

# 1 Introduction

## 1.1 General introduction

Inland aquatic resources are comprised of a variety of ecosystems spread over highly diverse landscapes. Living aquatic resources, reliant on these ecosystems, include a huge variety of plants, fish and other animals such as molluscs and crustaceans. However, these organisms are under threat the world over. The World Conservation Union 2002 Red List estimates that 20% of amphibians, 30% of fishes, 27% of molluscs, and 20% of crustaceans are threatened (IUCN 2002). Most of these organisms are found in freshwater (Darwall and Vié 2003). In North America, for example, it is estimated that freshwater fish species could be lost at a rate of up to 4% per decade. The lack of data in many other regions of the world prohibits accurate estimation, however it is generally recognised that a number of aquatic animals are under threat. These same resources are increasingly recognised as an imperative source of nutrition, especially in less developed regions where fish provide an important source of essential fatty acids for children and pregnant women (e.g. Neumann *et al.* 2002).<sup>1</sup> In the Mekong Basin it is estimated that between 70-80% of dietary protein comes from fish and other aquatic animals (van Zalinge *et al.* 2003). As stated by a senior environmental consultant working with the intergovernmental river management organisation, the Mekong River Commission (MRC):

In the West we sometimes talk about bio-diversity because it is nice to save species, but here it is a matter of people's lives. (Quoted in Spillius 2004)

Despite this emerging recognition, the complexity and diversity of living aquatic resources, the specific contribution to rural livelihoods and the well being of rural communities is not well understood.

The loss of overall biomass in world fisheries is framed in terms of a crisis of supply in the international arena. The 1995 Kyoto Declaration on the Contribution of Sustainable Fisheries and Food Security predicted that as world population reaches 7 billion by 2010,

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<sup>1</sup> Fish as a source of fatty acids are also linked to brain development in early *Homo sapiens* (see Broadhurst *et al.* 2002)

the likely demand for fish will reach around 105 million tonnes per year (FAO 1995). The declaration goes on to state that world fishery production reached a plateau of 72 million tonnes in 1995 and because

... this production is not likely to increase ... [and] unless appropriate actions are taken, the gap between supply and demand will expand ... [causing] the disappearance of fish from the diets of poor consumers who currently rely on them as their main source of protein (ibid., p.2)

This is reiterated in most, if not all, major international fishery policy documents (e.g. FAO 2002, 1995, 1995, 1997; NACA/FAO 2000). However, with 47% of world wild fish stocks fully exploited and a further 28% overexploited or fully depleted, it is the production of fish farming, termed aquaculture, that has been brought to the fore in planning and policy to meet the supply crisis (FAO 2002). The FAO (2002) argues, the rising cost of catching fish from the wild (capture fishery), and falling price of farmed fish (culture fish) will make it easier for public policy makers to defend support for aquaculture.

As this demonstrates, responses to the 'global fisheries crisis' are strategic simplifications, drawing from a diversity of perceptions of the decline of fisheries occurring at different scales and organised into a coherent argument (Johnson 2002). As living aquatic resources are drawn into development discourses of poverty and rural development in regions like the Mekong Basin they are polarised and simplified as aquaculture and capture fisheries, not reflecting the diversity of ecosystems, organisms, cultures and societies involved. At the national level in riparian countries, such as the Lao People's Democratic Republic (Lao PDR), living aquatic resources management and development are not only framed in terms of meeting shortfalls in supply but also within wider development goals of poverty and rural development.

## **1.2 Research Questions**

This thesis aims to assess how complex human-environmental systems are perceived by orthodoxies and policy in a developing country context. By employing a political ecology framework the thesis asks how locally based living aquatic resources use, development and management are influenced by wider processes of policy and knowledge formulation. This question is divided further to focus specifically on the

contribution of aquaculture and capture fisheries in Lao PDR with specific attention on the relative importance given to aquaculture within wider development orthodoxies such as the global fisheries crisis. There are four specific research questions within this thesis. The questions are scale sensitive, progressively examining the influence of broad scale knowledge over local systems of resource use and the governance of these resources in policy and planning. Each is now presented in turn.

