DEVELOPMENT AND NATURAL RESOURCES IN THE MEKONG REGION: THE INSTITUTIONAL CHALLENGE

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1. Introduction

This paper has been prepared within the framework of the Resources Policy Support Initiative (REPSI), implemented by the World Resources Institute in collaboration with the Stockholm Environment Institute (SEI) and a range of partners in Southeast Asia. Specifically, it has been developed within the frames of the regional analysis of REPSI.

1.1 Objective

The overall objective of this paper is to identify and characterize the main regional institutional challenges for a sustainable development of the Mekong region from an integrated natural resource and development perspective. The integrated perspective includes analytical as well as socio-political aspects of development.

The report can be seen as the first component in a series of analyses, discussions, and perspective papers, on regional institutional innovations for natural resource issues discussed within the REPSI project. In this capacity, it is intended to act as a robust problem statement for the overall regional analysis of REPSI. But the paper is also designed to stand on its own as an independent research report.

1.2 Background and Scope

A fundamental point of departure for the paper is the importance of ensuring regional development while protecting the natural resource base and the functions it provides for human development. This is a cornerstone in sustainable development and a precondition for meeting the needs of present and future generations. The overarching research question for this paper is: *What are the key regional institutional challenges for natural resource management from a sustainable development perspective?* Under this question, an analytical framework is applied in which a set of sub-questions on the socio-political context and the analytical knowledge base are addressed.

⇒ What local, national, and regional interests, priorities, and needs lie behind resource management and development decisions?

⇒ How are the various dimensions of the natural resource base linked to the social and economic systems and the key driving forces in the region?

These questions are further elaborated in Chapter 2.

The paper is only concerned with aspects of development that have an immediate link to the natural resource base. Therefore, in terms of economic development and driving forces, the discussion will be restricted to patterns and aspects of development that have a significant impact on the natural resource base and various stakeholders groups that depend on these resources. Key social sustainability aspects such as education and health are not addressed in the paper.

As the paper is delimited to deal with natural resource issues, it also avoids other environmental issues, such as climate change, local and regional air pollution, ozone depletion, and marine environmental issues. This is a conscious delimitation based on the mandate and scope of the REPSI project as a whole.

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1.2.1 A watershed approach – land and water resources

The natural resource issues relevant for the analysis can be framed in the watershed concept (Ratner, 2000). A watershed is a topographical unit defined by the flow of water. The watershed focus has traditionally implied a strong hydrological focus in the analysis; practices to control quantity, quality, and timing of water flows have frequently been the object of study. However, the watershed approach must not only be concerned with water issues, but also the forest and land resources that are intimately linked thereto. Land-use patterns and changes have direct effects on the flow and quality of water. The analysis of the problem and management practices must then focus on land use changes, forest cover, and other aspects that affect the watershed (Dixon, 1997).[2] In our conception of the watershed approach, two categories of natural resource issues are central to the analysis:

Water resources issues include large dams, hydropower, irrigation, water diversion, and impacts such as water quality and quantity, flooding, siltation, water shortage, fisheries and wetlands degradation as well as competing demands for resources between countries or communities. Water is key to the development prospects of the Mekong region. Large parts of the region base agricultural production on wet rice cultivation. Hydropower is a key asset for meeting the electricity needs and decreasing dependence on petroleum exports. The relative water resource positions and development needs are highly varied in the different countries. The regional nature and necessity to share resources mean it can be an instrument for cooperation and stability and for facilitating dialogue between countries.

Land resources issues include management of forest resources and biodiversity, conversion of forest into agricultural land, land degradation and erosion, logging, and uncontrolled and controlled trade in timber and non-timber forest products, as well as key linkages between forestry and agricultural practices in the uplands. Land resources are, as has been pointed out, tightly linked to the water resource issues and the management of the watershed. As with water, the supply of land varies significantly from country to country.

Even though the issue selected in this paper can be considered as an extremely complex issue, the complexity has been reduced by approaching the issue in stages. The aspect of natural resource use has therefore been divided into five different "issue areas": agriculture, hydropower, fisheries, forest resources, and biological resources. Much of the analysis has been divided according to these issue areas.

1.2.2 Geographical scope: a regional approach

Geographically, the analysis is made in the context of mainland Southeast Asia, and more specifically, the Mekong region. This covers Cambodia, Laos, Thailand, Vietnam, Burma, and Yunnan province of China. The Mekong region includes the whole countries and not just the areas that are delimited by the Mekong River Basin. However, many elements of the study will focus on the basin, since it is a central feature of the economic geography of the region, with a key role in agriculture and agro-industries, forestry, fisheries, energy, and transportation.

Another fundamental starting point for the paper is the acknowledgement that many of the watershed-related natural resource issues associated with development in the Mekong region are regional in nature. The regional dimension implies that:

a) The cause and effect of a resource problem are located in different countries—there is a trans-border effect. Examples are the impacts on the water flow downstream in the Mekong River or its tributaries from hydropower developments upstream, and the management and conservation of forests in border areas between Laos and Vietnam, where logging activities and trade occur across borders.
b) The same cause-effect relationship is displayed in several countries—there is a common concern that suggests cooperation among countries is better than isolated action in each country. Frequently, in economically integrated regions, which the Mekong region is rapidly becoming, decision-makers benefit from regional collaboration in addressing these common concerns. Examples in the region include issues such as deforestation, soil erosion, and water quality (Danida and Danced, 1997).

[2] The REPSI program addresses these issues in-depth in its *Theme A – Strengthening the Empirical Basis for Watershed Governance.* Another view emphasizes the socio-economic systems of the watershed, as is addressed in REPSI's *Theme B – Making Decentralization Work for Upper Watersheds.*

By focusing on the regional dimensions of natural resources and economic development, this paper will avoid repeating many natural resources studies that have been performed in the region.

1.2.3 Not a state-of-the-environment study

An overwhelming amount of overviews, accounts, assessments, and analyses have been written on the status and trends of the environment and natural resource base in the Mekong region. This paper will not duplicate these efforts. We will not present a systematic inventory of the state of the natural resource base in the region, as has been done by the Mekong River Commission (1997) and the Asian Development Bank (2000) for instance. Instead, we attempt to characterize a complex and linked biophysical and socio-economic system in an analysis that portrays the implications and linkages of different resource development interests and decisions.

In particular, trends will be assessed in light of the fundamental patterns of regional socio-political and economic diversity and change. There are fundamentally differing economic and political systems throughout the region, and as a consequence also very different institutional practices and governance norms in relation to resource development decisions. These are being challenged by recent streams of regional dynamics, which are represented through several highly interrelated elements, including political integration, for which there are several regional policy or semi-governmental bodies operating, and economic integration, which is partly driven through political integration, but primarily an effect of market forces coming to force at all levels in the region. Also, interests and priorities of local communities, NGOs, the private sector, and development assistance agencies set the stage for resource development decisions and trends.

1.2.4 Analysis on existing regional institutions

There is indeed a range of regional institutions that have been set up to deal with some aspects of the challenges identified in this paper, primarily at the intergovernmental level. These include institutions such as the Mekong River Commission (MRC), the Greater Mekong Subregion (GMS) of the Asian Development Bank (ADB), and Association of Southeast Asian Nations (ASEAN). These institutions facilitate the formation of a shared regional agenda for development and contribute to the political stability of the region through providing a forum for inter-governmental dialogue (Danida and Danced, 1997).

This paper does not enter the discussion on how existing institutions are equipped to handle the challenges. Nevertheless, it is recognised as part of the challenge that the mechanisms for really mainstreaming sustainability into development decisions are yet insufficient and ineffective. In this sense, many of the existing institutions seem to be as much a part of the problem as a part of the solution.

1.3 Research Process

The process of preparing this paper has gone on from October 1999 to March 2001. The preparation has involved several travels through the region, and a range of informal consultations with researchers, government officials, and international organizations, for determining the scope and strategic direction of the work, in relation to its usefulness and value-added for the regional discourse on natural resources policy and institutions.

In addition, drafts of the paper have been presented in regional research workshops in Chiang Mai, July 2000 and Phnom Penh, November 2000. The paper has benefited profoundly from substantive critiques and dialogues with the rest of the regional REPSI research network, involving both regional and international expertise.

2. Framework and Methodology

This chapter explains the framework and methodology used in the paper. The framework proposed in this paper has been considered useful for the types of multifaceted challenges the Mekong region currently faces. The analysis, as the challenge, will be complex and needs a broad-ranging and flexible framework to avoid resulting in irrelevant recommendations.

2.1 Selection of Analytical Framework

In searching for a framework for framing the institutional challenges of the Mekong region, it soon became evident that these challenges can be discussed in many different dimensions. In particular, the scoping process of this paper identified that it was seen as critical to talk about both socio-political and analytical levels of challenges. Any discussion on regional institutions must consider issues such as information, conflict, and representation in a rather integrated manner. The framework should allow parallel inquiries into the issues and problems in both the socio-political context and the linkages between development and natural resources.

The methodological basis of the paper is an analytical framework that draws upon concepts of risk assessment policy analysis and decision theory that has been proposed and tested in various decision-making contexts and cases (USEPA, 2000; Kørnøv and Thissen; Stern and Fineberg, 1996). The framework is generic in the sense that the context and the objective of the analysis is not specified, but it was deemed as particularly useful to apply in the case of the Mekong regional analysis since it allows for relatively complex issues to be mapped out and structured according to the both socio-political and analytical challenges that the region meets in its development endeavors.

The framework requires two underlying analyses, one of the socio-political context in the region and one of its knowledge base. The analytical framework combines the identification and characterization of the knowledge base, in terms of what we know about the linkages between the natural resource base and development, and a characterization of the socio-political context, in terms of the risk or potential for social conflict or social cohesion. By combining the two analyses, four general classes of institutional situations emerge (see Table 1), all of which are linked to some generic institutional contexts.

Table 1. The framework

		Socio-political context	
		Social consensus – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Knowledge base	**Strong knowledge base** – low uncertainty in the decision-making	A	B
	Weak knowledge base – high uncertainty in the decision-making	C	D

Source: Adapted from USEPA, 2000; Kørnøv and Thissen; Stern and Fineberg, 1996.

Obviously, these general classes are very crude and not specific enough for the purposes of this paper. The analysis will discuss in more detail the context within the framework. Depending on what context is relevant for the various issues faced in the region, and thus where in the framework the issue is located, different types and depths of institutional challenges are identified. From those, it is possible to formulate some generic recommendations on how to proceed in the achievement of effective regional governance and decision-making with a sustainable development perspective.

2.1.1 Implications for an Institutional Response

The positioning in the framework not only helps in pinpointing the institutional context. It also gives some institutional implications, such as the requirement to engage different types of deliberation processes to deal with that context. Stern and Fineberg (1996) define deliberation as "any formal or informal process for communication and for raising and collectively considering issues." This process, quite

naturally, becomes more complicated the more uncertain the knowledge base and the higher the risk for conflicting interests[3]:

Cell A – Rational problem solving. With low uncertainty and high level of consensus, the deliberation process can be kept to a minimum. In this case, *oversight deliberation* is likely to be enough, meaning that policy-makers make decisions and the deliberation process is used only periodically as a means of supervision.
Cell B – Mediation and negotiation. In cell B, the knowledge base is well developed, but there is a high risk of conflict due to the differing interests of the involved players. In this situation, mediation and negotiation through *stakeholder deliberation* is a preferred alternative. Experts, scientists, researchers, and other external groups can be left out, as they commonly are of more help if the knowledge base is weak.
Cell C – Additional research. The opposite situation to cell B is cell C—low risk of conflict due to corresponding interests, but a weak knowledge base resulting in high uncertainty about the analyzed issue. To involve the stakeholders in the deliberation may not be of much use here. Instead, an *expert deliberation* is likely to be more productive where researchers, scientists, and academia are consulted.
Cell D – Facilitation of a political process. In the most complicated situation—that of high uncertainty and with high risk of conflict—*integrated deliberation* or *broadly based deliberation* is required. This type of deliberation process, which involves both experts and outside stakeholders, has the potential to improve problem formulation, provide more knowledge, determine appropriate use for controversial analytic techniques, clarify views, and make decisions more acceptable. Integrated deliberation should be continuous throughout the decision-making process.

In order to utilize the proposed framework in its maximum ability, the vertical and horizontal axes in the framework need to be used to their full potential. To this end, an analysis of the knowledge base and the socio-political context has to be carried out with the aid of a set of research questions. After having completed the analysis that these questions enable, the framework introduced above is applied to each issue.

Before going into the analyses of the various resource issues relevant in the Mekong region and to the application of the framework on those analyses, the following section introduces the horizontal and vertical axes of the framework in more detail, and outlines a set of key research questions under each.

2.1.2 The socio-political context

The horizontal axis in the framework depicted in Table 1 describes the socio-political context consisting of various stakeholder interests, agendas, and needs. Depending on the nature of those interests, there is either a potential for conflict or for social agreement. Interests can either fail to agree or they can overlap. In the latter case, alliances may arise and create new power structures. To understand all these dimensions of the socio-political context, the interplay between the most central players, forces, and factors have to be identified and examined.

In order to map out the socio-political setting and interests within the Mekong region, and to determine the level of social consensus or potential for conflict, a number of analytical questions are posed. For illustrative reasons, the questions are not formulated in a general manner, but rather concentrate on the analytical focus of this study.

⇒ Are there opposing interests in the region with regard to development paths and decisions?
- What are the key resource concerns/interests in a national perspective?
- What is the nature and magnitude of communities' dependence and interaction with the natural environment?
- What are the key resource concerns and interests among interest groups other than the national and local actors?

⇒ Are there trade-offs between users from development trends and decisions?
- Are different agendas promoting or opposing other interests in the country?

[3] The following discussion is based on Stern, P. C. and H. V. Fineberg, Eds. (1996). *Understanding Risk. Informing Decisions in a Democratic Society*. Washington, DC, National Academy Press. and USEPA (2000). Toward Integrated Environmental Decision-making. Washington, DC, U.S. Environmental Protection Agency: 48.

- How do national development decisions affect the natural resource base and local groups' livelihoods?
- How do local groups interact with other users' needs of the same resource?

⇒ Is the power structure one of unequal balance?

- Do certain groups' interests dominate the decision-making in the region?
- Are local interests represented in the decision-making process?
- Are there opportunities for compensation for adversely affected groups?

The socio-political context can be characterized as one of high potential for social conflict if the analyzed region has features such as a rich variety of actors and interests, weak institutions, unbalanced power structures, or weak traditions and practices of public participation, transparency, and accountability.

Introduction to main stakeholder interests

The following stakeholder interests are commonly involved in influencing each other and the development agenda. (see Box 1 for a help in identifying who the interested and affected parties are):

- *National development priorities*, shaped by national interests and strategies commonly focused on the achievement of economic growth;
- *Local livelihood needs*, primarily shaped by local resource dependence[4], local interests, and vulnerability to changes in their livelihoods;
- *Women*, with their often forgotten role in the development process;
- *Regional cooperation*, economic, social, cultural, and environmental, primarily shaped by the common interest of economic advantages in the global arena. Regional cooperation interests can, however, also be created through a willingness to reduce conflicts and imbalances within the region;
- *Non-Governmental Organizations*, with their specific interests, agendas and mandates. Common interests include human rights issues, environmental sustainability, health improvements and poverty alleviation;
- *Overseas development assistance* contributed by both multi- and bi-lateral development agencies with their specific interests, agendas, and mandates. Poverty alleviation is a common interest among these actors, but they could also have a more specific focus on issues such as health or environmental sustainability;
- *International markets* affect through variances in consumer interests and demands;
- *Private sector*, which has come to play an increasingly important role through investment flows, directed by consumer demand, production costs, and resource availability;
- *Academics, researchers and specialists* contribute with their ideas and findings on various research areas or topics; and
- *Media*, which plays a role as communicators and magnifiers of movements around the world (Kingdon, 1995).

Box 1. Who are the interested and affected parties?

The interested and affected parties can often be identified by considering the answers to the following questions:

- Who has information and expertise that might be helpful?
- Who has been involved in similar discussions before?
- Who has wanted to be involved in similar decisions before?
- Who may be affected by the issue characterisation?
- Who may be affected but not know they are affected?
- Who may be reasonably angered if they are not included?

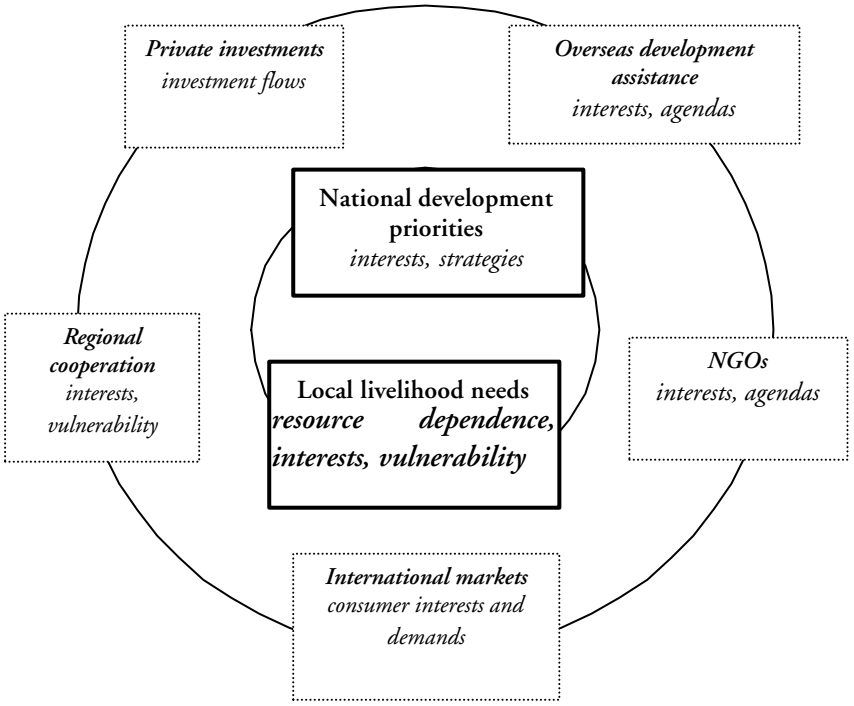
Source: Adapted from (Stern and Fineberg, 1996)

[4] The local resource dependence in the Mekong area is almost entirely based on natural resources. In other regions, however, this dependence may be based on other types of "resources", for instance one dominating industry that is the main income source of the local population.

