

MONTANE MAINLAND SOUTHEAST ASIA—A BRIEF SPATIAL OVERVIEW

David E. Thomas
World Agroforestry Center (ICRAF), Chiang Mai

SEEKING HOLISTIC VISIONS OF DIVERSITY IN MMSEA

As this community of colleagues working in MMSEA continues to grow and evolve, we see trends toward further articulation of broad-scale commonalities in the region, as well as efforts to more fully articulate and recognize the wide diversity of specific local conditions and communities within it. The first international symposium on MMSEA marked the emergence of a diverse loosely-knit community of scholars and practitioners working on upland resource problems in mainland Southeast Asia. This group felt the time had come to increase interaction with colleagues working on similar problems in other countries of the region, in response to growing mutual concern about sustainable development of mainland Southeast Asia's mountain lands and peoples. Building on increasing communication and identification of common issues, the second international symposium sought to focus on governance in diverse natural and cultural landscapes in MMSEA. Now, the third international MMSEA symposium seeks both to provide further focus on biodiversity and indigenous knowledge, and to increase participation by members of the ethnically diverse local communities of the region.

In his keynote address to this year's symposium, Professor Saneh Chamarik has posed a challenge for the MMSEA community to take a long-range view in addressing the need to instill a sense of commonality, inter-relatedness and solidarity among the diverse local communities of the region. He suggests that the integrity of the region's tropical resource base provides a key for the holistic dimension of efforts to embrace local biodiversity and indigenous knowledge, and that there is an implicit need for a keen sense of geographical unity as well as "a kind of people-to-people inter-relatedness." Ashis Nandy has gone on to underscore the need for visions that can build on, rather than suppress, the diverse range of ideas and local conditions that exist in the region, and has noted the emergence of environmentalism as a positive element among what he has characterized as an otherwise quite bleak set of recent trends.

There has already been considerable discussion about application of the tools of modern science and technology in efforts to subdue nature, resulting in both intentional

and unintentional negative impacts on traditional livelihoods, values and cultures, as well as on ecosystems as perceived at various levels. But other lines of human activity are also applying such tools in efforts to better comprehend and understand who we are, what we are doing to ourselves and our environment, and where we are headed, both as a diverse human population of individuals, communities and nations, and as a human species interacting with a wide range of other species in a thin biosphere envelope on only one modest planet within a vast universe. Indeed, various of us in the MMSEA community are exploring how some of these tools can assist in efforts by ourselves and our colleagues to better understand both the holistic and local diversity dimensions of MMSEA. As part of this continuing process, this paper uses a few simple image outputs from our emerging MMSEA spatial database to try to help us more broadly visualize various dimensions of MMSEA that are being discussed, and to solicit wider collaboration in our efforts.

WHERE IS MMSEA?

At the second international symposium, we posed the question, 'Where in the World is MMSEA?', in order to stimulate discussion on possible operational boundaries that could help facilitate efforts to focus and stimulate further collaborative work. As an initial starting point, we proposed a simple definition of areas that are between 300 to 3,000 meters above sea level and are located within a river basin that overlaps with at least one nation state of mainland Southeast Asia or Yunnan Province of China. The zone resulting from this simple physical definition is displayed in green in figure 1.

Although we anticipated objections to such a simple definition, our efforts to solicit alternative views and input to further refine and develop this definition have yet to materialize during the subsequent two years. Thus, most further references to MMSEA in this paper will refer to this definition, unless otherwise noted.

Since this symposium is being held in Yunnan, however, where various potential questions related to inclusion of areas above 3,000 masl or areas within the Pearl or Yangtze river basins, for example, would most likely be raised, we are still hopeful for suggestions to help us fur-

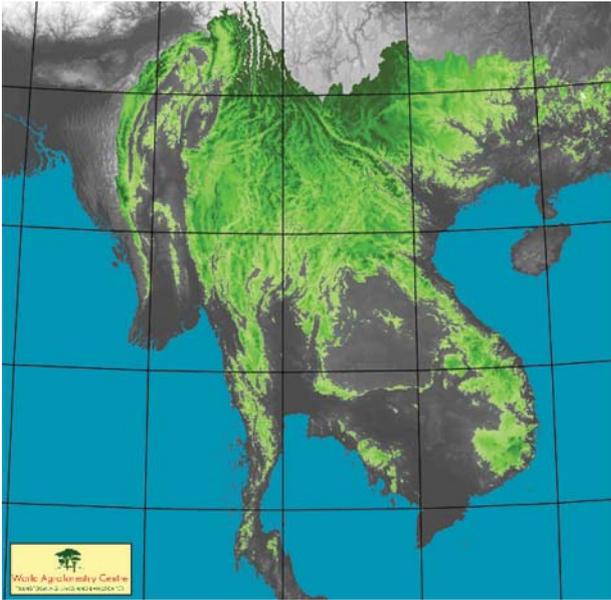


Fig. 1. The preliminary MMSEA zone

ther adapt, refine and otherwise improve this operational definition.

BROAD ADMINISTRATIVE AND NATURAL BOUNDARIES

As reflected in the nature of our operational definition, notions of MMSEA usually include reference to both nation states (or provinces in the case of China) and river

basins. During recent decades, we have lived through periods when nation state boundaries have been used as a means for segregating areas and peoples of MMSEA. With the end of the Cold War Era, as all parts of the region seek to renew and strengthen constructive relationships with each other, we find ourselves seeking additional foundations upon which to build common understandings of our region and our relationships with each other.

Thus, figure 2 overlays two types of boundaries on a map of mainland Southeast Asia that depicts elevation zones and prominent cities. On the left are boundaries of nation states and neighboring provinces of China created by governments. These are contrasted on the right with boundaries of major river basins created by nature, which have been a major physical factor influencing the human populations that have long occupied this region. In order to facilitate discussions related to MMSEA as a region, most of this paper will focus on visualizing the region in the context of the natural boundaries of river basins and associated geographical features.

Various organizations, such as international development banks and agencies interested in providing support largely for upgrading infrastructure and trade linkages among nation states and economic centers in the region have adopted the Mekong River as a unifying banner. This is particularly noticeable in activities associated with the Greater Mekong Subregion (GMS) – a code name for the five nation states plus Yunnan, which all have access to portions of the Mekong River. Indeed, much international attention has focused on the Mekong River since efforts

Government: Nation States

Natural: Major River Basins

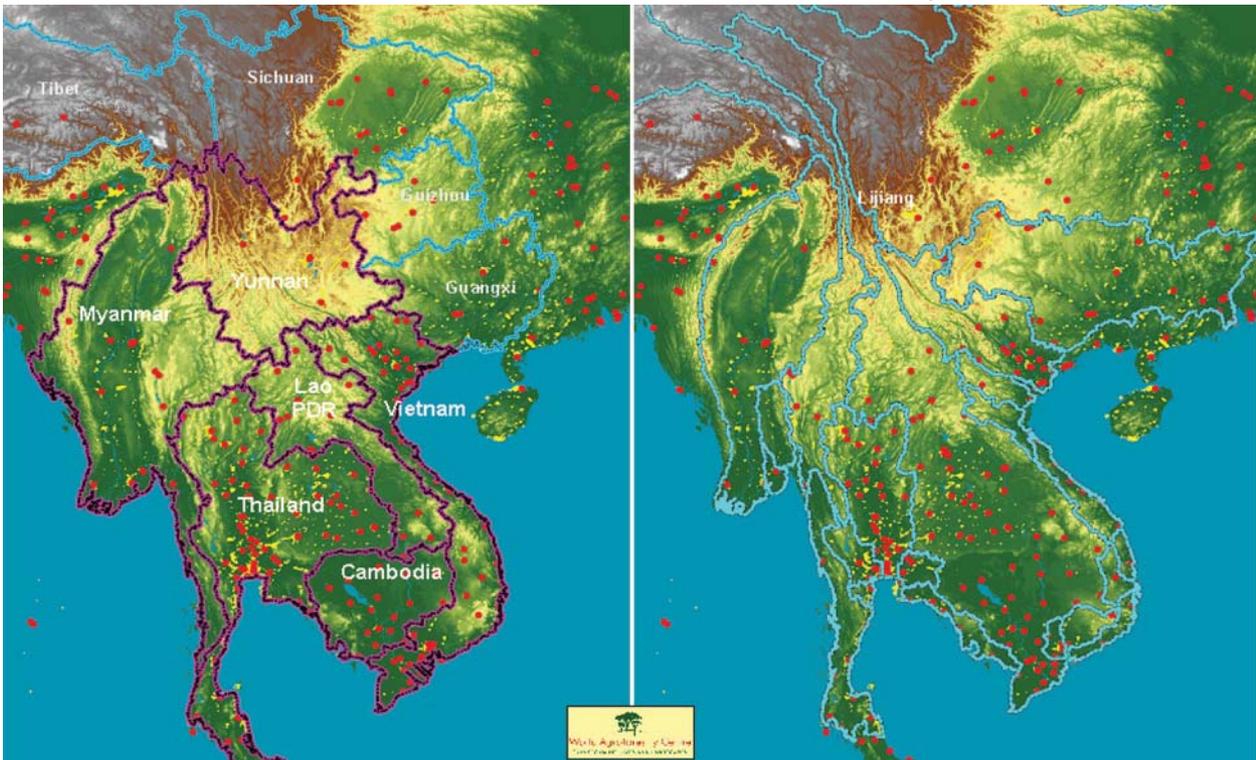


Fig. 2. Nation states and major river basins

began in the 1950s to establish an international organizational structure to “develop” the river and its tributary areas. Although these efforts finally resulted in establishment of the Mekong River Commission (MRC), the organization still does not include membership of “upstream partners” Myanmar and China.

While use of the Mekong as a banner for the region makes sense because of the common stake that all nation states have in this river basin, excessive focus on the Mekong basin itself can also obscure or distort understanding of various elements that are important for our characterization of MMSEA. Thus, we believe it is useful for us to very briefly examine river basins in the region, from the point of view that mainland Southeast Asia—and MMSEA—“includes more than the Mekong.”