First, to set a broad historical focus of a political ecology of living aquatic resources in Lao PDR, the thesis aims to understand how knowledge is formulated in a developing country context. In doing so the following question is addressed:

- What is the role of government and non government organisations in framing knowledge of living aquatic resources, and how has this established knowledge influenced the management and development of aquaculture and capture fisheries in Lao PDR?

Second, the thesis presents a comparative geography of aquaculture and capture fisheries. This is framed within a political ecology framework by questioning established orthodoxies and patterns of aquaculture development. This is addressed with reference to the question:

- What is the nature of environmental, economic and social influences on the broad scale development of aquaculture, and how does this relate to the existing role of capture fisheries in Lao PDR?

Third, the thesis investigates the locally specific context of living aquatic resources use by focusing on the role of aquaculture and capture fisheries both between and within rural Lao communities by answering the following question:

- What is the role and importance of living aquatic resources in the livelihoods of rural Lao communities, comparing the difference between adopters and non-adopters of aquaculture?

Finally, the thesis critically assesses the use of living aquatic resource in policy and

planning by comparing how aquaculture and capture fisheries are represented by communities, government and non-government organisations. This is addressed by the question:

- How are living aquatic resources framed and represented within wider development agendas of conservation, poverty alleviation and rural development of government and non-government organisations, and how do these relate to the role and importance given to aquaculture and capture fisheries in rural communities?

### **1.3 *The aquaculture-culture fisheries continuum***

Living aquatic resources are most often simplified as ‘fisheries’. The most common distinction made within ‘fisheries’ is that of aquaculture and capture fisheries. This, however, neglects the diversity of living aquatic resources and the variety of ways in which they are exploited. The outcome for policy is that ‘fisheries’ becomes ambiguous, and fisheries development can be interpreted arbitrarily as either culture or capture activities. Elizabeth Harrison (1994), in her exposition of the failures of aquaculture development in Africa argues that

... the most, and often the only, significant thing aquaculture and capture fisheries have in common is that they both involve fish. (p. 245)

This understates the importance of fish as a common denominator within a variety of resources and activities. Nevertheless, there is cause for concern when the crisis of supply is reduced to ‘fish’ without reflecting on the difference between aquaculture and capture fisheries. To highlight the diversity of living aquatic resources, Hans Guttman (1996) proposes a continuum of aquaculture and capture fishery activities based on capital intensification and resource tenure (Figure 1-1). This provides an heuristic model for understanding the complex diversity of aquaculture and capture fishery systems ranging from capital intensive aquaculture and open ocean industrial fisheries to the types of small-scale artisanal fisheries and aquaculture seen in the Mekong Basin and Lao PDR.

### 1.3.1 Capture fisheries

Capture fisheries are the last large scale hunter gatherer activity in the world. Fisheries range from commercial, industrial open-ocean to small-scale artisanal in inshore and inland areas. There is a diversity of these fisheries that is not easily simplified into responses to deal with the fisheries crisis. Artisanal fisheries are characterised by their diffuse and complex nature and have not been extensively studied. Those that have studied them have tended to focus on access arrangements, traditional ecological knowledge or their transition to more commercial fishery systems (Jentoft 2000; Johannes 1981; McCay 1978).