In the Mekong region, most of these players are relevant. However, the national priorities and local livelihood needs can be considered to be more fundamental than the others and are thus put in the center of the analysis (see Figure 1). The other interests that play a role in the Mekong area, but affect the situation more indirectly, are placed in the outer circle.

Figure 1 illustrates the nexus of key interests and agendas in relation to development decisions. It is not difficult to imagine that social conflict could easily arise within any region. To achieve the opposite – social consensus – high value agreement is required. The term value in this context refers to the set of underlying factors that, taken together, cause people to form their interests in the development arena. These factors, or values, can range from ethical principles, to characteristics of consequences that matter to, priorities (Keeney, 1992). If the various interest groups share the same value-base and agree on the value of one alternative as compared to another, there is high value agreement, and the possibility of reaching consensus is accordingly high.

Figure 1. Key players and factors in regional development decisions



Gender analysis

Power is commonly unbalanced between men and women, which risks resulting in distorted policies. A number of environmental trends have an impact on women's lives in particular. Women are usually disproportionately affected because they are more dependent on natural resources in order to carry out their farm and household activities (Kirjavainen, 1999). The majority of poor women in developing countries are engaged in farming and related enterprises such as animal husbandry and fishing with critical dependence on the availability and quality of natural resources such as land, water, and forests (Mehra, 1993). Women also tend to have less access than men to formal decision-making authorities and be less involved in local decision-making structures (Woroniuk and Schalkwyk, 1998).

An analysis of the natural resource use and the impacts that development has on the natural resource base that lacks the dimension of gender differences risks being incomplete. Hence, development interventions (implemented by the government or any other actor) will be more effective if they are based on an understanding of: i) the location- and time-specific gendered nature of environmental use and

management, and ii) the importance of ensuring an environmentally aware gender perspective (Guijt, 1997).

Applying the framework to the knowledge base analysis is the next step. The following section introduces the type of questions one can use to establish whether the knowledge base is uncertain or not.

2.1.3 The knowledge base

The vertical axis in Table 1 describes the context in terms of the knowledge around the analyzed issue, its systems linkages and characteristics, the uncertainties and the predictability inherent in the issue. Before the framework introduced above can reveal anything about uncertainties in the knowledge base, that base needs to be dissected and analyzed. To do this, each sector's link to sustainable development is explored. The following questions help pinpoint the most important pieces of information necessary to the issue in question and relate to the relative robustness of the knowledge base. They are posed in the analysis of the knowledge base in relation to each of the natural resource issues that are relevant for the Mekong region.

⇒ What are the current patterns of natural resource management and use?

- Are there data that illustrate: i) state and usage trends of natural resources and ii) main linkages between natural resources and sustainable development?
- What do we know about the root causes and driving forces behind resource degradation?

⇒ Is the use of natural resources sustainable?

- Does it exceed the carrying capacity (Box 2)?
- What are the main environmental and natural resource hotspots (in terms of major threats of exhaustion or degradation)?
- What potentials still exist in the region to further utilize the natural resource base in a sustainable manner to achieve better development outcomes?

⇒ What is the level of scientific consensus?

- Is there consensus about how to analyze the issues?
- Is there consensus about the existence and nature of the linkages, and the causes behind the trends, or do different groups convey different messages about the state of a natural resource and its potential to serve as a base for a sustainable development?

⇒ Are there omissions from the analysis that are important for decisions (for example possible harms, management options, or effects), and are interested and affected parties likely to consider these omissions seriously?

The knowledge base can be characterized as being uncertain if the system to be analyzed (the nexus of natural resource and development outcomes in the case of the Mekong region) is a complex and interactive system, if it is in constant change, if uncertainties are inherent in it (for example, due to a large international market influence), or if there is incomplete knowledge.

Box 2. Carrying capacity

"Carrying capacity sets the limit or threshold to which natural resources can be used on a sustainable basis with a given level of management inputs. Where this limit is exceeded through "over-population" or other forms of human "over-exploitation," degradation occurs and the carrying capacity may be further reduced."

Source: Grimble, 1996

Some comments on key driving forces

Many of trends in development and natural resource use are fundamentally driven and changed by persistent and dominant macro trends, usually taken to include population growth and migration, poverty, economic growth, integration of markets, political change, and technology (Raskin, Gallopin et al., 1998).

Economic growth is a key engine behind, and primary objective of, every country's development effort. It implies steady increases in physical assets, human capital formation, infrastructure and production. It provides rising incomes for households, increases enterprise profits, and provides government revenues. The country's capacity to avoid foreign debts is also improved with economic growth.

Economic growth, as a driving force behind natural resource use, is multi-faceted. First, it has direct effects, such as an increased demand on natural resources with increased incomes.

Economic growth can also have indirect effects on natural resource use, including effects on poverty outcomes and population growth. The World Bank (2001) notes that growth has been an important source of poverty reduction, and that as countries become richer, fertility declines. Both of these trends are likely to reduce the pressure on the natural resource base (see further discussions below). In general, however, the linkages between economic growth and the environment are too many and too complex to be adequately represented in an aggregate form (Munasinghe and Cruz, 1995) (Kågeson, 1997). Instead, attention should be given to the components of growth and the technologies involved (Statens, Offentliga, Utredningar, 2001: 2). This would include, for instance, whether the growth is based on an unsustainable outtake of natural resources.

Resource dependence is an important development concern. Countries generously endowed with natural resources would then intuitively seem to have an advantage in development. Yet, empirical evidence actually point to the opposite (Vincent and Ali, 1997). In a global study, Sachs and Warner (1995) found that resource dependence is negatively correlated to economic growth. Economies with abundant natural resources have tended to grow less rapidly than natural resource-scarce economies.[5] Box 3 discusses two indicators that can be used to illustrate a country's natural resource dependence.

Box 3. Assessing natural resource dependence

A more detailed examination of the resource dependence of the country can be seen in the World Bank's analytical framework on *Wealth Estimates* and *Genuine Savings* (Kunte, Hamilton et al., 1998). The *Wealth Estimate* indicator measures the stock of assets of a country in terms of natural capital, produced assets and human resources. Through monetary valuation of a set of natural resources, the natural capital can be quantified in the same terms as the other types of capital. Hence, an indication of the natural resource endowment in relation to the economy as a whole, and in relation to other countries, is shown. Building on the same concept, the *Genuine Savings* indicator measures the "true" rate of savings in an economy after taking into account depletion of natural resources and damage caused by pollution. Through the creation of savings and man-made investment in return for depleted natural resources, conventional economics state that sustainable development can be achieved. As long as the rents from the degraded natural resource base are captured for re-investments in human resources or productive assets, rather than consumption, the country has positive genuine savings, and hence is considered sustainable. The underlying assumption is that it is allowable to have substitution between natural capital and man-made capital. This has been criticized widely among environmentalists and more recently in ecological economics. It is frequently referred to as "weak sustainability", as opposed to "strong sustainability", where substitution is not allowed.

When discussing *economic integration*, one distinguishes between modest integration and deep integration. Modest integration comprises arrangements among nations for economic transactions and activities across borders. Deep integration includes the formation of a customs union, in which tariffs among countries are abolished, or the establishment of a single market, with movement of capital, labour, and goods, like the European Union (EU) (Kakazu, Tang et al., 1998).

Scientific evidence of the impacts on natural resources from economic integration is inconclusive. The analysis is complex and difficult since it depends on several mechanisms, such as legislation, pricing, and

[5] More precisely, the paper shows that economies with a high ratio of natural resource exports to GDP in 1971 tended to have low growth rates during the subsequent period 1971-89. This negative relationship held true even after controlling for variables found to be important for economic growth, such as initial per capita income, trade policy, government efficiency, investment rates, and other variables. This seemed valid both in developed and developing countries since the 1970s.

regulation. Depending on baseline assumptions and approaches, researchers may well come to opposite conclusions. The example of trade illustrates this complexity. Trade between countries is seen by many as a prerogative for increased welfare, which is considered necessary for investments in the environment to become possible. Trade is also considered by some people a way of making natural resource use more efficient (Sida, 1998). However, others argue that increasing production and transports, which commonly follow an increase in trade, result in environmental degradation and exhaustion (Reed, 1996).

Population growth is commonly depicted as the main driving force behind resource pressures. However, the evidence is not conclusive. Increasing populations obviously exert pressure on both social systems and natural resources, as the demand for goods and services increase. Population growth also increases the need for employment and livelihoods, which exerts additional direct pressure on natural resources. The nature of the livelihood systems and the practices employed are key determinants, however, and it is therefore impossible to make generic statements (World Bank, 1992).

The role that *poverty* plays as a driving force is as complex as the role of many of the other forces discussed in this paper. The most common theory with regard to poverty as a driving force to natural resource degradation is that poor people lack the means or incentives to intensify production, or to produce sustainably. According to Ekbom and Bojö (1999), however, little empirical evidence exists that poor people are the agents of environmental degradation. They even point to examples where the opposite is true, that is where for example long-term investments in water irrigation structures among poor people have been made. However, poverty does not only come into the picture of natural resource degradation as a driving force. The poor are also victims of environmental damage (World Bank, 1992; Bucknall, Kraus et al., 2000; Ekbom and Bojö, 1999). They are also to a large extent dependent on the surrounding resources, and commonly the surrounding natural resources, considering the lack of private resources (Sterner, 2000; Bucknall, Kraus et al., 2000).

Technological change is identified by many as a key driving force for alleviating the poverty-stricken countries while protecting the environment (Sachs, 2000). Technological change is a force that affects resource use and degradation patterns in many different ways. New farming practices develop, which might include nutrient recycling or the introduction of new species through biotechnology developments. Such changes have both important positive and important negative implications for the use of water, fertilizer, and pesticides.

Chapter 3 takes a general look at driving forces in the context of the Mekong region. However, while the trends in the region are discussed separately in Chapter 0, specific sector aspects are brought up and included in the sector analyses in Chapter 4.

2.2 Methodology and Tools

The underlying analyses (of the knowledge base and the socio-political context) have been performed in this study to a large extent through reviews of already existing literature and various databases. The sources used are authored by a varied group of research instances, including individual researchers, universities, research institutes, non-governmental organizations, governmental organizations, regional organizations, bilateral donor organizations, multi-lateral donor organizations, and international organizations. Indicators are used as a main tool for analysis (see below). There are, however, several other analytical means and tools that could be used in underlying analyses. Examples of such means and tools include interviews, case studies, surveys, scenario modeling, and workshops.

Such analyses may already exist in available literature. In such cases, the framework could be directly applied to those analyses. However, while systematic inventories of the natural resource base in the Mekong region have been performed, there is still a need for analyses that focus on the nexus of sustainable natural resource use and development outcomes, and on the socio-political contexts.

Indicators and data

Selected indicators have been used to highlight existing trends and inter-linkages, especially between the use of the natural resource base and sustainable development. The indicators used are specific for the issues discussed in this paper, as well as for the countries involved. This is explicitly mentioned because it

is a common mistake to believe that one can apply a universal set of indicators, which would be equally applicable in all cases. Experience tells us that such a set does not exist. Experience also tells us that a small set of well-chosen indicators tends to be the most effective approach. In order to arrive at that small set, a few selection criteria can be used: direct relevance to issues, clarity in design, realistic collection or development costs, high quality and reliability, and appropriate spatial and temporal scale.

However, depending on the purpose of the indicators, the analytical level for which they are to be used, and the existing context, not all of the above mentioned selection criteria may apply, or indicators may be selected based on different, often more pragmatic, criteria. For example, in this paper, indicators are mainly used to shed light on trends that are relatively well assessed. In that case, the indicators do not need to establish causal relationships, but rather to indicate possibilities and obstacles in achieving priorities. As such, they are not meant to indicate an impact of an activity, which makes the selection criteria of appropriate spatial and temporal scale less relevant than otherwise. All of the other criteria are, however, still of importance. The analytical level and the context, in which the indicators are used, imply, in this case, that only indicators for which data already exist have been selected. The pragmatic selection criterion "available data" is often used when the analysis is carried out at a level higher than the local. The main reason for this is the cost of data collection, which often is significantly higher at a national level than at a project level. Furthermore, the context of this paper, a desk study made during a relatively short time span, made collection of new data infeasible. This almost always means that the use of proxies is a necessity.

Box 4. Indicator quality and reliability—the example of biodiversity

It can be very difficult to assess data and indicators without both quality control and knowledge about the area studied. While the World Bank (2000) reports that Laos did not have any protected areas at all in 1996, Paine, Byron et al. (1997) put Laos in third place in the region with only Cambodia and Thailand above it. This is, unfortunately, not the only problem with data on protected areas. In general, it is very difficult to find indicators for biodiversity. The first reason for this is that it is difficult to know what kind of biodiversity a country has in general. For example, the number of birds and mammals in a country may be fairly well known, but an accurate count of plants is not as easily achieved. A commonly used indicator such as "number of threatened species" is therefore not always very reliable.

A second reason for the difficulties in selecting biodiversity indicators is that available data show quantity rather than quality. This is certainly the case with the indicator used above—protected areas. There are, above all, two quality issues that come into play: i) the area protected may not be very rich in biodiversity, so that a country may have a lot of protected land while its biodiversity is still suffering; and ii) just because an area is protected on paper does not guarantee that the protection is in force. This problem is commonly called the problem of "paper parks"—parks that exist on paper, but not in reality. Despite these problems with the indicator of protected areas, it is commonly used as the best available proxy of biodiversity. The fact that a country has created a number of protected areas is commonly seen as a certain commitment, which is perhaps the first step towards preserving biodiversity in a country—a decision that can be the reason for several conflicts.

While indicators have the potential of being a powerful tool in highlighting trends, as well as opportunities to improve those trends, environmental indicators especially still have many "teething problems" due to their relative infancy. Indicators should therefore be used with care and reflection of what they demonstrate and indicate. The example of biodiversity indicators illustrates several problems that currently exist with environmental indicators. This is discussed in Box 4.

2.3 Suggestions for Further Analysis

The discussion in this paper is theoretically possible to push further ahead if the processes and structural aspects that lie behind the setting of the agendas were to be further analyzed. Such analysis could contribute to the formulation of recommendations on how to change the current socio-political context to one of a more widespread social agreement. Power structures, complex realities, research findings, gender (in)equalities, and the inherently unstable nature of political processes belong to those processes

and structural aspects that explain the game behind the importance of various players in the developmental processes. An analysis of these structures and processes would be highly relevant for the Mekong region as well. Unfortunately, information on this is scarce and such an analysis has therefore not been included in the following chapters.

2.3.1 Understanding power structures

There are several structural aspects that lie behind the setting of the agenda. One aspect that can be of special significance for the understanding of how decision-making in a region is organized—especially in situations of social conflict—is power structures. It is becoming more and more common to analyze those structures in order to better know where and how to focus efforts that aim to change current behaviors, values, and manners.

"Power structure analysis" can be performed using a variety of tools. An understanding of whose interests dominate the decision-making scene is central. To study the decision-making process and means of communication and dialogue within a society is therefore imperative. However, there may be certain parts of the power structure that are more "informal" and thus difficult to identify and understand only using available written information. In such cases, more informal sources, such as experience collected while working within various organizations, could be indispensable.

If the power structure turns out to be unbalanced, increased transparency, accountability, and participation will be three ways of correcting the situation so that a more just, or at least all-inclusive, decision-making system can be achieved.

2.3.2 Processes behind the agenda setting

Apart from the power structures, there are a number of processes that influence the agendas of the different actors. Kingdon (1995) discusses three kinds of processes by which agendas are set and alternatives specified—problems, policies, and politics:

a) *Problems* can potentially influence anybody's agenda. In the case of the local population, an occurring problem (for example, a reduction in fish catches) is likely to trigger the interest to affect the current situation, and thus their agenda is set. It is equally easy to see how a problem would affect the agenda of a national decision-maker—for example, if energy supplies became insufficient, the agenda at the national level is likely to become focused on such aspects as hydropower expansion;
b) *A gradual accumulation of knowledge and perspectives in a given policy area* is another process affecting agendas. The knowledge may be contributed to the different groups of society by different people, for example, academics or specialists in a certain policy area may be those influencing national decision-makers, while local NGOs or representative organizations may contribute with additional knowledge to local interest groups; and
c) *Political processes* such as swings of national mood, vagaries of public opinion, election results, and changes of administration are especially powerful as agenda setters for the interest groups that are politically vulnerable, for example national decision-makers. For this process, the local interest groups may not be as affected but they play no less a role in it—without their involvement, the political processes will not be as important in setting the agenda of the other interest groups. Hence, political processes play an important role in the socio-cultural context, functioning as a basis for social consensus or conflict.

2.3.3 Exploring the incentive structures behind resource use

In addition to the focus of this paper, a deeper analysis of the root causes and incentive structures behind resource use is much needed to understand the natural resources and development context in the region. It would be an important input for building up effective institutions. Such analyses would need to go into why the patterns of decision-making and natural resource use look like they do: for example, what are the main forces and incentive structures that lie behind resource use decisions of the different actors? What of the current situation needs to be changed in order to achieve sustainable development; and what recommendations can be proposed for achieving the changes?

Incentive structures are often depicted in a mainstream economic conceptual framework, outlining problems in the system for explaining resource degradation along categories of market failures, policy failures, and institutional/governance failures, or some combination of these.

Market failures refer to the inability of market prices, under certain conditions, to reflect accurately the value of environmental goods or services (Dixon, Fallon Scura et al., 1996; Tietenberg, 1996). They thus include issues of externalities, open access to resources, imperfect information, and monopolies. Several of these market failures lead to environmental and resource degradation, especially the first three—externalities, nonexistent property rights, and lack of information.

Externalities refer to a situation where the affected individual is separated from the source of the effects (IISD, 2001). One example is the resource user who maximizes private benefits, while the cost of the usage, such as downstream pollution or siltation, is borne by other users. *Nonexistent property rights* for certain goods or services, so called open-access resources or public goods, commonly lead to overexploitation due to the lack of market value. This is popularly called "the tragedy of the commons." The third market failure affecting the natural resource base is *lack of information*, which also leads to incorrect pricing since it risks giving the impression that a resource is abundant, resulting in an under-pricing of the resource (IISD, 2001).