Figure 3 separates views of river basins in the region into three categories (from top to bottom):

- The *Big Three* river basins include the Yangtze, Mekong and Salween. These are all large basins with long rivers that include headlands that extend far up into the Tibetan plateau (well beyond the boundary of Yunnan Province). Both the Mekong and Salween cross international boundaries, and while the Yangtze is fully within the boundaries of China, its large size results in “domestic trans-boundary” issues that may approach the complexity of international issues in at least some aspects. The MMSEA altitude zone occupies substantial areas in the middle portions of these river basins.
- The *Middle Four* river basins include the Pearl, Red, Chao Phraya and Irrawaddy. As these shorter rivers have their headwaters below altitude zones where snowpack prevails, their flows are totally dependent on rainfall of the monsoonal climate of the region. MMSEA altitude zones occupy the middle to headwater portions of all four river basins, which in aggregate form a substantial part of MMSEA.
- The *Small Coastal River Basins* of mainland Southeast Asia include eight relatively larger river basins, and a larger number of small coastal catchment areas too small to distinguish at this scale. This type of small river basin has its own set of characteristics that follow from stronger effects of seasonal and spatial variability in the patterns of rainfall upon which their flows depend. Upper portions of many of these basins are also in the MMSEA zone. While in aggregate they represent a relatively small portion of MMSEA, they are often of considerable strategic importance to various countries, such as in the central portions of Vietnam.

HUMAN SETTLEMENT PATTERNS

Given this set of physical river basins and the positioning of MMSEA altitude zones within them, we now turn to current patterns of human settlement in mainland Southeast Asia.

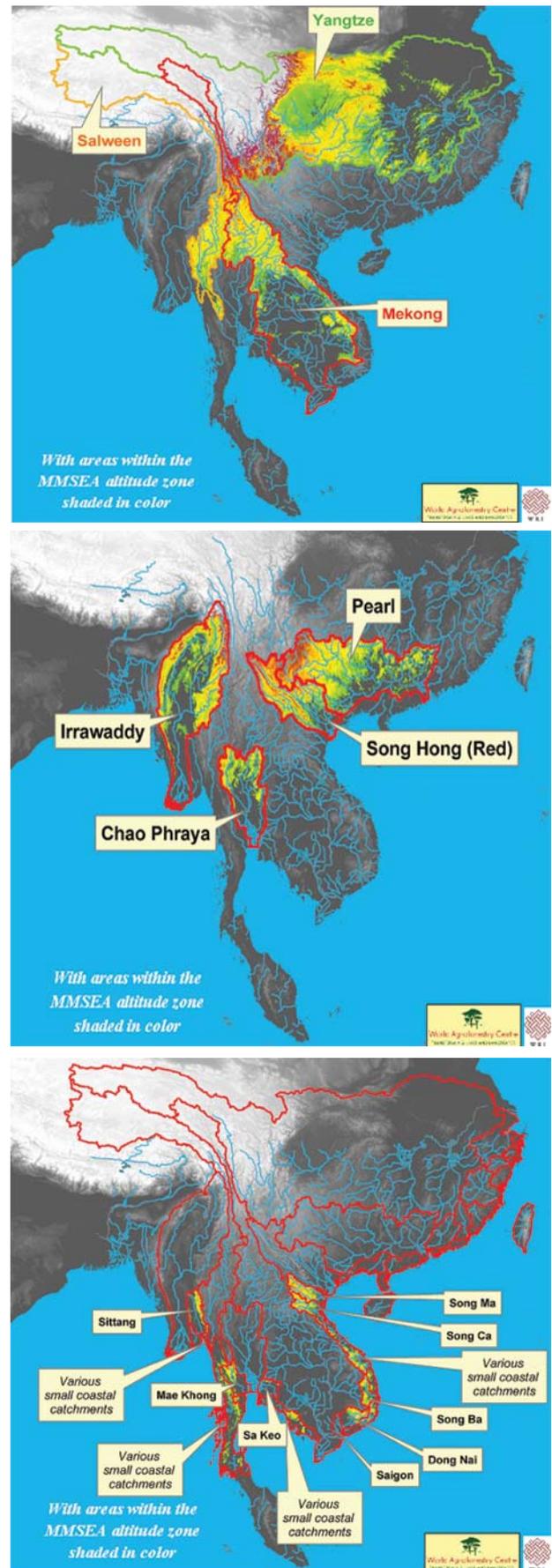


Fig. 3. Three types of river basins

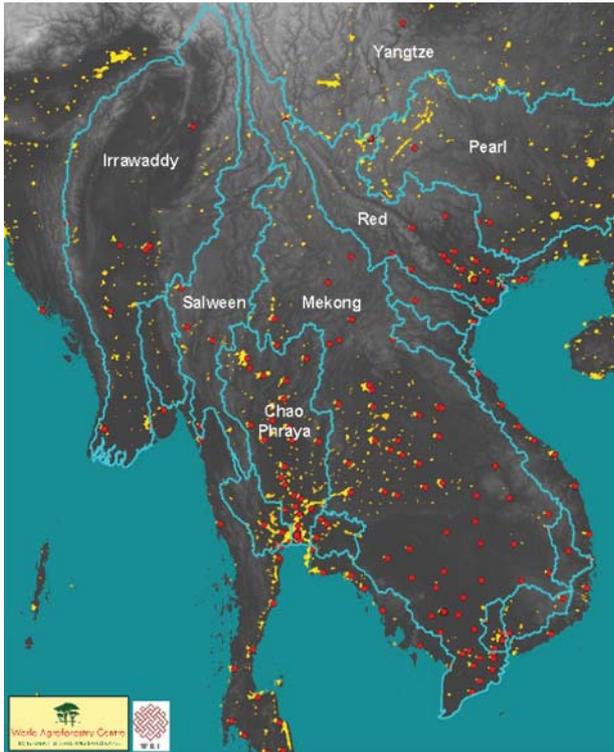


Fig. 4. Cities and urban lights at night

One interesting view of the region is provided by satellite images of lights in urban areas at night. Figure 4 overlays both locations of prominent cities in the region (red dots) and associated areas of urban lights at night (yellow) on river basins of the region. These urban lights may be interpreted as providing a rough indicator of intensity and extent of centers of urbanization and economic integration. Points particularly worth noting from this image include:

- There is great variability in the urban lights associated with cities in different parts of the region.
- Major urban centers are mostly concentrated near coasts and in lower portions of river basins.

Thus, we would expect that centers of economic power would largely be located in coastal and lowland zones.

If we want to expand our view of human settlement from major cities and urban centers, we can look to the distribution of overall population densities in the region. Figure 5 displays this data, along with major cities and urban lights, using separate images for lowland and mountain zones—as determined by the 300 masl lower altitude boundary of the MMSEA zone.

These images confirm that the lowlands are home to majority populations of the region, both urban and rural, who are likely to dominate political as well as economic power. It is also clear that MMSEA zones have relatively low population densities and relatively few major cities and urban centers. While population densities are relatively higher in mountain zones of China, they are still relatively lower than the very high lowland densities of China. Perceptions of these relative densities have been associated with government-sponsored efforts to resettle people from very high-density areas, such as the Red River valley, into what have been perceived by lowlanders as “under-populated” mountain areas.

The relatively low population densities in MMSEA zones are not, however, associated with large areas of wilderness. Another picture of the human settlement network in mainland Southeast Asia is provided in figure 6, which includes major roads of varying quality (red) and towns—also called “populated places”—(yellow points) from the Digital Chart of the World, along with major cities (green). While the size of towns and roads are exaggerated in this

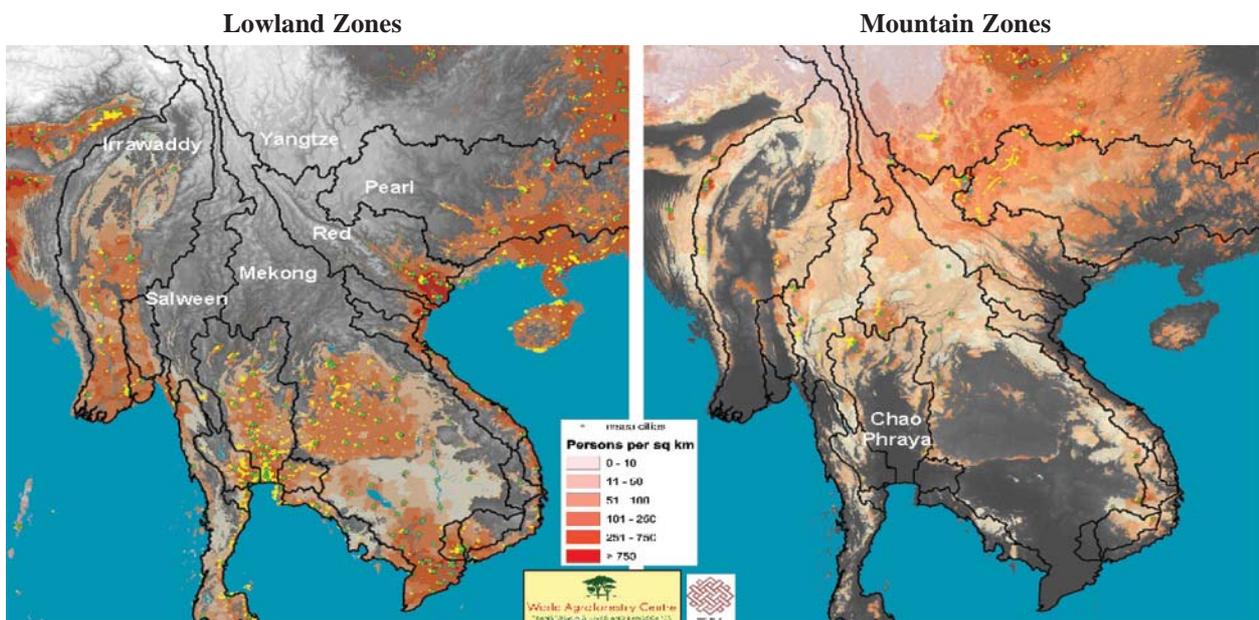


Fig. 5. Population distribution in major river basins

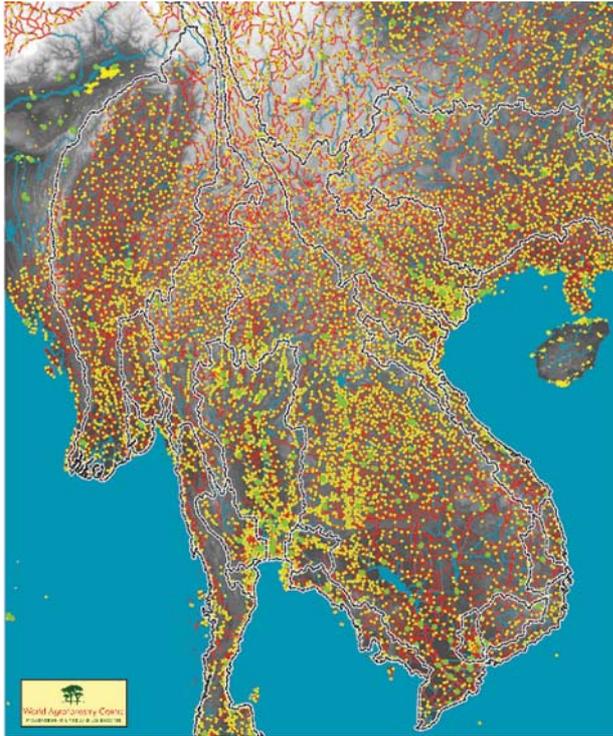


Fig. 6. Human settlement network

display, it is quite successful in making the point that an elaborate network of roads of varying quality links human settlements of many sizes throughout both mountain and lowland zones of most all the river basins of mainland Southeast Asia. This suggests that perhaps there are characteristics of mountain regions and sources of local livelihoods that provide good reasons why population densities are relatively lower in those zones. It also suggests a relative scarcity of pristine natural ecosystems and probable sources of difficulty in establishing and maintaining large wilderness areas free from human settlements.