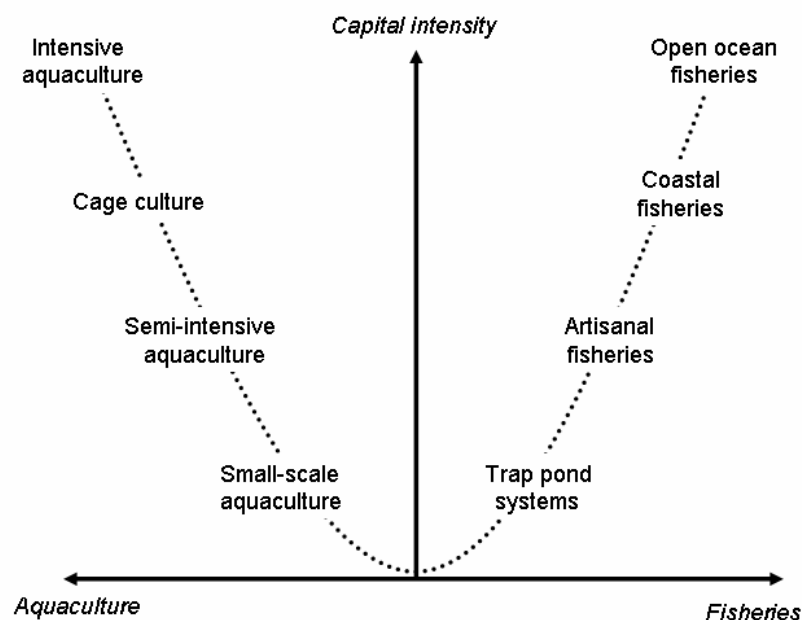


Figure 1-1 Aquaculture-fisheries continuum (Source: Guttman 1996)

Inland artisanal fisheries are comprised of fishers operating throughout a range of scales and habitats with a variety of fishing gears targeting a variety of species. Deap Loeng *et al.* (2003), for example, list over 150 types of fishing gear used to catch most of the 1200 species in the Cambodian Mekong fishery. These gears target a wide range of species in various habitats including rice fields, streams, wetlands and rivers. Contrary to Garrett Hardin's (1968) tragedy of the commons, artisanal fisheries are rarely open access. Instead they are managed through a combination of community, state and customary regulations (Johannes 1981; Baird 1999; McCay 1978; Jentoft and McCay

1995). Such restrictions may be enforced at the national level, community level or even household and individual level.

Artisanal fisheries are commonly thought of as subsistence based. However, there are many examples where fish are sold to extensive market networks that extend across countries and regions (Bayley and Petrere 1989; Bush 2004). As such fish provide not only a source of protein but also an easily traded commodity with both high economic and subsistence value, neither of which is fully reflected in planning and policy (Bayley and Petrere 1989).

### **1.3.2 Aquaculture**

Aquaculture describes a group of activities associated with the rearing of aquatic organisms. In contrast to capture fisheries, aquaculture is characterised by human intervention in the rearing process of aquatic organisms. The FAO's (1997) definition is as follows:

Aquaculture is the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms which are harvested by an individual or corporate body which has owned them throughout their rearing period contribute to aquaculture while aquatic organisms which are exploitable by the public as a common property resource, with or without appropriate licenses, are the harvest of fisheries. (p. 6)

Aquaculture requires not only an input of time like capture fisheries, but also continued capital investment in fingerlings and feed. Claude Boyd and Rudy Schmittou (1999) argue that aquaculture

... is the science and art of farming or managing aquatic ecosystems to produce crops of animals and plants for profit. (P.61)

Large scale industrial aquaculture, such as salmon in Europe and North America, is controlled by multinational companies seeking large returns on their investment (Wood *et al.* 1990). Less capital intensive aquaculture systems, found in rural communities,

offer both supplementary food and income. Peter Edwards and Harvey Demaine (1997) term this small-scale rural aquaculture and describe it as:

... the farming of aquatic organisms by small scale households using mainly extensive and semi-intensive husbandry for household consumption and/or income (p. 4).

This system is characteristic of the majority of aquaculture in Lao PDR, and indeed the Mekong Basin (Funge-Smith 1999; Phillips *et al.* 2002). It is typically characterised by shallow hand dug, rain fed ponds with an average area of 2300m<sup>2</sup> with most fish consumed in the household (Funge-Smith 1999).