Comprehensive economic analyses, that, for example, address the watershed as a system, do therefore inform decision-makers at the regional level about the true economic benefits (or costs) of various resource development schemes. The mainstream economic response is then to develop policies that give price signals, which include social costs, to users, "forcing" them to take those costs into account in their productivity calculations and thereby to maximize social welfare. Economy-wide policies can be very powerful since they do not necessarily rely on institutions and organizational constraints.

Policy failures refer to instances when government policies have unintended, perverse side effects, or cause resource-use behavior inappropriate from a societal perspective (Dixon, Fallon, Scura et al., 1996). Thus, they are also guilty of under-pricing. Common policy failures include subsidies for certain inputs. This risks resulting in an overuse of environmentally harmful products (for example, subsidized pesticides), or in a distorted impression of the (non)scarcity of a resource (for example, land in the case of a subsidy to land conversion) (IISD, 2001).

A third category of failures is institutional and governance failures. *Institutional failures* typically include aspects such as a lack of appropriate sector policies and monitoring, inadequacies in institutional mechanisms, and weak capacity (see Box 5 for an introduction to inadequate resource rents—a typical institutional failure). Frequently, the impact from inadequate markets and policies is aggravated by inadequate institutional or governance mechanisms. Even if adequate policies are in place, a common institutional failure is the lack of capacity in government agencies to implement the policies. *Governance failures* are tightly linked to, and some times included in, institutional failures and consist of a lack of transparency and accountability, and an unbalanced distribution of rights and responsibilities. These types of failures have gained increasing attention in recent times, emphasizing the quality of governmental services and the participation in decision-making from actors and stakeholders in society.

Box 5. Inadequate resource rents

In the natural resource sector, a common institutional failure is the inadequate application of resource rent fees from business actors. This argument is particularly pertinent in the forestry sector, but the economic argument also applies, in principle, to water and other natural resources.

The extraction of natural resources usually earns the producer a return that is higher than the opportunity cost of labor and capital used to exploit them. This return is called the resource rent (Vincent and Ali, 1997). This is an economic surplus, which should be used by the country to finance development, investment, or consumption. The rents in the forestry sector are typically collected through stumpage fees that the producer pays as a resource tax. Stumpage fees should reflect the resource rents. If not, when this fee is set too low, the producer has an incentive to over-extract the resource, above the economically and environmentally efficient optimum. This will induce deforestation and might impoverish forest-dependent communities. This problem is reinforced by weak institutions for collecting taxes and stumpage fees, and may get worse by short-term pressures to obtain income.

In the Mekong region, fees have been consistently well below what would be justified from resource rents. They should be adjusted upwards in many parts of the region. Increasing these fees would enable the governments to capture a reasonable share of the income generated by logging, mining, and other natural resource-related activities. But most important is that it would establish a more appropriate structure of user incentives for determining the rate of extraction, hence limiting such problems as deforestation significantly.

3. Transformation of the Region: Driving Forces and the Resource Base

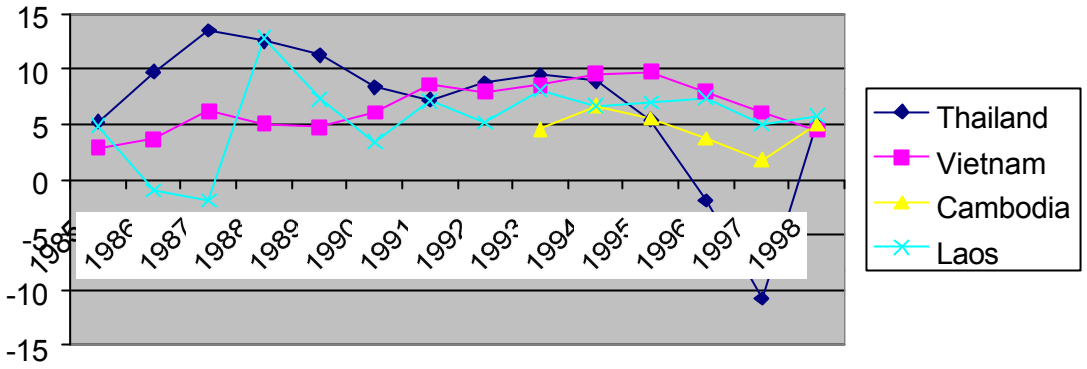
Driving forces, while not inevitably persistent, typically play an overriding role in determining patterns of natural resource use and degradation and they certainly condition the initial direction of economic, social, and environmental change. Frequently however, very little is known about exactly how the driving forces affect natural resources. This chapter will discuss what we do know about three of the major driving force phenomena of economic growth, integration, and population growth, and how they affect the natural resource use at the macro level in the context of the Mekong region. This way, the state of this knowledge base can be assessed. Specific linkages between the driving forces and different sectors will be discussed separately in the sector discussions in Chapter 4.

3.1 Economic Growth

Economic growth in the region is rapid, although the countries vary a great deal in economic development[6]. Southeast Asia, in general, enjoyed high economic growth rates in the early to mid 1990s (Figure 2). In 1997, the economic crisis struck, and growth rates became negative in many part of Asia. In light of the crisis many foresaw a slow recovery. However, in late 1999, it was evident that the region would recover more quickly than anticipated. Growth rates are expected to be 6-9% over the coming years (Asian Development Bank, 1999).

[6] Economic growth rates are usually measured as Gross National Product (GNP) in the national currency converted to US dollars by the exchange rate. An alternative measure is the GNP adjusted for Purchasing Power Parity (GNP PPP), which is measured on the basis of local prices for a number of products. GNP PPP is intended to measure actual living standards.

Figure 2. GNP per capita, PPP



Source: Asian Development Bank, 2000

Still, poverty persists throughout the Mekong region's urban and rural areas; particularly the many parts of the uplands face high levels of poverty. In the region, pervasive rural poverty is taken by many to be the single most critical failure of government policy. Therefore, the pursuit of economic growth is usually a prime objective of all governments. But there are questions related to the impacts of economic growth on equitable and sustainable use of environmental resources.

3.1.1 Dependence on natural resources

The Mekong region has had large endowments of natural resources and has relied heavily on the export of natural resources in order to obtain income to import capital and goods. As a result, the Mekong region displays a high degree of dependence on the natural resource base.

Table 2 shows the origins of GNP in 1997 in the six countries and compared to averages for low-, mid-, and high-income countries around the world. "Agriculture" includes agricultural and livestock production, logging, forestry, fishing, and hunting, and is therefore a good proxy for the whole range of land and water resources that we are concerned with. As can be seen in the table, compared even to other poor countries, there is high resource dependence in Cambodia, Laos, and Myanmar. In the table, on Thailand is considered to belong to the Mid Income category.

Table 2. Origins of GNP in 1997 (in % and US$)

	Agriculture	Industry	Manufact.	Service	GNP/Capita
Regional:					
Cambodia	51	15	6	34	282
Laos	52	21	16	26	357
Myanmar	59	10	7	31	172
Thailand	11	40	29	49	2543
Vietnam	26	31		43	330
Yunnan	19	49	37	32	479
World Avg:					
Low Income	28	28	18	43	350
Mid Income	11	37	24	52	1890
High Income	2	31	21	63	25890

Source: Asian Development Bank, 1999; World Bank, 1999

It is worth to notice the high share of the service sector in Thailand, which is largely attributed to the ever-expanding tourism industry, which, for its long-term survival depends on conservation measures and sustainable management of natural resources.

The natural resource base has traditionally been seen by national governments and aid agencies alike as one of the prime assets for development and poverty reduction. "Resource-based growth" is the common term for such strategies (Martinussen, 1999), which typically include cash-crop development, expansion of irrigated agriculture through groundwater pumping, reservoir development and water diversion, timber plantations and timber logging. In an influential and highly debated essay "The Myth of Asia's Miracle" (Krugman, 1994) asserted that in the long run, growth can be achieved only through productivity increases, for instance through improving technology and a more effective work organization. Many of Asia's economies grow by expansion of inputs, such as natural resources and labour forces, rather than by productivity gains. This, he argues, is not sustainable in the long run.

The regional context gives fairly clear support to the negative correlation between natural resource dependence and development. The reasons for the negative relationship between resource dependence and growth are not entirely clear, but by studying the cross-country effects of resource endowments on trade policy, bureaucratic efficiency and other determinants of growth, Sachs offers two explanations: 1) the "Dutch Disease" theory and 2) political economy theory (Sachs, 1996).

The "Dutch Disease" theory states that when an economy derives much of its income from natural resource extraction, and depletion is not accounted for, the measurements of national income, savings and investments, and fiscal balance will be exaggerated and the currency overvalued. This will boost natural resource sectors at the expense of other sectors such as manufacturing sectors, with higher value added potential and higher employment opportunities. The Dutch disease has generally a detrimental impact on general development. However, if extracted resources can be processed adding value and employment in the country, the Dutch disease is no longer a problem.

The political economy explanation, in short, is that resource-endowed countries as a rule have had worse economic policies, including more extreme rent-seeking behaviour. Competing fractions of governments and other power centres fight for the natural resource rents and end up inefficiently exhausting the resources. Exploitation of resources for export is important in poorer countries that are rich in resources, such as Cambodia and Laos. These countries also have demonstrated more extreme rent-seeking behavior than the other countries in the region. Countries of higher income often contribute to a regional demand for resources that, in the case of Thailand and Yunnan province of China, is also due to relative national scarcities (Sachs, 1996).

3.1.2 Implications of growth on the natural environment

Economic growth is believed to have some adverse effects since increasing incomes lead to a higher "physical" demand for products including resource-based products, and hence a higher pressure on the environment. In the Mekong region this has clearly occurred, as the combination of growth with the opening of cross-border trade, has caused accelerated depletion of both timber and non-wood forest products. Indirectly, increasing income and population also have effects on water demand for various uses. On the other hand, economic growth has many positive effects on the environment, or rather on society's ability to manage the environment. Global studies have demonstrated that growth provides the resources and technology necessary to mitigate and prevent environmental problems.

In the region, Thailand has experienced the most serious resource degradation, but it has also succeeded in establishing an economic growth process that has raised the income of the majority of the population. In contrast, Laos and Cambodia frequently see the rents from their natural resource base being captured by companies outside the country. This is also an effect of the turbulent and disconcerting political history of these countries.

The economic crisis

By studying the economic crisis of 1996-1998, we might be able to say something about the relationship between economic growth and the natural environment in the Mekong region. How did the economic

recession impact on the patterns of natural resource use? The crisis affected different countries in the region in different ways. In Thailand, the high level of integration with global markets induced a greater effect than in the other countries. In Vietnam, which was less exposed, the currency effect was marginal. Laos did suffer heavy impacts due to the extreme reliance on Thai economic activities.

The immediate effects of the crisis on the environment seem to have been beneficial to the environment. Industrial activities and traffic volumes declined. World market prices for timber and other resources collapsed, resulting in decreased extraction rates and increasing the relative returns on postponing production into the future. The feasibility of hydropower development projects was reassessed as developments became less attractive from the investor's viewpoint.

However, there are concerns that the long-term effect of the crisis has been an increased pressure on natural resources. At the livelihood level, marginalized urban residents, unable to find income opportunities in the cities, may turn back to the countryside, hence increasing the stress on land and water resources. The mismanagement of natural resources will then likely be exacerbated. However, the impacts of the crisis on urban-rural migration patterns, which in turn would be expected to cause environmental pressures, are not totally clear. Estimates of a migration from Bangkok to rural Thailand were put forward to show a strong trend of ever-increasing resource pressure in the upland villages as a consequence of the economic crisis. But the estimates failed to account for the complex background of seasonal and repeated migration patterns. Under normal circumstances, Bangkok's population fluctuates by 800,000 people from dry to wet season. Therefore, in all likelihood, the migratory impacts of the economic crisis tended to be overestimated (McAuliffe, 1999).

The impacts of the crisis on rural communities were complex and difficult to distinguish. A study in the Ratchathani Province in Northeast Thailand showed that the crisis induced a shift from export-oriented mono-crops to alternative agriculture. This, in combination with high increases in the cost of agricultural inputs (many of which being imported and subsequently much more expensive in Thai currency), led to less expenditure on agricultural input, increased integration with local markets, increased production for home consumption, and less price volatility.

At the macroeconomic level, an important factor in an economic crisis is the restricted access to foreign capital. The imperative of maintaining macroeconomic stability means that one either has to cut the level of investment or increase the rate of natural resource extraction. A permanent shift downwards in exchange rates also typically increases the competitiveness of marketing primary resources. The economy may then shift to rely more heavily on primary production for exports and income, which inflicts additional pressure on the resource base. Currency devaluations are, for instance, likely to accelerate the forest extraction in order to realize the immediate values (Vincent and Ali, 1997). So far this effect was overrun by the demand slump among the most important importers. Therefore, the currency devaluation did not lead to increased extraction.

All in all, the picture is still ambiguous. It is however clear that the environmental improvements resulting from the regional crisis are short-term and have long-term costs associated with them, environmental as well as social.

3.2 Economic Integration

Throughout the region, national governments, the private sector, and development agencies constitute a strong force pushing for increased economic integration (Abonyi and Pante, 1997). Regional economic and political integration is generally associated with improved conditions for growth (Cambodia Development Resource Institute, 1998), but it also has implications for the environment.

In the Mekong region, economic integration occurs in parallel with an increased political cooperation, although a political integration, such as in the EU, is rather distant. The differences between the economic and political systems are still very far apart, with two highly centralized planning economies (Laos and Vietnam) and two highly market-oriented economies (Thailand and Cambodia). Therefore, integration in the region is characterised primarily by trade liberalization, market expansion through infrastructure investments, and a relatively modest political cooperation.

Trade within the region, as well as with other countries, has both increased and diversified in recent years. The private sector is a strong driver behind this, and the process has primarily been driven by the strategic decisions of firms. In later years, this market-based integration has been followed by official agreements for regional cooperation, supported by government institutions that encourage private investment and trade, such as the AFTA agreement of the ASEAN, and the GMS programme of the Asian Development Bank. Today, market-oriented reforms as well as the strengthening of the ties between countries are strong trends in the Mekong region, and the speed of transformation is notable. The economic integration has also induced a rapid expansion of unofficial trade, which sometimes is estimated to be higher than the official trade.

At the global level, the linkages between economic integration and growth are reasonably clear. Empirical data have shown that liberal trade regimes boost growth and development. Also governance practices seem to be influenced by trade regimes. Empirical data suggest that an open and simple trade policy seems to impose a certain discipline among officials that in turn leads to good governance among public officials as well as in the private sector. The linkages between trade liberalization and equity issues, such as the impact on income distribution, are less clear (Bussolo and Solignac, 1999)

In the context of the Mekong region, the impact on trade flows and economic activities from the formal integration arrangements in the region cannot yet be estimated. Cambodia only joined ASEAN in 1999, Laos and Myanmar in 1997, and Vietnam in 1995. The ADB-GMS programme was established in the early 1990s. The regional economic crisis abruptly changed trends of trade and growth. Therefore it is difficult to draw any conclusions. However, it is widely anticipated, and also a shared political vision, that the region as a whole will experience an increased economic integration both regionally and globally.

Expanding markets is an integral part of economic integration, and an explicit objective of many development agencies. It is supported primarily by infrastructure development and investment. Current and planned investments in infrastructure will continue to expand markets into remote areas in the uplands of Laos, Cambodia, and Vietnam, which will have wide-ranging consequences on resource use and access.

3.2.1 Implication for natural resources and livelihoods

Economic integration works through many mechanisms. Market expansion has transformed the access and use of resources throughout the region and most markedly in the uplands. This has been the situation in Thailand for many years, and more recently in Vietnam, Laos, and Cambodia. In Vietnam, new market opportunities have resulted in people from lowland areas moving into the uplands in order to develop cash-crop plantations, such as coffee. This movement, with governmental support, increases the pressure for, and competition over, land. Meanwhile, it is clear that the alarming deforestation trends in Laos and Cambodia in recent years are a direct result of the market access for foreign firms. The role of the private sector in logging and the effects of agro-industries such as coffee, rubber, and silk need to be further studied.

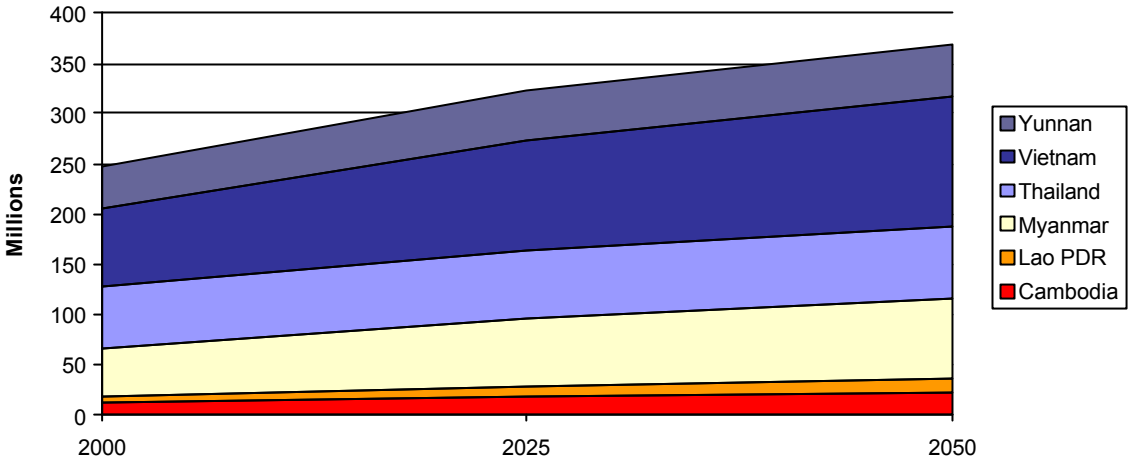
Questions have also been raised about how regional integration affects livelihoods and the environment in countries that are poorly integrated and internally fragmented, such as Cambodia and Laos. There is a concern that regional integration will only strengthen the link between the capitals and the neighbors, and that the rural majorities will be left aside. Also, there is a concern that weak economies, such as Cambodia and Laos, will increase their output by fostering unsustainable economic activities, through building upon comparative advantages based on natural resource exploitation, cheap labour, and weak legislation (Cambodia Development Resource Institute, 2000).