While we can learn quite a bit from such depictions of human population and settlement patterns in the region, these images have so far masked very important variability in the region associated with ethnic diversity. Most of the majority populations, which we have seen are centered in lowland zones of river basins in the region, are generally characterized by a dominance of one or a few major ethnic groups historically associated with the various empires that have waxed and waned in the region. These ethno-linguistic groups are now associated with majority populations in each of the nation states of the region, which (with the obvious exception of Yunnan) have never been consolidated into a single large nation state such as seen in neighboring regions of east and south Asia.

This situation is in rather sharp contrast with conditions found in most mountain zones of the region, which have long been characterized by a far greater diversity of ethno-linguistic groups. In some cases, these mountain minority groups may be relatively close or distant relatives of a group that forms a majority population elsewhere in the region (such as various ethnic ‘tai’ groups), but there

are also a considerable number of groups that (at least today) have no such “homeland” areas. In either event, however, mountain minority ethno-linguistic groups in almost all cases span national boundaries. There are also a variety of theories and legends associated with how various groups have moved and changed over various periods of historical time.

The ethnic diversity aspect of MMSEA human settlement patterns has been, and remains, relatively difficult to depict in a spatial data format. Most effort to date has been directed toward construction of maps depicting ethnic zones in parts of mainland Southeast Asia. As an example of this approach, figure 7 presents a map of ethno-linguistic groups in Laos, Vietnam and Cambodia published in 1970, but largely based on earlier work. While such maps are useful in helping to visualize general distributions of ethnic diversity, they also tend to give an impression of overly-distinct zones occupied by different groups.

Some more recent maps of ethnic groups have sought to put more effort into defining both major and minor groups within each mapping unit, in order to more effectively depict the ranges of different groups and their relative numbers in each area. These maps, however, can be

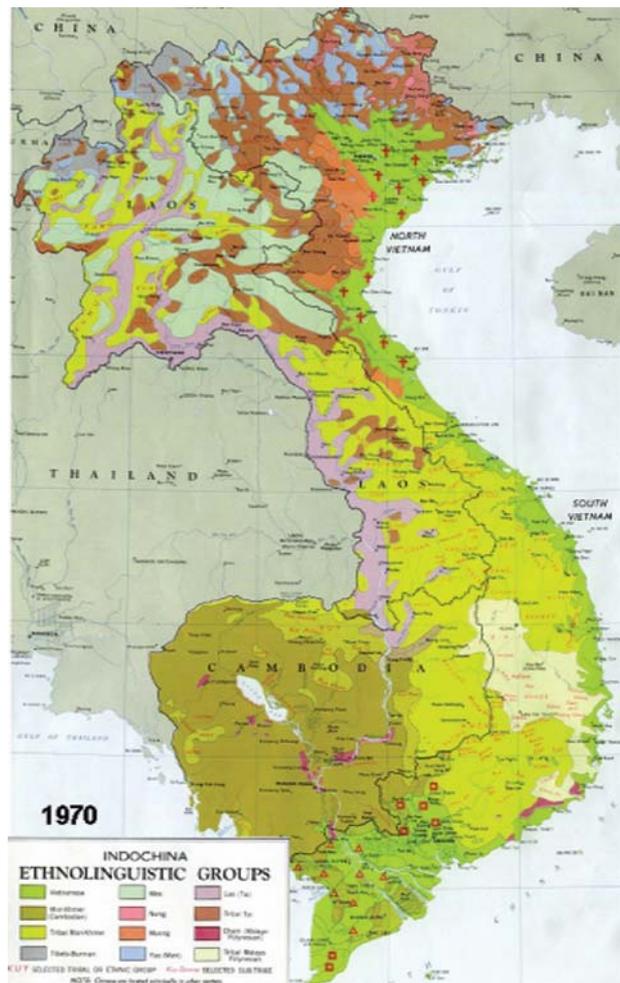


Fig. 7. Ethnic map of “IndoChina”

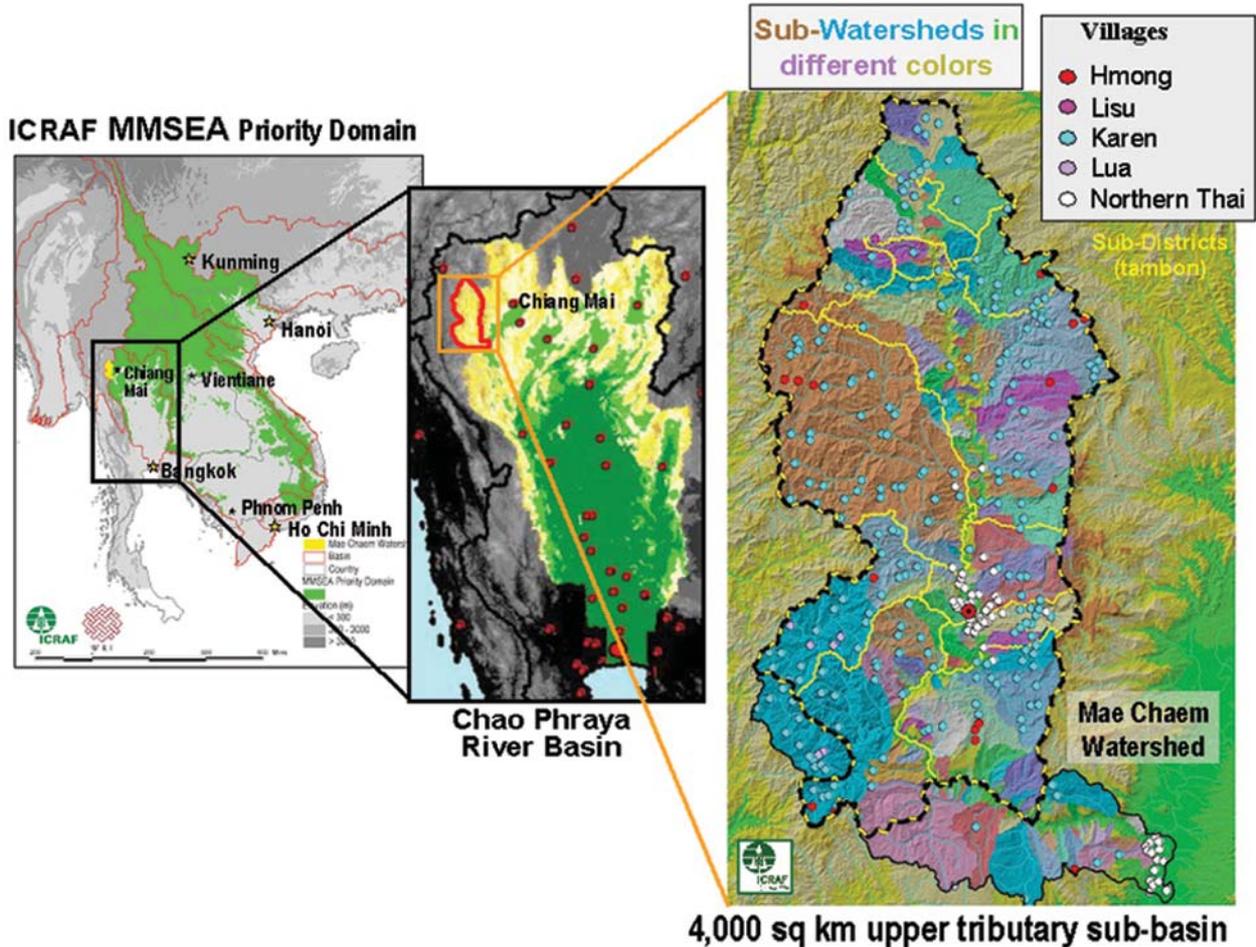


Fig. 8. Local ethnic mosaic in Mae Chaem

quite difficult to read and interpret. It is also still difficult for them to capture various aspects of distribution patterns.

One of these aspects is the often localized patterns of MMSEA ethnic distribution. Figure 8 presents one example of such localized patterns within Mae Chaem, a 4,000 square kilometer upper tributary of the Chao Phraya river basin in north Thailand. The clustering of ethnic northern Thai villages in lowland areas around the district town is distinct, while ethnic Hmong and Lisu villages are located primarily in highland areas near ridges that surround the watershed. Majority ethnic Karen villages are widely distributed throughout middle and lower highland elevation zones. Such localized patterns of ethnic distribution are common throughout MMSEA, and many have been undergoing shifts and processes of change at various rates.

It is clearly a challenge to more effectively capture such complicated, but important, distribution patterns in spatial databases. Efforts to try various alternative approaches are continuing, however, and we hope substantial progress can be made before the next MMSEA symposium is convened.

HUMAN IMPACTS ON LAND COVER

The next question is what has been the impact of human settlements and their associated livelihoods on the vegetation and terrestrial ecosystems of the region?

A quite simplified depiction of basic land cover of lowland and mountain zones in river basins is presented in figure 9. Lowland zones are clearly dominated by transformation into rice paddies and cropland, with very few forested areas remaining, and only limited areas of mixed agroforestry landscapes.

In contrast, most mountain zones appear quite different and are clearly the main location of both remaining forest and mixed agroforestry landscapes. The obvious exception is the Pearl river basin and parts of the Yangtze, where extensive conversion of forest to permanent croplands is associated with the relatively higher population densities found in China and relatively smaller proportions of river basins located in lowland zones defined by the 300 masl terrain contour.