### **1.3.3 Living aquatic resources and policy**

Small-scale rural aquaculture has been identified as a key response to the shortage of fish supply faced by poorer people as outlined in the 1995 Kyoto Declaration on Fisheries Sustainability and Food Security. Edwards (1999) argues that small-scale systems can be instrumental in the alleviation of poverty. He states that:

Rural aquaculture contributes to the alleviation of poverty directly through small-scale household farming of aquatic organisms for domestic consumption and/or income; or indirectly through employment of the poor as service providers to aquaculture or as workers on aquatic farms of wealthier farmers; or indirectly by providing low-cost fish for poor rural or urban consumers. (p.5)

Building on the ‘global fisheries crisis’, which further suggests that aquaculture provides the only realistic alternative of providing fish for poor people, small-scale rural aquaculture is promoted as a tool for addressing poverty alleviation. This is variously stated throughout the Mekong Basin (Guttman and Funge-Smith 2000; Funge-Smith 1999; Setboonsarng 1993; Edwards 2000, 1999; Edwards *et al.* 1999; Edwards 1999; Demaine *et al.* 1999). However, as argued in this thesis, the belief that aquaculture is a panacea for poverty and rural development is founded on wider orthodoxies that often do not reflect the realities of rural communities.

In his paper entitled *Blue Revolution or Red Herring?* Phillip Kelly (1996) begins within the premise that development signifies the process through which existing systems of production give way to new ones. He argues that aquaculture has “been

‘naturalised’ ...as a common sensical and irrefutable positive solution to underdevelopment” (p.43). He goes on to say that this ‘naturalisation’ has permeated through to the expectations of fishing communities despite obvious restrictions in meeting, or wanting to meet those expectations. Priscilla Weeks (1992) argues that these expectations are embedded within the stated goals of aquaculture - improved nutrition, export revenue, and replenishment of wild fish stocks. Implicit in these goals are fundamental assumptions of equitable distribution of wealth from increased production.

The application of aquaculture to poverty alleviation has been critically analysed in Bangladesh by David Lewis (1997). He shows how the government and international agencies promoted aquaculture as a production based system that could meet development and poverty agendas. He recognises that aquaculture was seized upon as an activity that increases production and income, but does little to improve access and income for low income households. It is widely recognised that wealthier households are more likely to own ponds than poorer households in Bangladesh (Barman *et al.* 2002). However, it is still argued by some that poorer households will adopt when, like during the Green Revolution, economic viability is established (Gupta *et al.* 2002).

The promotion of aquaculture therefore appears to be inherently political rather than a reflection of needs and realities within rural communities. As Kenneth Ruddle (1993) argues:

In some instances, ‘aquaculture’ may just have become a fashionable term entered into national policy documents merely to satisfy the policies of donors or assistance agencies. (p. 24).

Ruddle goes on to suggest there should be parallel development of aquaculture and capture fisheries. This is an important distinction, and one which is central to this thesis. The various activities along the aquaculture-capture fisheries continuum have different roles for different people in rural communities, and the complexity of these roles needs to be reflected in development planning and policy.

Recognition of the role of capture fisheries for poverty alleviation and rural livelihoods is an equally important, yet widely neglected, area of research. Christophe Béné (2003) notes the almost complete absence of fisheries case studies in the literature on poverty.

He describes the auto-reinforcing paradigm prevalent in policy and research; people are poor because they are fishers and they are fishers because they are poor. This is variously stated as fishers being the ‘poorest of the poor’ and the fishery as an ‘activity of last resort’. Empirical understanding of ‘fisheries’ has not been incorporated within policy. Instead, assumptions are made about the importance of living aquatic resources to rural livelihoods, framing fishery dependency as a circumstance of poverty to be addressed through rural development.

In summary, the global fisheries crisis has been simplified and polarised into aquaculture and capture fisheries. In turn, an understanding of the specific contribution of the entire spectrum of living aquatic resources to fishers livelihoods has been neglected. The role of both aquaculture and capture fisheries need to be empirically critiqued by comparing the wider assumptions with the realities of resource users.

#### **1.4 Research problem**

Inland living aquatic resources are increasingly recognised as an undervalued resource the world over (Coates 2002). However, at the Second Large River Symposium held in Cambodia 2003 discussion focused on the lack of research on the importance of these resources to rural livelihoods. The Symposium concluded that quality information on the specific role of inland living aquatic resources to rural livelihoods is needed as water becomes increasingly scarce and politicised. As Derek Johnson (2002) outlines with respect to world fishery decline, the lack of locally specific information means the complexity of local resource use is often simplified into stories of cause and effect. By addressing global problems of fishery degradation through detailed local level field work this thesis addresses both broad theoretical questions of human-environment interaction as well as contributing an important empirical record of Lao fisheries.

