouraging farmers to convert farmland and grazing land to tree plantations. Most arable land has been terraced, using either packed dirt or stones.

Agricultural practices vary based on elevation and terrain. People resident in lower-lying Middle montane zones are able to cultivate multiple crops of rice in one year, and to diversify into sugar cane or the commercial production of crops like mulberry or vegetables. Households located in Upper montane zones typically plant one crop of corn and a winter crop of wheat or vegetables, but may also have plots of tea or eucalyptus. As the landscape is highly variable, most households have access to several plots with different production capacities, and therefore cultivate a variety of different crops on a small scale.

Figure 1-22. Location of Baoshan study areas



Most residents also have access to either collective or individually-managed forest land, from which they are allowed limited use of timber. Households in upland areas typically derive additional income from the sale of non-timber forest products (NTFPs) such as mushrooms and pine nuts. Supplemental income and livelihood support comes from raising livestock: a few chickens, pigs, goats, and a cow or water buffalo for use in plowing.

Rural residents are clustered in 'natural villages,' which are then grouped into 'administrative villages,' which is the lowest level of public administration. Townships and then counties are the higher levels of government; Baoshan administers four additional counties, as outlined in Figure 1-22.

Transportation infrastructure is limited by the landscape. Although smaller roads consist of packed dirt, many villages are not far from an asphalt or cobblestone road. However, the routes are often tortuous, and frequent repairs are necessary due to the prevalence of landslides and cave-ins, particularly during the rainy season. Overall road density is around 50 km per 100 km^2.

Basic services such as access to electricity and running water are often unreliable. Education and health services are relatively poor, and most rural students do not attend high school. Access to markets and technical expertise is also limited. Some areas are able to utilize irrigation, if they are located near small reservoirs. Terracing is the main mechanism to cope with steeply sloping land in upland zones, but many areas are highly eroded and heavily grazed.

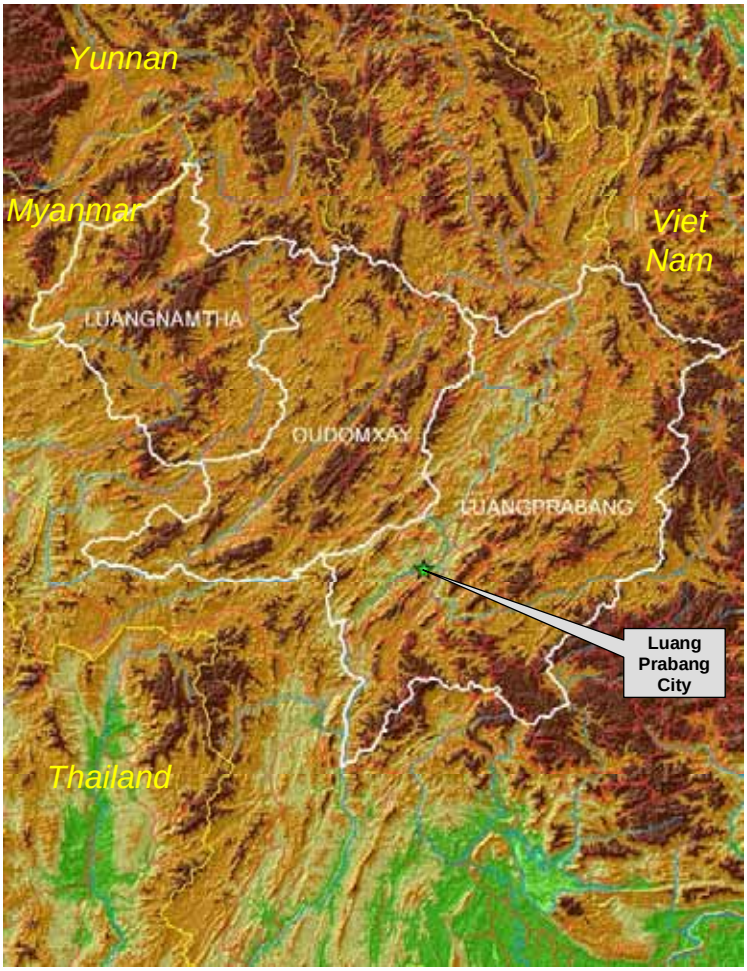
Case studies on household economy and migration were conducted in the villages of Baicai and Yangliu (Figure 1-22), around 15 km from the city of Baoshan. The elevation at these two sites in the upper montane zone ranges from 1,500-2,600 masl, and household economies are still largely dependent on the production of grain for subsistence purposes. Land at the lower elevations is used for paddy rice, but middle and upland zones are used to cultivate corn and other dryland crops. Households in this area rely on management of multiple different production systems at different elevations, and usually raise livestock and use forest resources.

Other case study sites (Figure 1-22) focus on issues related to commercial vegetable production, which is increasing rapidly in villages at lower elevations, particularly along the Nujiang river valley. At these lower lying middle to upper montane zone locations, elevation (700-1,500 masl) and warmer climate makes it possible to cultivate sugarcane and other high-value crops. Wandian, located along a tributary of the Nujiang, has a similar climatic and agricultural environment. Oranges, coffee, tobacco and mulberry (for silkworms) are all state-supported alternative crops in these villages. Households typically have lowland plots that can be used for sugarcane or seasonal paddy rice and vegetable production, as well as plots at higher elevation that are used to cultivate corn or tobacco. Forest resources and livestock grazing are more limited, except for on the steepest slopes.

1.3.5 Lao PDR study sites: Emerging markets in Northern Laos

Case study sites in the Lao PDR were located at various locations within the three northern provinces of Luang Namtha, Oudomxay, and Luang Prabang (Figure 1-23). These sites represent relatively remote, predominantly middle and upper montane zone locations that have relatively recently been exposed to emerging opportunities for market production. At the same time, they have been subjected to government policies and programs seeking to stop shifting cultivation practices that were a key component of traditional livelihoods, and to relocate and consolidate small remote ethnic minority villages into larger multi-ethnic settlements with intensive commercial agriculture and village forest lands located in lower-lying areas where the government is seeking to establish transportation and development corridors in the region.

Figure 1-23. Locations of study areas in Laos



Of particular importance in this area is a major road link with China, which enters Laos at the border in Luang Namtha, and branches into a major connection with Thailand and a major road to Luang Prabang and destinations further south. The latter also includes important branches to the east that connect with Vietnam. These roads are part of the regional road network being developed in association with the GMS grouping of states, and supported by the Asian Development Bank and other sources (see section 3.2.5).

Road development is also accompanied by changing policies and international trade relationships with neighboring countries. Commercial production of crops such as sugarcane, maize, watermelon, Job's tears, paper mulberry and others, as well as various non-timber forest products, for sale to markets in neighboring countries has already been increasing for a number of years. But the magnitude of the recent 'boom' in planting of rubber trees threatens to dwarf, and perhaps displace many of these other components. Related issues are discussed in the context several sections of this report.

More detailed analysis of land use change in this area, as well as adjacent Bokeo province, conducted by project researchers has already been reported elsewhere [Thongmanivong & Fujita 2006]. This, and other data and information used in this report related to these areas in northern Lao PDR have primarily come from studies conducted by project researchers in association with other research projects and partners. Several additional secondary sources of data and information have also been cited, most of which are based on research conducted by people, organizations and projects with whom project research staff are very familiar, and have often had various previous working relationships.

1.4 Structure of this report

The overall structure of this report is very closely aligned with the structure of our research strategy as already presented in section 1.2. Major points include:

- This first chapter has provided an introduction and overview of biophysical and human dimensions of the Greater Mekong Region, of where the uplands are located in the region, of the role and importance of issues related to poverty and market integration, of the research objectives and strategy of this project, and of the locations where studies used in this project were conducted.

- Our core research analyses and findings are presented in Chapters 2 through 6, with each of these chapters addressing one of our five major research questions (section 1.2.2):
    - Who and where are the poor? (Chapter 2)
    - How have market opportunities changed? (Chapter 3)
    - What strategies have been used to respond and adapt to changes in opportunities? (Chapter 4)
    - How might larger transitions in society affect opportunities and responses? (Chapter 5)
    - What are the implications of state policies for market opportunities and access for the poor? (Chapter 6)

- The structure of each of these chapters is roughly parallel and divided into four parts. The first part introduces major issues and concepts used to orient our work directed toward the question that is the subject of that chapter. The second part seeks to provide an overview and review of findings at the regional level, whereas the third part presents examples of related more local level findings at our case study sites. The fourth part then builds and draws on the previous sections to provide a more specific response to the question addressed in that chapter.

- The final chapter (Chapter 7) then presents a synthesis of findings in previous chapters in the format of an overall summary that includes our major policy-related conclusions.

We realize that this report is a rather long narrative, and that it covers a fairly broad range of topics and areas. Thus, readers with very limited time or more narrow interests might consider one of two options:

- For a rapid overview of our work and findings, Chapter 7 has been structured in a way that it could stand on its own as a summary. Some cross-references have been cited, and the list of figures and tables can help readers find illustrations related to particular issues of interest.

- For those with more narrow interests, we have also tried to structure chapters 2 through 6 in a manner that they could stand alone in reporting our findings related to a particular set of issues. Again, some important cross-references have been cited, and the table of contents and lists of figures and tables may help locate particular topics or illustrations.

We also hope, however, that at least some readers will be willing and able to read through the entire report. For these readers, we hope we have been able to communicate our approach and our findings in a manner that demonstrates our efforts to build arguments and extract conclusions based on evidence we have found. We welcome comments, criticism, and alternative interpretations and points of view.

2. Who and where are the poor?

This chapter presents how we have sought to address this question by clarifying the definitions and measures of poverty used in our analysis, by providing a broad spatial assessment of distributions of poverty in the major altitude zones of the region introduced in the previous chapter, and by providing a range of findings and insights from case studies conducted in specific local areas in the region under this and previous studies. It then concludes with a brief synthesis of our overall assessment of findings related to distribution of the poor in mainland Southeast Asia.

2.1 How is poverty defined, and why does it matter?

In order to assess issues related to market and resource access of the poor in upland zones of the Greater Mekong Region, we first need to clarify our understanding of who the poor are, how poverty is measured, and why poverty is an issue in the region.

2.1.1 Definitions and measurement of poverty

There are various approaches to defining and assessing poverty. Most analysts now recognize that poverty is multi-dimensional in nature. Thus, not surprisingly, there is also an increasingly diverse range of ways in which poverty is conceptualized. While conventional conceptualizations tend to focus on poverty in terms of material deprivation that can be assessed by monetized income or consumption levels, it has become increasingly clear that this conceptualization fails to include various other important dimensions of poverty. As pointed out in recent reviews for the Asian Development Bank [ADB 2004, Osmani 2003], newer strands of evolving conceptualizations of poverty can be grouped into those associated with the capabilities approach, the livelihoods (or vulnerability) approach, and the social exclusion approach. While these three approaches are interrelated, each contributes an additional set of insights into the nature and causes of poverty, with implications for policy analysis and formulation. Measurement and assessment of poverty using these newer approaches, however, is more complicated and often requires less conventional types of data that may not be available for populations across broader regions.

Thus, given the scope, information needs, and resource limitations of this research project, discussions of poverty in this report focus draw heavily on data that is available for material forms of poverty based on monetized income and consumption levels. But we also try to bring in additional factors in discussions of particular countries where information is available. Moreover, some of the case studies have included information on additional perspectives and local perceptions of poverty as they try to untangle some of the relationships between poverty and access to markets and resources in this globalizing era.

Income and Consumption Based Definitions of Poverty and Inequality

The most widely used definitions of poverty are based on levels of income or consumption expenditures [UNSD 2005]. The focus is on monetary or material poverty, and identification of material deprivation in terms of income or consumption levels that are inadequate to attain a basic minimum acceptable standard of living in a society. Clearly, standards for defining minimally acceptable income or consumption levels will vary across societies and over time.

Measurements of this type of poverty require a "poverty line" benchmark level of income or consumption that enables a person to attain the minimum acceptable standard of living, as well as a means for collecting data on income and/or consumption from at least a representative sample of a given population. One advantage of this more conventional conceptualization of poverty is that it can be assessed across large populations using established national census or survey data on household income and expenditures.

Once the benchmark poverty line and data from a sample or census of the population are obtained, various measures have been developed for analyzing and assessing the data. Some of the most commonly applied measures (which are also components of the Foster, Greer, Thorbecke (FGT) family of poverty measures summarized in Box 2-1) include:

- ***Poverty incidence*** is the proportion of individuals whose income or expenditure falls below the poverty line. The measure may be based on either national or international poverty lines. Poverty incidence is also referred to as the headcount ratio, or even the poverty ratio or poverty rate.
- ***The poverty gap index*** gives a sense of how poor the poor are and reflects the depth of poverty. It is equivalent to the shortfall of consumption below the poverty line per head of the total population, and is expressed as a percentage of the poverty line.
- ***The poverty severity index*** (or squared poverty gap index) adds the dimension of inequality among the poor to the poverty gap index, and is said to reflect the severity of poverty. For a given value of the poverty gap index, populations with greater dispersion of incomes or expenditures among the poor will show up with a higher value for the squared poverty gap index.

While the above measures are effective for identifying three aspects of the poverty level of a given area or domain, they do not address the question of how many poor people are present within the domain. Thus, a second associated set of measures are also commonly used to examine absolute numbers of poor within an area.

- ***Poverty magnitude*** is simply the total number of persons in the domain being assessed whose income or expenditure falls below the poverty line. It is also referred to as the total poverty headcount or the total number of poor.