To help further visualize the relationships between these land-cover patterns and human settlements in the region, figure 10 adds to this depiction cities, urban lights, major roads

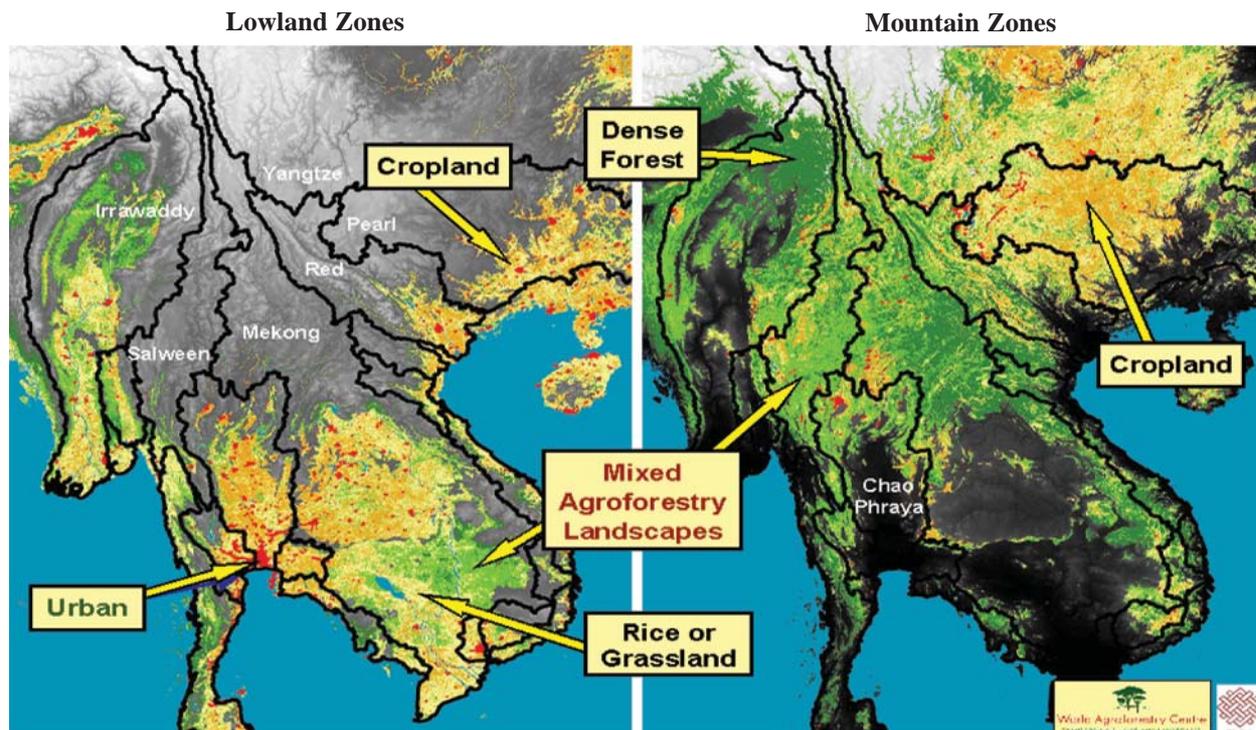


Fig. 9. Basic land cover in lowland and mountain zones

(black) and railroads (red). The urbanized, economically integrated lowland agriculture production areas clearly stand out in central and northeastern Thailand and in most major lower and delta zones of the region’s river basins. Again, this type of pattern extends to somewhat higher elevations in the Pearl and Yangtze river basins in China.

The rather extensive portions of the MMSEA zone covered by fragmented forests and mixed forest and cropland, which are visualized in figure 10 as agroforestry landscapes, are of particular interest to the author and his colleagues associated with programs of the World Agroforestry Centre (ICRAF).

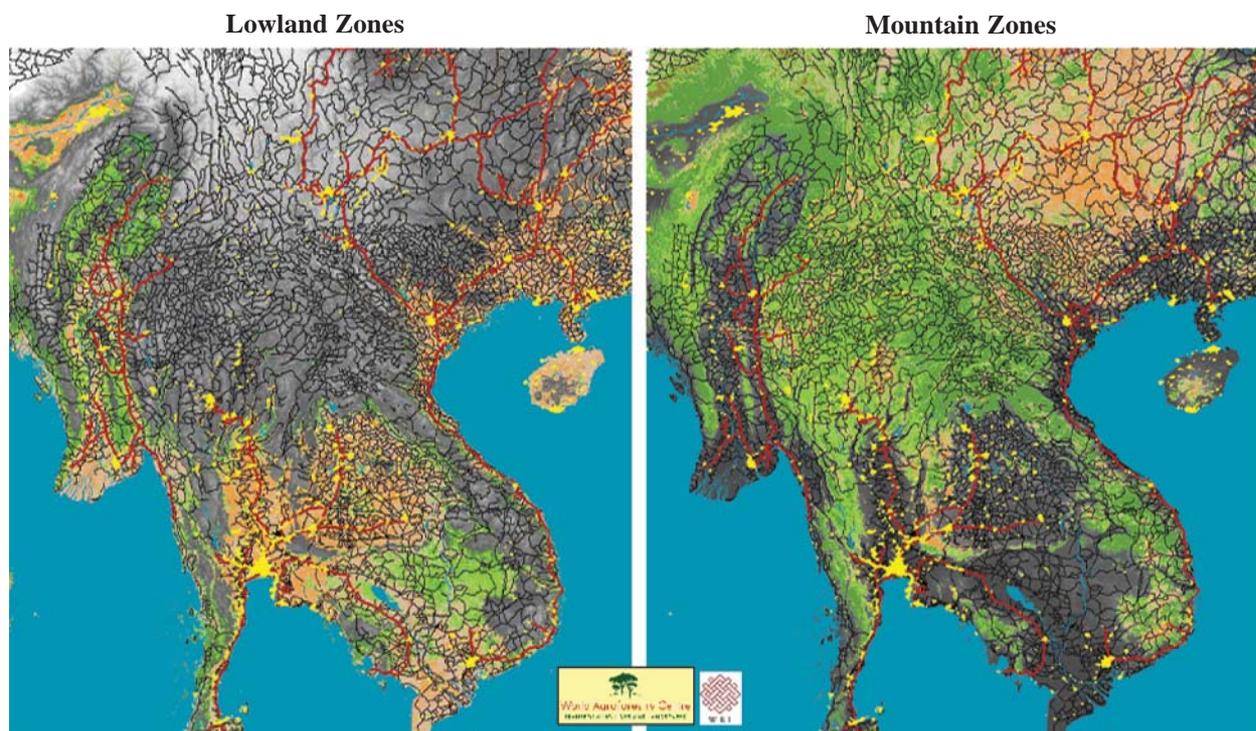


Fig. 10. Cities, transportation and land cover

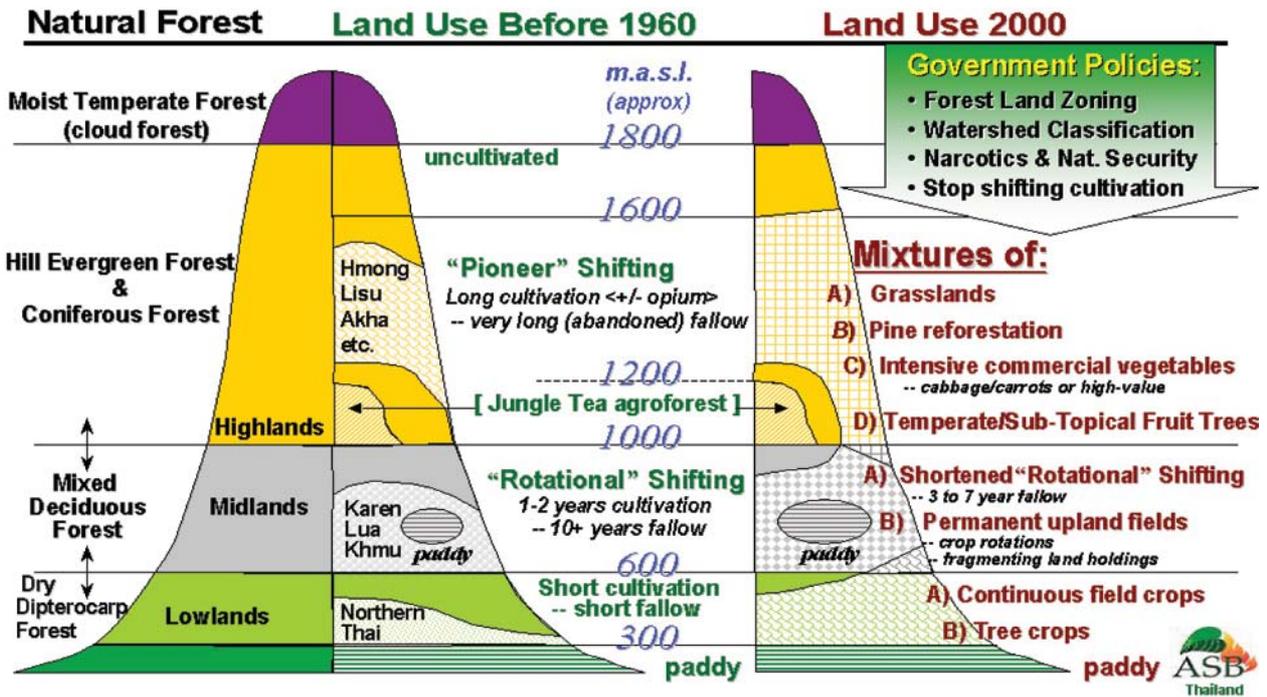


Fig. 11. Altitude zones of changing land use in North Thailand

LOCAL PROCESSES OF LAND USE AND LIVELIHOOD CHANGE

Since we know from various sources that mixed agroforestry landscapes have long been present in this region, these areas do not necessarily represent simply the frontiers of conversion to permanent agricultural cropland. But in order to understand these patterns of land use and processes of change that are occurring in MMSEA, we need to make more efforts to build systematically on detailed studies of local processes of land use and livelihood change in a sample of local areas that can capture major components of variation in the region.

As one example of an approach to examining processes of land-use change in MMSEA, we can begin in what is today northern Thailand, which centers on upper reaches of the Chao Phraya river basin and extends over ridges into portions of the mid-Mekong and Salween basins. As in most of the MMSEA region, one major aspect of variation in land-use patterns is associated with altitudinal gradients. A simple diagrammatic representation of some of the major elements of this variation is presented in figure 11. Although it is overly simplified, we have found it to be quite useful, and we are encouraging colleagues to make similar ones for other parts of MMSEA.

There are three major components to this diagram that should be emphasized here, without dwelling too much on details, each of which could be associated with quite extensive discussions.