Poor people need to be a part of the market in order to benefit from it. For people outside the systems, the likely personal benefits are not easily predicted. Although in the long run, it is likely that economic integration benefits the poor, short-term and local effects might be very severe because of changes in input and output prices, loss of income opportunities, and increased risks to the livelihood from switching from subsistence to market-oriented production.

3.3 Demographic Trends

The population of the Mekong region is 240 million, with 65.7 million of these people living within the hydrological basin of the Mekong River. Population growth is rapid and will likely continue in Laos, Cambodia, Vietnam and Burma (see Figure 3).

Figure 3. Regional population projection



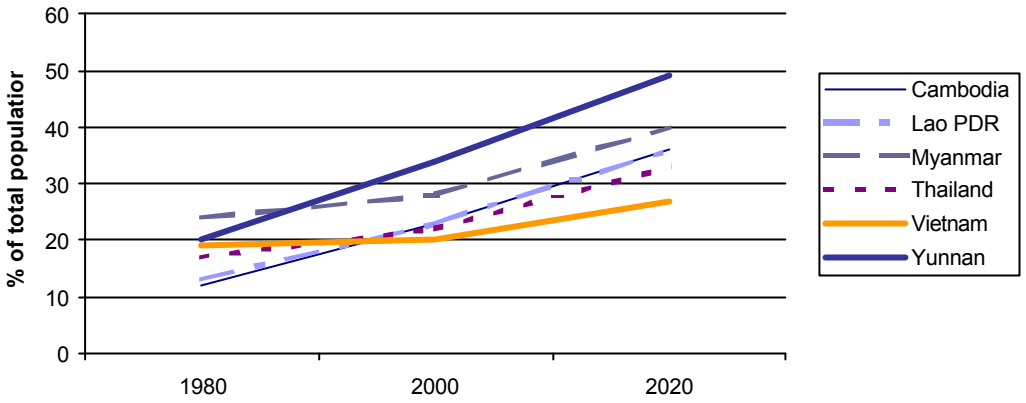
Source: World Resources Institute, 1998; Asian Development Bank, 1999

The regional population growth rate averages at approximately two percent, although there are marked variations, such as in some of the upland areas of Laos and Vietnam, where higher rates are not uncommon. The region also has an enormously wide range of different population densities. Laos, for example, has only 19 people per square kilometer, while Vietnam ranges from 300-500 people per square kilometer (Asian Development Bank, 2000).

The demographic transition in the region involves radical changes in the region's age structure as a consequence of improved health arrangements and declining mortality rates. The countries that are the poorest are in the earliest stages of this transition, and hence have a larger share of young people. In Laos and Cambodia, it is estimated that more than half of the population is under the age of fifteen (Öjendal, 2000). Vietnam stands out by having an unusual combination of low economic development and a high proportion of elderly people (Nordic Institute of Asian Studies, 1998).

The region's population is overwhelmingly rural. It is estimated that 80 percent of the basin's population lives in rural areas, basing their livelihoods on direct use of the region's relative natural wealth. It is difficult to foresee urbanization trends in the future. The World Resources Institute (1998) estimates that in 2020, 60-70% of the population will still live in rural areas (see Figure 4). However, the Nordic Institute of Asian Studies (1998) foresees a dramatic urbanization in the following years, as a consequence of economic growth, as this process seems to have lagged in the region compared to other countries in Asia.

Figure 4. Urban population projection



Source: World Resources Institute, 1998

The Mekong region is characterized by immense population diversity. The uplands are particularly complex in this regard. In Laos, there are as many as 68 ethnic groups comprising almost half of the population. But ethnicity is not a function of nationality. Almost one million ethnic Khmers live in the Delta region of Vietnam (McElwee and Horowitz, 1999), while there are more ethnic Lao in Thailand than there are within the borders of Laos. Livelihood systems have evolved over time in response to, for example: the hydrological regime, starkly contrasted geographic settings, extreme political events, and uneven access to resources. Although many communities are heavily dependent upon certain activities, in most cases, rural livelihood systems are a complex combination of several activities that contribute towards security.

3.3.1 Population and natural resources

Subsistence agricultural production and other resource-based activities are key activities for the livelihoods of the majority of the rural population, and this is not likely to change. As a consequence, intensification of agriculture and expansion of agricultural land will be important trends. Population growth in the region has been shown to lead to agricultural expansion that has increased the pressure for conversion of forestland into agricultural land. It also has caused higher pressure on forests through increased fuel wood demands. In supporting an increasing population, the carrying capacity of the resource base in many places has been exceeded and degradation has been the inevitable consequence. In general, the uplands have a low carrying capacity compared to lowland agro-ecological systems, and the response to an intensified cultivation is frequently rapid degradation or collapse of the ecosystem (Donovan, Rambo et al., 1997).

Hence, a largely rural population puts significant pressure on the natural resource base. It is not clear if the alternative, having urban populations, would mean lower pressure on resources, since income is higher among urban populations and therefore, the demand for products is higher. The mobility of rural populations, whether it is a result of migration, resettlement or domestic strife, has intensified competition for increasingly scarce resources. The social and political means of managing this competition and mediating conflict between mobile communities are not developed. Governments often place upland forest farmers practicing shifting cultivation in this category, but in fact there are other important factors driving local level resource conflict. For example, the New Economic Zones policy in Vietnam has transferred a large number of lowlanders into upland areas deemed to be under-populated areas of economic growth potential.

3.4 What Do We Know about Driving Forces?

The knowledge base regarding how driving force phenomena are transforming the region and affecting the natural resource base and sustainable development is inherently weak. There is reasonably good basic data for standard factors such as economic growth and population growth, but basic data on population migration patterns are weak and so is data, so far, on economic integration.

At the next level, the linkages between factors such as economic growth and integration and the natural resources are not well understood, neither in the region nor elsewhere in the world. There are counteracting trends and forces that make any assessment on environmental and social considerations extremely difficult. The components and results of growth determine the resource implications in unpredictable ways. The linkages between population growth and the resource base are somewhat clearer, but the diversity and movements of the populations in various rural contexts complicate the issue.

This Chapter has addressed the macro-level linkages between development and natural resource use in the Mekong region. In the next Chapter, linkages for each of five issue areas will be discussed. In that context, some comments on the specific connection between the issue area and the driving forces will be made.

4. Five Areas of Resource Use and Development

In this section, we have identified five key issue areas of natural resources and development in the region. This grouping of issues is far from the only possibility, but it is felt that such a presentation of the issues could shed new light on the linkages and challenges that emerge from the discussion, from a truly integrated environment and development perspective.

4.1 Securing and Developing Agricultural Production

Agriculture is arguably the most prominent and most critical of the natural resource sectors in the Mekong region. Underlying issues of large populations and scarce lands put agricultural productivity increases high on every government's agenda.

4.1.1 Socio-political aspects: national priorities and local livelihoods

Agriculture is key in all national development strategies. Self-sufficiency in basic food production is an explicit development goal for Laos and Cambodia. In Cambodia, agriculture is abundant but productivity is low and agricultural strategies for self-sufficiency in rice production are a key priority. Also in Vietnam, the promotion of agriculture and rural development are explicitly raised as key objectives for the government (IMF, 1999), although self-sufficiency in rice production was achieved a few years ago. The means to achieve this include continuing to raise agricultural productivity and creating off-farm employment. In Thailand, rural industrialization and rural agricultural improvement (through irrigation) have become priority areas for national development.

To increase productivity on already cleared land, the use of inputs, such as water and agro-chemicals, needs to change. While an explicit strategy for agro-chemical use is uncommon, many countries have priorities and strategies for water use. The following section, which dissects the knowledge base on the linkages between agriculture activities and sustainable development, discusses the extent to which irrigation systems and agro-chemicals are used. In addition, it discusses water availability, a necessary precondition for all agriculture.

There are important plans and demand for water diversion and irrigation schemes throughout the region. Diversion schemes divert flows from the river into either reservoirs or to direct irrigation structures. Also, inter-basin transfers of water are being discussed. Thailand has suggested diverting Mekong water to supplement the flow in the Chao Phrya Basin, eventually aiming to reduce conflicts in water uses between upstream and downstream users and increasing water supply to Bangkok. As a consequence of Thailand's plans to divert water from the Mekong and Mae Kong rivers, regional conflicts have arisen. Although the region as a whole is well endowed with water resources, there are serious spatial and temporal variations that cause shortages. Allocation mechanisms are needed and are presently discussed under the MRC's Water Utilization Program (Mekong River Commission, 2000).

While all of these interests are at a national level, parts of the local population within each country are, in this case, likely to agree with their national governments. The population distribution between rural and urban areas (see Figure 4) indicates that a majority uses the land as a source of food and income. The indicator depicted in Table 2, "Origins of GNP," confirms this. This indicator shows that the majority of

the population is dependent on the agricultural sector for its livelihood. Furthermore, we know that a large share of the agricultural production does not even show up in the GNP, since it does not enter the market economy.

This dependence is equally true from a gender perspective. Rural women are the main producers of the world's staple crops—rice, wheat, maize—which provide up to 90 percent of the rural poor's food intake (FAO, 2001). According to Kirjavainen (1999), between approximately 45 percent and 65 percent (depending on the country) of the farming population in the Mekong region are female. Women are also most often the collectors, users, and managers of water in the household, as well as farmers of irrigated and rain-fed crops (Women in Development Service, 2001).

Livestock production is another very important part of the agricultural sector. It is also an important economic opportunity to basic income generation for rural populations. In Laos, livestock production has been estimated at 21% of the GDP (1995) and with a high growth rate (Phonvisay, 1998). Livestock production can constitute a competition with other systems, as the grazing areas are in competition for land with other uses (Cheva-Isarakul, 1998). However, livestock production systems can be integrated with other agricultural and forestry systems. Integration of crops and livestock can mean a mutually reinforcing, not competing system (Simaraks, 1998). The design of adequate management systems becomes an important priority to make sure that the systems can be developed in harmony.

Agricultural activities do provide a risk of conflict between different communities, notably in view of growing population pressures. The pressure for *conversion* of agricultural land has been known to induce conflicts between various groups. This has been clearly demonstrated in the uplands of Vietnam and Thailand. Commonly, lowland people are settling further and further up the hills, sometimes with national support, to cultivate the land. As a result, the upland farmers that have practiced cultivation based on traditional systems and property rights are being pushed away. A recent example is the settlement of lowlanders in the Dak Lak Province of the Central Highlands in Vietnam, which has caused serious uprising and riots among upland people.

There are other local groups that risk being adversely affected by an *intensification* of the agricultural activities. One example is downstream fishermen whose livelihood risks being destroyed with increasing uses of agro-chemicals. There is also potential for conflict between irrigated agriculture and agriculture based on the seasonal flow regimes of the rivers. Irrigation priorities upstream might divert water and alter the flow regime for downstream communities. For Vietnam, the safeguarding of the hydrological regime of the Mekong River is essential for agricultural purposes. Almost the entire food production of Vietnam depends on the Mekong water flow. Vietnam as a country is very vulnerable to changes in the Mekong water flow and the key priority at the regional cooperation level becomes Mekong delta security. The management of the hydrological regime and the sectors that depend on it is essentially a complicated conflict of objectives for regional development.

4.1.2 Knowledge base: water, agrochemicals, and productivity

The pressure on land for agricultural purposes is high, both from intensified agricultural practices and from conversion of land. High rates of population growth and migration are drivers behind high demands on land and food production. Present land and water scarcities put a limit on the actual rural development in parts of the region. A continued expansion of agricultural activities therefore seems difficult to combine with a sustainable development path. However, with more detailed studies of the different countries and their potentials, the picture becomes more diversified.

Low productivity is a major impediment to development within the agricultural sector today. Table 3 shows a common indicator of productivity: *yield*. In this case, cereal yield is appropriate since rice is included in those data (all of the countries in the Mekong region grow rice on at least half of their arable land (FAO, 2000)). The numbers show that almost all of the countries have a cereal yield that is fairly average for the region (Cambodia and Vietnam are the exceptions with a cereal yield that is low and high respectively in comparison to the other countries). However, if a region such as the European Union (EU) is included in the comparison, it becomes clear that the East Asia and Pacific region as a whole lies relatively low on the yield scale, with cereal yield numbers that are half of those in the EU (see Table 3).

Table 3. Overall yield and rice crop area

Country	Cereal yield (kg/ha)		Rice cropped area as a share of total cropped area (%)
	1979-81	1996-98	1999
Cambodia	1.025	1.784	85
Laos	1.402	2.643	75
Myanmar	2.521	2.944	52
Thailand	1.911	2.466	57
Yunnan China			
Vietnam	2.049	3.754	63
Mekong region	2.116	2.729	
EU	4.035	5.673	

Source: World Bank, 2000; Dawe, 2000

As can be seen, productivity increases have been dramatic in many cases. Productivity within agricultural systems is commonly increased by intensified use of water and agro-chemicals. The next section will discuss in more detail the features of such intensification.

Water diversion and irrigation

Agriculture is by far the most important water user, accounting for 85-95% of water withdrawal in the region, also influencing quality through run-off and non-point sources, which are hard to follow. The attempts to become self-sufficient in rice production (Laos and Cambodia) and the endeavor to secure and increase rice export revenues (Thailand and Vietnam) require large amounts of water. Irrigation needs are the highest in Thailand. The potential for reservoir development is large since less than 50% of the potential has been developed in Mekong tributaries. In Thailand, current plans are to increase the paddy area from 500,000 to 800,000 ha. Dry-season irrigation is also an essential feature of agriculture in Yunnan. An increase in agricultural productivity could be part of the solution to both these issues, but whether such a development is sustainable or not cannot be determined with available information.

Water availability and freshwater withdrawals differ significantly between countries, as can be seen in Table 4. Thailand's and Vietnam's availability of freshwater for agricultural, industrial, or domestic uses is well below the world average and the other countries of the Mekong region. At the same time, they are using a much larger share of their water resources than the other countries. The same pattern of a relatively low availability and high usage can be observed in China, even though their usage has not decreased but increased. At the opposite end, Cambodia and Laos have an abundance of freshwater resources and are consuming very little compared to Thailand and Vietnam.

Table 4. Water availability and withdrawals in the Mekong region

Country	Availability* (m^3 per capita)	Withdrawal** (% Of resources)
Cambodia	41,407	<0.5
Laos	56,638	1
Myanmar	23,515	<0.5
Thailand	6,698	16
Yunnan – China	-	-
Vietnam	11,647	15
China	2,285	16
World (Avg)	8,354	-

*Data include flows from other countries. In the case of Thailand and Vietnam, these flows constitute around half of the water availability.

**Data refer to any year from 1980 to 1998.

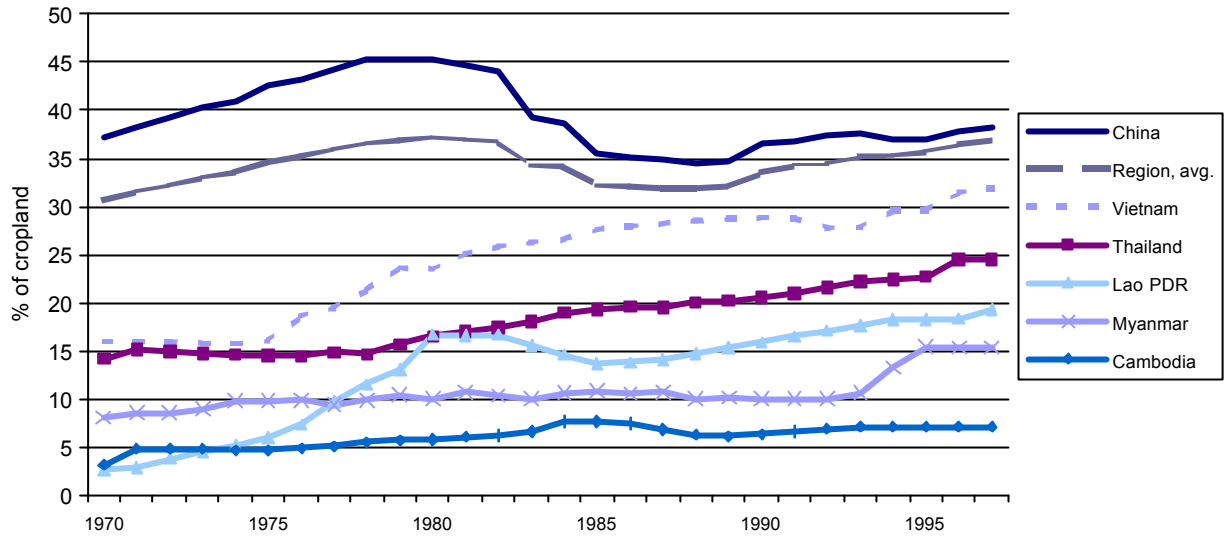
Sources: World Bank, 2000; World Resources Institute, 2000

Unreliable rainfall has historically given rise to large uncertainties and low resilience for rural communities to provide for themselves. This, in combination with the logging of the uplands, creates a critical lack of reliability in water. A continued focus on rice in agricultural production implies increased water demand, since rice expansion is very water-intense compared to other crops. The question, of course, in relation to the issue of water availability and use in the context of sustainable development is: What is these waters' carrying capacity? That is, how much water can a country withdraw and still be on a sustainable path?

All of the countries have increased their irrigation during the last two decades (Figure 5). A couple of them (Myanmar and Thailand) have increased their irrigation between 30-50%--a big relative change, even if the areas irrigated in those countries are still fairly small. Laos, Myanmar, and Cambodia are, however, far behind, for example, China in their irrigation expansions.

Today, wasteful use of irrigation water is quite common, partly due to inadequate water management and inefficient water distribution. This is caused by policy failures, such as under-pricing of water and the lack of water control and measurements. Other important trends are expanding irrigation in the lowlands and intensified farming technologies, which may cause severe salinization of soils—something that may affect downstream ecosystems, for example mangroves, negatively, and risks having a negative impact on future production within the agricultural and aquaculture sectors. The trend of wasteful water use on the one hand and the effects on soils of expanded irrigation on the other hand makes any conclusion about possibilities of achieving sustainable development lean towards the positive. If prices were to be raised to create incentives to use less water for irrigation, the pressure on cultivated soils would be reduced. To draw a conclusion about sustainable development becomes more complicated, however, if the farmers decide to use more agro-chemicals, for example, to compensate for the reduction in irrigation, since agro-chemicals also have negative effects on the environment.