Box 2-1. Foster, Greer, Thorbecke poverty measures

The FGT (Foster, Greer, Thorbecke) measures are a family of poverty measures where α is a measure of the sensitivity of the index to poverty, the poverty line is (z), and (G_n) is equal to the poverty line (z) less actual income (Y_i) for poor individuals. When α is set equal to 0, P(0) is simply the headcount index. When α is set equal to 1, P(1) is the poverty gap index, and when α is set equal to 2, P(2) is the severity of poverty or squared poverty gap index.

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{G_n}{z}\right)^\alpha, \qquad (\alpha \geq 0) \qquad G_n = (z - y_i).I(y_i \leq z).$$

FGT 0: Poverty Headcount Index. the proportion of the population that is counted as poor. It is often denoted by P(0), where N is the total population, and I (.) is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise. So if expenditure (Y_i) is less than the poverty line (z) then I(.) equals to 1 and the individual would be counted as poor. N_p is the total number of poor. The formula for the headcount index is as follows

$$P_0 = \frac{1}{N}\sum_{i=1}^{N} I(y_i \leq z) = \frac{N_p}{N},$$

FGT 1: Poverty Gap Index. This index measures the mean proportionate poverty gap in the population, where the poverty gap (G_n) is the poverty line (z) less actual income (Y_i) for poor individuals (the non poor have a zero poverty gap). Some think of this measure as the per capita cost of eliminating poverty (relative to the poverty line), through perfectly targeted transfers to the poor, in the absence of transactions costs and disincentive effects. The formula for the poverty gap index is as follows

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{G_n}{z}. \qquad G_n = (z - y_i).I(y_i \leq z).$$

FGT 2: Poverty Severity Index (or squared poverty gap index). This is a measure of the severity of poverty in an area. By squaring the poverty gap for each individual/household, this measure gives greater weight to those observations that fall far below the poverty line than those that are closer to it. The formula for severity of poverty, or squared poverty gap index, is

$$P_2 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{G_n}{z}\right)^2. \qquad G_n = (z - y_i).I(y_i \leq z).$$

Source: CIESIN. 2006. Catalog of small area estimates of poverty and inequality

- ***Poverty density*** is the overall average density of poor persons per unit area of the domain being assessed. It is calculated by dividing the poverty magnitude of a domain by its area, resulting in a value that is usually expressed in persons per square kilometer.

Both of the above sets of measures seek to measure poverty against an independently established outside standard, in order to provide estimates of absolute poverty within the domain for which the poverty line is established. A third set of commonly applied measures address issues associated with relative poverty by assessing inequality among the population in levels of income or consumption expenditures. In order to avoid confusion, these are best referred to as measures of inequality.

- ***The Lorenz curve*** is a curve that represents the relationship between the cumulative proportion of income and the cumulative proportion of the population in income distribution, beginning with the lowest income group. If there were perfect income equality, the Lorenz curve would be a 45-degree line.

- ***The Gini coefficient*** is a commonly used measure of inequality that represents the area between the Lorenz curve and the 45-degree line. Mathematically, it is expressed as:

$$G = |1 - \sum_{k=0}^{k=n-1} (X_{k+1} - X_k)(Y_{k+1} + Y_k)|$$

Where G = Gini coefficient, X = cumulated proportion of the population variable, and Y = cumulated proportion of the asset variable. The asset variable can be a measure of any type of asset under study, such as income, consumption expense, land, labor, etc.

In the case of income poverty, the asset variable would be actual income. Thus, with perfect income equality the Gini coefficient would be equal to zero; with perfect inequality it would be equal to one. Internationally, Gini coefficients of income tend to range from a low of 0.3 to a high of 0.7.

Not surprisingly, there are also several other sets of measures that are used to analyze poverty data. For example, the SEN Index is an example of another type of poverty measure, while inequality can be measured using the Generalized Entropy approach or the Atkinson Index.

In an effort to provide a meaningful way to compare poverty across countries, efforts associated with establishment of the Millenium Development Goals articulated a two-level set of global poverty lines. They were chosen through assessments of the lowest ten poverty lines among a set of low-income countries.

- ***$1-a-Day Poverty*** identifies members of the population with average consumption expenditures less than $1.08 a day measured in 1993 prices converted using purchasing power parity (PPP) rates. This is considered a severe poverty condition.
- ***$2-a-Day Poverty*** identifies members of the population with average consumption expenditures less than $2.15 a day measured in 1993 prices converted using purchasing power parity (PPP) rates. This is considered an important, but less severe poverty condition.

Table 2-1. Poverty Incidence and Magnitude in GMS countries, 1990 - 2003

Country	Headcount Ratio (percent)		Magnitude (thousand persons)	
	1990	2003	1990	2003
$1-a-Day Poverty Index and Magnitude of Poor				
China	33	13	377,055	173,072
Cambodia	46	34	3,953	4,526
Lao PDR	53	29	2,183	1,630
Myanmar	*n a*	*n a*	*n a*	*n a*
Thailand	10	1	5,651	415
Viet Nam	51	10	33,446	7,861
$2-a-Day Poverty Index and Magnitude of Poor				
China	72	42	825,043	536,554
Cambodia	84	77	7,248	10,361
Lao PDR	91	74	3,773	4,210
Myanmar	*n a*	*n a*	*n a*	*n a*
Thailand	43	28	24,168	17,217
Viet Nam	87	54	57,675	44,063

Source: Asian Development Bank (ADB) - Key Indicators 2005

Using these external global standards, progress of countries toward meeting the Millennium Development Goals for reducing poverty is being assessed by the World Bank based on pri-

mary sample surveys. Progress of GMS nations between 1990 – 2003 is summarized in Table 2-1.

It is instructive to note that while all GMS countries (except Myanmar where data is not available) appear to have made significant progress in reducing the incidence (headcount ratio) of poverty, in Cambodia and the Lao PDR this has not always translated into reduced magnitude in the number of poor people.

There are also efforts at the global level to track changes in inequality. Data on the overall Gini coefficients at national levels is one of the most common measures. Another common indicator is the ratio between the income or wealth of the richest quintile (20 percent) of a population to the income or wealth of the poorest quintile. Efforts are being made to establish databases containing time series data on such indicators. As an example, Table 2-2 displays national-level data for GMS countries from the Asian Development Bank that measures annualized change from the early 1990's to 2002/4.

These data indicate that inequality has been increasing in all countries except Thailand, and

Table 2-2. Change in Inequality Indicators for GMS countries, 1992 - 2004

Country	Period	Gini Coefficients			Top 20	Bottom 20	
		initial year	final year	Annualized change ( )	initial year	final year	Annualized change ( )
China	1993–2004	40.7	47.3	1.35	7.6	11.4	3.70
Cambodia	1993–2004	31.8	38.1	1.63	5.2	7.0	2.68
Lao PDR	1992–2002	30.4	34.7	1.32	4.3	5.4	2.35
Myanmar		*n a*	*n a*	*n a*	*n a*	*n a*	*n a*
Thailand	1992–2002	46.2	42.0	-0.97	9.4	7.7	-1.98
Viet Nam	1993–2004	34.9	37.1	0.55	5.4	6.2	1.31

Source: ADB Key Indicators 2007

is especially rapid in China. While inequality in Thailand appears to be decreasing, these decreases began from the highest levels of inequality in the region. This presumably reflects recent growth in the primarily urban middle classes in Thailand.

While data at this level are useful at the global level for the types of assessments for which they were developed, this level of aggregation is not very useful for improving understanding of poverty at levels that are useful for analyses under this project. At the extreme, for example, national level poverty or inequality data for China tells us very little about conditions in the montane province of Yunnan, and the same is true regarding distributions of poverty and inequality within all of the GMS countries.

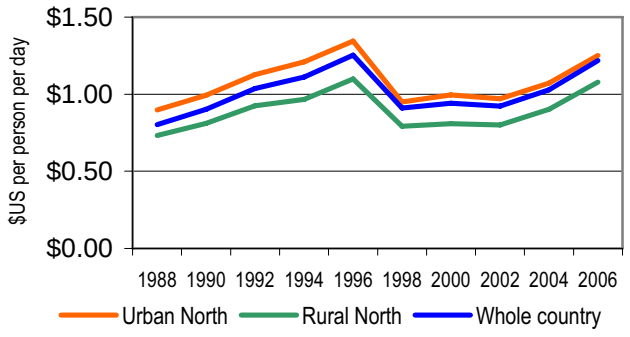
Thus, further assessments of poverty clearly required access to data at sub-national levels, which also means that the poverty lines used for assessing poverty must be based on criteria established within the context of each GMS society. Examples of the types of approaches encountered in each country include:

Poverty lines in Thailand

In Thailand, the Office of the National Economic and Social Development Board (NESDB) constructs poverty lines and provides definitions of poverty in the country. Poverty conditions are defined those where people do not have adequate expenditure to meet basic necessities in life including food, housing, clothing, transportation and medical expenses. This level of minimum expenditure to sustain a basic livelihood varies according to region and depending on whether people live in urban or rural areas. The poor are defined as those falling below this regional area-specific poverty line.

Case studies under this project, for example, use the 2006 Northern regional poverty lines of 1,227 baht (US$ 1.08) per person per month for rural areas, and 1,425 baht (US$ 1.25) per person per month for urban areas. Figure 2-1 charts change in the US dollar value of the poverty line for Northern Thailand and the whole country during 1988-2006, and Table 2-3 provides the actual values in both Thai Baht and US$ currency.

Figure 2-1. Poverty lines in Northern Thailand and the whole country, 1988 – 2006



Source: NESDB

Table 2-3. Urban and Rural Poverty Lines in Northern Thailand, 1988 – 2006

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006
Poverty line (baht/person/month)										
North(urban)	708	762	860	913	1,023	1,178	1,199	1,252	1,294	1,425
North (rural)	578	623	705	729	835	984	974	1,032	1,089	1,227
Exchange rate (baht/$US)	26.29	25.59	25.4	25.15	25.34	41.37	40.16	43.00	40.27	37.93
Poverty line ($US/person/day)										
North(urban)	0.90	0.99	1.13	1.21	1.35	0.95	1.00	0.97	1.07	1.25
North (rural)	0.73	0.81	0.93	0.97	1.10	0.79	0.81	0.80	0.90	1.08

Source: NESDB for poverty line in baht, Bank of Thailand for foreign exchange rate

There are also many other views on how to conceptualize, define and measure poverty in Thailand, including rather longstanding interest in "quality of life" indicators, as well as the views underlying the focus of the Ninth 5-year National Economic and Social Development Plan on "sufficiency economy" principles and dimensions of well-being such as empowerment and happiness. Efforts to broaden information associated with these needs include village-based national data collection systems on basic minimum needs (BMN) and the National Rural Development Committee (NRD2C) database.

Poverty lines in Vietnam

In Vietnam, the multi-dimensional nature of poverty is recognized, and poverty is being a ssessed on the basis of the sustainable livelihood framework. Various World Bank activities are attempting to integrate broader notions of risk, vulnerability, social inclusion and opportunities [World Bank 2006a]. Activities supported by the Australian Agency for International Development define poverty in terms of meeting basic necessities, as well as accountability from state institutions and civil society, and freedom from excessive vulnerability to adverse shocks [AusAID 2001].

The operational definition of the poor used in case studies under this project is based on the current system used by the Ministry of Labor, Invalid and Social Affairs (MOLISA), which is based on a poverty line of 200,000 VND per person per month. Further investigations within local case study areas also include poverty criteria based on who local authorities and local people perceive to be the poor. Additional factors related to poverty in Vietnam are also discussed in a subsequent section, and in the context of our case study.

Poverty lines in the Lao PDR

Especially during the last decade, the Lao PDR has been exploring various approaches for assessing poverty. Using more conventional expenditure and income approaches, it has been developing and refining the Lao Expenditure and Consumption Survey (LECS), as well as the population censuses conducted every 10 years since 1985. Both are managed by the National Statistics Center (NSC). Previous poverty assessments using this data employed poverty lines developed by Kakwani et al. [2002] which have now been updated to provide time series compatibility for the recent Lao PDR Poverty Assessment (LAOPA) [World Bank 2006b].

But leadership in the Lao PDR is also keenly interested in multi-dimensional characteristics of poverty. Thus, for example, it has also conducted a major Participatory Poverty Assessment [ADB 2001], as well as a broad analysis of poor districts that was used in developing its national Poverty Reduction Strategy Paper [World Bank 2004]. The recent LAOPA effort seeks to incorporate and build on as much of this information as possible.

Poverty lines in China

China has an elaborate national statistical system operating under the National Bureau of Statistics, which includes a national population census, a national agricultural census, and both rural and urban household surveys that can provide data for poverty assessments.

China also has additional poverty assessment efforts associated with various major previous and current poverty reduction programs. The most recent is the poor household register established by the Poverty Alleviation and Development Office of the State Council. Some of the issues associated with this data have been discussed by Ahmad [2007].

Small-Area Estimates of Poverty

In terms of the basic poverty line standards used to assess poverty using income or consumption expenditure approaches, there are clearly issues within each country regarding the adequacy of current methodologies. Yet these approaches still provide the most consistent and broad-based approach for assessing poverty that is currently available. But for efforts to better understand how poverty is distributed across societies and landscapes, there is a clear need to have far more disaggregated databases. By disaggregating poverty data into small units, it can then be linked with spatial database systems that contain many additional types of spatially explicit and similarly disaggregated data. This can then provide a powerful tool for exploring additional types of relationships between poverty and a wide range of additional factors with which it is believed to be linked. And once relationships are further clarified, this can also provide valuable information for efforts to improve poverty alleviation policies and how their programs are targeted.