Explanations of environmental crisis based on scientific investigation of complex phenomena are both socially and culturally embedded and as such politically constructed (Forsyth 2003; Thompson *et al.* 1986; Leach and Mearns 1996; Fairhead and Leach 1998; Stott and Sullivan 2000; Blaikie and Brookfield 1987). Resulting policy statements often reflect what is technically possible rather than providing equitable solutions to specific problems. The lack of accurate and timely information means that assumptions become dominant through what are referred to as environmental

orthodoxies, narratives or myths (Stott and Sullivan 2000; Fairhead and Leach 1995). These are statements of ‘truth’ that define causes and provide solution to complex environmental problems. They gain prominence when systematic or ‘scientific’ investigation is often not possible due to the complexity of the problem and the lack of available research capacity. Instead, knowledge is produced and reinforced through what Tim Forsyth (2003) refers to as the *coproduction* of knowledge through both environmental science and politics. That is, knowledge produced from a combination of objective observation and historical assumption and reified through social and political interests (based on Jasanoff 1996).

There is a growing body of political ecology literature that challenges the assumptions that underlie these orthodoxies. Piers Blaikie and Harold Brookfield (1987) in their seminal treatise *Land degradation and Society* defined political ecology as concerning:

... ecology and broadly defined political economy [encompassing the] constantly shifting dialectic between society and land based resource...within classes and groups and society itself (p.17),

This integrated society-nature perspective provided an important breakthrough, by addressing the causes of environmental degradation through a combination of knowledge, power and politics. Political ecology has attempted to use multiple methodologies to focus on the social construction of environmental claims. The most notable of these include Michael Thompson *et al.* (1986) who question international orthodoxies of soil erosion and deforestation in the Himalayas. A number of publications by Melissa Leach, Robin Mearns and James Fairhead challenge the assumptions of deforestation in West Africa (Leach and Fairhead 2000; Leach and Mearns 1996; Fairhead and Leach 1995, 1996, 1998). In doing so they question the fundamental precepts of the global deforestation ‘crisis’.

Orthodoxies also exist in international development. Emery Roe (1994) critiques the development narratives that underlie the orthodoxies that instruct public policy. His analysis focuses on how ‘stories’ provide explanations to complex and uncertain problems and how, in turn, these gain ascendancy in policy as statements of ‘truth’ (Roe 1991; Hajer 1995). Political ecology research has also focused on critical analysis of these development narratives as they affect the environment. Raymond Bryant and

Sinéad Bailey's (1997) *Third World Political Ecology* stresses the importance of 'putting politics first'. This has focused attention on the influence of broader political and economic forces. In doing so they adopt an actor oriented approach, looking at how different organisations influence policy decisions. This is central to Richard Peet and Michael Watts' (1996) liberation ecologies, which engages organisations and institutions practically "... challenging conventional notions of development, politics, democracy and sustainability" (p. 3).

This thesis draws from this body of literature to challenge not only the simplification of the global fishery crisis, but also the position of living aquatic resources within wider development narratives. Practical engagement of fisheries orthodoxies is being given increasing attention. Questioning the sustainability of world fisheries supply, Daniel Pauly *et al.* (2002) show that China, which makes up 64% of total world aquaculture production, has constructed vast over-estimates of fishery production for political ends. According to their calculations, adjusting for this overestimate means that global fishery supply has been in decline at a rate of 0.7 million tonnes per year since the late 1980s. Although this exacerbates our perception of a global fishery crisis, critically analysing the coevolutionary production of 'facts' means that wider myths can be deconstructed and better management paths can be sought. This is central to the simplification of complex fishery problems outlined by Johnson (2002). The promulgation of a 'crisis narrative' at the global level has moulded the diversity of local perceptions surrounding fisheries decline to conform to the narrative without critical reflection. This is especially evident in inland fisheries in Southeast Asia where these wider orthodoxies are adopted in lieu of accurate and timely statistics (Coates 2002).