- Natural vegetation and ecosystem gradients are indicated by the column of forest type labels on the left of the diagram.

- Variation in ethnic groups according to altitudinal zones and the agroecosystems traditionally associated with each group are indicated by columns of labels in the center of the diagram.
- Current land use is indicated by the column of labels to the right of the diagram, as well as some of the major government policies that seek to directly affect land-use practices.

Clearly, traditional livelihoods result in an overall mosaic of land-use practices that indicate mixed agroforestry landscapes have long existed in this area. But a range of forces driving change have been sweeping through this area since about 1960, including those associated with population growth, agricultural commercialization, opium crop substitution, infrastructure development, government administration and health, education, and other services, and more recently economic restructuring and globalization. In addition, various government policies such as those depicted in fig. 11 have sought to specify or constrain how responses to these forces should affect land-use practices and patterns. The net result of these factors has often remained a mosaic agroforestry land-use pattern, but component practices, relative proportions and spatial configurations of these patterns have often changed very substantially, along with associated change in local livelihoods and impacts on environmental services.

But land-use change has not occurred in uniform patterns across northern Thailand. Figure 12 takes us again to the Mae Chaem watershed, indicating how land use in different areas within the basin is associated with different directions and stages of general patterns of change. Elevation zones in this figure are color coded to match

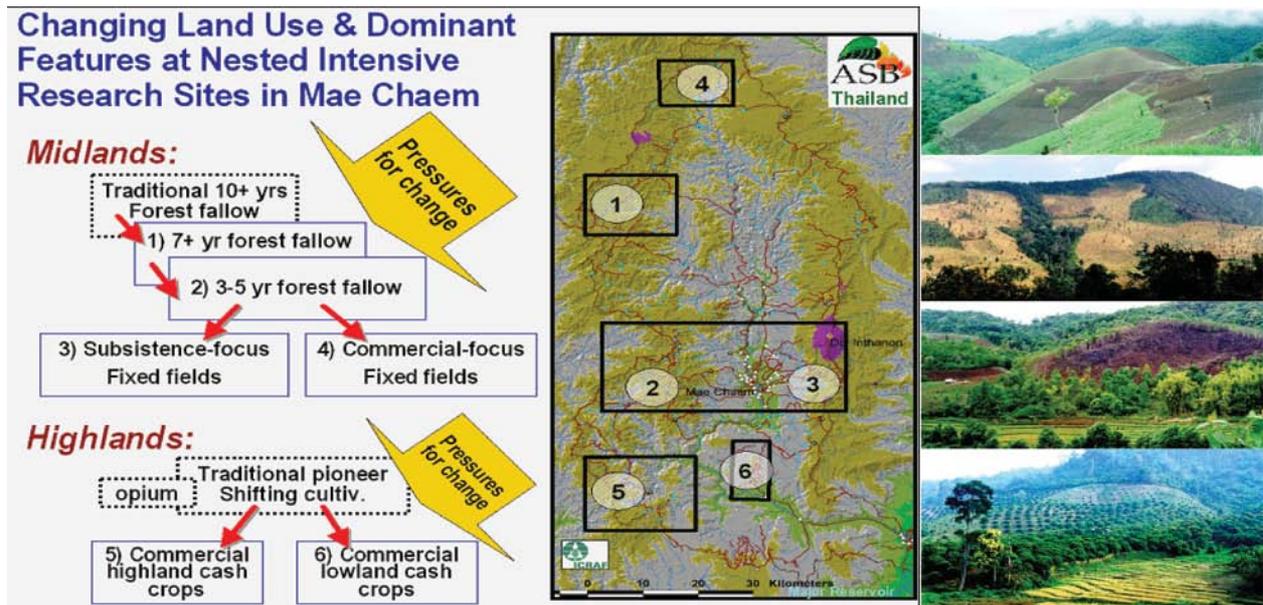


Fig. 12. Spatial variation in land-use change

those in figure 11. While infrastructure, access, ethnicity and various other factors help to explain some of the variation in land-use patterns and practices among areas, understanding of how these processes have varied remains limited.

Although mixed mosaic patterns of land use are seen in broader levels of assessment, complex local variation among agroecosystems of diverse ethnic groups and local conditions complicates efforts to interpret patterns of overall land-use change. The overall mosaic land-use pattern of the Mae Chaem watershed, as interpreted from data from Landsat by the Land Use and Cover Change (LUCC) project is presented on the left side of figure 13. It is clearly difficult to see any of the variation known to exist in the watershed, such as that indicated in figures 11 and 12.

Yet the existence and impacts of localized processes of change within such broad mosaic patterns of mixed agricultural and forest land uses can be verified and examined through more detailed study of local areas. As an example of this type of approach, we “zoom in” on land use in the Mae Raek sub-watershed of Mae Chaem, as indicated on the right side of figure 13. Land use in this sub-watershed is associated with conditions indicated as number 3 in figure 12, wherein the fairly long-cycle forest fallow rotational shifting cultivation system of ethnic Karen communities dominant in mid to upper portions of the watershed has been transformed to livelihoods based on household-level fixed field cultivation and permanent forest.

In order to help understand this transformation, figure 14 shows three more detailed images of land use excerpted from a time series of images made from aerial photos of the area during the last 50 years.

- In the Mae Raek of 1954, land-use “footprints” of traditional community-managed rotational forest fallow

systems were still evident in Karen areas. There was no national park or modern roads, and Thailand had not yet begun its series of national economic and social development plans. A modest amount of rice was grown in paddies in small valley areas where it could be developed (yellow), while upland rice (interplanted with an array of minor crops) was cultivated in contiguous household fields in one “compartment” delineated in the landscape; each year cultivation would shift to a new compartment and a 10+ year cycle of forest regeneration would begin in the compartment cropped the previous year. While a substantial portion of the area was in different stages of forest regeneration (shades of purple), only a small proportion was opened to cultivation in a given year (orange).

- By 1984, the Inthanon National Park was declared, including claim to the upper third of the sub-watershed. Road access was greatly improved, and development projects associated with reforestation (reddish purple), opium crop substitution, ending shifting cultivation, and rural development were in full swing. Increased fragmentation in the land-use pattern at this point reflects disintegration of community forest fallow cycles as communities were pressured to reduce fallow lengths and establish household permanent fields for upland rice cultivation.
- By 1996, subsistence upland rice production had “settled” into permanent fields, which required a rotation to upland soybeans every third year, as well as fertilizer and herbicide inputs. Cash for inputs and other things becoming available in the local economy needed to be obtained from additional production of upland cash crops, which in this area is now mostly maize for agro-industrial firms. Opium on upper ridges is gone, and all forest is now permanent (even the area in purple

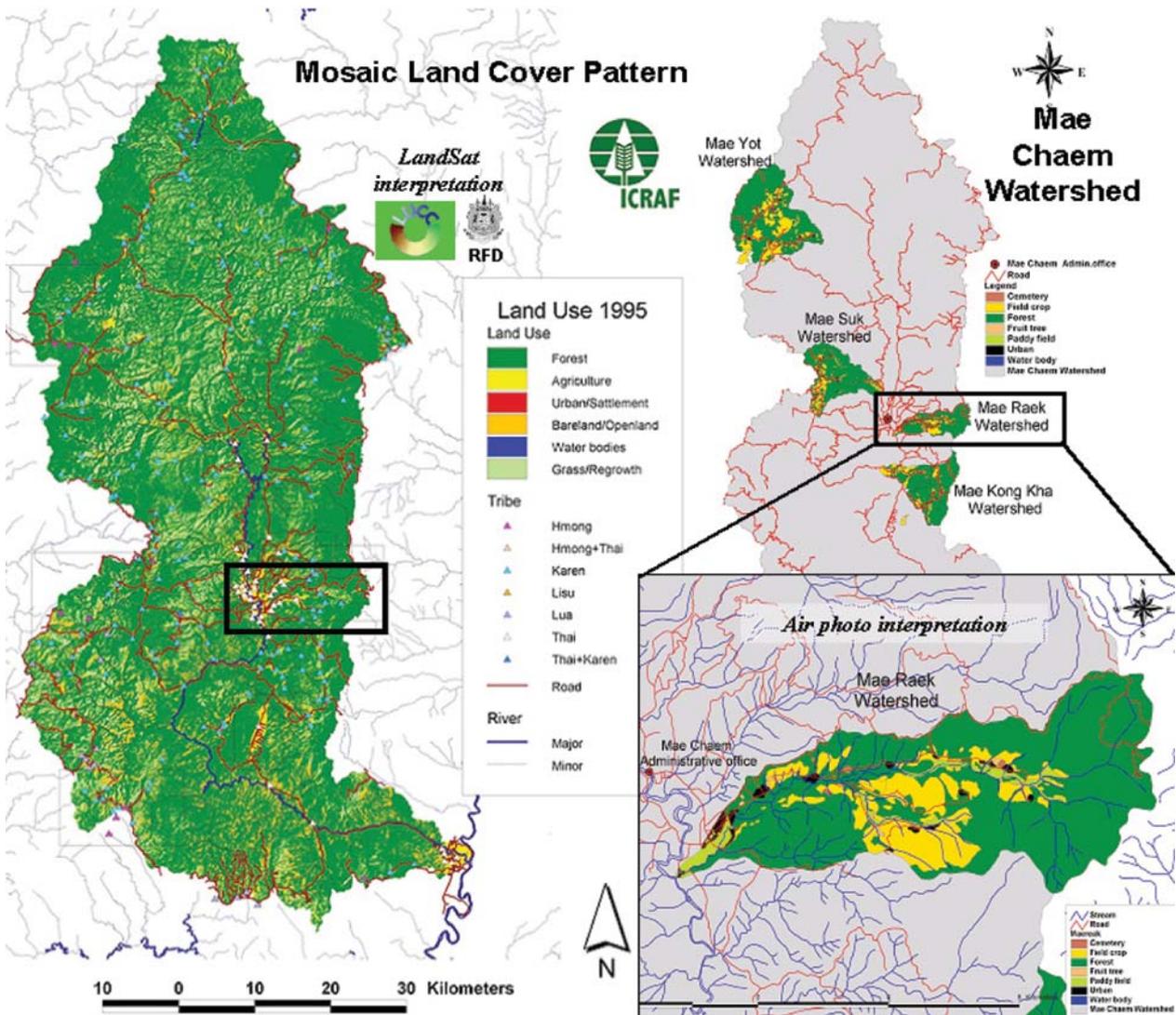


Fig. 13. Mosaic land cover in Mae Chaem and a sub-watershed

is ‘old fallow’ that will not be cut again), with specific areas being established for community “subsistence forest” and “conservation forest”.