These needs have been recognized at various levels, resulting in efforts by a growing community of analysts to develop approaches under the banner of poverty mapping. Perhaps the most prominent has been activities conducted in association with the Development Research Group of the World Bank, using techniques they have developed to estimate poverty at a local level by combining census and household survey information. These methods have now been tested through applications in various countries, including all of the GMS states except Myanmar. The basic approach has been summarized in a recent book [Bedi 2007], along with case studies that include Cambodia, Yunnan, Vietnam and Thailand.

This data has already begun to be applied in assessing various wider dimensions of poverty and its relationships with other issues. Noteworthy as initial examples of some of the types of potential applications where this data can be used include work on the poverty-environment nexus in Cambodia, Lao PDR and Vietnam [World Bank 2006a], and on relationships between poverty and forests in Vietnam [Sunderlin 2005, Muller 2006]. A wide variety of additional types of applications are clearly possible, including some of the types of analysis to which our project has sought to contribute.

But gaining access to this data for further work by researchers who are outsiders to this group has often been somewhat problematic, and increasingly difficult with higher levels of data disaggregation. The Socioeconomic Data and Applications Center (SEDAC) and the Poverty Mapping Project of the Center for International Earth Science Information Network (CIESIN) at Columbia University are seeking to help address this issue by providing open access to as much of this data as possible through their website on small area estimates (SAE) of poverty and inequality[1]. For GMS states, however, data at the most disaggregated level is only available for Cambodia, there are no associated boundary files for Cambodia or Yunnan, and no data at all for Thailand or the Lao PDR. After a great deal of effort, however, we have been able to access SAE data and reconstruct spatial datasets for the countries and levels indicated in Table 2-4.

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1 http://sedac.ciesin.org/povmap/datasets/ds_nat_all.jsp

Within the SAE datasets we obtained for use in this study, there are also some additional limitations.

Table 2-4. Access to small area estimates of poverty data

	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam	Yunnan
Level 1	province	province	n.a.	province	province	prefecture***
Level 2	district	district	n.a.	district	district	county
Level 3	commune*	n.a.	n.a.	tambon	commune**	township**

* poverty data available, but no access to appropriate boundary file
** access to boundary files, but no access to poverty data
*** access to boundary files, but no known poverty data at this level

- The dataset for the Lao PDR was constructed from published data from 1998 [Kakwani 2001] that only allows us to calculate total poverty incidence, there is no data on how much of the populations are urban, and data is missing for several districts. We know from other sources [van der Weide 2004; World Bank 2006b] that other more complete and updated versions exist, but we were not able to gain access to them for this study.
- For Cambodia, there is no calculation of Gini coefficients, and data is either missing for a few districts, or our boundary file is not fully time-matched with the data. This dataset is discussed by Tomoki Fujii [2003, 2007] and elsewhere [MOP-WFP 2002]. More recent data also exists [World Bank 2006c].
- The Vietnam data is complete for measures at the total population level, but only poverty incidence can be calculated on a rural versus urban basis. Detailed information on development and application of this dataset are available [Minot et al. 2003, 2005; Swinkels 2007].
- For Thailand, data is complete for measures on rural and urban populations, but only poverty incidence can be calculated for overall population levels, and there is no data for the Bangkok Metropolitan Area. The basic data we acquired (without unit codes, population data or boundary files) is one product of published work [Somchai et al. 2007; Healy 2003].
- For Yunnan, measures are complete, but as for Thailand, overall population data was missing. In both cases, however, we were able to obtain population data for the right year and make the calculations. Work in Yunnan is described by Ahmad [2007].

2.1.2 Why poverty definitions and measures matter

As already mentioned in the previous chapter of this report, governments in GMS states are recognizing the importance of eliminating, or at least minimizing poverty in their societies, and this recognition tends to be based on some combination of three lines of reasoning:

- *Moral*. Poverty can be a moral or ideological issue, and most governments engage in extensive rhetoric about how their programs will help everyone in society to meet their basic needs and pursue prosperity.
- *Economic*. Reducing or eliminating poverty can be an economic issue because of the cost of government programs to help poor people, at least in times of crisis. And because as people move above poverty levels they will produce and consume more, reducing poverty can also help stimulate the domestic economy.

- *Security*. Poverty can be a national security issue because of potential threats to political stability that can arise when significant components of the population are not able to meet their basic needs, or feel they are excluded from access to prosperity.

Moreover, all governments in the GMS region have proclaimed that increased market integration is a central component of their approach to poverty alleviation. There are many different views and variations on how this can or should be achieved, and many additional factors seen as important for promoting broader notions of improved well-being and quality of life. Nevertheless, promotion of broad effective participation in globalizing market economies is a key element of their approach, and action programs are at various stages of design and implementation.

But how polices and programs are formulated, how their objectives and targets are established, and whether they achieve their intended objectives will all relate to how poverty is defined and measured. Moreover, selection of definitions and measures that are most appropriate will likely vary according to the importance placed on moral, economic or security lines of reasoning. And in any event, definitions and measures are likely to be influenced by different interest groups through these inherently political decision-making processes.

In order to help clarify some of the implications of variations in definitions and measures of poverty, our regional assessment of distributions of poverty employs several different measures of poverty in GMS states for which data is available.

2.2 Distributions of poverty in the Greater Mekong Region

This section employs small area estimates of poverty in all GMS states except Myanmar as the basis for providing an overview of the distribution of poverty in the region. In doing so, it is important to keep in mind that definitions of the poverty line standard for assessing poverty are different between countries. Thus, the picture we seek to paint in this chapter is one that merges spatial distributions of relative levels of poverty and numbers of poor people within countries, with how poverty is perceived and is being measured among countries.

In conceptualizing distributions of poverty, one of the first basic questions that need to be asked is whether we are seeking to identify areas according to the incidence or depth of poverty within them, or whether we are seeking to identify where the greatest number of poor people are located. The first two sections below will address these two issues, both of which are quite relevant for formulations of poverty alleviation policies. They also raise rather different questions related to access to markets and resources.

2.2.1 Locations of poor areas

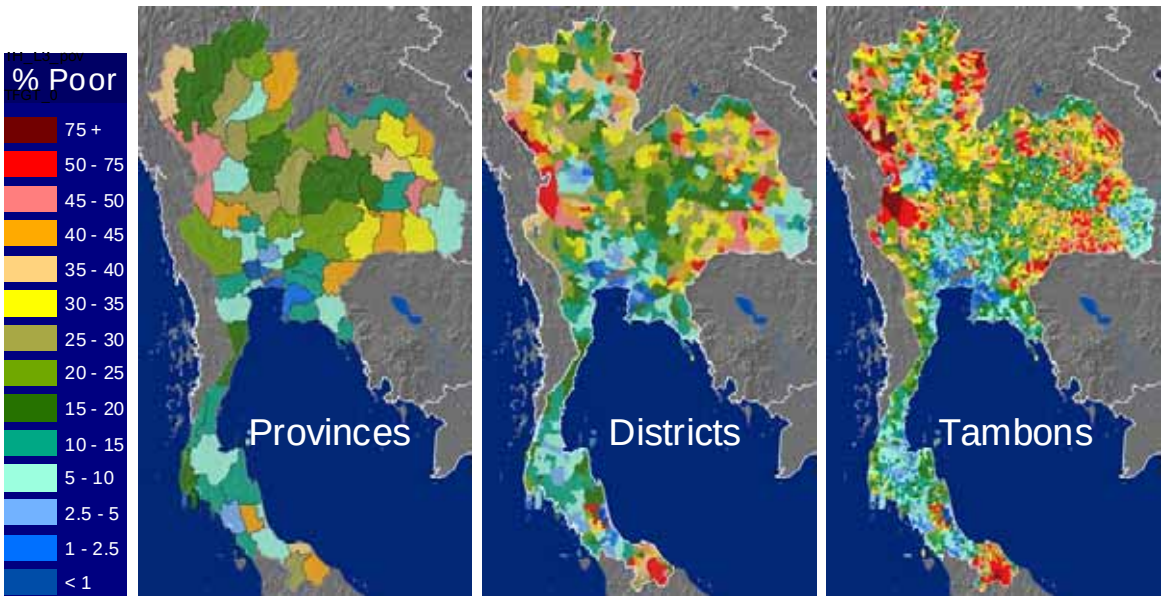
Many efforts to try to improve understanding of poverty or to target programs that seek to help alleviate poverty begin with an assessment of areas within a country or other relevant domain in terms of poverty incidence (or headcount ratio). Many now also extend the approach to include assessment of poverty gaps or poverty severity.

But in taking this poor area-based approach, one of the most basic initial issues is the resolution of the assessment, which is a function of the degree of disaggregation that is possible in the data that is available. In order to provide an example of how resolution can affect to the outcome and utility of poor area assessments, Figure 2-2 shows poverty incidence data for Thailand at provincial, district, and sub-district (tambon) levels.

Close examination of the maps in this figure demonstrates many of the implications of increased resolution through disaggregation of poverty data into smaller spatial units. In the province-level (also known as level 1) map there appear to be no provinces where the incidence of poverty exceeds 50 percent of the population, and the lowest levels only occur in a few areas around Bangkok. But at district level (level 2), the full range of poverty incidence categories can be observed, while at tambon level (level 3) extremes at both ends occur at more locations in the country. This, of course, is not surprising since aggregation is essentially an averaging process. But visualization of the increased variation that is masked by aggregation helps underscore the need for assessment of disaggregated data, and clarify some of the implications for poverty analysis and targeting of poverty alleviation programs.

One of the implications here is that district level (level 2) data represent what is really about the minimum level of disaggregation that can be very useful for analysis of relationships between poverty and other types of spatial or spatially disaggregated data. For most who are

Figure 2-2. Poverty incidence in Thailand at province, district and tambon levels, 2002



familiar with life in rural areas this is no surprise at least because of the obviously different characteristics of conditions in the central districts (*amphoe muang* in Thailand) of each province.

It is also worth noting the degree to which provincial boundaries disappear or endure with increasing levels of resolution. In cases where they endure, it raises various questions about whether there are issues associated with particular provincial administration and programs – which are extensions of a centralized government system that is supposed to provide an equitable distribution of investments, programs and services among provinces – or whether there may some issues related to data collection and analysis. This is also an example of how disclosure of disaggregated data can help improve transparency and accountability, as well as an indicator of why many factions within the system oppose such disclosure.

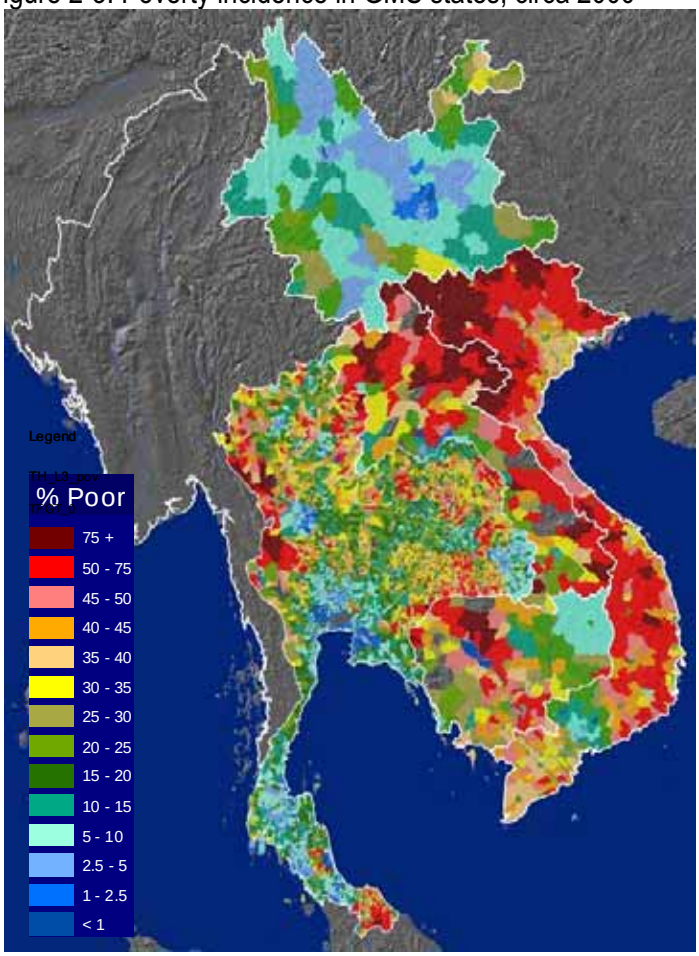
The next step is to expand our classification of areas by the incidence of nationally-defined poverty to all portions of the GMS for which we have data. The results are displayed in Figure 2-3. As indicated in this figure, our analysis has used the greatest level of disaggregation that we were able to achieve for each country, as shown in Table 2-5. Thus, level 2 data (district level, or county level in Yunnan) has been used for all countries except Thailand, where we used the available level 3 data. By using a common set of poverty incidence categories for all countries, we are able to gain some insight into relative distributions of poor areas and the way they are viewed across countries.

Table 2-5. SAE data used in analysis for this report

	Cambodia	Thailand	Vietnam	Yunnan	Lao PDR
year:	1999	2002	1999	2000	1998
adm level:	level 2	level 3	level 2	level 2	level 2
unit:	district	tambon	district	county	district
N:	180	7,254	613	128	127

While various interesting patterns appear in this map, the most obvious is the relatively low levels of poverty incidence in Yunnan. Although we were not able to gain access to the township level poverty data for Yunnan, we know from maps included in analyses conducted under the study that township level data did not have such great intra-county variation that it radically altered the overall picture from county-level data [Ahmad 2007]. Thus, either there is a very significant difference in how poverty is being defined in Yunnan, or else there really are much lower levels of poverty incidence in Yunnan.