In an international development context, living aquatic resources have, as outlined above, been simplified and polarised as aquaculture and capture fisheries. Aquaculture provides a solution to the global fisheries crisis as well as meeting wider aims of poverty alleviation and rural development (Edwards 1999; Bardach 1997; Barton and Staniford 1998). As such, aquaculture has been heralded as the 'blue revolution', a term coined from the modernisation, and transfer of technology-based paradigms of the Green Revolution (Coull 1993; Kwei-Lin 2001). Some argue that the upsurge in aquaculture will surpass the importance of the Green Revolution in agriculture by filling the gap between declining wild stocks and increasing population demands (Kwei-Lin 2001; The

Economist 2003; ASEAN-SEAFDEC 2002). However, there is growing critical analysis over the ability or desirability of achieving a Blue Revolution. As Kelly (1996) outlines:

Pointing out the discourses or myths that have served to legitimise aquacultural development is not of course, to suggest that some of these justifications are without merit. Issues of food security and employment are indeed fundamental in considering development strategies. But when seen as discourses of development, accepted truths can be destabilised and opened to critical scrutiny - in short they can be demythologised. Like myths, they are not necessarily untrue, but they serve to veil the uglier parts of the story ... Such issues are felt most acutely at a local level and so are best illustrated through a specific example. (p.47)

Critical reflection of aquaculture within the wider agendas of living aquatic resources management and international development must include key assumptions that underlie living aquatic resources management and development. The benefits of aquaculture should, as Kelly states, be 'demythologised' to make clear the possibilities of aquaculture rather than seeing it as a panacea for development and poverty alleviation. Kelly further argues that this is best done through empirical, local level research.

Stemming from the practical analysis of this thesis is also a series of theoretical problems relating to the epistemology of responses to environmental degradation, management and development. These problems are drawn from the meaning and application of 'ecology' as an heuristic for understanding complex, diverse and resilient systems and its role in integrated political ecology and geographical research. This draws specific attention to the difference between simple linear and complex multi-linear systems, explanations and representations.

Linear systems describe progression or development from one state to another or, alternatively, a cause and effect relationship between two states. Within international development linear models have dominated. These include Rostow's (1961) stages of development, Wallerstein's (1979) world systems theory and Frank's (1967) dependency theory. These models have been challenged by a number of authors, most notably Hettne (1995), however a linear teleology within international development persists.

Linear systems also describe cause and effect relationships whereby explanations for a problem are more easily articulated and solutions formulated. This is characteristic of

the global fisheries crisis where the decline in fish supply is explained through a simplified narrative of overfishing and increased demand and responded to through narratives of increasing production. This thesis refutes such simplifications by arguing that linear explanations do not account for complex and contingent causes of fisheries degradation, or provide nuanced understanding for the formulation of adequate responses. Instead, a multi-linear approach is taken as a starting point to critical reflection. In doing so analysis draws on an ecological framework through which the concept of multi linearity can be applied to explaining fisheries degradation. As such, this thesis extends this notion of ecology within political ecology. Particular attention is given to the critical employment of political ecology with an emphasis on how the multi-linear capacity of 'ecology' can provide an important and often overlooked approach to social-environmental interaction operating at multiple scales.

In summary, the need for better analysis of environmental and development orthodoxies is well established. This thesis aims to critically assess the assumptions that constitute wider orthodoxies of living aquatic resources management and development. Particular attention is given to understanding the role of aquaculture and capture fisheries in rural livelihoods and critical reflection on how this role is reflected in policy and planning. In doing so analysis also focuses on the theoretical debate surrounding the role of ecology in political ecology, by analysing how the concept can reveal complex, diverse and resilient human-environment interrelationships.