The overall net effect of these changes has been a very substantial increase in area cropped in a given year (orange), since it includes both subsistence and cash crops, as well as an increase in areas of “permanent forest”. The simultaneous expansion of both of these components was at the expense of areas of regenerating forest fallows. Studies are being conducted to assess the impacts of this transformation on local livelihoods, local society, and environmental services.

As different areas within the Mae Chaem watershed are at different stages of paths of transformation such as this one (fig. 12), similar studies are being conducted in other areas to compare the driving forces and the effects of such transformations, and to help build a better understanding that can improve interpretation of mosaic patterns of land-use change in complex agroforestry landscapes in this part of the MMSEA region.

Since biodiversity is one of the major themes of discussions at this year’s symposium, we now turn to two different visions of biodiversity and some of their manifestations in MMSEA. The first is seen in responses of national societies and governments in the region to the growing global concern that is driving expansion of conservation efforts, while the second turns to more local visions of agrobiodiversity in the context of the region’s mixed agroforestry landscapes.

CONSERVATION RESPONSES TO CHANGING LAND COVER

As global concern for biodiversity grows, substantial resources are beginning to be directed toward expansion of areas for biodiversity protection. The central thrust of most of these efforts is toward demarcation of areas where human settlement is to be excluded and human land-use activities are severely restricted to those of a ‘non-destructive’ nature.

Since we have seen that most remaining forest areas are in mountain zones of mainland Southeast Asia, it should not be surprising that protected area conservation programs also have their greatest impact in MMSEA zones. Figure 15 overlays protected areas (red) currently registered at the international level with land use in lowland and mountain zones of river basins in the region. The total number and extent of protected areas is greater than this and still expanding. In the past, these areas have frequently been declared and demarcated by central governments with little or no consultation or concern about local communities living within the areas targeted, which have subsequently either been relocated or placed in a highly restricted “enclave” status. While there are indications that such processes are now including more consideration of and consultation with local communities, protected area expansion is clearly a major element of land-use issues in MMSEA zones. Thus, one major set of issues in the region relates to how much expansion at what locations is necessary for what types of biodiversity protection, and what forms of resource use are allowable for what components of the population.

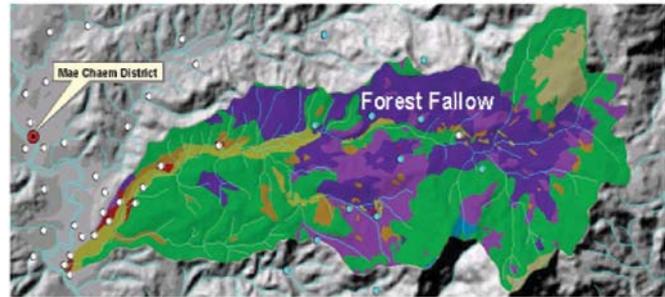
Furthermore, there is a range of additional state forest and conservation policies that have their greatest impact in MMSEA zones. Large additional areas in some countries have been assigned other types of reserved status for various purposes, such as for timber production. Most countries also have or are establishing watershed classification systems that seek to place further restrictions on land use in upper river basins, with the objective of maintaining watershed services for downstream populations.

All of these efforts are indicative of a trend across the region toward increased delineation of zones for different types of land use, established by governmental systems of decision-making that are politically dominated by majority lowland societies. Perhaps not surprisingly, one of the overarching issues associated with conservation programs follows from the fact that it has been very difficult for lowland societies to recognize traditional practices that use forest regeneration to restore fertility (swidden cultivation) as a legitimate form of agriculture. Lowland views have also been reinforced by “experts” from international organizations and “development” agencies. Thus, land tenure, land allocation, and competing demands for land for timber production and protected conservation area expansion continue to be major issues across the MMSEA region.

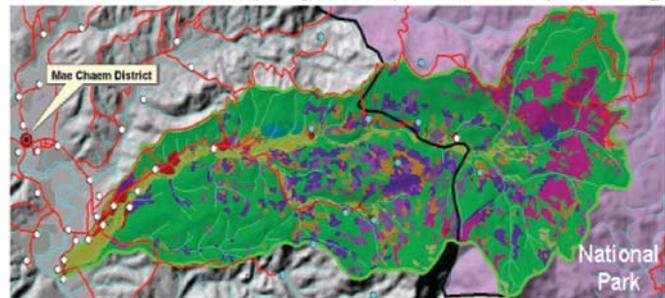
AGROBIODIVERSITY IN MMSEA LANDSCAPES

Many local communities of various ethnic groups have centuries of experience in utilizing a wide range of flora and fauna in mixed local agroforestry landscapes. Thus, for the managers of many of the region’s agroforestry land-

1954 – Traditional fallow systems, no park



1984 – Roads, projects, park, tree planting



1996 – Fixed rice + cash field crops

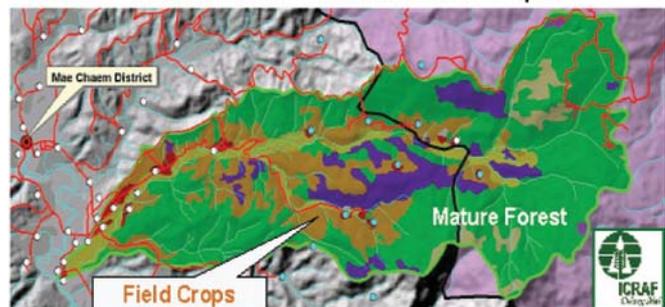


Fig. 14. Land-use change in Mae Raek

scapes, biodiversity is viewed more from the point of view of how it interacts directly with local human populations rather than as a separated zone from which human populations are “fenced out”. While this type of view is now frequently associated with the term “agrobiodiversity”, it often involves much more than concern about genetic variation within plant populations of a single “crop” species. As an example of this, we can look at three types of local approaches for integrating “agriculture” and “forest” components of agroforestry landscapes in MMSEA:

- In forest fallow swidden systems, forest is temporarily cleared for “agricultural crop” production, and then returned to natural forest regeneration processes. Within the cropping component of this “sequential” agroforestry system, upland rice is often mixed with quite a large number of other “crop” species, including “domesticated” native plants. Forest fallow components allow for areas of early forest regeneration stages to be available each year, so that useful native plants from early-succession plant communities are also plentiful there.

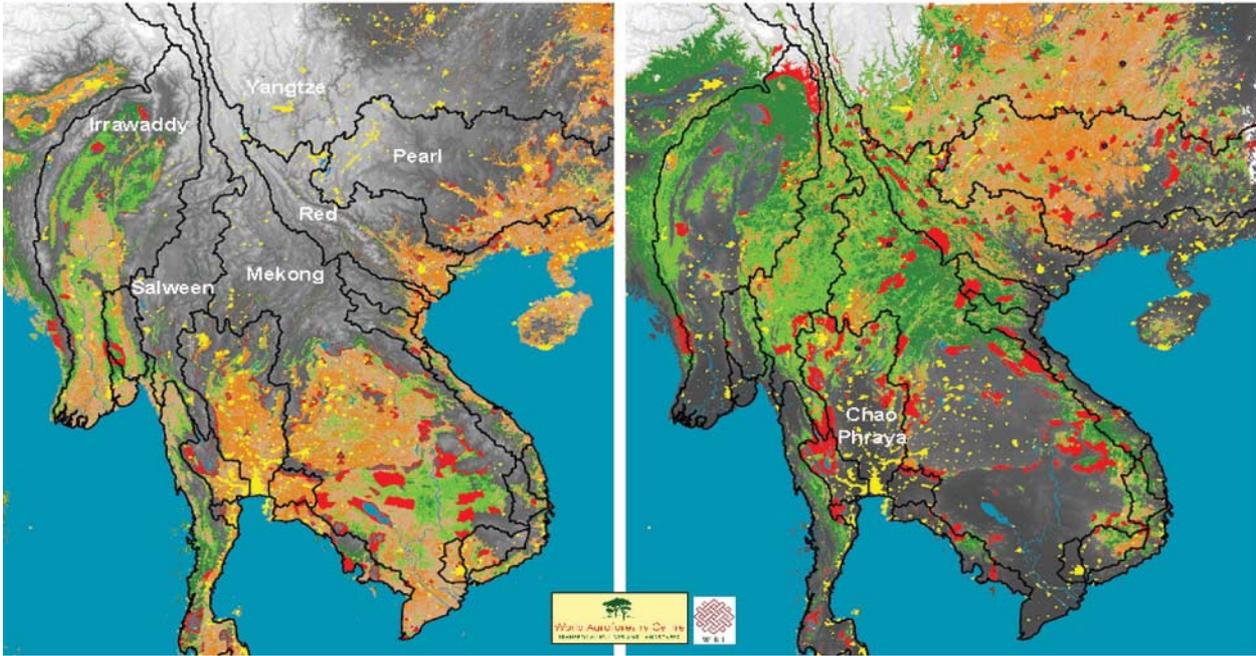


Fig. 15. Registered protected conservation areas

- Other types of “agroforest” practices include “enrichment planting” of perennial “agricultural” species into forest areas, such as the “miang” (*Camellia sinensis*) tea gardens found in the upper Chao Phraya river basin and neighboring areas. While these may be associated with some thinning of forest species, the basic forest communities and structure are maintained. In some areas, such systems are being gradually transformed to include greater numbers of a range of “agricultural” species, with a consequent reduction in native ones (fig. 16). And in still other areas, highly diverse mixed orchards with uneven-aged “agricultural” trees (some of which may be native to the area), are planted in a manner that mimics the structure of native forest (fig. 17).

While the number of natural species may be lower in various such types of “agroforests”, their “forest-like” structure may provide habitat and environmental service functions similar to natural forest. But “scientific” study of these systems is still very scarce.