Figure 2-3. Poverty incidence in GMS states, circa 2000



The second obvious pattern in this data is the very high levels of poverty incidence in montane areas of northern and central Vietnam and Laos, and agreement in areas along their common montane border. Highest levels in Yunnan are also near the border with Vietnam in the Red River valley, as well as in the northeast near the border with the densely populated Sichuan area.

In Thailand, highest levels of poverty incidence are also found in mountain areas of the north and along the western border with Myanmar, as well as in the Northeastern region.

Yet another pattern that is apparent is the lower levels of poverty incidence in areas around capital cities, and especially around Bangkok, Kunming and Ho Chi Minh City. The delta areas of the Red River and the Mekong River have intermediate, but somewhat high poverty incidence levels, whereas the Chao Phraya delta shows very low levels.

In order to clarify overall patterns of the distribution of poverty incidence levels within countries, this data is aggregated at national levels in Table 2-6. The three sub-tables show how land area, total population and numbers of poor are distributed among areas classified according to their level of poverty incidence. In the Lao PDR, more than half of the poor live in areas with greater than 50 percent poverty incidence; these areas account for a similar proportion of the total land area, but contain only about one-third of the total population. In

Cambodia and Vietnam, areas with poverty incidence at 75 percent or more contain relatively small percentages of poor people and total population, but in Vietnam they account for 18 percent of national land area. In both countries, most of the poor live in areas having poverty incidence levels of between 35 and 75 percent. In Thailand half of the rural poor live in areas with poverty incidence above 30 percent, but these areas have considerably smaller shares of land area, and especially population. Data from Yunnan indicate the highest poverty incidence levels are just over 35 percent. There appears to be a tendency for more poor people to live in areas with relatively high poverty incidence levels, but trends are not as clear as they are in other GMS states where data is available.

Table 2-6. Poor area shares of poor, people & land

area % poor	Poor Area Share (%) of the Total Land Area				
	Lao PDR	Cambodia	Thailand	Vietnam	Yunnan
75+	20	5	2	18	-
50-75	32	14	9	38	-
45-50	6	8	5	11	-
40-45	5	11	6	12	-
35-40	6	6	7	8	1
30-35	9	5	9	3	9
25-30	5	14	9	2	4
20-25	8	9	11	1	2
15-20	4	9	12	4	13
10-15	3	4	12	2	19
5-10	1	14	12	1	26
2.5-5	0.3	0.1	4	0.1	20
1-2.5	0.5	-	2	-	6
<1	-	-	1	-	0.3
	100	100	100	100	100

area % poor	Poor Area Share (%) of the Total Population				
	Lao PDR	Cambodia	Thailand	Vietnam	Yunnan
75+	11	3	0.3	3	-
50-75	21	18	5	14	-
45-50	4	13	3	10	-
40-45	5	16	4	18	-
35-40	3	12	5	18	2
30-35	15	7	6	8	6
25-30	6	14	7	4	6
20-25	12	5	9	4	2
15-20	9	4	12	6	12
10-15	10	3	14	4	20
5-10	1	6	15	6	22
2.5-5	3	0.3	8	6	17
1-2.5	1	-	6	-	13
<1	-	-	5	-	1
	100	100	100	100	100

area % poor	Poor Area Share (%) of the Total Number of Poor				
	Lao PDR	Cambodia	Thailand	Vietnam	Yunnan
75+	23	6	1	7	-
50-75	32	27	16	23	-
45-50	5	16	8	13	-
40-45	6	18	9	21	-
35-40	3	11	9	18	5
30-35	12	6	10	7	16
25-30	4	10	10	3	12
20-25	7	3	10	2	4
15-20	4	2	10	3	17
10-15	3	1	9	1	19
5-10	0.2	1	6	1	14
2.5-5	0.3	0.0	2	1	6
1-2.5	0.0	-	0.5	-	5
<1		-	0.1	-	0.1
	100	100	100	100	100

While visual inspection of the distribution of poor areas is useful in gleaning insights such as these, our next step was to conduct a more systematic examination of interactions between poor areas classified by their poverty incidence levels and the altitude zones articulated in the first chapter that define the domain of upland areas in the region.

Poor areas & altitude zones

Combining data layers for poor areas and our six altitude zones enabled us to construct the tables displayed in Table 2.7. Aggregates of areas by their poverty level class are characterized by the overall distribution of their land area among altitude zones, along with data on their population density, urbanization, and relative shares of national populations and land area. Poverty and altitude zone classes are also color coded to facilitate comparison with their respective distribution maps.

These data allow us to refine our assessment of basic terrain and demographic characteristics of poor areas in each country:

- *Cambodia*. As expected from its small proportion of land in the montane zone, there appears to be little association between poverty incidence zones and altitude levels. Indeed, most of the poorest areas have most all of their land area in the coastal lowland zone. The main association in this data is that lower poverty incidence levels are generally associated with higher levels of urbanization.

- *Lao PDR*. Areas with poverty incidence levels above 50 percent cover more than half of the land area of Laos and contain about one-third of the entire population. A very large proportion of their land is located in the montane zone, and most of it is in middle and upper portions of the montane zone. For remaining parts of the country, however, trends are mixed. While there is a general tendency for higher proportions of upper montane land to be associated with higher poverty levels, the trend is not very strong, especially in areas with middle to upper-middle levels of poverty incidence.

Table 2-7. Areas classified by poverty incidence levels

Cambodia

area	oor	People Share %	% People Urban	People Density per/km²	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
	75+	3	3	32	5	71	24	4	2	0	-	100
	50-75	18	1	82	14	89	5	1	5	0	-	100
	45-50	13	8	107	8	91	9	0	0	-	-	100
	40-45	16	11	93	11	81	18	1	0	-	-	100
	35-40	12	6	119	6	91	7	1	1	-	-	100
	30-35	7	12	93	5	83	14	2	1	-	-	100
	25-30	14	13	63	14	53	26	13	7	1	-	100
	20-25	5	46	35	9	46	30	8	12	4	-	100
	15-20	4	81	29	9	56	37	4	2	-	-	100
	10-15	3	76	46	4	64	28	2	5	0	-	100
	5-10	6	82	26	14	22	66	7	5	0	-	100
	2.5-5	0	100	275	0	73	25	2	-	-	-	100
	1-2.5	-	-	-	-	-	-	-	-	-	-	-
	<1	-	-	-	-	-	-	-	-	-	-	-
		100	19	65	100	65	26	5	4	0	-	100

Lao PDR

area	oor	People Share %	% People Urban	People Density per/km²	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
	75+	11	na	13	20	0	6	7	53	34	-	100
	50-75	21	na	15	32	1	18	13	42	26	-	100
	45-50	4	na	16	6	-	1	18	61	20	-	100
	40-45	5	na	25	5	0	38	23	24	15	-	100
	35-40	3	na	14	6	0	7	12	46	35	-	100
	30-35	15	na	37	9	4	33	21	30	12	-	100
	25-30	6	na	28	5	5	57	8	15	15	-	100
	20-25	12	na	34	8	1	42	10	30	18	-	100
	15-20	9	na	52	4	-	46	17	29	7	-	100
	10-15	10	na	72	3	0	40	27	30	3	-	100
	5-10	1	na	21	1	-	29	16	48	7	-	100
	2.5-5	3	na	221	0	-	100	0	-	-	-	100
	1-2.5	1	na	27	0	-	51	10	23	16	-	100
	<1	-	-	-	-	-	-	-	-	-	-	-
		100	na	23	100	1	23	13	40	23	-	100

Thailand

area	oor	People Share %	% People Urban	People Density per/km²	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
	75+	0.3	6	17	2	4	12	16	52	15	-	100
	50-75	5	4	67	9	11	42	14	25	8	-	100
	45-50	3	6	72	5	9	49	13	21	8	-	100
	40-45	4	6	80	6	11	50	14	20	5	-	100
	35-40	5	8	73	7	12	47	16	20	5	-	100
	30-35	6	10	80	9	15	48	15	18	4	-	100
	25-30	7	11	88	9	20	45	15	17	4	-	100
	20-25	9	13	90	11	22	43	16	15	3	-	100
	15-20	12	16	106	12	34	41	13	10	2	-	100
	10-15	14	18	127	12	37	41	12	8	1	-	100
	5-10	15	26	145	12	47	36	9	6	1	-	100
	2.5-5	8	40	227	4	63	30	5	2	0	-	100
	1-2.5	6	54	387	2	81	14	4	2	0	-	100
	<1	5	61	468	1	64	20	9	7	0	-	100
		100	21	110	100	27	41	13	15	4	-	100

Vietnam

area	oor	People Share %	% People Urban	People Density per/km²	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
	75+	3	6	43	18	1	9	17	42	31	0	100
	50-75	14	9	84	38	16	27	19	28	9	-	100
	45-50	10	8	207	11	53	15	11	20	1	-	100
	40-45	18	8	357	12	61	10	11	14	3	-	100
	35-40	18	8	525	8	89	5	1	3	2	-	100
	30-35	8	12	554	3	73	6	4	14	3	-	100
	25-30	4	24	514	2	65	21	13	1	0	-	100
	20-25	4	52	848	1	74	7	3	16	0	-	100
	15-20	6	53	351	4	58	35	5	2	0	-	100
	10-15	4	44	481	2	89	10	1	0	-	-	100
	5-10	6	67	1,045	1	80	11	0	0	9	-	100
	2.5-5	6	99	9,137	0.1	99	1	-	-	-	-	100
	1-2.5	-	-	-	-	-	-	-	-	-	-	-
	<1	-	-	-	-	-	-	-	-	-	-	-
		100	24	232	100	36	18	14	23	10	0	100

Yunnan

area	oor	People Share %	% People Urban	People Density per/km²	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
	75+	-	-	-	-	-	-	-	-	-	-	-
	50-75	-	-	-	-	-	-	-	-	-	-	-
	45-50	-	-	-	-	-	-	-	-	-	-	-
	40-45	-	-	-	-	-	-	-	-	-	-	-
	35-40	2	5	192	1	-	-	1.3	27	71	0.3	100
	30-35	6	10	79	9	0.0	0.3	1.0	11	80	7	100
	25-30	6	9	164	4	-	-	0.0	8	90	2	100
	20-25	2	7	95	2	-	0.0	1.0	13	75	11	100
	15-20	12	12	99	13	-	0.2	1.4	10	80	8	100
	10-15	20	17	114	19	-	0.1	0.2	5	91	4	100
	5-10	22	19	93	26	0.0	0.3	0.6	6	85	8	100
	2.5-5	17	34	97	20	-	-	0.0	11	75	14	100
	1-2.5	13	53	236	6	-	-	-	0.1	88	12	100
	<1	1	25	253	0.3	-	-	-	-	100	-	100
		100	23	111	100	0.0	0.1	0.5	8	83	8	100

- *Thailand*. Relationships are considerably more clear in Thailand. Areas with poverty incidence of 75 percent or more have more than 80 percent of their land in the montane zone and have very low population densities, but they include only 2 percent of the land area and only 0.3 percent of the people. Beyond that, however, the proportion of an area that is located in middle and upper montane zones is clearly associated with higher poverty incidence levels. Increasing population density and urbanization are associated with lower poverty levels, and with increasing proportions of land in the coastal lowland zone. Trends for the upper lowlands and lower montane zones are less clear, at least partially because of the large share the Northeast region has in both upper lowland zone land area and moderately high poverty incidence levels.
- *Vietnam*. In Vietnam, as in Laos, areas with poverty incidence above 50 percent occupy more than half of the land area of the country, and most of their land area is in montane zones. Here, however, they account for only 17 percent of the total population. Yet two-thirds of the people and 80 percent of the land area are within districts with poverty incidence levels above 35 percent. Within this band higher poverty levels are associated with greater proportions of land in montane zones, and lower overall population densities; urbanization rates are all quite low. Higher levels of urbanization are generally associated with decreasing poverty incidence at lower levels of the scale.
- *Yunnan*. More than 80 percent of both the people and the land area of Yunnan are located within counties with poverty incidence levels between 1 to 20 percent. Moreover, there are no clear relationships between relatively higher or lower levels of poverty and altitude zones or overall population density. The only identifiable relationship is the lowest levels of poverty incidence are associated very mildly with higher urbanization and population density.

This assessment of relationships between poverty incidence levels and altitude zones has demonstrated that in Cambodia, which is 90 percent of it land area in lowland zones, and in Yunnan, where more than 80 percent of its land is in the upper montane zone, there appears to be little relationship between levels of poverty incidence and altitude zones. In Vietnam, Laos and Thailand, however, the very poorest areas are associated with high proportions of land area located in middle to upper montane zones. These areas also have relatively lower population densities, low levels of urbanization, and are considered relatively remote.

Poverty gaps and severity

While poverty incidence levels allow us to classify areas according to the proportion of people below the nationally-defined poverty line, it does not provide information on how far below the poverty line are the levels of income or consumption of the poor. Thus, although our datasets for poverty gaps and severity are less complete, we also mapped available data using a similar approach. Data for Viet-nam are for the overall population, but for the other countries they are for rural populations only. By constructing a common set of classes that spanned the range of levels found in countries for which we have data, we are able to show variation within each country, while also capturing a picture of how levels compare across countries. But of course, we need to again caution the reader that these calculations are all

relative to poverty lines defined in somewhat different ways in each country. Results are displayed in Figure 2.4.