Figure 5. Irrigation land (% of cropland)

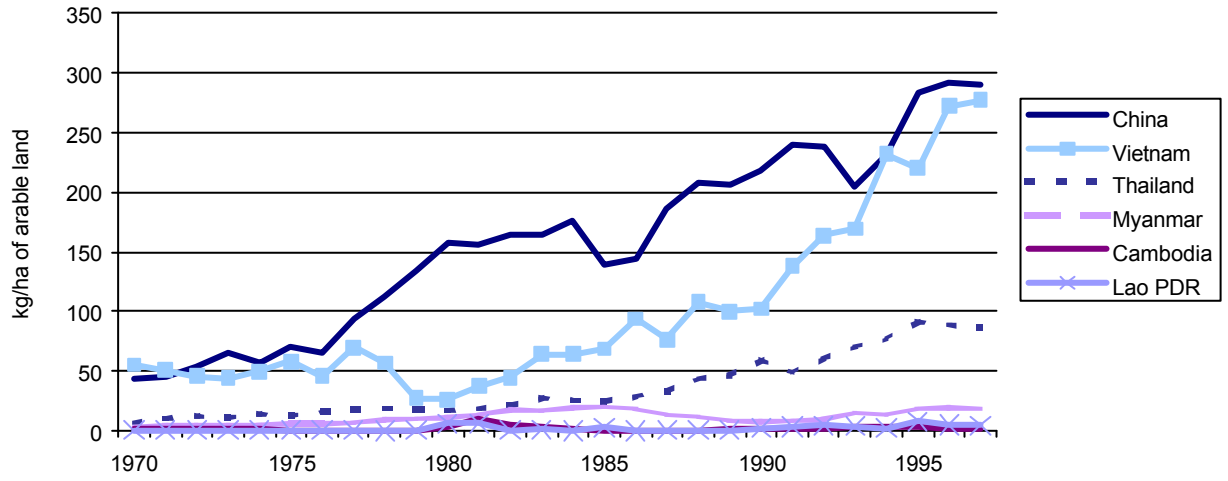


Source: World Bank, 2000

Agro-chemicals

Fertilizer and pesticide use is on the rise, as a consequence of more intensified farming practices and cash crop development. There are significant differences in fertilizer use between the countries, as is illustrated in Figure 6. Compared to, for example, China's average, which in 1996 was, according to some estimates, up to 400 kg/ha (the highest in the world)[7] (Institute of Geography, Chinese Academy of Sciences et al., 2000), most of the countries still use very little agro-chemicals.

Figure 6. Fertilizer consumption (in kg/ha of arable land)



*Data for 1996 suggest that Yunnan used about 175 kg/ha (Institute of Geography, Chinese Academy of Sciences et al., 2000)

Source: World Bank, 2000

The data thus suggest that, based on agro-chemical usage, there is great potential for agricultural intensification in at least Laos, Cambodia, and Myanmar. It is notable, however, that even though Vietnam's fertilizer consumption per hectare of arable land has increased approximately 500% over the

[7] Note that the data for China in **Figure 6** ([World Bank, 2000 #97]) show lower estimates. This only illustrates the difficulties in finding reliable data.

last two decades, productivity data do not suggest a corresponding increase (see Table 3). This suggests that other factors have played an important role in the struggle for increased agricultural productivity than the use of agro-chemicals.

The use of agro-chemicals can lead to severe environmental and health problems (through pollution of surface and ground water tables), and also to reduced agricultural productivity in the future as soil degradation increases due to pollution. In addition, agro-chemical polluted water may have an effect on downstream activities such as fisheries. The use of illegal persistent compounds is common, and this is believed to cause a greater risk of problems over the coming years. An "unlimited" increase in agro-chemical use is therefore not recommended from a sustainability perspective. The current impact in the Mekong region of the countries' chemical use has, however, not been established.

There are other pollution-related issues of regional concern. *Agro-industries* are promoted a great deal. Industrial expansion in fields such as rice processing, beverages and canning, will imply potential pollution issues. A rapid increase in *animal husbandry* is another concern as a shift in demand is expected. Grain surplus and economic growth usually lead to an increased demand for meat. As people obtain a basic food security and incomes grow, the demand for meat increases.

Land conversion and upland agriculture

As was pointed out in the previous section, agricultural land is scarce in the region. In search of new land for cultivation, it has been a common trend that people migrate into the upland areas to cultivate the land. These are marginal areas where lowland agricultural practices rarely are sustainable. Instead, certain traditional upland agricultural and agro-forestry production systems have been demonstrated to be more appropriate. Shifting cultivation is one such traditional practice of agriculture in the uplands. The extent of this practice is difficult to estimate but it is closely tied to the population pressures and migration patterns. Mainstream development discussion and national and regional levels have often identified shifting cultivation as a major cause of deforestation and that it is a practice that must be abandoned. However, many scholars are now suggesting that traditional shifting cultivation practices involving large areas can indeed be sustainable. With increasing population pressure in the uplands however, the pressure for land often becomes too high for the traditional practices of large areas and long fallow periods to be viable. The fallow periods become too short for the soils to revitalize. In some areas, fallow periods are reduced to 3-5 years, which is unsustainable (Mekong River Commission, 1997).

4.1.3 Framing of the institutional challenge

For the issue of agriculture, the knowledge base can be considered as moderately weak for three main reasons:

⇒ Even though some of the links between water and agro-chemical use and a sustainable development are fairly well established in general terms, those links in the context of the Mekong region are not entirely clear.

⇒ The carrying capacity of the land in the Mekong region has not been established, complicating any conclusions on where the borderline is between sustainable and unsustainable resource use.

⇒ The interaction and possible substituting nature of various inputs makes the picture complex and difficult to analyze.

The socio-political context can be characterized as one of moderate potential for social conflict due to the following key reasons:

⇒ Each country prioritizing and valuing its own water use for irrigation and other agricultural purposes, which risks resulting in conflicts between the countries in the region.

⇒ Several different groups being involved and affected by any decision to increase agricultural activities. Even if farmers may agree with national interests, one can suspect that groups such as upland subsistence farmers and local fishermen active downstream of the agricultural areas will not share those same values or interests.

To summarize, the situation can said to be characterized by a relatively weak knowledge base and a moderate potential for social conflict (see Table 5).

Table 5. Applying the framework to the issue of agriculture

Knowledge base \ *Socio-political context*	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		
Weak knowledge base – high uncertainty in the decision-making		AGR

4.2 Tapping into the Hydropower Potential

Hydropower is an important part of the energy supply in the Mekong region. It is a relatively pollution free and low-cost electricity source and is frequently seen as the best way to meet society's energy needs in a reliable and cost-effective way, and has become something of a symbol for regional development. A weak energy supply is seen as a bottleneck for national economic development.

4.2.1 Socio-political aspects: regional priorities and conservation interests

National development interests obviously have a key role in the development of hydropower. When studying national interests in the hydropower arena, it becomes clear that these interests are related to relative resource endowments on the one hand and the general development level in the country on the other. Hydropower exploitation is an opportunity for countries of slow economic development and a large resource base, such as Cambodia and Laos, to export and earn some much-needed foreign exchange. It is especially notable in the light of the recent dramatic increase in oil prices, which makes it necessary for countries in the region to earn export incomes in order to be able to afford oil imports, and replace oil as the primary energy carrier for domestic purposes.

Estimates of net economic benefits usually motivate the exploitation interest. These are closely linked to regional demand projections. Demand for electricity is projected to increase with a factor of 4 to 8 in the region over 30 years (World Bank, 1999). The projections are presented in some detail in Table 6.

Table 6. Demand projection: Annual electricity growth rates for 2000 to 2020

	Low	Base	High
TWh	415	597	831
Cambodia	6.4	8.0	9.2
Laos	5.9	7.3	9.3
Myanmar	3.8	6.6	6.9
Thailand	6.4	7.6	9.0
Vietnam	6.7	8.0	8.7
Yunnan	4.7	7.6	8.7
Region total	6.2	7.6	8.7

Source: World Bank, 1999

In Vietnam, energy needs are on a rapid increase, both for the domestic population and for attracting investment and industrial expansion. Therefore, hydropower development is an important priority for Vietnam. In Thailand, a safe supply of cheap energy is important, and the current oil bill is eating away at the foreign exchange. Today's international oil prices are difficult to cope with for a country like Thailand. It has become a priority for energy supply to link up to Laos' hydro potential. Currently, Laos exports 80 percent of its produced electricity to Thailand (Öjendal and Torell, 1997). Electricity from hydropower made up 17 percent of Laos export earnings in 1993—a number that is likely to increase with the Memorandums of Understanding that Laos has signed with both Thailand and Vietnam (Jacobs, 1996).

Plans for tapping into the hydropower potential are being pursued throughout the region. For instance, there are advanced plans on development of the Se San 3 project in Vietnam, and the Nam Theun 2 project in Laos. The Dachaochan in Yunnan is under construction. Engineering and feasibility studies are taken place in many other sites (Plinston and Daming, 2000; White, 2000). A development scenario of 18,000 MW over the next ten years is not unlikely, the majority of which will happen in Laos and Cambodia. Also, the province of Yunnan plans on developing hydropower potential. With the already existing dams and the construction of two more to be in operation before the year of 2010, an 8,550 MW capacity has been achieved. In the round that follows between 2010 and 2020, another 6,850 MW is planned (Öjendal and Torell, 1997). Thus, it is likely that the pressure on water resources from developing hydropower in the Mekong region will not only continue but also even increase.

The plans for a hydropower "cascade" in the Yunnan province of China (Plinston and Daming, 2000) is a major national concern in downstream countries such as Laos, Vietnam, and Cambodia. Any serious disturbances in discharge could induce high level international conflict (Öjendal, 2000). Presently, dams are being commissioned on the mainstream of the Mekong River. This has the scope of increasing conflict between downstream countries and China, but where countries like Laos or Cambodia, as downstream and much smaller countries would be ill positioned to resolve this to their benefit (Tarr, 2000).

At one level, there is a value agreement among governments about the priority of developing the hydropower potential in the region. There are common national interests for hydropower expansion in the region. All countries are interested, either as exporters or as importers. However, there is still a relatively high potential for conflict within and between countries. The direct transboundary nature of the impacts makes it a difficult issue to manage between countries. This was one central motivation behind the establishment of the Mekong River Commission and its predecessors. There are many national interests for restricting hydropower developments. These interests are related to the agricultural and fishing industries. Different ministries and other public sector agencies frequently have differing positions on the priorities in water resource development. Depending on the mandates given, the agencies form their values, which then become a basis for priorities. The potentially disruptive impact of

hydropower development on other key sectors and priorities, including the fisheries and the agricultural sector in the downstream countries, provides the potential for intra-state conflict and competition.

The preservation of the natural hydrological regime is an important imperative for much of the agricultural production in the Mekong delta that supplies 90% of the rice in Vietnam, and for the inland fisheries that constitute a crucial protein source for Cambodia and Laos. The Mekong River Commission (MRC) has been established to balance and mediate national interests relating to the development of the Mekong River Basin. Its predecessor, the Mekong Committee, was formed already in 1957, so the issue is not a new one. The MRC is in the process of developing a new Basin Development Plan for the Mekong River Basin (Mekong River Commission, 2000), which has been stated as a top priority for the member countries (Cambodia, Laos, Vietnam, and Thailand). This plan includes, but is not limited to, hydropower development. China, who is the upstream country and who has little to gain directly from negotiating its development plans, has chosen not to participate in the MRC. A "cascade" of dams in the Chinese part of the Mekong is in the making (Plinston and Daming, 2000). This is a cause of great concern for the downstream countries.

Historically, hydropower exploitation has occurred with considerable donor support, although recent debates around large dams in the region and elsewhere may have put a lid on the funding potential for the moment. Most development agencies, including the World Bank, ADB, and national agencies, have become sensitised to the protesting voices of damming. As international development agencies are becoming much more careful in supporting these investments, the difficulties of finding development financing and the social and environmental critique have fed back to national governments. Vietnam has now delayed the development of the Se San 3, originally projected for construction starting in 2000 with ADB loans.

Rural communities affected by hydropower developments rarely seem to gain much from them. Frequently, displacements of people are necessary and major disruptions in local livelihoods result. Communities have rarely had appropriate access to information on development plans and have usually been left out of the development discourse (World Commission on Dams, 2000). The disruptive impacts of hydropower on local communities have proven to be cause for conflict and social unrest within countries. From a gender perspective, the impacts may be even worse since women and men may be differently affected by large-scale dislocations and may benefit differently from the increased economic activity such as the one created through hydro-power investments (Woroniuk and Schalkwyk, 1998).

This has also lead to widespread concern among NGOs, researchers, and civil society groups. NGOs, primarily in Thailand and Cambodia, often claim to represent the interests of local communities in development discussions. These NGOs constitute a major interest of anti-dam development and are an important and powerful voice in policy-making today. International NGOs, such as the International Rivers Network, also represent this interest.

4.2.2 Knowledge base: potential and impacts

Hydropower has traditionally been viewed as a very attractive investment for development financing. However, winds are changing in view of many years of harsh critique against the un-wanted side effects of hydropower development. In the last few years, official bodies, such as the World Commission on Dams, have embraced much of this critique that only a few years back was seen as an extreme conservationist perspective (World Commission on Dams, 2000). Today, there are serious concerns with the development of hydropower projects in the Mekong region, which could impact downstream livelihoods and production.

What is the potential?

The social, environmental and economic implications of hydropower development depend critically on what kind of hydropower development we are talking about. No dam is like the next one. For instance, the idea of hydropower "potential" can have many different meanings. Obviously, the technical and economic feasibility, as well as the social and environmental impacts, will depend on the site and what kind of potential is being developed. It is useful to separate whether we are talking about a purely technical potential, an economic potential, or what might be called a "sustainable" potential. For Laos, as

well as for Cambodia, there is still immense hydropower potential that can be developed, and this is an important priority for the governments. Their hydropower potential is almost totally untapped (Table 7). At the regional level, MRC has estimated the potential installed capacity in the Mekong basin alone to be more than 30,000 MW. ADB has an estimate reaching 58,000 MW. In any case, a very small fraction of this potential is yet developed. Table 7, adapted from an ADB report, can probably be said to describe the *technical* potential. Plinston and Daming (2000) state: "the potential as defined here includes many potential projects that would prove infeasible, and appears to include other rivers than the Lancang. It takes no account of environmental concerns, resettlement, and inundation issues."

Table 7. Potential for hydropower development (TWh per year)

	Potential ADB 1995	Potential MRC 1997	Developed today
Cambodia	41	36	7.9
Lao	102	102	-
Myanmar	366	0.5	1.1
Thailand	49	26	4.6
Vietnam	82	10	5.8
Yunnan	450	71	7.9
Region total	1090	245	20.5

Sources: Plinston and Daming, 2000; Mekong River Commission, 1997

The *economic* potential is a moving target, depending on the opportunity cost of capital (i.e., the economic return on the investment compared to other investments). This, in turn, depends on other energy prices and demand projections. Naturally, to develop all this potential would require a lot of investment and infrastructure. For example, the 18,000 MW that the Lao potential consists of would have to be generated on 54 dams, in addition to 15 run-of-the-river projects (Kaosa-ard, Pednekar et al., 1995). The availability of capital for these investments obviously constitutes a major barrier against large-scale development, especially in light of recent donor attitudes towards large dams.

The *sustainable* potential, where social and environmental implications are key considerations in the decision, is often estimated to be considerably lower than the economic potential. Obviously, the sustainable potential is contingent on a value judgement containing many subjective elements. There is no absolute level of acceptable sustainable impacts on local communities and the environment. A value judgement will, to a considerable degree, also be relevant for the economic potential, since assumptions made in demand projections will determine much of the potential.

Impacts

Hydropower development, in general, often has a serious disruptive impact on the surrounding environment. On the biophysical side, dams and reservoirs will interrupt and alter the physical and ecological characteristics of the river by changing water flows, sedimentation patterns, nutrient flows and biota status (Mekong River Commission, 1997). Hydroelectric developments often convert flowing rivers into lacustrine ecosystems by eliminating natural water flows. Reduced silt downstream is a potential consequence. This may carry both benefits and costs. It can mean reduced nutrients in the water (a cost) but also reduced sediment in irrigation systems (a benefit). On the positive end, scientists have demonstrated improved nutritional levels, higher fish catches, and agricultural productivity improvements, as well as flood control as key elements of damming and hydropower development (White, 2000). From a pure water quantity perspective, the operation of the dam usually increases dry season flows, and reduces wet season flow (Chapman and Daming, 1996). All these impacts might be both positive and negative for various sustainable development concerns.

On the socio-economic side, a common and problematic impact is the displacement of people, which tends to impose great social costs on the local communities that need to be resettled as well as economic costs for providing new infrastructure and facilities. However, resettlement need not only be a cost, if as a consequence of the displacement, the quality of life of the displaced community is improved. Displacement can be taken to mean both physical displacement and livelihood displacement (World Commission on Dams, 2000). The physical displacement is the most direct and visible effect. However, the livelihood displacement can be far more serious, as communities that depend on land and various ecological functions are deprived of their traditional means of livelihood. Frequently, the project assessments fail to account properly for these down-stream impacts, as evidenced by the incidents due to construction and operation of the Yali Falls dam of the Se San River between Vietnam and Cambodia (Fisheries Office, 2000).

Dams and hydropower must be studied in the large context of the integrated watershed, including external factors affecting the dam as well as the effects imposed by the dam on the biophysical and socio-economic systems. Frequently, the interaction between these systems is the key challenge to manage. As an example, in the case of the Mekong River, the Tonle Sap and its fisheries depend on the annual reverse of the flow. This function might be discontinued through the damming of the mainstream river. Inland fisheries are crucially dependent on this ecological function and on the seasonal migration of many fish species. An obstruction of the migration paths might have severe impacts on fish production in the region.