- In addition to various types of “agricultural” or “agroforest” patches in MMSEA agroforestry landscapes, remnant patches of natural forest are also usually present, and frequently found in association with stream headwaters, steep drainage gullies, and other strategic locations in the landscape. In many cases they are associated with use rules or taboos, and they may play a role in spiritual beliefs or local rituals. In any event, these forest patches—which are sometimes

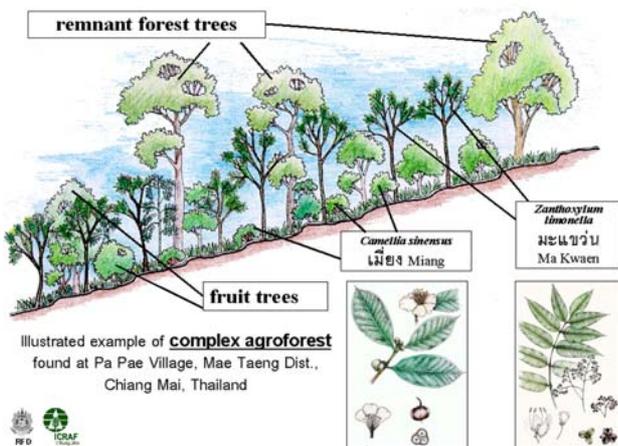


Fig. 16. Agroforest with increase of agricultural and decreased native species in North Thailand



Fig. 17. Agroforest of mixed orchards and uneven “agricultural” trees planted to mimic forest

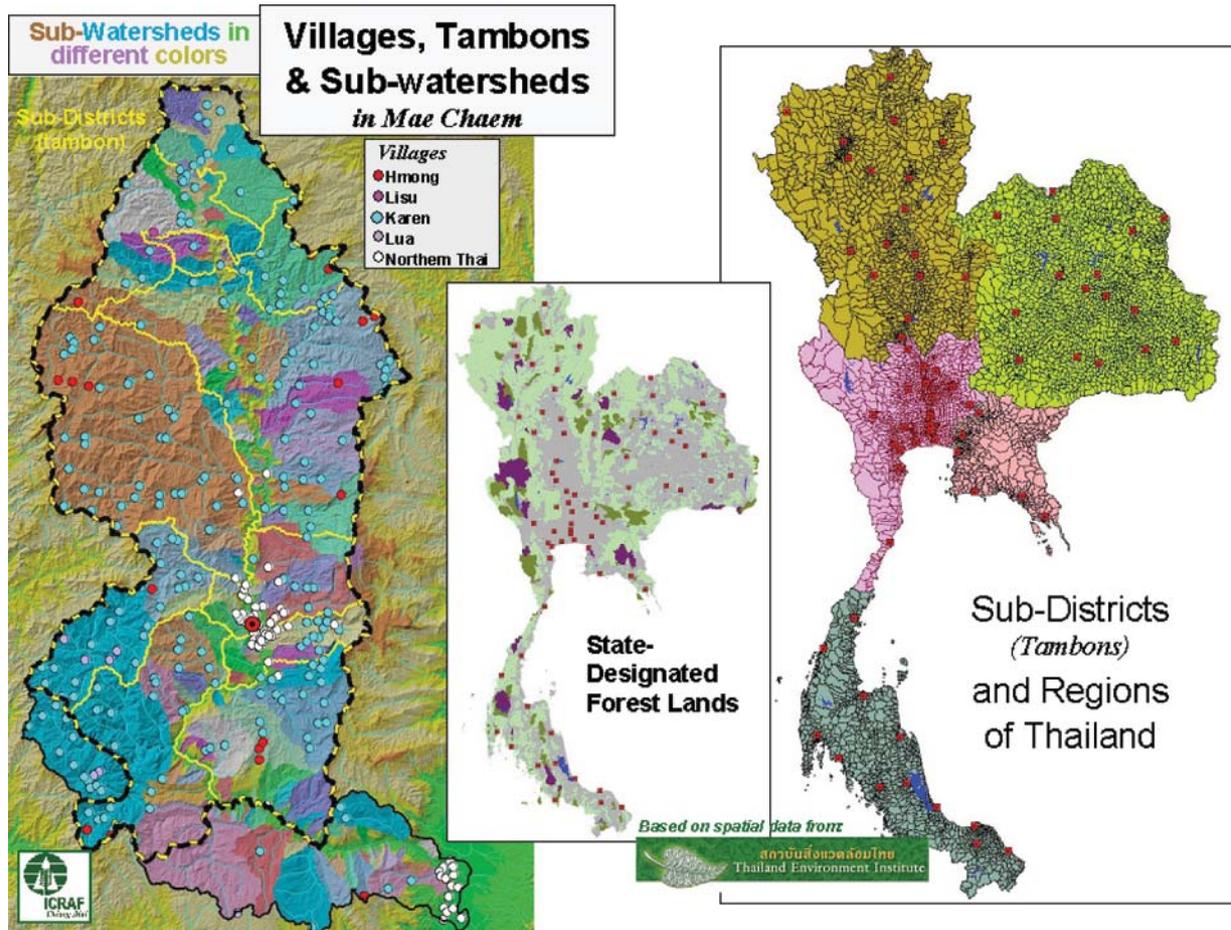


Fig. 18. Local government units in Thailand. Sources: ICRAF Chiang Mai and Thailand Environment Institute.

near or connected to larger forest areas—also play a role in overall biodiversity properties of agroforestry landscapes in MMSEA.

Thus, the degree to which agroforestry landscapes in MMSEA either “destroy” or “maintain” environmental services, such as biodiversity, watershed functions or carbon stocks, is not necessarily a simple issue resulting in a binary choice. But in order to assess the biological or social “acceptability” of the level of environmental services they provide, environmental service objectives and the criteria and indicators by which they can be assessed—including ones that incorporate insights from local knowledge based on generations of experience—need to be articulated and clearly understood. And the “other side of the coin” is that environmental services provided by agroforestry landscapes should be recognized by “stakeholders” near and far who share in the benefits from them, and who should also have an equitable share in any additional costs associated with their maintenance. The political economy of how environmental services are produced and who benefits from them is likely to be an issue of increasing importance in MMSEA and its relationships with downstream lowland populations in the years to come.

NATURAL RESOURCE GOVERNANCE

Social and institutional change is yet another trend with potential for substantial impact in MMSEA and its relationship with downstream lowland areas during coming years. While there is growing consensus across mainland Southeast Asia that local institutions are best placed to manage resources to meet local needs and build on local knowledge, stakeholders from local to downstream to global levels also want assurance their needs will be met. Levels of government administrative units have been the initial focus for decentralization, but there are indications that other forms of social organization may also be necessary. Thus, one of the major challenges for the region relates to how it can establish, operate and maintain a system of units of social organization that can effectively manage the natural resource base to meet this nested hierarchy of needs, including negotiation of acceptable distributions of costs and benefits. In order to help us visualize some of the nature and scope of these issues, the left side of figure 18 takes us back to the Mae Chaem watershed in the upper Chao Phraya river basin. Even within this one 4,000 square kilometer basin one can see:

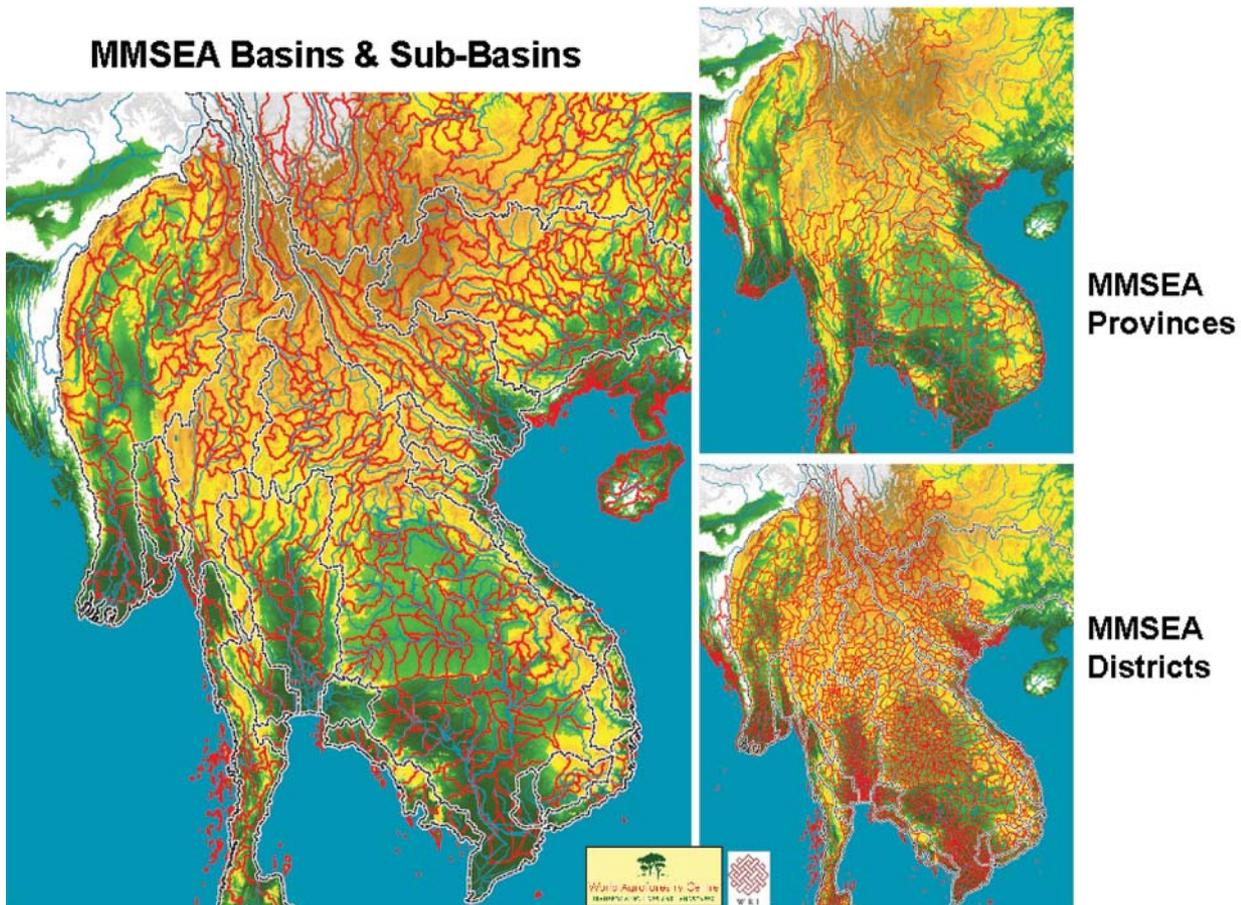


Fig. 19. Meso-level watershed and administration units

- A substantial range in the size and configuration of individual sub-watersheds, each with its set of local village communities and ethnic mix. Pilot local sub-watershed management committees are trying to bridge village and ethnic boundaries in some areas, in order to manage common resources and reduce local upstream-downstream tensions related to water supplies and fears of flash floods and landslides.
- The “mismatch” between jurisdictions of elected sub-district (tambon) governments and the sub-watersheds within which its constituency lives. While local governments have the legal mandates and administrative and budgetary mechanisms to support local natural resource management, the natural units of forest, watersheds and other resources in their domain seldom correspond to their own administrative boundaries. Moreover, how will these various local organizational units respond, for example, to downstream concerns about water flow or quality from the Mae Chaem watershed as a whole?