As this figure illustrates, the spatial distribution of poverty gaps and poverty severity are very similar in the case of these four countries. Indeed, the largest poverty gaps and highest levels of severity are found in the same types of areas where we found the highest poverty incidence levels – relatively remote mountain areas in northern and central Vietnam and northern and western Thailand, along with parts of Northeast Thailand and areas north of Tonle Sap in Cambodia. Although relatively lower overall, highest levels in Yunnan are adjacent to Vietnam in the upper Red River valley, near Sichuan in the northeast, and in some areas near to Myanmar.

Figure 2-4. Poverty gaps and severity in GMS, circa 2000

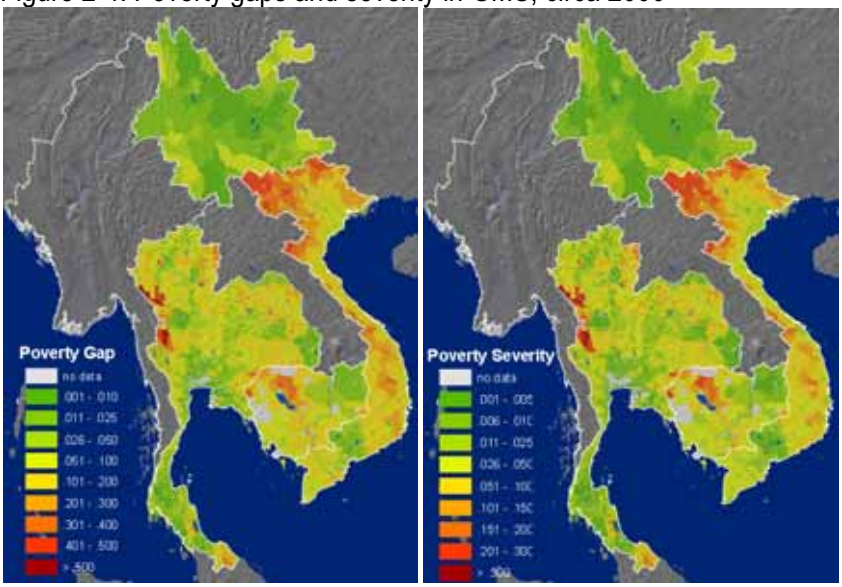
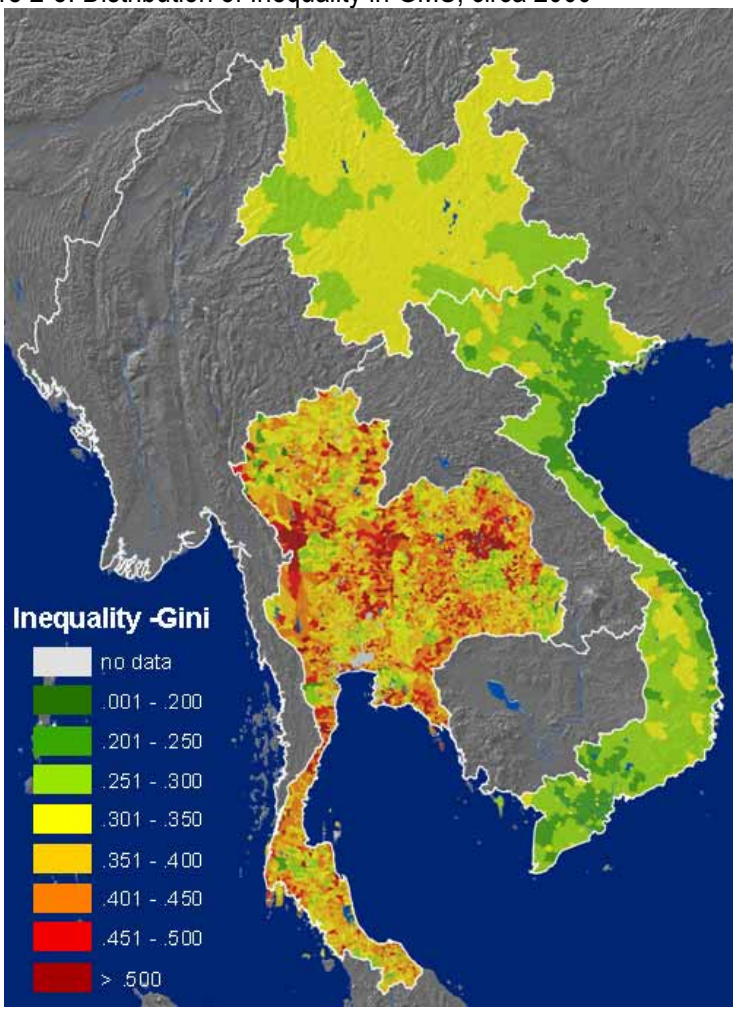


Figure 2-5. Distribution of Inequality in GMS, circa 2000



Since these patterns add little information to the analysis above, we will not present any further assessments of poor areas based on these measures of poverty depth.

Inequality

One approach that seeks to transcend issues associated with national poverty lines is to look at relative poverty by examining inequality in income or consumption levels. Thus, we also used data from small area estimates to map Gini coefficients in countries where such data is available.

In this case, the data available to us was limited to only three of the GMS countries, Vietnam, Yunnan and Thailand. Again, data from Vietnam is from the overall population, while data from Yunnan and Thailand are for rural populations only. Results are displayed in Figure 2-5.

Despite the fact that data from Vietnam are for the total population, the lower levels of inequality are quite striking. It is also instructive to note that the relatively higher levels of inequality in Vietnam are associated with the same primarily montane areas in northern and central parts of the country that stood out in terms of their high poverty incidence levels.

Of course the other striking feature of this map is the high levels of inequality in Thailand. When we compare this distribution to the distributions assessed earlier in this chapter, it is clear that much of this inequality in Thailand is occurring in areas with relatively low poverty incidence levels, and that inequality is only associated with measures of poverty gaps or poverty severity in some areas. This presumably implies that some components of the population have very high incomes, while substantial numbers of people must be just above the poverty line in some areas, and possible well below it in areas with high poverty severity.

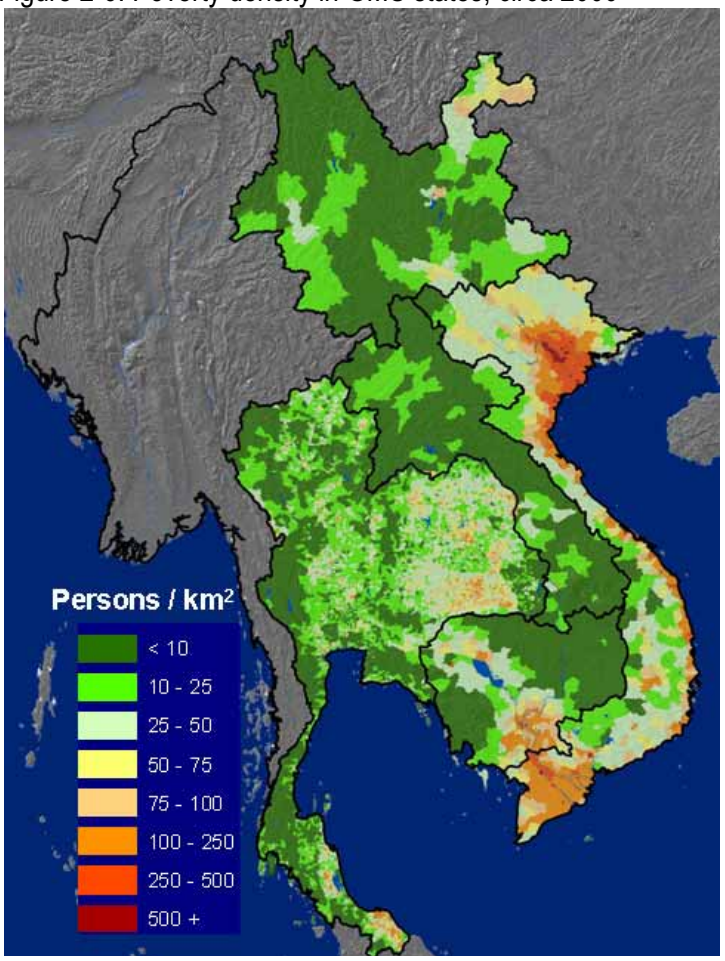
This raises questions about relationships between economic development, at least as it has been occurring in Thailand, and levels of inequality. Indeed, it is interesting that Yunnan shows overall levels of inequality that are intermediate between Vietnam and Thailand, which is where it would also be located in terms of its per capita level of overall economic development (see next chapter). Thus, although Yunnan has a far narrower bandwidth of inequality than what is found in Thailand, given the trends at the national level in China shown in Table 2.2, it will be interesting to see what the future has in store.

Clearly, identification of poor areas, whether based on poverty incidence, gaps or severity, is useful, both from an analytical point of view and from a policy formulation perspective. But as we have already seen in our assessments of poor areas, at least in this region many of the poorest areas also have relatively low levels of population density and small shares of the overall poor population. Thus, the next section seeks to add some balance to the assessment of this section by examining areas according to the number of poor people residing within them.

2.2.2 Numbers of poor in different types of areas

While it is important for both analysts and policy makers to know locations of areas where the proportion and depth of poverty are most severe, it is also important for them to know where the greatest numbers of poor people are located. Thus, the next stage of our assessment of poverty in the GMS region turned to this perspective.

Figure 2-6. Poverty density in GMS states, circa 2000



One of the most straightforward ways to assess the spatial distribution of numbers of poor people is simply to calculate their density, or the number of poor people per unit area in small disaggregated areas. Thus, we made these calculations based on data in the small area estimates of poverty datasets for all countries except Myanmar. Results are mapped in Figure 2.6. The same approach as in previous sections was employed by identifying a suitable range of classes that could capture variation within and among all five countries.

There are two initially striking features of the distribution of data in this map. The first is the relative lack of differences among countries relative to the distributions in most of the previous maps in this chapter. Of course, Vietnam has the highest density levels, but the manner in which data blends at its borders with data from neighboring countries is reassuring.

The second striking feature is the nearly inverse relationship for many – but certainly not all – areas between relative poverty incidence levels and poverty density levels. This pattern is especially clear in northern and central Vietnam and the neighboring mountains of Laos, where what were the areas of highest poverty incidence are now seen as the areas of low poverty density. It is not the case, however, in Northeast Thailand or northeastern Yunnan where areas of high poverty incidence are also areas of relatively high poverty density.

In order to further explore the implications of issues such as these, we crossed data layers on poverty density with our altitude zones, and calculated a few additional demographic vari-

ables for each area in our dataset. The results are tabulated in Table 2-8. This set of sub-tables for each GMS country for which we have data provides another perspective on poverty in the region:

- *Cambodia.* In this case, even Cambodia shows a quite clear relationship between poverty density and altitude zones. Areas with highest poverty density are located in the coastal lowland zone, and greater proportions of area in increasingly higher altitude zones are associated with lower poverty density levels. This is parallel to the same trend in overall population density. Most people are distributed among intermediate levels of

Table 2-8. Characteristics of areas classified by density of poor people

Cambodia

overty den ity level er m	People Share %	People Density per/km2	% People Urban	Poverty Density per/km² Rural	Poverty Density per/km² Urban	Poor Share %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	5	19,425	100	-	1,605	1	0.0	100	-	-	-	-	-	100
250-500	5	1,474	78	134	196	3	0.2	100	-	-	-	-	-	100
100-250	23	259	12	114	9	28	6	99	1	0.1	0.0	-	-	100
75-100	17	198	11	79	7	18	5	99	1	0.1	-	-	-	100
50-75	13	170	7	59	3	13	5	98	2	0.0	-	-	-	100
25-50	21	81	6	34	1	23	17	95	4	0.4	0.0	-	-	100
10-25	10	48	29	14	4	10	14	75	18	3	4	0.2	-	100
<10	7	8	10	2	0.2	4	53	42	43	8	7	0.9	-	100
	100	65	19	23	3	100	100	65	26	5	4	0	-	100

Lao PDR

overty den ity level er m	People Share %	People Density per/km2	% People Urban	Poverty Density per/km² Total	Poor Share %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	-		-	-	-	-	-	-	-	-	-	-	-
250-500	1	1,524	na	253	1	0.0	-	100	-	-	-	-	100
100-250	3	779	na	205	2	0.1	12	77	6	5	-	-	100
75-100	-		-	-	-	-	-	-	-	-	-	-	-
50-75	6	356	na	60	2	0.4	-	99	1	-	-	-	100
25-50	8	51	na	32	14	4	1	60	13	20	7	-	100
10-25	39	37	na	16	43	25	2	29	11	39	19	-	100
<10	43	14	na	5	39	71	1	18	15	42	25	-	100
	100	22	na	9	100	100	1	23	13	40	23	-	100

Thailand

overty den ity level er m	People Share %	People Density per/km2	% People Urban	Poverty Density per/km² Rural	Poverty Density per/km² Urban	Poor Share %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	0	4,415	97	27	586	0.2	0.0	86	10	4	-	-	-	100
250-500	1	2,424	85	126	194	1	0.1	80	15	6	-	-	-	100
100-250	7	496	47	107	21	9	1	42	55	2	1	0.0	-	100
75-100	6	280	34	72	12	10	2	22	73	3	2	0.0	-	100
50-75	13	216	27	55	6	18	6	19	75	4	2	0.3	-	100
25-50	25	148	17	32	3	30	19	25	60	9	5	1	-	100
10-25	30	103	15	15	1	24	32	32	37	15	13	3	-	100
<10	18	52	16	5	0.2	9	39	25	27	17	25	6	-	100
	100	110	21	20	2	100	100	27	41	13	15	4	-	100