4.2.3 Framing of the institutional challenge

When it comes to tapping the hydropower potential in the Mekong region, the knowledge base can be characterized as weak for the following reasons:

⇒ The complexities of the river basin ecosystems and the dependencies of communities are only beginning to be understood.

⇒ The knowledge about the implications on hydropower development on the hydrology of the river is rather weak. There is a high risk and uncertainty involved in any development decision.

⇒ The implications for migrating fish species, the delta fisheries and rice production, and the impacts on local communities are not very well known, but constitute a very high risk.

The socio-political context shows a very high level of social conflict potential:

⇒ There are many competing interests and needs involved.

⇒ There is a very low level of social value agreement.

⇒ In fact, as Öjendal (2000) concludes: “All the criteria for water conflicts are there.”

To summarize, the hydropower issue faces the combined challenge of dealing with an issue that has a very high potential for conflict and low value agreement on the one hand and weak knowledge base on the other (see Table 8).

Table 8. Applying the framework to the issue of hydropower

Knowledge base \ *Socio-political context*	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		
Weak knowledge base – high uncertainty in the decision-making		HYD

4.3 Sustaining and Developing Fisheries

Globally, fish is the source of 16 percent of all animal protein that humans consume (World Resources Institute, 1996). In the Mekong region, fish as a source of animal protein is much more important, constituting the primary source of protein to some 52 million people of the Mekong River Basin. Therefore, it has been identified as a key issue area.

4.3.1 Socio-political aspects: national priorities and local livelihoods

Fisheries are a high priority for the region. Their importance varies among the countries as well as within the individual countries, but a general observation is that the countries depend far more than the average person in the world on fish for their protein. In Cambodia, fisheries are absolutely crucial for national food security, with almost 80% of the people's animal protein intake coming from fish (Öjendal, 2000). In Laos and Vietnam, fisheries are also of central dietary importance, accounting for at least 50% of animal protein (FAO, 2000). As a consequence, fish is the second most important component of the diet, next to rice (ESCAP, 1997). Since fishing is crucial as the protein base for the population, sustaining or improving the fish catch is an important interest for both governments and communities.

But the fisheries are not only of dietary importance in the region; they also have great economic value. In Cambodia and Laos, fishery incomes represent a significant share of GDP (about 5 percent) despite the fact that the larger share of the catch does not enter the formal economy (ESCAP, 1997). The fisheries of southern Laos are among the most important and diverse in the region, involving rice field fisheries, smaller streams, and floodplain swamps (Hirsch, 2000). In Thailand, inland fisheries are not of such a central economic or livelihood importance and they are typically not mentioned as priorities in national strategies. In Thailand, the fisheries sector plays a limited role for the economy, at 1.9 percent of GDP in 1996. In Vietnam, export earnings from fishery are on the rise (ESCAP, 1997). In 1993, fisheries-related export earnings in Vietnam ranked third among all exports (Bowden, 1998), while in 1999 it had climbed up to second place with over 10 percent of the total export earnings (FAO, 2000). Throughout the region, the sector is increasing in importance.

In general, rural communities' dependence on fisheries for subsistence is well recognised and included in national development discussions. The role of women, who are actively involved in both aquaculture and fishing activities in the region (Kirjavainen, 1999) may, however, not always be taken into account. There is a shared agenda from a livelihood perspective and from a national income perspective to preserve and develop fisheries.

However, the management of fisheries seems to be incompatible with some of the other development imperatives, such as industrial and hydropower development. Furthermore, in most cases, fisheries have a backseat role in relation to for instance hydropower development (Öjendal, 2000). The extreme importance of fish for people's livelihood makes this a critical issue. The potential for conflict between fisheries interests and other development imperatives is relatively high. The fishermen's livelihoods are constantly threatened by development plans of the river systems. The cumulative effects of these plans are not easy to predict but are likely to be serious. Also within the fisheries, the potential for conflict is important. However, the extent to which aquaculture systems compete with wild-capture systems is not well known (Bush, 2000).

4.3.2 Knowledge base: data problems and the sustainable yield

There is a severe lack of data; both of the fish catch today and over time, which makes it impossible to show any accurate trends in inland fisheries. We have little knowledge about the status of the fisheries resources in the Mekong region, although there is a general feeling that the Mekong River is today being fished close to its maximum (Mekong River Commission, 2000). The figures in Table 9, based on official statistics, point towards the difficulties in data. In contrast to the FAO numbers that, for instance, give 8-9 kg per year as the per capita supply of fish, Hirsch (2000) reports that the annual per capita consumption is nearly 75 kg for the communities living near the waterways in Cambodia and Laos. This discrepancy cannot be explained by the difference in geographical scope.

Official statistics on fish catch in the Lower Mekong Basin amounts to a total of 360,000 tons per year (Van Zalinger, Nao et al., 2000). The Fisheries Programme of the Mekong River Commission estimates a tripling of that figure to around 1 million tons per year (Mekong River Commission, 2000). However, recent studies based on household surveys and extrapolations (not yet validated) indicate that this also might be a great underestimation, and that the real fish catch could actually be over 3 million tons per year. This is almost ten times the official numbers (Pedersen, 2000)!

Table 9. Fishery data

Country	Per capita supply of fish for direct human consumption (kg/yr)	Percent of animal proteins consumed
Cambodia	9.0	Up to 75
Laos	8.54	30-50
Myanmar	16.6	80
Thailand	23.6	
Yunnan China		
Vietnam	111	~50
Asia (aver)	13.4*	
World (aver)		16

Source: FAO, 2000; World Resources Institute, 1996; World Resources Institute, 1998; Bowden, 1998

While data is lacking, we know that population growth constitutes an important driving force behind the fisheries issue. Therefore, pressure on the fish resource is likely to continue to grow in view of the rapid population growth in the region, notably in the poor rural areas. Also, increasing income levels and expanding export markets constitute important drivers behind intensified fishing (Ahmed, 2000).

A sustainable outtake of the fishery resource

According to the FAO (2000), the development prospects for the fishery sectors for, and within, the countries look quite different. In Cambodia, freshwater aquaculture has significant growth potential, but the inland capture fishery would have to become more productive, through more efficient management and marketing, to be able to develop further. Another scenario is apparent in Thailand, where efforts to

achieve a sustainable production at 3.5 million tons per year have been undertaken. In general, these efforts aim to rehabilitate the fisheries resources while reducing excessive fishing and minimizing by-catch.

While some assessment of the potentials of increasing production can be possible, it can be difficult to tell whether the fish resources in the region are over-exploited, since most activities are in the informal sector and therefore estimates of catches are so uncertain.

Today, the Mekong region shows small signs of over-fishing. Nevertheless, it seems that some countries have hit the ceiling in terms of available fish. There are also some physical signs of over-exploitation, such as the disappearance of giant fish species in the Mekong River (Pedersen, 2000). The potential for over-fishing should not be underestimated, in view of the rapidly growing rural populations. Bowden (1998) states that over-fishing is a reality everywhere in Vietnam. A likely reason for this is the methods used in the fishing. As a result, despite big investments in the fishing fleet, production of marine fishing between 1987 and 1992 dropped by 39%. Similar patterns seem to appear in Cambodia and Laos (ESCAP, 1997). Traditional institutions for governing fisheries and a sustainable utilization have implied some protection to local stocks, but frequently national legislation is not in tune with these traditional governance systems (Van Zalinger, Nao et al., 2000).

Linkages to other sectors and sustainability targets

In general, the fisheries sector does not significantly disturb any other development sectors (Öjendal and Torell, 1997). However, it should be pointed out that the fishery sector could contribute negatively to other aspects of development. An expanding aquaculture industry may mean continued destruction of riverine forests to establish aquaculture farms and might compete with wild capture fisheries (Bush, 2000). Bowden (1998) reports: "5,000 ha of mangroves are cleared annually in the Ca Mau Peninsula (in Vietnam) for the establishment of shrimp ponds. Shrimp ponds in the country have increased from 11,000 ha in 1984 to 132,000 ha in 1992. At the same time, mangrove forests in the area were halved." This is just another example of production practices that are not only unsustainable from an environmental point of view, but also from a production point of view as the very resources on which shrimp are dependent are being destroyed.

The linkages between cultivated fisheries and capture fisheries are not well understood (Bush, 2000). On the one hand, a rapid development of inland aquaculture at different levels will have impacts on the ecological functions that are hard to predict. New species introduced under aquaculture can spread and alter the ecological balance of the rivers (Mekong River Commission, 2000). The floodplains in the Mekong delta are targeted for development by the MRC. The central plains and highland areas might also be developed, which could have impacts on fisheries both in the uplands and downstream. On the other hand, it is not just the primary ecological impacts that matter. It is of key importance to understand how developments of aquaculture change the motivations and behaviour of rural communities. This we know very little about. Therefore, some analysts see the development of aquaculture as the way to conserve the wild fish stocks rather than being deleterious (Be, 2000).

Fisheries management systems for the sustainable exploitation of capture fisheries, as well as the development of small-scale aquaculture development, will be important strategies for securing livelihoods and raising rural income. Habitat protection is another necessary strategy for reaching these objectives.

While the fisheries sector does not disturb other sectors, development activities within other sectors pose severe threats to fisheries. Water resource development schemes seem to present the most formidable threat in the near future. Activities that pose a threat to fisheries include habitat degradation and migration route obstruction due to large-scale development projects, navigation developments, industrial discharge, deforestation, and agricultural run-off. Particularly, hydropower developments have been identified as a major threat. Local people living along the Se San river have observed that almost all fish species have been negatively affected by the unusual hydrological and water quality conditions (Fisheries Office, 2000).

Warning signals are also raised with regard to lost spawning grounds due to mechanical restructuring of the riverbed for navigational purposes. Sedimentation and siltation, due to poorly designed regulation

and irrigation networks may cause both water quality damages and migratory obstruction (ESCAP, 1997). In addition, many tributaries and wetlands serve as important breeding and nursery grounds for fish. These areas are under threat or may be cut off for migration from water resource development projects, such as hydropower.

Water quality is an obvious concern for fisheries. A thorough water quality assessment of the Mekong River was carried out in the MRB Diagnostic Study (Mekong River Commission, 1997). According to this study, in general, water has been found to be of good quality, except for local variations, and most water quality problems are due to natural phenomena such as salt and acid-soil leaking and saltwater intrusion. However, industrial development in urban areas, such as Vientiane and Phnom Penh, both residing by the Mekong River, frequently have very poor environmental management, and hence are beginning to impose a significant threat to the fisheries in the Mekong river (Pedersen, 2000).

To summarize, inland fisheries are threatened by water resource development, through for instance:

- a change in flood areas, depth of water, frequency and duration of inundation in flood plains;
- salt water intrusion;
- reduction of the supply of nutrients which are trapped in the reservoirs;
- deterioration of the oxygen in the water;
- loss of spawning grounds, due to navigation developments; and
- obstruction of migration from damming and power facilities.

The environmental management of the Tonle Sap lake system for maintaining fish production has been recognised as one of the key natural resource challenges for the region (Asian Development Bank, 1999). In relation to this, the safeguarding of the hydrological regime, with the annual reversal of the flow of the Tonle Sap, is a priority in the regional cooperation. The river's annual flooding is a vital ecological function, not only for the Tonle Sap fisheries in Cambodia, but due to the vast migration of the fish species, also for Laos, Vietnam, and possibly all the way up to Yunnan Province.

Framing of the institutional challenge
The fisheries sector reveals a very high uncertainty with regard to the knowledge base:

⇒ Data is extremely poor. We know very little about the actual status of the fish resource. The principle reason for this is that the majority of the production goes into the informal economy and local livelihood needs without ever reaching the market or tax base of the countries. Such information is of course highly critical when it comes to development planning.

⇒ The fisheries sector is consistently under-valued in economic terms since subsistence production is not included in national statistics. As a result, development decisions are made on inadequate data, and the economic value offset by for instance damming and hydropower construction might have been underestimated by 90% in current methods of estimation.

⇒ The implications of damming and water diversion on fish productivity are almost completely unknown, and it is impossible to predict accurately the impacts on the resource from various development initiatives.

With respect to the socio-political context, we can conclude the following:

⇒ The fisheries issue has a relatively lower potential for conflict with other priority sectors. There is some common vision between national governments and rural communities about the importance of fisheries.

⇒ Conflicts and competition due to aquaculture and over-fishing is however an immediate risk, notable in light of the rapid rural population growth that will require increasing demand for food.

In summary, the fisheries issue displays a combination of very weak knowledge base with a relatively low risk for social conflict (Table 10).

Table 10. Applying the framework to the issue of fisheries

Knowledge base \ *Socio-political context*	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		
Weak knowledge base – high uncertainty in the decision-making	FIS	

4.4 Managing Forest Resources

Forestry is a very important sector in the Mekong region and is likely to continue to grow in importance. The logging activities and trans-border movements of goods have wide implications for the entire region.

4.4.1 Socio-political aspects: national income and illegal activities

Forests play an important role in all of the regions' countries. However, the roles they play differ slightly from country to country depending on the amount of forest resources the countries have and what share of export earnings logging constitutes.

Thailand presently has less than 30 percent forest cover. Since 1989, Thailand has had a ban on all logging in natural forests, and has implemented a series of supporting measures to protect the remaining forests and to promote private sector involvement in forest management and plantations (FAO, 2000). National priorities in Thailand therefore seem to lean towards a more careful exploitation of forest resources in the future. A continued production of timber is part of those plans, but management and production methods are to be more sustainable in their nature.

For *Laos*, natural resources extraction for exports is a key element of the development strategy. Logging is a major export earner—wood products account for more than 35 percent of Laos' total export revenues and the share of forestry of the GDP is estimated at around 15 percent (FAO, 2000). However, to look only at the official numbers may be misleading since illegal logging is frequent. The illegally "exported" timber may add as much as 50% to the legal amounts (Öjendal and Torell, 1997).

As in Laos, forestry is a very important export sector for *Cambodia*. In 1995 and 1996, the forestry sector contributed approximately 12 percent of the national income. Unfortunately, illegal logging and cross-border log smuggling are significant problems for Cambodia as well. Logging, mostly illegal, continues at the rate of approximately 1.5 million m^3/year; harvesting takes place without regard to environmental standards (Hong-Narith, 1997). Cambodian authorities have also been known to sell logging concessions in protected areas to several different companies. Meanwhile, traditional tenure rights that may support good environmental management are disregarded.

Vietnam produces significant quantities of round-wood, although 80 percent is consumed as fuel. The contribution to GDP from the forestry sector therefore remains very low. The national priorities include an aim for a sustainable forestry sector in which sustainable commercial production of a wide range of

wood products as well as conservation activities take part. It is planned to reach by the year 2005 a forest cover of 40-45% over the whole country from the 29% Vietnam had in 1995. For a period of 15-20 years, the mismanagement of the country's forests forced the government to ban production. The mismanagement also led to foreign investors being reluctant to invest due to limited forest resources. At the same time, private entrepreneurs and state-owned agencies did not have the resources to invest in new equipment, leaving the forestry sector relatively unused throughout the period (Tuong Van, 1997).

It is not only the national governments that prioritize the forest sector. The population in the Mekong region is also highly dependent on the resource base provided by the forests for their livelihoods. For example, forests are often a major source of paid employment for rural women (FAO, 2001). Furthermore, in Laos 80% of domestic energy consumption is based on fuel-wood (FAO, 2000). In Vietnam, the corresponding number is 95%. It is not uncommon that the collection of firewood is the women's task. As a result, not only large-scale development interests but also population and livelihood patterns are at the center of forest resource usage and, as a result, of forest degradation. These shared interests seem to lay the ground for a situation of social consensus with no serious reasons for disagreement among the forestry stakeholders.

However, conflicts over forest resources can take place in many different ways. They can spill over into other sectors and have an impact on other resources such as water. For instance soil erosion, which can be accentuated by upland farming practices and deforestation, affect the quality and quantity of the water and hence the livelihoods for the lowland fishermen and farmers. The Mekong River is one of the heaviest silted rivers in the world already from natural erosion (Inthavan, 1996). Deforestation can also affect the supply of biological resources, which many groups depend on for their livelihoods (see section 0). Conflicts between communities often result from "poverty alleviation" efforts. Policies have encouraged lowland people to move into the uplands and make upland farmers switch to market-oriented cash crops and more intensive agriculture. This has resulted both in land conflicts and in deteriorating water quality downstream.

Conflicts may also be triggered by new ways of exploiting a resource. When traditional forestry systems are replaced with large-scale logging, this affects the livelihoods of the upland farmers, by for instance making fuel wood less accessible. Competition and conflict over forestry resources has taken place between governments and rural communities, such as in the case of Cambodia, where logging concessions for fulfilling the government's need for foreign exchange and logging interests impact on indigenous upland populations, that are frequently removed from the decision-making processes (Fisheries Office, 2000).

4.4.2 Knowledge base: data problems, exploitation, and forest cover

The region as a whole seems to be abundant in forest resources, but there are also significant regional scarcities. Thailand has the scarcest forest, but Vietnam is also facing serious pressures at the aggregate scale. Forests have been and are being depleted at a fast rate. Afforestation efforts cannot cope with deforestation rates in the region.

It is a well-established fact that aggregate demand for most forest products, except wood fuel, increases with income (FAO, 1999; Repetto, 1997). In the wake of economic development, we see increased demand for timber within and outside the region, although more for pulp and paper products than round wood. So there seems to be a regional trend in intensified logging, facilitated by economic integration and infrastructure development. In addition, today fuel-wood is the main energy source for cooking and heating for the rural people in the region, and population pressure forces land-clearing for agricultural land expansion.

Deforestation can cause severe damage to ecological and socio-economic systems. It eliminates the habitat for plant and animal species. The most serious long-term implication is probably that it eliminates the buffering system for water and it causes soil erosion in the form of loss of topsoil (for a brief discussion on soil erosion see Box 6). Both of these aspects can be harmful to other sectors, such as agriculture and hydropower production. In addition, landslides and flooding are common events as a consequence of deforestation. Deforestation also has severe social consequences—medicinal plants become more difficult

to find and the collection of firewood, typically the women's task, becomes very laborious and time-consuming.