A sense of the sheer number of sub-district governments that would need to be involved in this level of localized natural resource management in Thailand is indicated by comparison of the center map in figure 17 that depicts reserved forest (light green) and protected areas, relative

to the map on the right that depicts boundaries of sub-district governments in all regions of the country. If the diversity and complexity of local conditions elsewhere is comparable to those faced by sub-district governments in Mae Chaem, it becomes clear that coordination within and among this number of local organizational units presents a major challenge.

Thus, if management at larger forest areas and river basin and sub-basin levels is to be effective, it becomes obvious that there is a role for higher levels of social organization. And, since major government processes are conducted through existing administrative structures, such efforts must have working relationships at district, provincial and national levels.

In order to broaden visualization of these issues, figure 20 displays some of the meso-level units potentially involved at intermediate levels of natural resource management in MMSEA. Maps on the right side of the figure show district and provincial level units across river basins of the region, while the map on the left shows major river basins and sub-basins. How to establish, operate and maintain relations among differing administrative and natural resource units is clearly a challenge at all levels of hierarchies of both natural and human organization.

While some advocate alteration of administrative boundaries to match more closely with watersheds, the

process of doing so would be exceedingly difficult and would still result in mismatches with units of forest or other natural resources, as well as with organizational patterns related to social, economic or other characteristics of “macro-landscapes” around the region. Similar issues also extend to the international level in most of the large river basins, as well as in some of the most important large protected forest areas.

A more likely path might lead toward less formal organization of networks of local communities directly involved in managing natural resource units, combined with clear channels for their linkage with governmental administrative units. Both types of organization could have nested hierarchies that are linked at appropriate levels. One important element of how such hierarchies could function effectively at their various levels would be a clearer understanding of types of natural resource management decisions—and the roles of different stakeholders—that

would be most appropriate at each of the nested spatial and organizational levels. This could help lead to efforts to more fully develop management and support system capacities at each level, as well as methods for inter-level interaction and negotiation. A second element is a need to focus on process elements of how social units function within and among levels, in order to assure that these processes are inclusive and transparent enough to establish and maintain credibility and their own longer-term viability.

Such organizational and management within the context of a range of trans-boundary conditions in larger river basins. The Chao Phraya and Yangtze river basins provide two different scales where “domestic trans-boundary” issues need to be addressed within single national frameworks. Trans-boundary issues in the Red, and small portions of the Pearl and Irrawaddy river basins, require bilateral collaboration, and the Salween extends this to the trilateral level. The most

Government: Nation States

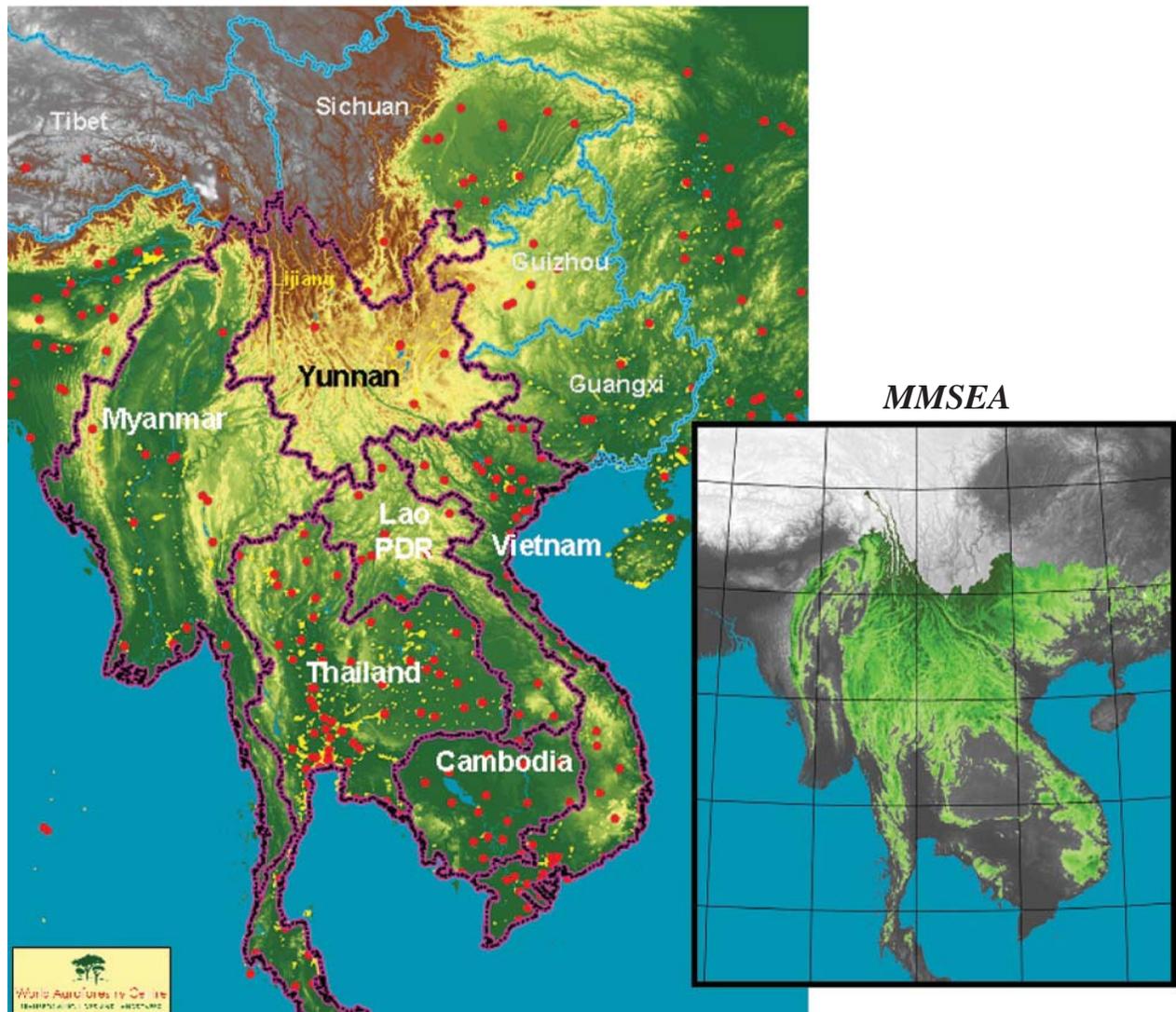


Fig. 20. Nation states and the MMSEA

complex set of conditions is clearly represented in the Mekong river basin, the effective overall management of which will require collaboration among all six countries with administrative borders that include portions of the MMSEA region. In a sense, the region provides a good set of different conditions for experiments with international cooperation in river basin and other natural resource management. While efforts associated with building the Mekong River Commission have been long and difficult, this is largely due to the complexity and difficulty of the important issues they seek to address.

THE MMSEA COMMUNITY OF NATION STATES

While most of our discussions have focused on patterns of characteristics and trends that reoccur across the MMSEA region, governance issues bring us back to the reality that governance institutions and programs exist and function within the context of the various nation states of the region. Each nation state, with its subsidiary units of organization, has its own historical, cultural, linguistic, social, political, legal and economic context. Indeed, this is another dimension of the diversity that characterizes the MMSEA region. Yet, each nation state itself embraces a substantial range of diversity, some of which is shared with neighboring MMSEA nation states. As each nation seeks its own balance with forces pushing and pulling it toward both greater localization and globalization, there is another level of regional balance that will be necessary to help assure longer-term viability and sustainability. There is an emerging shared vision that underlies this series of MMSEA symposia, and we hope collaborative use of spatial analysis tools can help foster its further articulation.

Thus, figure 19 now brings us back to the nation state paradigm with which we began as we turn to the country reports in the next section of the symposium.

ACKNOWLEDGEMENTS AND DATA SOURCES

This paper has sought to provide a brief survey-level overview of some of the major characteristics and emerging issues in the MMSEA region, in order to help set the context for more detailed and focused components of this symposium. The concepts and views expressed here are a synthesis of discussions and ideas derived from many sources and colleagues in the region over many years, and they are by no means claimed as the original ideas of the author. Many of these colleagues are here to present more detailed papers and engage in specific discussions of various of these topics. Others could not make it to this MMSEA symposium, while still others have already passed from our midst. Moreover, since a detailed literature review is well beyond the scope of this presentation, and since many inputs have come from sources other than published literature, there is

no attempt to reference them here, beyond general acknowledgement and thanks from the author. Nate Badenoch reviewed the governance section.

Perhaps the greatest amount of original effort has been in preparation of the images presented here to help visualize characteristics and issues related to topics that will be further discussed at this symposium. Inspiration for this effort came from the three maps of mainland Southeast Asia prepared by the World Resources Institute for the first MMSEA symposium, and from feedback and encouragement following our small presentation at the second symposium. Data from which these images are derived has come from components of the MMSEA regional spatial database that we are currently constructing from a quite wide variety of sources, and which we hope to soon make available to interested colleagues working around the MMSEA region. Specific data used by the author in preparing images presented here include:

MMSEA-LEVEL DATA:

- *Topography*: GTOPO30 and Hydro1k datasets from the USGS EROS Data Center
- *River sub-basins*: Hydro1k dataset, *ibid.*
- *River basins and major streams*: SEA Basins Project, University of Washington
- *District to national boundaries*: Columbia University/CIESIN & World Resources Institute
- *Population distribution*: gridded population datasets from NCGIA-UNEP/GRID
- *Cities*: Asiatowns dataset from NCGIA-UNEP/GRID
- *Urban lights*: Nighttime Lights of the World dataset from U.S. Defense Meteorological Satellite Program
- *Roads, railroads and towns*: Digital Chart of the World datasets
- *Land cover*: reclassification of 1km Global Land Cover dataset from University of Maryland
- *Protected areas*: UNEP-WCMC dataset provided by World Resources Institute

THAILAND-LEVEL DATA:

- *Forest lands & tambons*: Thailand on a Disc dataset from Thailand Environment Institute
- *River basin and sub-basins*: Multiple Cropping Centre, Chiang Mai University

MAE CHAEM-LEVEL DATA:

- *Overall land use*: Dr. Suwit Ongsomwang and Land Use and Cover Change (LUCC) project
- *All other data*: ICRAF Chiang Mai GIS team, led by Ms. Pornwilai Saipothong