Vietnam

overty den ity level er m	People Share %	People Density per/km2	% People Urban	Poverty Density per/km² Rural	Poverty Density per/km² Urban	Poor Share %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	12	3,932	69	458	171	5	1	100	0.2	-	-	-	-	100
250-500	27	991	17	334	22	27	6	96	2	1	0.4	0.1	-	100
100-250	31	429	19	149	12	31	17	79	11	5	4	1	-	100
75-100	8	217	20	79	7	9	9	50	23	10	14	3	-	100
50-75	8	124	16	58	3	11	15	25	21	21	25	8	-	100
25-50	10	80	14	34	2	13	31	17	19	17	32	15	0	100
10-25	3	44	11	18	1	4	17	15	21	17	31	15	-	100
<10	0	17	23	7	1	1	5	5	17	10	44	24	0	100
	100	232	24	79	6	100	100	36	18	14	23	10	0	100

Yunnan

overty den ity level er m	People Share %	People Density per/km2	% People Urban	Poverty Density per/km² Rural	Poverty Density per/km² Urban	Poor Share %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	2	23,854	100	-	900	1	0.0	-	-	-	-	100	-	100
250-500	-						-	-	-	-	-	-	-	-
100-250	-						-	-	-	-	-	-	-	-
75-100	7	457	50	64	21	11	2	-	-	-	2	98	0.2	100
50-75	5	210	13	50	5	12	3	-	0.4	1.3	18	79	1.0	100
25-50	11	144	24	26	3	19	9	0.0	0.3	1.3	11	86	1.3	100
10-25	36	135	20	13	2	35	29	-	0.1	0.7	9.0	89	0.8	100
<10	40	76	19	4	1	22	58	0.0	0.1	0.2	7	79	14	100
	100	111	23	11	2	100	100	0.0	0.1	0.5	8	83	8	100

poverty density, while the greatest proportion of land area in the country is in areas with the lowest levels of poverty density.

- *Lao PDR.* In Laos, more than 80 percent of the people and 95 percent of the land area is in areas with a poverty density of less than 25 poor persons per square kilometer. The vast majority of these areas are located in montane zones, and especially in the middle and upper montane zones. Remaining areas of the country show a strong trend toward increasing poverty density and population density as altitude zones become lower.
- *Thailand.* Nearly half of the people and 70 percent of the land area are in tambons that average less than 25 poor persons per square kilometer. While these areas include most of the nation's land located within montane zones, they also include substantial areas located in lowland zones. This obviously reflects a merging in these categories of relatively remote montane areas where poverty incidence is high but population density is low, with lowland areas where population densities are higher but poverty incidence is low. Overall, trends toward higher poverty density are associated with higher population density and greater urbanization; where poverty density exceeds 500 persons per square kilometer, it is fundamentally an urban poverty issue. Intermediate levels of poverty density show large proportions of land area in the upper lowlands largely due to the contribution from the Northeastern region of the country.
- *Vietnam.* Areas in Vietnam with less than 50 poor persons per square kilometer account for just over half of the total land area, with the vast majority located in montane zones, but only about 13 percent of the population and 18 percent of the poor. About 70 percent of the poor people are located in districts with poverty densities greater than 100 persons per square kilometer, more than 95 percent of which are located in lowland altitude zones; the vast majority are in rural areas.
- *Yunnan.* Three-quarters of the people and 87 percent of the land area of Yunnan are located in counties with poverty density levels of less than 25 persons per square kilometer. These areas account for about 57 percent of poor people, and while the vast majority of land area is in the upper montane zone, most land areas in alpine and lower-to-middle montane zones are also included. Areas with higher levels of poverty density are small in terms of their share of both land area and total population; areas with poverty density above 100 persons per square kilometer are a purely urban phenomenon. It is the intermediate areas of 25-100 poor persons per square kilometer where the share of poor people is proportionally larger than the share of land or total population, but there is no clear difference in their distribution among altitude zones.

Clearly, this assessment presents a quite different picture of poverty. Yet it also responds to the question of "where are the poor?" Moreover, it also shows another dimension of similarity and differences in the distribution of poverty within and among GMS states.

The other side of the coin: People above the poverty line

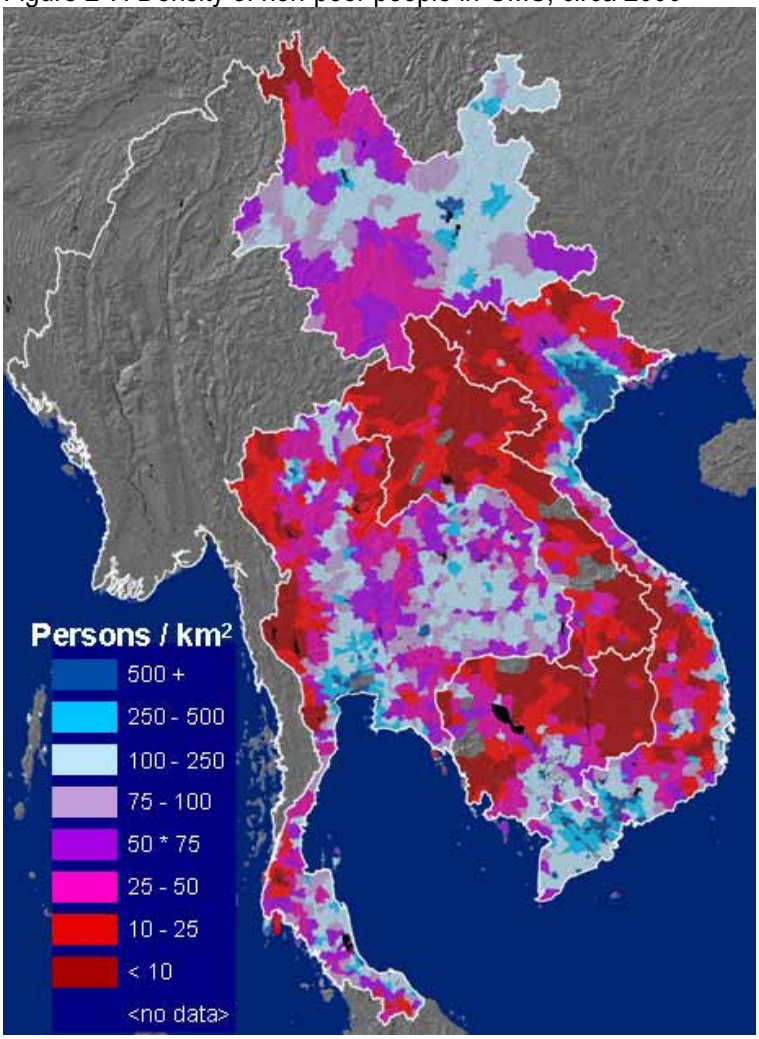
This project seeks to explore issues associated with access to markets and resources by the upland poor. Thus, we have invested significant effort in identifying where poor areas and poor people are located in relation to upland zones. But in order to be able to assess past or poten-

tial future impacts of access on well-being, we also need to know something about where are the people who are able to achieve livelihoods that allow them to have levels of income or consumption that exceed national poverty lines. In other words, we need to know something about the distribution of the non-poor population of the region.

Perhaps the most straight-forward way to examine locations of non-poor people is simply to calculate their density in a manner similar to how we have assessed density of poor people. Again, the small area estimates datasets provide the basis for these calculations, which are mapped in spatial form in Figure 2-7.

In order to further explore implications of this map of the distribution of people who have managed to achieve a socially acceptable minimum level of income or better, we have again crossed this data with our altitude zone data layer, and present the results in a set of national sub-tables in Table 2-9.

Figure 2-7. Density of non-poor people in GMS, circa 2000



One aspect of the spatial distribution of non-poor people that is visually apparent is the relatively high level of agreement on each side of the border of GMS states. Again, the higher montane zones in northern Vietnam and Laos have large areas of low density. These areas also extend along the mountain range to the south that separates the two countries, and join the lower altitude, but relatively remote areas of northern Cambodia. A similar pattern also extends across northern Thailand, and along its western border with Myanmar. Relatively lower densities are also apparent in areas of Yunnan with extensive areas in the alpine zone, as well as in the southwestern part of the province.

At the same time, we see relatively high densities of non-poor in the delta areas of the Chao Phraya, the Mekong and especially the Red river basins, as well as in major mountain valleys, in the Mun and Chi sub-basins of the Mekong in Northeast Thailand, along the narrow coastal lowland zone of Vietnam, and in areas around Kunming in Yunnan, from which relatively high densities radiate out toward Sichuan, toward Myanmar to the west, and toward Vietnam to the southeast. While the largest urban areas of each country are associated with high density of non-poor, the high density areas appear much larger than the cities themselves. National breakdowns of non-poor density confirm these types of relationships within each GMS country:

Table 2-9. Areas classified by density of non-poor people

Cambodia

non-poor density level per km²	People Density per/km²	% People Urban	category share (%) of total people	category share (%) of total non-poor	category share (%) of total poor	Poverty Incidence %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	2,849	89	10	14	1	14	0.2	100	-	-	-	-	-	100
250-500	464	100	2	3	3	20	0.3	95	4	0.4	0.0	-	-	100
100-250	237	11	37	38	28	38	10	98	2	0.2	0.0	-	-	100
75-100	159	2	10	9	18	47	4	99	1	0.1	0.0	-	-	100
50-75	116	13	11	10	13	42	6	85	11	2	2	0	-	100
25-50	67	10	17	15	23	46	17	87	9	2	2	0	-	100
10-25	27	7	7	5	10	49	16	72	18	5	5	0.5	-	100
<10	8	1	5	5	4	45	46	41	45	7	6	1	-	100
	65	19	100	100	100	39	100	65	26	5	4	0	-	100

Lao PDR

non-poor density level per km²	People Density per/km²	% People Urban	category share (%) of total people	category share (%) of total non-poor	category share (%) of total poor	Poverty Incidence %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	828		6	8	2	13	0	-	98	2	-	-	-	100
250-500	400		3	3	2	26	0	6	88	3	3	-	-	100
100-250	206		4	5	1	13	0	-	100	0.3	-	-	-	100
75-100	101		8	11	4	19	2	0.0	96	1	3	0.2	-	100
50-75	76		8	10	4	21	2	2	74	13	10	2	-	100
25-50	52		12	13	10	34	5	6	51	14	15	13	-	100
10-25	25		32	34	30	36	30	1	33	17	32	18	-	100
<10	11		28	16	46	65	60	1	9	13	49	28	-	100
	22		100	100	100	39	100	1	23	13	40	23	-	100

Thailand

non-poor density level per km²	People Density per/km²	% People Urban	category share (%) of total people	category share (%) of total non-poor	category share (%) of total poor	Poverty Incidence %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	1,386	68	17	20	4	5	1	70	22	7	1	0.4	-	100
250-500	372	30	11	12	6	10	3	67	26	6	1	0.0	-	100
100-250	178	14	33	33	30	18	20	41	52	5	1	0.2	-	100
75-100	116	7	13	12	16	25	12	31	59	7	3	0.5	-	100
50-75	87	6	12	11	18	29	16	33	50	10	6	1	-	100
25-50	55	4	10	9	17	32	20	26	41	16	14	3	-	100
10-25	26	5	4	3	7	35	15	9	30	24	30	7	-	100
<10	11	2	1	1	3	52	12	3	15	20	48	14	-	100
	110	21	100	100	100	20	100	27	41	13	15	4	-	100

Vietnam

non-poor density level per km²	People Density per/km²	% People Urban	category share (%) of total people	category share (%) of total non-poor	category share (%) of total poor	Poverty Incidence %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	1,413	41	41	49	27	24	7	95	2	1	2	0.0	-	100
250-500	564	13	20	20	21	37	8	88	8	1	2	1.5	-	100
100-250	268	10	18	17	19	40	15	73	14	5	6	0.6	-	100
75-100	155	15	4	4	5	45	6	55	19	9	12	4.0	-	100
50-75	127	10	5	4	7	50	9	48	30	15	7	1	-	100
25-50	81	12	5	3	8	56	14	16	30	21	28	5	-	100
10-25	53	10	5	2	9	68	20	5	20	23	38	14	-	100
<10	30	8	3	1	6	81	20	1	12	15	42	29	0	100
	232	24	100	100	100	37	100	36	18	14	23	10	0	100

Yunnan

non-poor density level per km²	People Density per/km²	% People Urban	category share (%) of total people	category share (%) of total non-poor	category share (%) of total poor	Poverty Incidence %	Land Share %	Lowland Coastal	Lowland Upper	Montane Lower	Montane Middle	Montane Upper	Alpine	
500+	1,297	92	7	7	3	6	1	-	-	-	-	100	-	100
250-500	346	39	10	10	6	7	3	-	0.3	0.4	1	96	2	100
100-250	157	18	48	47	50	12	34	-	0.1	0.3	5	93	1	100
75-100	101	11	13	13	14	12	14	-	0.0	0.1	5	94	1	100
50-75	73	16	14	13	16	13	21	0.0	0.6	1.6	16	80	2	100
25-50	46	14	9	9	11	14	21	-	-	0.1	10	78	11	100
10-25	17	20	1	1	1	12	4	-	-	-	-	26	74	100
<10	8	12	0.2	0	0.3	14	3	-	-	-	-	29	71	100
	111	23	100	100	100	12	100	0.0	0.1	0.5	8	83	8	100

- *Cambodia.* Three-quarters of the overall population and 80 percent of the poor in Cambodia live in districts with non-poor density levels between 25 to 250 persons per square kilometer, and more than 95 percent of their area is in lowland zones. Districts with lower non-poor density levels occupy more than 60 percent of the total land area, and have more than 10 percent of their land in montane zones. But districts with non-poor densities higher than 250 persons per square kilometer are primarily urban areas located in the lowland zone; they account for 12 percent of the total population, but only 4 percent of the poor and 0.5 percent of total land area.