Box 6. Soil erosion – a negative externality from unsustainable land use

One of the serious environmental consequences of unsustainable land use is soil erosion. Soil erosion is a flow concept that has to do with the removal of part of the soil in one place, and displacing it to somewhere else. It is measured as a rate such as tons/ha/year. Soil erosion is, in combination with wind and rainfall, caused when:

a) Cultivated land is used more intensively
b) Cropping practices change—annual soil loss from bare soil to that of the specific crop
c) More marginal lands (steeper hills in the uplands) are cleared for cultivation
d) There is overgrazing from livestock production
e) There is deforestation from forestry or from infrastructure development.

In the watershed context, erosion is a serious problem that impacts both upstream and downstream areas. Upstream impacts include agricultural productivity losses, and loss of water storage capacity. Downstream impacts are sediment deposit (which may be beneficial through the creation of delta lands, but more frequently is damaging to infrastructure, such as dams and irrigation channels). Sedimentation is the physical impact of soil erosion. However, the linkage is not linear and easy to predict. There may be lags of many months between initial removals of soil until sediments deposit downstream. Measurements of cause and effect are difficult and hence the efficiency of remedial measures is not easily predictable.

Estimates of costs of soil erosion should ideally address both on-site damages in terms of the productivity losses and off-site issues in terms of the sedimentation damages. However, economic estimates have been made in several places around the world, indicating that the on-site damages are by far the more important ones.

Natural vegetation is the best protection against soil erosion. Water is slowed down in its physical movement and more likely to be absorbed by the soil than to flush it away. Root structures hold the soil together and the vegetation holds water. The trade-off then becomes between preventing soil erosion by leaving natural vegetation cover and agricultural activities to generate livelihood and income.

Thailand is moderately forested, and its forest cover has roughly halved since 1960. The rate of forest loss is now down to 0.3% per year, due to strict logging bans. Instead, timber imports have replaced domestic supplies and the deforestation is exported. Thailand is one of the world's leading importers of tropical sawn-wood. Its imports are also almost three times the size of its exports of forest products (FAO 2000).

There seems to be a fairly high capacity of the neighbouring countries to meet this demand. *Laos* has comparatively rich forest cover relative to most other Asian countries with 54% of the land area covered. However, high quality forest is gone and the depletion rate is picking up dramatically in the wake of economic integration to an estimated annual 1.2% in the 1990s (World Resources Institute, 1996).

Vietnam is not abundant in resources like Laos, but does not share the scarcities of Thailand either. Vietnam has almost 20 million hectares classified as forestland. Slightly less than half of this, however, can be considered truly forested area.[8] The remainder is denuded hillsides and barren lands (FAO, 2000). Good quality forests only constitute 11% of the forested area (the most densely forested areas are the Western High Plateau, the north central region, and the coastal south central region (FAO, 2000)). In the northern mountain provinces in Vietnam, forest cover is reduced to 8-10% of the surface. This is a result of logging, firewood collection, land clearance for agriculture, and shifting cultivation (Donovan, Rambo

[8] The issue of classification of land as forests even though it may truly be denuded hillsides and barren lands, is not only a problem in Vietnam. Such misclassification exaggerates the forest cover, making the deforestation problem at times look less serious than it is in practice.

et al., 1997). Vietnam has lost 30% of its forest cover in the last 30 years and annual deforestation in the 1990s has been at 1.4% (World Bank, 2000).

Cambodia is, similarly to Laos, extensively forested, with around 60 percent forest cover, although the southern and central parts of the country have less forest cover and face a shortage of wood. Localized population concentrations, the civil war over the two decades, and the recent dynamics of wood supply and demand have a strong influence and have led to spontaneous deforestation over the last 20 years (Hong-Narith, 1997). Deforestation has been rapid, with 250,000 ha annually (ca 1.5%) in the 1990s and about 50-100,000 ha annually from 1960 to 1990 (Mekong River Commission, 1997). However, a forceful crack-down on illegal logging and reform of the concession system have had important implications for Cambodia's sustainable development.

Box 7. Using forestry data as an assessment tool

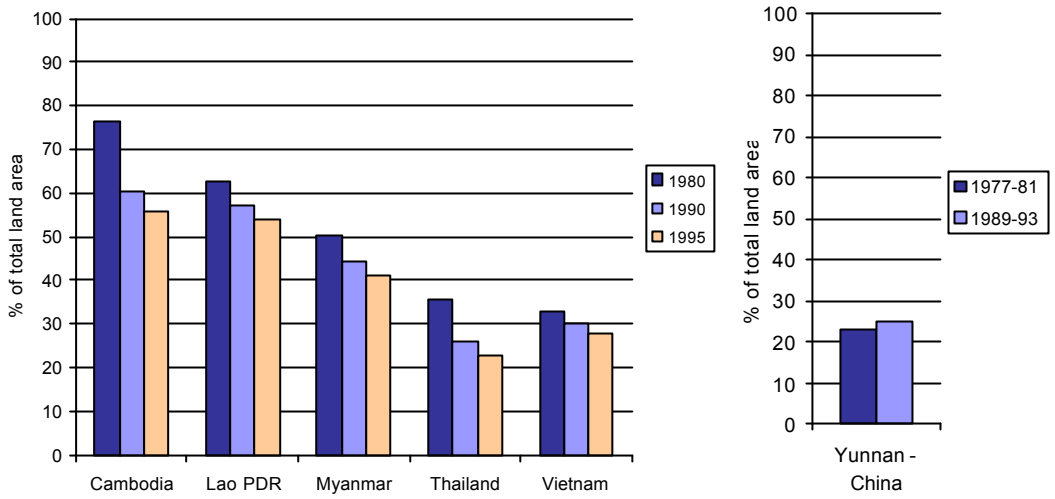
It is difficult to establish how big the problem of deforestation is in the Mekong region since data is unreliable due to illegal logging and other aspects of the informal economy, as well as a lack of information sharing between agencies. For example, official data on logging activities are hardly of any use in countries where illegal log production might account for as much as 90 percent of the total logging, as was the case in 1997 in Cambodia (Bowden, 1998). However, without using any data, it is not an easy task to assess the state of the countries' forests. For that reason, Figure 7 illustrates the change in forest area in the Mekong region, as reported by the World Resources Institute (World Resources Institute, 1998). As a quality assessment, these numbers can be compared to other literature reports. It can be worth pointing out that, depending on the data collection methods used, data on forest cover may not be as unreliable as data on, for example, logging. The reason for this is that forest area can be assessed using satellite images, which show both legally and illegally deforested areas[9]. Logging data, in comparison, is collected through surveys or similar methods. The results therefore depend on the data collectors' possibilities of being all-inclusive in their monitoring—something that can be quite difficult in the monitoring of logging, especially when it includes illegal actions.

Figure 7 makes it clear that deforestation has increased in all of the countries except from the Yunnan province in China. Vietnam used to be the country with the least forested land area relatively speaking, but between 1980 and 1990, deforestation in Thailand led to even smaller forest covers. This conclusion is consistent with Kaosa-ard, Pednekar et al. (1995): "between 1976 and 1982, the annual deforestation rate (in Thailand) reached 3.85 percent, one of the highest in the tropical countries worldwide."

Comparing WRI's data to the numbers in Kaosa-ard, Pednekar et al. (1995) for the countries' forest areas, they are not terribly off, but WRI's data show in general a larger area as forested (e.g., Kaosa-ard, Pednekar et al. say that forest cover in Laos was 49 percent in 1982 and 47 percent in 1989 compared to WRI's data of 63 percent in 1980 and 57 percent in 1990) Box 7 discusses briefly the usage of data in assessing the forestry sector.

[9] For technical notes on how the WRI data were collected, the reader is referred to World Resources Institute (1998). *1998-99 World Resources Report. Environmental Change and Human Health*. New York & Oxford, Oxford University Press.

Figure 7. Forest cover as a percentage of total land area



Source: World Resources Institute, 1998; Institute of Geography, Chinese Academy of Sciences et al., 2000

In order to be able to conclude something with regard to sustainable development, these numbers should preferably be compared to a number on carrying capacity of the region's forests. That is, what are sustainable levels? Again turning to Kaosa-ard, Pednekar et al. (1995) for information, it is clear that the observed deforestation levels are not sustainable, at least not in all of the countries. They, for example, report that total cutting in Cambodia exceeded, according to the Economist Intelligence Unit, 1.5 million m^3 in 1992, or seven times the sustainable levels.

4.4.3 Framing of the institutional challenge

In summary, the knowledge base can be considered strong mainly as a result of relatively streamlined opinions about carrying capacity and the current state of the region's forests:

⇒ The carrying capacity aspect in the forest sector is relatively easy established, and an unsustainable use of forest resources can therefore be identified. The issue of sustainable development with regard to forests is a question of both quantity and quality:

- As long as deforestation is of greater extent than afforestation efforts within the region, the sector activities can be considered unsustainable from a quantity perspective;
- If, furthermore, the forests that are being cut down are primary forests, or at least older than ordinary plantation forest, quality, in terms of biodiversity and livelihood needs, is being degraded in an unsustainable manner.

⇒ Since the knowledge base for the Mekong region is relatively strong in terms of deforestation trends, we can conclude that the forest resources are not being used in a sustainable manner;

⇒ In addition to this conclusion, that rely mostly on official deforestation data, we can conclude that the situation is most likely even worse than first expected if illegal logging is taken into account.

While the knowledge base may not be as uncertain as it is for many others of the natural resources, the socio-political context is still one of social conflict:

⇒ There is a potential risk of conflict between countries. The issue of soil erosion clearly illustrates that deforestation in a country upstream may lead to siltation problems in another country downstream; and

⇒ There is a risk of social conflict between national interests and local livelihood needs, both within the forest sector itself and between the forest sector actors and other local population groups. Large-scale logging risks taking over the land that subsistence farmers depend on, and it risks depleting fuel

wood, medicinal plants, fruits, and other sources of nutrition and energy for upland farmers and other poor groups. Lowland farmers and fishermen also risk being affected.

Having pointed out these aspects of social conflict, it should be pointed out that there are two aspects of social *consensus* as well in the region:

⇒ All of the countries share the national interest for using their forest resources as a source of development. At times, the development of the forest sector is even in the interest of another country. For example, Thailand is somewhat dependent on a sustainable development (until it has been able to hopefully achieve sustainable development within its own forest sector) in its neighboring countries considering the high amounts of forest products that Thailand imports from those countries; and

⇒ Most of the countries in the region also share the problems of illegal logging and smuggling. This could potentially create a common basis for consensus-based discussions and action plans against an ever-increasing problem—both in terms of quantity and economic importance.

The institutional challenges that the region has to meet in relation to the forest sector seem to be of a less complicated nature than those in many other sectors. To summarize, the forestry sector displays a combination of a moderate to high risk of social conflict and a relatively strong knowledge base (see Table 11).

Table 11. Applying the framework to the issue of forestry

Knowledge base \ *Socio-political context*	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		FOR
Weak knowledge base – high uncertainty in the decision-making		

4.5 Managing the Biological Resources

Biological resources play a role in and for such development areas as conservation, tourism, trade, and local livelihoods. In addition, they compete for land with several other sectors including agriculture, forestry (logging), hydropower, and subsoil asset extraction (for example, oil exploitation). Included in the discussion are non-wood forest products (NWFPs), biodiversity, and an "unspoiled environment."

4.5.1 Socio-political aspects: needs for land development and conservation

Tourism is considered a priority sector in the national strategies as in the Greater Mekong Subregion programme of the ADB. Today, Thailand has by far the largest number of tourists per year (7.8 million in 1998), but as a share of exports, the tourist sector plays an even bigger role in Laos (16.4%) and Cambodia (19.3%) than in Thailand (9%) (World Bank, 2000). Tourism requires a fairly unspoiled environment to prosper, which may result in conflicts over space and with activities within sectors such as forestry and hydropower development. Currently, plans for the utilization of natural resources seldom accounts for potential losses in tourism, which commonly results in other development activities with

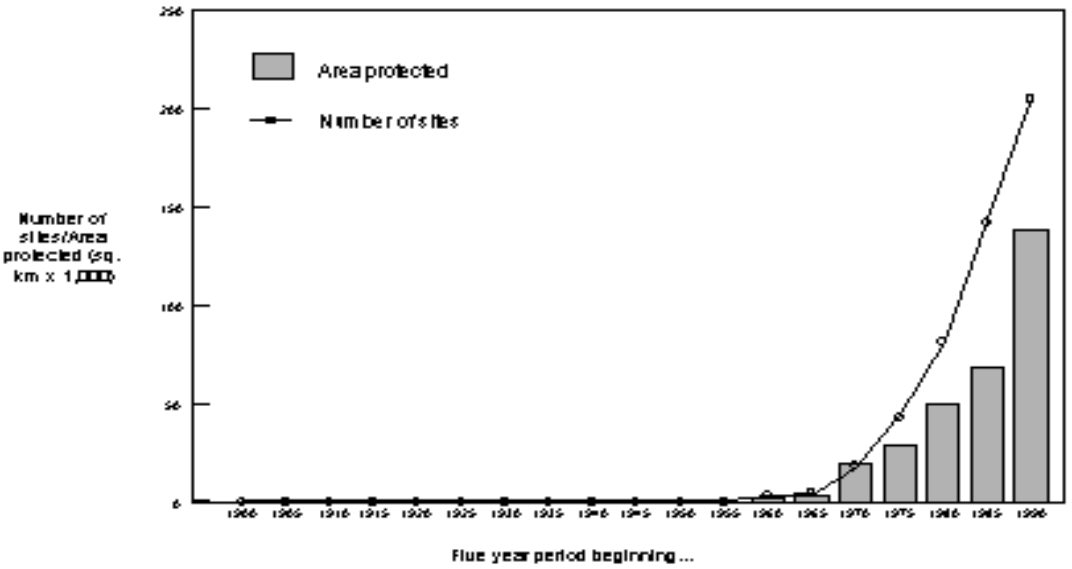
adverse environmental impacts being implemented (for example, construction of dams, oil exploitation, or widespread deforestation) (Öjendal and Torell, 1997).

Today, various interests strive in different directions in the region. On the one hand, there is a pressure for increasing protected areas and to develop tourism potential through nature conservation measures. Paine, Byron et al. (1997) say, for example: "at a national level, many countries in the region have developed conservation strategies or national environmental management strategies." The actual result in the country, however, depends, of course, on other aspects as well, such as introduced and enforced policies, actions taken, and public awareness. On the other hand, there is a pressure for increasing the conversion of forested areas into agricultural land as a consequence of the escalating population pressure. It is therefore easy to imagine different patterns of competition for resources between conservation interests, upland farmers, tourism development interests, and logging interests.

National protection interests (such as national parks) sometimes conflict with the livelihoods of hill tribes, who are deprived of their land as a consequence of conservation. Furthermore, conservation interests are sometimes in conflict with development interests (local and national), who strive to exploit their resources. These conflicts are at times further intensified with the frequent backing by international active and environmentally conscious NGOs, who are very active in the region, of national conservationists' interests. National development interests that are restrained by this sometimes refer to this new Western interest in developing countries as "environmental imperialism."

It is very difficult to find information about the current pressure on Mekong countries to convert more land into protected areas, and thus too examine if there is reason for competition over remaining, unprotected lands. However, as Paine, Byron et al. (1997) say, "a brief review of the historical development of protected areas provides a basis for considering current trends, and identifying prospects for the future." Studying the historical development within the Mekong region, two things become clear: i) some countries have expanded their protected areas quite a lot, both in number of sites and area covered, during the last few years (the regional result of these expansions can be seen in Figure 8); and ii) some countries still have a long way to go. An example of such a country is Myanmar, which has less than a half percent of its land area protected (Figure 9).

Figure 8. Growth of protected areas to end - 1994



Source: Paine, Byron et al., 1997

The development of protected areas could here be of use as an indicator as, for example, a rapid increase in protected land areas could indicate an increase in conflict potential. Analyzing the trend over the last 20 years shows that practically all the governments in the Mekong area accept and promote protected

areas as a means to achieve conservation objectives. Thus, as long as conservation is a priority, conflicts over land are likely to appear.

Remaining land areas of rich biodiversity are frequently located in the uplands, currently difficult to access. With the development of new transportation links and other measures for market expansion this will change. Many groups in society will be negatively affected by a disappearing biodiversity. NWFPs constitute a significant contribution to the livelihoods in the region, but they are also an important source of income for the countries (for a list of the most important NWFPs in the region, see Box 8).

Box 8. Non-wood forest products in the Mekong region

Cambodia	Rattan, bamboo, resin, wax, lac, medicinal plants and animal products
Laos	Benzoin, turpentine and rosin, damar oil, honey and wax, cardamom, rattan, bamboo and sugar palm
Thailand	Bamboo, rattan, lac, gums, resins, mushrooms, and medicinal plants
Vietnam	Cinnamon bark, anise, pine resin, rattan, bamboo, tung oil, lac, and medicinal plants

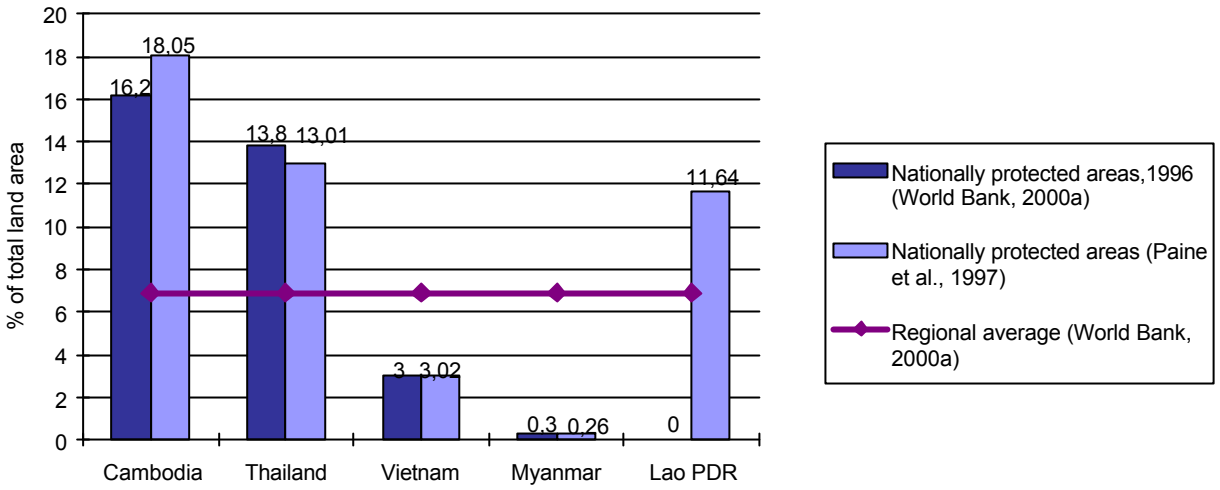
Source: (FAO, 2000)

The total value of world trade in NWFPs is of the order of US$11 billion, of which about 60% is imported by the European Union, the United States, and Japan (FAU, 1996). The forests of Southeast Asia have traditionally remained the major source for many of these products; wildlife is extensively hunted and traded throughout the region, and there has been a significant trade in furs and skins, fruits, resins (naval stores, copal), fungi, wild honey, medicines, aphrodisiacs, oil (*Cassia*, *Citronella*), sandalwood, bamboo, and rattan ware. Recently, NWFP trade has reached new heights in China. Probably no other single country in the world processes as many wild products. Through increases in China's purchasing power, the domestic demand for NWFP and wildlife has increased tremendously. There is also growing interest worldwide in Chinese and oriental natural foodstuffs and medicines. Consequently, it dominates world's trade today (FAU, 1996).
Externally and internally people will be affected by a reduction in biological resources in the region; traders of NWFPs will lose their income source, the tourist sector is likely to suffer with less income for the governments as a consequence, and local people may lose an important source of income and subsistence, to mention a few. Women in the region are likely to be negatively affected since they commonly are dependent on the natural resource base and access to land in order to generate and collect produce (e.g., wild foods such as mushrooms and other non-tree forest products) (Kirjavainen, 1999). The sustainable use and exploration of the region's biological resources can therefore be considered a very important issue for development. At the same time, their protection and preservation is vital for the long-term livelihoods of the people in the region.