- *Lao PDR.* In Laos, 60 percent of the people and three-quarters of the poor live in districts that occupy 90 percent of total land area, but have less than 25 non-poor persons

per square kilometer. The vast majority of their land area is located in montane zones, with more than half located in middle or upper montane zones. Districts with higher non-poor densities are associated with increasingly higher overall population densities and increasing proportions of their small land areas located in lowland zones.

- *Thailand.* About 70 percent of the population and 80 percent of the poor live in tambons with between 25 – 250 non-poor persons per square kilometer, which occupy about two-thirds of the land area of the country. Areas with lower non-poor densities occupy about 27 percent of the country and have low population density, but relatively high poverty incidence levels. Higher non-poor density levels are associated with increasing urbanization and low poverty incidence in small areas with more than 90 percent of their land in lowland zones. Overall, for non-poor densities of less than 100 persons per square kilometer, there is a quite strong association between increasing non-poor density and decreasing proportions of land in montane zones.
- *Vietnam.* Nearly 90 percent of the people and about two-thirds of the poor live in areas where non-poor densities are more than 100 persons per square kilometer. These areas occupy only about 30 percent of total land area, and about 90 percent of their land is in lowland zones. In the rest of the country, increasing non-poor density shows a strong relationship with increasing population density, decreasing poverty incidence levels, and decreasing proportions of land in montane zones, and especially middle and upper montane zones. Districts with non-poor densities of less than 25 persons per square kilometer occupy 40 percent of the total land area, and most of it is located in middle and upper montane zones. While these areas contain only 8 percent of the population, they account for 15 percent of the poor, and there are more poor than non-poor people..
- *Yunnan.* Three quarters of the people and 80 percent of the poor live in counties with between 50 – 250 non-poor persons per square kilometer. These areas occupy about 70 percent of the total land area. While almost all of this area is located in the upper montane zone, these counties also include most of the land in the province located in lower elevation zones, but only a small amount of land in the alpine zone. Alpine zone land is primarily located in counties with lower levels of non-poor density and overall population density, but their poverty incidence levels are not significantly different from the majority area. Counties with non-poor densities above 250 persons per square kilometer are more urban and account for 17 percent of the population, but only 9 percent of the poor and 4 percent of the total land area.

Overall, then, it appears that urban areas across the region are associated with high population densities that have a relatively lower proportion of poor than the general populations. With the exception of Yunnan, these urban areas are primarily located in lowland zones associated with river deltas, major river valleys, and coastal areas. Montane Yunnan still shows relatively lower poverty incidence and magnitude in urban areas, but elsewhere in the province both appear to be relatively evenly distributed In primarily lowland Cambodia, there also appears to be little relationship between poverty incidence levels and altitude zones, but the greatest magnitude of poor people is associated with the coastal lowland zone.

Elsewhere in the region, however, there is considerable variation. In the Lao PDR, both poverty incidence and poverty magnitude are strongly associated with proportion of land area in middle and upper montane zones, where the population of non-poor people is very sparse. In Vietnam, where poverty is overwhelmingly a rural issue, there is a stark separation between poverty incidence, which is most severe in middle to upper montane zones, and poverty magnitude, which is far greater in lowland zones. In Thailand, poverty incidence is also most severe in more sparsely settled areas with larger proportions in middle and upper montane zones, but poverty magnitude is greatest in areas of intermediate density and mixed altitude zone composition, although the upper lowland zone is strongly represented due to the role of the Northeastern region.

In order to help round out our regional overview of the distribution of poverty in the GMS, we now turn to more specific discussions regarding poverty in Vietnam and Laos, and how poverty has been changing over time in Thailand.

2.2.3. Where and Who are the poor in Vietnam?

Using the national total poverty line as a standard, 23 million Vietnamese are identified as poor, while only 9 million are classified as poor according to the food poverty line [Sunderlin & Huynh 2005]. Moreover, farmers with better access to markets were found by Pandey and Khiem [2002] to have lower incidence of food shortages than farmers with limited market access. Highest poverty rates (incidence) in Vietnam are concentrated in the Northern Uplands, the Central Highlands and the Central Coast [Minot & Baulch 2002; IFPRI, 2003].

Throughout the country, rural areas of provinces are significantly poorer than their urban counterparts [Minot & Baulch 2002]. Since rapid modernization in Vietnam occurs last and is slowest in the most remote areas, some believe it makes sense that most poor people in Vietnam are found in rural areas [Sunderlin & Huynh 2005]. Other variables found to be positively linked to rural poverty include bare and rocky land cover, steep slopes, acid sulphate soils, sandy soils, saline soils, and distance to a town of at least 10,000 inhabitants. Annual rainfall, annual hours of sunshine, and elevation have not been found to have statistically significant effects. As much as three quarters of the variation in district level poverty can be explained by agro-climatic factors and market access [IFPRI 2003].

In Vietnam there are 11 million households trying to earn their living from 7.7 million ha of agricultural land, which means very small farm sizes, especially in densely populated lowland areas [ADB 2000]. Poverty is also more common among farming households than others, with 48 percent of farming households found to be poor, compared to less than a quarter of households with their main income source from off-farm activities. Poor families are highly correlated with low education of the household head, as well as with large family size with a large proportion of children. Most ethnic minorities also have higher poverty rates than other people, probably because of language barriers, less favorable land, and less education. [ADB 2000].

Box 2-2. Main messages on Where and Who are the poor in Vietnam?

- The highest poverty rates in Vietnam are concentrated in the Northern Uplands (highest), the Central Highlands and the Central Coast.
- The most severe poverty and highest poverty incidence rates are in remote, upland regions, which are sparsely populated. This poverty may due to the mountainous landscape, distance to major markets, limited infrastructure and high shares of the population belonging to ethnic minorities
- Densely populated cities and delta areas account for a greater absolute number of poor people despite relatively low poverty rates in the big cities.
- 90 percent of poor people in Vietnam are found in rural areas.
- Physical and socio-economic variables positively linked to rural poverty are bare and rocky land cover, steep slopes, acid sulphate soils, sandy soils, saline soils and distance to a town of at least 10,000 inhabitants. Three quarters of the variation in district level poverty can be explained by agro-climatic factors and market access. Low education of the household head and ethnic minority status are other important social variables.
- Ethnic minority people are often among the poorest in remote areas, probably due to unfavorable infrastructure, lack of access to markets, poor soils and discrimination.

Other studies have also found the density of poverty to be greatest where its incidence is lowest [IFPRI 2003]. Thus, densely populated cities and delta areas account for a greater absolute number of poor people, despite relatively low poverty incidence in big cities. For example, provinces near the Red river delta and Hanoi (Thai Nguyen, Bac Giang and Phu Tho) are less poor than provinces near the country borders and they have better infrastructure and higher population density as well.

The most severe poverty and the highest poverty rates (% of all people) are, however, found in remote, upland regions, which are sparsely populated [IFPRI 2003]. The World Bank [1999] found that 90 percent of poor people in Vietnam are found in rural areas, and the situation is predicted to look similar in the future. This is seen to imply that poverty alleviation programs for the rural sector should focus on agriculture and off-farm enterprise and services. However, because of unfavorable infrastructure, lack of access to markets, poor soils, and discrimination, ethnic minority people are often among the poorest in remote areas. And, given the context within which programs must operate, much of this poverty is seen as likely to be very expensive to alleviate [Sunderlin & Huynh 2005].

The most effective poverty targeting variables/criteria have been found to be those relating to house quality and ownership of durable assets. Television or radio ownership is surprisingly better as a targeting indicator than all other assets, demographic or educational variables. But the use of an index of television and radio ownership for targeting would be problematic, as it would be easy for households to conceal ownership if it became known that ownership would exclude them from being selected as program beneficiaries [Minot & Baulch 2002]. Therefore, it is important to have many indicators for the same purpose, so that crosschecks and triangulation can help improve findings.

Another more diffuse poverty indicator may be forestry. Most of the poor in Vietnam (90%) live in rural areas and their main income is from agriculture and forestry, especially in the uplands [World Bank 1999]. Thus, forestry may have a close linkage to poverty alleviation. Sunderlin and Huynh [2005] suggest three key linkages between the forest sector and poverty alleviation:

1. There is an important cause and effect relationship between transformation of rural livelihoods and dramatic changes in forest cover as they occurred during the same time periods and in the same places. Poor, remote areas are often also where the last pockets of natural forests survive longest.
2. Poor people in remote areas often depend at a relatively high level on goods/services from natural forests.
3. But at the same time, many rural people get benefits from eliminating forests through selling timber and other products, and to obtain new arable land.

Sunderlin and Huynh [2005] also explain two strategies for potential forest-based poverty alleviation. The first seeks to avoid or mitigate poverty. Forests resources can prevent people from slipping into poverty or from becoming poorer, if they serve as a safety net, "gap filler", or additional source of petty cash for its owners. The second strategy seeks to eliminate poverty. Here forest will help to lift a household out of poverty through being a source for savings, investments, and livelihood diversification, thus permanently increasing income and welfare [Sunderlin & Huynh 2005]. Usually, either of these strategies are combined with others to alleviate poverty. In their report, Sunderlin and Huynh suggest some different ways of forest resource use that potentially could assist poverty alleviation processes. These include conversion of forestry to agriculture, timber production, non-timber forest products, environmental services (including compensation for downstream benefits), employment and indirect benefits, such as creation of jobs for others than just forest producers.

2.2.4. Where are the poor in Laos?

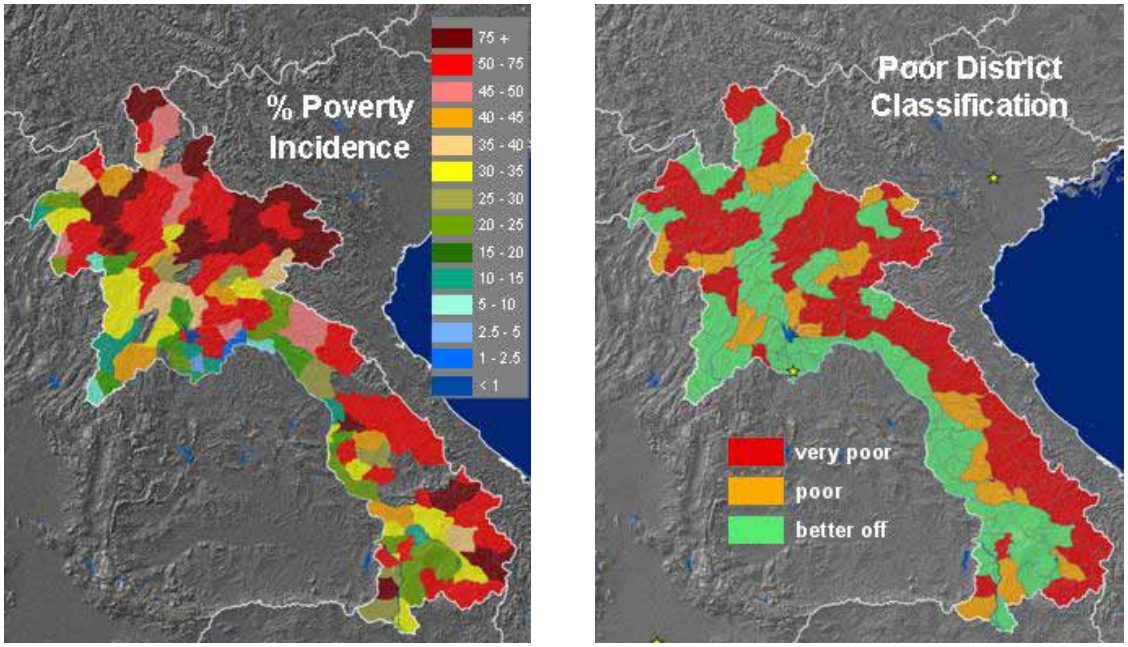
Although a series of studies on income and consumption-based poverty have been conducted in the Lao PDR, government programs target poor areas that were identified with a somewhat different approach. The ADB-supported participatory poverty assessment conducted in Laos [ADB 2001] was particularly effective in raising a number of questions about poverty and poor populations in Laos, which helped influence thinking and activities during development of the landmark National Growth and Poverty Eradication Strategy (NGPES) [World Bank 2004]. Recently, a second round of participatory assessments has also been launched [Chamberlain 2007].

During formulation of the NGPES, various assessments of poverty in Laos were conducted and reviewed, and analyses were conducted at various levels on characteristics of districts and their poor populations. As a result, 72 districts were classified as 'poor', and 47 of these classified as 'very poor'. Although the resulting categories are quite simple, the process through

which they were identified was quite complex and included a range of perspectives from different sectors and levels [see World Bank 2004 for the complete NGPES and its annexes]

In order to compare the outcome of this approach, Figure 2.8 compares the maps of poverty incidence using the small areas estimate data [Kakwani 2001] with a map of the NGPES classification. Although there are numerous differences, there are few major discrepancies. Moreover, poverty data has been improved and updated since the initial work upon which our small area estimate data is based, and World Bank analysts claim there are no major conflicts between the results of these two approaches [World Bank 2006b].

Figure 2-8. Estimates of poverty rates and NGPES district classes, Lao PDR



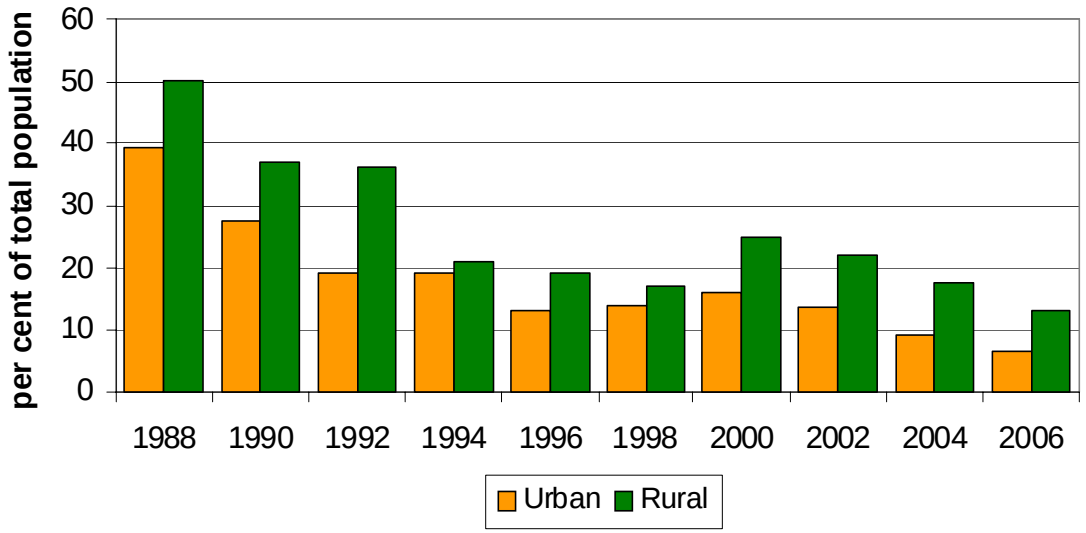
Data sources: Kakwani 2001; World Bank 2004

2.2.5 Changes in poverty over time in Northern Thailand

Our assessment of the spatial distribution of poverty in Thailand used disaggregated data that was available for 2002. While this assessment has helped us clarify questions of spatial distribution, since it represents a single point in time it has not captured the dynamics of change in poverty over time that is occurring in all countries of the region. As an example of the change that has already taken place, this section presents data on changes in poverty incidence and magnitude that have been occurring during the last 20 years in Thailand and its northern region where our case study is located.

The proportion of people and the number of people in Northern Thailand who were under the poverty line during 1988-2006 are displayed in Figure 2-9 and Table 2-10. It is clear that the proportion of poor people in Northern Thailand has decreased significantly through time. In 1988, the proportion of poor people in urban areas of Northern Thailand was 39 per cent of total urban population, decreasing to 16 per cent in 2000 and only 6.5 per cent in

Figure 2-9. Poverty Incidence in urban & rural areas of North Thailand, 1988-2006



Source: NESDB

2006. Similarly, the proportion of poor people in rural areas of the region was as high as 50 per cent in 1988, decreasing to 36 per cent in 1994 and 17 per cent in 1998. While levels then increased after the 1997 economic crisis to 25 per cent in 2000, since then they have been decreasing with economic recovery to 13 per cent in 2006. Although impacts of the economic crisis appear to have begun more quickly in urban areas, subsequent impact in rural areas appears to have been even greater.

Table 2-10. Poverty Incidence and Magnitude in Northern Thailand, 1988 – 2006

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006
Proportion of poor ( )										
North urban	39.19	27.82	19.12	19.06	13.41	14.1	16.11	13.54	9.28	6.50
rural	50.12	37.11	36.25	21.18	18.96	17.08	24.87	22.06	17.36	13.31
Whole country	42.21	33.69	28.43	18.98	14.75	17.46	20.98	14.93	11.16	9.55
Number of poor (1,000 persons)										
North: urban male				201	145	155	174	156	110	73
female				222	155	163	192	161	116	74
North: rural male				895	817	761	1,128	1,020	800	633
female				928	834	746	1,096	953	816	630
Total North				2,246	1,951	1,825	2,590	2,290	1,842	1,410
Total poor in Thailand (million persons)										
	22.1	18.4	15.8	10.7	8.5	10.2	12.6	9.1	7.0	6.1
Total population in Thailand (million persons)										
	52.4	54.5	55.6	56.6	57.6	58.7	59.9	61.2	62.9	63.4

The proportion of poor people in rural areas of Northern Thailand has generally been higher than the average for the entire country, as seen in Table 2-10. The number of people in the region below the poverty line was 1.4 million persons in 2006. Most of the poor reside in

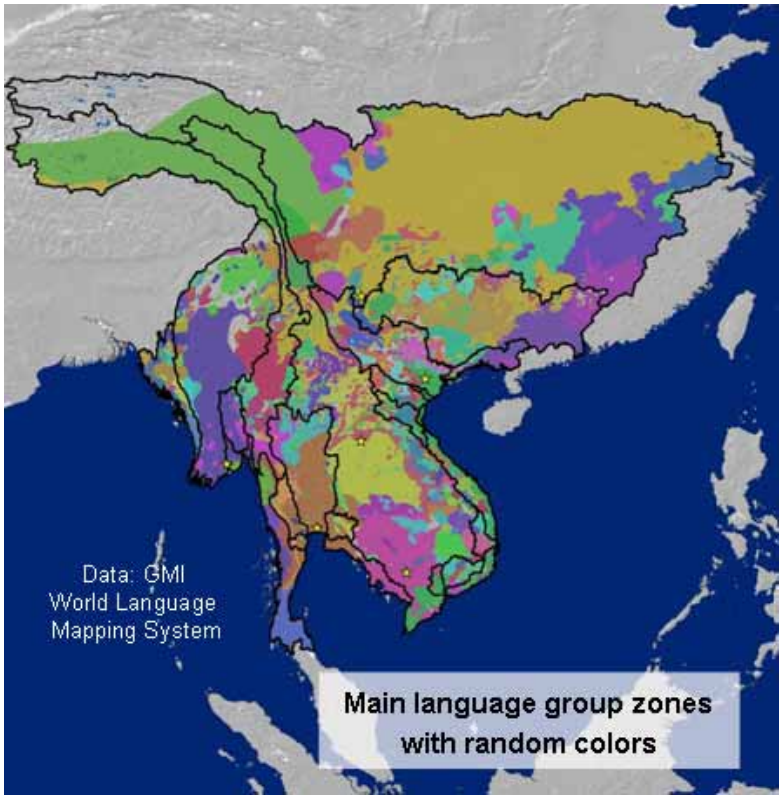
rural areas, with an equal proportion among men and women. This compares with a total of 6.1 million poor persons nationwide, and a national poverty incidence level of 9.6 per cent.

2.2.6 Ethnicity and poverty -

Ethnic diversity is considered a characteristic of mainland Southeast Asia in general, and especially of its montane zones. Relationships between percentages of ethnic minorities and poverty incidence and depth have already been mentioned in the context of Vietnam, but they are also a common feature of discussions about poverty across the region.

In order to help bring more clarity to discussions about ethnicity, Figure 2-10 maps data on zones in major river basins of the region that are dominated by different ethno-linguistic groups. It is important to note that colors in this map have been assigned randomly, so that there has been no effort to use color codes to indicate in this map which groups are most closely related to each other. Rather, the intent is simply to portray the distribution of overall diversity and complexity of the groups in various parts of the region. Thus, the increased complexity of patterns in montane areas is visually obvious.

Figure 2-10. Ethno-linguistic distributions in river basins



Moreover, the complexity of ethic distributions is really considerably more complicated than this map indicates. Zones in this map only attempt to chart the dominant group of a particular area. But within each zone - and especially in montane zones - there are usually minorities of other groups, usually in separate settlement areas, and often differentiated by altitude zones. Examples of ethnicity at village level in the Upper Ping River Basin will be shown in the section below on the case study area in Northern Thailand. In addition, these zones have been dynamic over time as various ethnic groups moved in response to conditions in various parts of the region. Even today, hundreds of thousands of ethnic Shan people have fled to Thailand from their homeland in Myanmar, due to a combination of their fear of perceived persecution and lack of livelihood opportunities in Myanmar.

For reasons that vary across space and over time, ethnic minorities are also marginalized by societies dominated by particular ethnic groups that are usually most prominent in areas where major agricultural zones and urban centers are located. There are also often considerable differences among ethnic groups in terms of their relationships with dominant ethnic groups, and how they are generally perceived by power elites and mainstream societies.

Figure 2-11. Relationships of ethnicity with poverty incidence & severity in Vietnam

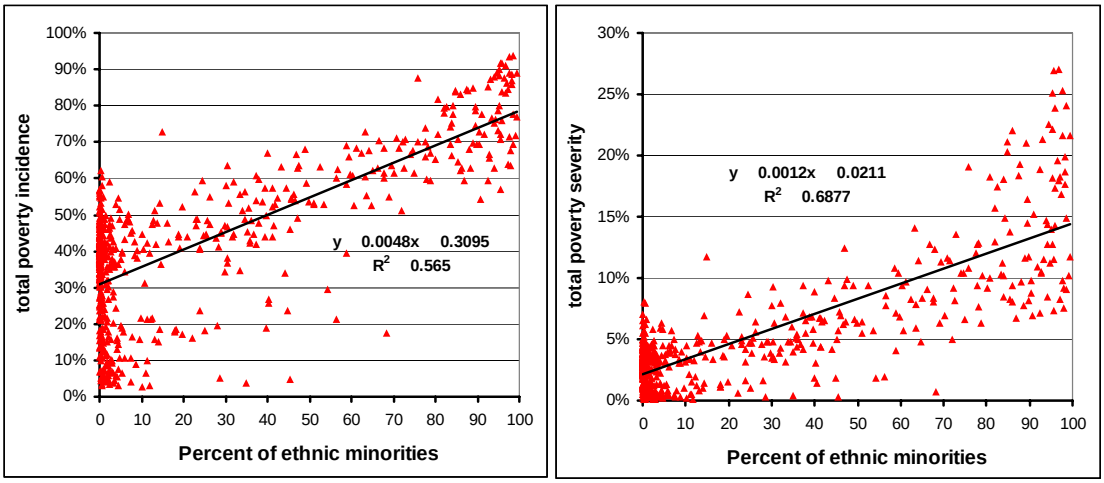
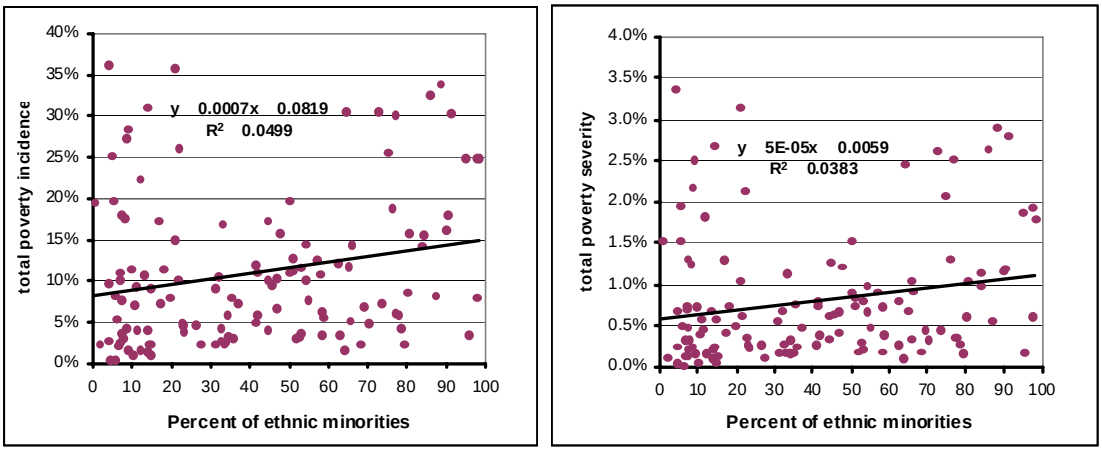


Figure 2-12. Relationships of ethnicity with poverty incidence & severity in Yunnan



Small area estimates datasets for Vietnam and Yunnan include information in the form of the percentage of people in the reporting unit that belong to ethnic minority groups. Although this is a very coarse measure of this issue, it is instructive to examine relationships of this variable with measures of poverty. Results of data scatter plots and regression lines displayed in Figure 2-11 for Vietnam and in Figure 2-12 for Yunnan show two quite different patterns.

In the case of Vietnam, there is a fairly clear general relationship between increasing proportions of ethnic minorities and poverty incidence levels, and the relationship is even stronger

with the index of poverty severity. In Yunnan, however, there are virtually no relationships among these variables. It is tempting to see this as possibly associated with a higher degree of integration of minorities into society in Yunnan, where cultural diversity is perceived as one of the province's major characteristics in the context of larger Chinese society. One would anticipate various relationships that would be likely to emerge in data from Thailand and the Lao PDR if such data were available, and one might also anticipate differentiation of relationships with different ethnic groupings. Many in Vietnam and Laos are now recognizing and trying to address these issues in various ways. But in Thailand, the lack of ethnicity data associated with poverty assessments is a reflection of official pretensions that ethnicity is not an issue in their society. One only has to look at the ethnic composition of areas with highest poverty incidence and severity, however, to see reality.