4.5.2 Knowledge base: protected areas and development

Considering the importance of biological resources in the region, an assessment of the state of those resources is vital. The extent of protected areas in the region could be used as an indicator to that end. The protected areas network has increased over the years. Laos and Cambodia contribute to the dominant share of the increase in protected areas in the region. Until they started to develop their protected areas, Thailand and Vietnam were the countries with the largest share of protected land. It is interesting to note, as illustrated by Figure 9, that currently only Vietnam and Myanmar are positioned below the regional average (which is very similar to the world average, at 6.6 percent protected land as a share of total land).

Figure 9. Protected areas as percentage of total land area, 1996



Vietnam has, however, plans to double the current protected areas network within the next few years (Paine, Byron et al., 1997). Myanmar has historically not had the same focus, despite extensive recommendations by the FAO and a high level of biodiversity. The Forest Department has, however, established a significantly increased target for protected areas according to Paine, Byron et al. (1997). Judging from the picture painted by Figure 9, the countries in the region face some different challenges in terms of protecting their biological resources. Cambodia, Thailand, and Laos (according to some estimates), all have a protected areas network that is not only above the regional, but also the world average. It is also above the target of 10 percent set by the World Conservation Union (IUCN). However, Vietnam and Myanmar are both far below those targets and averages—an indication that these countries' biological resources risk disappearing if no conservation decisions are taken.

Combining the knowledge that Laos is one of the poorest nations in the world with its rapid expansion in protected areas, it becomes clear that the protected areas are part of the country's plan in achieving economic development. The pressure on other parts of the economy is also likely to increase. For example, as the supply of nuts, honey, medicinal plants, oils and resins, and wildlife for food diminish, more rice and other food staples need to be produced. Furthermore, there may be global interests and benefits from areas that are as rich in biodiversity as the ones in the Mekong area (e.g., in Thailand there are 17 different ecosystems, containing approximately 7 percent of the species of plants and animals in the world (Kaosa-ard, Pednekar et al., 1995)). All of these aspects have an economic value if managed in a correct and sustainable manner.

4.5.3 Framing of the institutional challenge

The knowledge base can be summarized as weak:

⇒ The carrying capacity for the biological resources in the region has not been established, and would be very difficult to establish in any reliable manner. Studies could be carried out to try and determine what, for example, tourists are willing to pay to be able to experience an unspoiled environment, but that would only capture a part of the links between sustainable development and biological resources;

⇒ Biodiversity is, almost per definition it seems, difficult to monitor, measure and value. These features makes it difficult to establish where the limit to exploitation and land conversion should be drawn;

⇒ The high complexity of the linkages between the sectors dependent on or affected by decisions regarding protection of land, makes the drawing of any conclusions with regard to sustainable development intricate and problematic.

Despite some agreements, the socio-political context in the management of biological resources has to be summarized as one of high potential for social conflict:

⇒ National governments, national and international NGOs and local groups all have their different interests and priorities when it comes to the region's biological resources—there are many occasions of disagreement among stakeholders.

⇒ At times the interests and priorities of the stakeholders overlap (for example, national priorities to expand the protected area network and the dependence of NWFPs for the local livelihoods). The reason for overlap may be that the stakeholders work in or for the same sector, but there are also occasions of agreement between stakeholders who represent different sectors.

⇒ Based on earlier trends, the expectations are for the governments to continue to protect land with increasing risks of conflicts. Many different sectors and actors compete for the same resources in this case. The stakeholder groups competing for the same resources are large and powerful. This is mainly due to the mix of governmental, non-governmental, and local stakeholders in both the group that promotes protection of biological resources and in the group against such protection.

⇒ Considering that a protection of land, as long as it works well and does not only consist of "paper parks," prohibits any other type of activity (except maybe from continued gathering of NWFPs for livelihood purposes), the basis of conflict can be considered inflexible. Due to this inflexibility, the conflicts are likely to be difficult to resolve.

The knowledge base is unfortunately one of high uncertainty, further complicating the institutional challenges (See Table 12).

Table 12. Applying the framework to the issue of biodiversity conservation

Socio-political context

Knowledge base	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		
Weak knowledge base – high uncertainty in the decision-making		**BIO**

5. Discussion and Conclusion

In the previous sections we have presented an overview of trends, issues, and interests in relation to natural resources and development in the Mekong region. Without doubt, the development context in the region is a complex system of challenges at local, national, and regional levels. An analytical framework separating issues of the knowledge base from the socio-political concept has been applied to each natural resource issue or sector. As has been discussed in some detail in Chapter 4, there are indeed differences between the sectors in the characteristics of the knowledge base and the socio-political context. Table 5 illustrates the variation between the issues in the framework, while also demonstrating the general tendency across the issues. Despite many variations among the countries and sectors, the socio-political context is complex enough to be generally classified as one of social conflict, and the knowledge base is insufficient enough to be classified as rather weak, across the natural resource issues in the region.

Table 13. The framework revisited

Knowledge base \ *Socio-political context*	**Social consensus** – low risk of conflicting interests	**Social conflict** – high risk of conflicting interests
Strong knowledge base – low uncertainty in the decision-making		**FOR**
Weak knowledge base – high uncertainty in the decision-making	**FIS**	**AGR** **BIO** **HYD**

Below, this insight will form the basis for a discussion on general findings and some general conclusions about the characteristics of the regional institutional challenge caused by the natural resource and development complex in the Mekong region.

5.1 Key Characteristics of Knowledge Base and Socio-political Contexts

The following key features characterize the *knowledge base*:

- A highly complex and interactive system, with inherent uncertainties

Interactions around natural resources use and development are clearly multi-directional, and inherently difficult to understand and manage. The socio-ecological system is characterized by changing markets (such as in the cases of agriculture and NWFP trade), complex ecological systems (such as in the fisheries sector), and unpredictable political and human behavior (such as in upland agro-forestry patterns). The root causes behind resource use and degradation are complexly intertwined and often difficult to distinguish. Population growth, market expansion, demand growth, poorly planned land development, policies creating disincentives to sustainability behavior, weak institutions, rent-seeking behavior, and inappropriate agricultural practices all contribute to a complex system of interacting forces. They are grounded in both the driving forces that are propelling the socio-ecological system forward, and the incentive structures in policy, markets, and institutions. This will make exact predictions and relations between different parameters very difficult to make.

- A system in constant economic, political, and physical change

Chapter 3 demonstrated how economic and political change act as driving forces of development. These trends include rapidly increasing trade within and outside the region, increased market access for previously remote areas facilitated by large-scale infrastructure developments, political decentralization, growing, changing, and migrating populations, and increasing income levels for a large share of the population in the region. The forces drive patterns of resource use in ways that are hard to predict and understand.

- Incomplete and varying knowledge at the sector level

Chapter 4 demonstrated that much remains to be learned for each natural resource sector. Sometimes, as in the case of fisheries, there is a critical lack of even basic data. More often there are no time series that show changes. In almost all cases, the linkage between different sectors, and between development and the use or management of the resource is ill understood or even virtually unknown. Some sector-based resource linkages that we still know too little about include: intensification of agriculture in relation to soil

and water environmental conservation; forestry practices in combination with biological resource protection; hydropower development in relation to fisheries and natural flow preservation; industrial expansion in relation to water quality protection; infrastructure and market integration in relation to forest conservation and local livelihoods; navigation development in relation to preservation of aquatic habitats; and forest exploitation in relation to local livelihood rights.

- The future will hold surprises—good and bad

Experience tells us that most significant events in political and economic history have escaped prediction. The same goes for many environmental aspects of development. It must be recognized that regardless of how much we plan, we will be surprised for good and for bad in the future. This does not mean that we cannot plan for the future. Many aspects of development in relation to natural resources are well documented and possible to predict, such as the increasing pressure for land from migrating populations and the deforestation problem as a result of the search of export revenues.

The following key features characterize the *socio-political context*:

- Large disparities in politics and economic status

The Mekong region is characterized by large economic and political disparities. First, there is a mixture of centralized planning regimes (China, Vietnam, Laos) and market-oriented regimes (Thailand, Cambodia) in the region. Second, the power disparities between countries are striking in terms of economic and political power. China is far more powerful than the others politically and economically. Thailand and Vietnam are, in turn, more powerful than Laos and Cambodia. Added to the equation is the relative resource dependence that tends to be much higher in the less powerful countries. This disparity aggravates the situation. A pattern crystallizes of conflict potential together with an ambition between all countries to play down this conflict, due to political and economic rationales that probably go beyond the natural resource arena (Öjendal, 2000).

- Very different development status and conditions

Despite being close neighbours with many shared resources, the countries of the Mekong region differ greatly in development status and potential. The socio-political history has been a main factor affecting this, but the resource endowment also varies significantly between countries at the aggregate level. Generally, national economic development priorities call for improved agricultural productivity, better industrial base, export earnings, and a safe and cheap energy supply. But as has been demonstrated in Chapter 4, the needs and priorities of different countries vary significantly.

- A rich variety of actors and interests

National governments, NGOs, private sector, international development agencies, and rural communities view the management of natural resources in many different ways. The broad spectrum of interests, dependencies, and vulnerabilities indicates the difficulties in mediating between different needs and priorities, and points towards the potential for increased competition and conflict over allocation of and access to natural resources.

- Multiple potentials for resource competition at different levels

Resource competition is becoming more common between communities. Today, there are many examples in the region where intensive use of resources and increased exploitation bring people in conflict with their neighbors. The case of water and watershed functions is especially illustrative. Upstream flow regulation, while benefiting some, may in fact deprive a downstream community of an essential watershed function, such as flushing salinity out of agricultural land.
Competition over resource access also takes place between governments and rural communities, such as in the case of logging concessions. Hence, there are potential conflicts between countries, between different local communities, between local communities and national government development priorities, and between local communities and development projects. A key challenge is to ensure equitable access and benefit sharing between different uses. It becomes clear that mechanisms are needed to manage this problem.

- Institutions are weak in capacity with great variations in capabilities

There are significant variations within and between countries in the institutional capacities to handle these complex analytical and political challenges. Frequently, this has hampered information sharing and dialogue not only between countries, but also between different authorities in one country. This is one reason for the lack of data and information at the regional level today.

- Traditions and practices of public participation are weak for decision-making processes at different levels of government

There is not a strong tradition for public participation and stakeholder involvement in decision-making in the Mekong region. In later years, the voice of non-governmental organizations (NGOs) have been strengthened significantly in the development discourse all over the world, and quite notably so in the Mekong region. This is the case both for the influential and well-resourced international NGOs, such as WWF, IUCN, and Oxfam, as well as for local and national NGOs operating in the Mekong region. However, there are still strong concerns about the lack of opportunity for rural communities to be represented in decision-making at national and regional levels. Questions can be raised in relation to how well these NGOs really represent local interests. It also is necessary to have direct participation with the local communities affected by the development decisions.

5.2 Towards a Regional Institutional Response

Our analysis has described the challenges in terms of the knowledge base on the one hand, and in terms of the socio-political context on the other hand. The regional institutional mechanisms must adapt and respond to the situation of high socio-political risk and high uncertainty. However, in the institutional response, the consideration of these aspects can be mutually reinforcing.

5.2.1 A stronger knowledge base

In order to support the essentially socio-political processes of determining and planning for different uses of the region's natural resource base, it is important to improve the knowledge base and understand the connection between development patterns and the natural resource base. The political process must be supported by analysis and the accumulation of knowledge. If the knowledge base is considered weak, then explicit, systematic and strategic efforts to improve it over time need to be formulated. With a stronger knowledge base, it is likely that the values of the various actors may converge at some point—lack of good information is not uncommonly the basis for disagreement and conflict. Therefore, institutions must develop mechanisms for developing the knowledge base in order to understand as much as possible of the complex and interlinked changes and what they mean for the natural resource base and plan for dealing with them.

There are several ways in which the knowledge base can be improved, including acquiring, processing, and accommodating information, data, and perspectives; facilitating or conducting scientific research and analysis of resource systems linkages and trade-offs; facilitating information exchange and data sharing for resource management; pre-testing of existing material on representatives of the various interest groups and analyzing the past in retrospective studies; and establish systems for monitoring and prediction, learning from experience and historical events. If these activities were to be carried out, it would not only involve a strengthening of the knowledge base, organizations could also help conserve resources and solve problems.

MRC also has an explicit role of building up and sharing scientific knowledge, while making a considerable effort toward environmental protection. The mandate is, however, clearly delimited to planning for the sustainable development of the Mekong River Basin, with a specific focus on water. Many regional natural resource challenges fall outside of that mandate. These include, for instance, trans-border logging activities, trade in non-wood forest products, and upland livelihood and resource issues. There is a lack of information sharing and political discussion on these more land-oriented issues at the regional level today.

It can be questioned whether the inherently political nature of inter-governmental bodies is the most appropriate form of organizing and sharing information and scientific knowledge. Perhaps, platforms for information exchange and research without a political mandate must be established. Regional institutions

might be needed that can keep a non-political agenda and interact with governments at arms length rather than implement the national interests, which tends to be the case in many of the current regional institutions. The establishment of regional scientific centers or networks for advancing the knowledge base seems like one way forward. Such exchange and cooperation should, among other things, deal with the challenges related to illegal activities, more efficient resource practices, and alleviation of the extreme dependence on the resource base.

5.2.2 Adaptive management responses

We have discussed the system as containing many inherent uncertainties and systems features that defeat prediction. Institutions set up to deal with the uncertainties must be aware that conventional planning approaches in a rationalistic and centralized sense will not necessarily be successful. Instead, adaptive approaches to planning must be promoted. This calls for a reinvention of decision-making and establishment of integrated decision processes (Mortensen, 1998; Milch and Varady, 1998). Rapid institutional response and adaptability, that is, the ability to respond to new information and changing circumstances, will be a key success factor. Furthermore, the mainstreaming of environmental and sustainability issues into decision-making processes at the national and regional levels needs to be strengthened. This means that integrated knowledge bases must be in place and be open to all stakeholders and there must be processes that allow for stakeholder participation for substantive reasons, which is for the purpose of eliciting and learning from local and traditional knowledge.

5.2.3 Broad-based deliberation

This brings us to the issue of deliberation and participation. In Chapter 2, we described a theoretical situation with a weak knowledge base and high risk of social conflict and identified the need in such a case for facilitating a political process, including broadly based deliberation. For this deliberation to happen, institutions must be open to social environments. This type of deliberation process, which involves both experts and outside stakeholders, has the potential to improve problem formulation, provide more knowledge, determine appropriate use for controversial analytic techniques, clarify views, and make decisions more acceptable.

Participation is a key aspect in the political management of these issues. What is needed to bring these local communities into the discussion? The need for reform in regional cooperation is clear from the point of view of local communities with high dependence on the natural resource base. A highly integrated participation process is recommended. All layers of society need to be involved, and representatives from many different interests present. To understand the countries' traditional culture, as well as future prospects for development, is vital, which demands participation from experts as well as local groups that currently depend on their resources for their survival.

Unfortunately, many stakeholders, including rural communities, are often excluded from the decision-making processes that affect them, be they national, regional, or even local. At the same time, regional institutions influencing investments and resource use have not worked out viable mechanisms for giving voice to community needs and concerns in their planning, decision-making, or monitoring processes. Even if the structures and mechanisms exist, they do not yet function reliably (Thailand Development Research Institute, 1998).

5.2.4 Mediation mechanisms

Political institutions need to put in place strong mediation and conflict resolution mechanisms in order to be able to manage the multiple potential tensions in the natural resource and development context that have been described. The regional nature of these issues suggests it might be necessary to create some form of intergovernmental institutional mechanisms with "teeth" that can safeguard principles such as transparency and accountability across national borders. This points towards a need for the establishment of flexible regional legislative and enforcement regimes. It needs to be further discussed whether intergovernmental mechanisms that have been applied in other regions are applicable or welcomed in the particular context of the Mekong region.

There are concerns about the non-participation of China and the half-hearted contributions from Thailand in the regional natural resources discussions, primarily manifested through the Mekong River

Commission. But, the interest of Thailand and China to be "good neighbors" in the region and hence act accordingly should not be under-estimated. There are strong reasons to believe that the momentum that ended armed conflict in the region and marks a transition to a market-based economy will facilitate improved cooperation between countries. Many observers see natural resource issues, such as shared waters, as a first vehicle for cooperation that can be extended into other areas. The shared interest in natural resources brings the countries to the discussion table for discussing regional governance for the first time.

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