### **1.5 The Mekong Basin**

The Mekong River is the 12th longest river in the world and 8th largest in terms of discharge. The Mekong Basin covers 795,000 square km and is home to approximately 65 million people living in the five riparian countries: Yunnan province (PR China), Burma, Thailand, Lao PDR, Cambodia and Viet Nam. This river system is comprised of a number of aqua-ecosystems that include the mainstream Mekong River, main tributaries, small streams, seasonal back swamps, and wet-rice fields which are spread across a range of mountainous, floodplain and estuarine ecosystems (Figure 1-2). The Basin has 1200 recorded species of fish, however estimates have been made upwards of 2000 (Rainboth 1996; MRC 2001; van Zalinge *et al.* 2003). The variety of species and habitats throughout the Basin has meant that there is a great diversity in fishing gears numbering over 160 in Cambodia alone (Claridge *et al.* 1997; Deap *et al.* 2003). The

total estimated yield from the fishery ranges from 2.1 to 3.2 million tonnes per year, of which aquaculture makes up approximately 8% (Table 1-1).

Living aquatic resources are coming under increased pressure within the Mekong Basin as competition for water increases. There are many examples including the downstream impacts of hydro electricity dams (Baird *et al.* 2002; Roberts 1996; Bakker 1999), the competition over water for irrigation (Lorenzen *et al.* 2000; Kamkongsak and Law 2001) and the development of navigation channels (Meynell 2003).

**Table 1-1 Fisheries production estimates in the Mekong River Basin**  
(Source: van Zalinge *et al.* 2003)

Country	Population	Average per capita consumption	Total <sup>1</sup> fish consumption	Capture <sup>2</sup> Fisheries Catch	Reservoirs <sup>3</sup> fish catch	Aquaculture <sup>4</sup> production
	(million)	(kg)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Cambodia	11	65.5	719,000	682,150	22,750	14,100
Lao PDR	4.9	42.2	204,800	182,700	16,700	5,400
Thailand	22.5	52.7	1,187,900	9,323,00 <sup>5</sup>	187,500	68,100
Viet Nam	17	60.2	1,021,700	844,850	5,250	171,600
<b>Total LMB</b>	<b>55.3</b>	<b>56.6</b>	<b>3,133,400</b>	<b>2,642,000</b>	<b>232,200</b>	<b>259,200</b>

<sup>1</sup>Sjorslev 2001 recalculated by Hortle and Bush 2003

<sup>2</sup>Total consumption minus Reservoir catch and Aquaculture production

<sup>3</sup>MRC Management of Reservoir Fisheries data

<sup>4</sup>Phillips 2002

<sup>5</sup> Includes a large part of the probably more than 50,000 tons of freshwater fish products exported from Cambodia to Thailand (Van Zalinge *et al.* 2001).

LMB – Lower Mekong Basin

Fundamental to the development of the Basin is the underlying perception of an ‘under-utilised’ or ‘uncontrolled’ river both in policy and planning. Karen Bakker’s (1999) study on the politics of hydropower development in the Basin highlights this point by arguing that water is framed in technocratic terms of “... ‘uses’ and ‘users’ rather than the reprioritisation or displacement of uses” (p. 220). ‘Under-utilisation’ directly reflects the lack of understanding about the living aquatic resources. Organisations such as the Mekong River Commission (MRC) have, in recent years, concentrated on assessing and advocating the value of the Basin’s ‘fisheries’. They have attempted to place an economic value on the fishery to align it with the accounting systems of environmental and social impact assessments. Despite an estimate of the annual monetary value of the fisheries at US\$1478 million, their efforts have been restrained by the lack of timely and

accurate statistical information (Sverdrup-Jensen 2002; Coates 2002). The perceived underutilisation of water resources has meant that little attention has been given to establishing the importance of living aquatic resources reliant on these waters. There is, therefore, a need for alternative methods of assessing the inland fisheries that not only provides statistics but also information that highlights the importance of the resource to communities (Coates 2002). Nevertheless, a central challenge remains in coordinating the multiple interpretations of ‘importance’ and translating them into policy and planning.

Mekong fisheries are understood by different people in different ways. This leads to a variety of research agendas and value systems that influence the ways in which the fishery resources are managed and developed (Hirsch 2003). For example, both capture and culture fisheries are valued through biodiversity, consumption and economic value. However, at the regional and national scales these values do not resolutely show the importance of living aquatic resources to local rural communities. As such, there are discrepancies between national and regional accounting and reporting of fisheries and local realities.



Figure 1-2 The Lower Mekong Basin

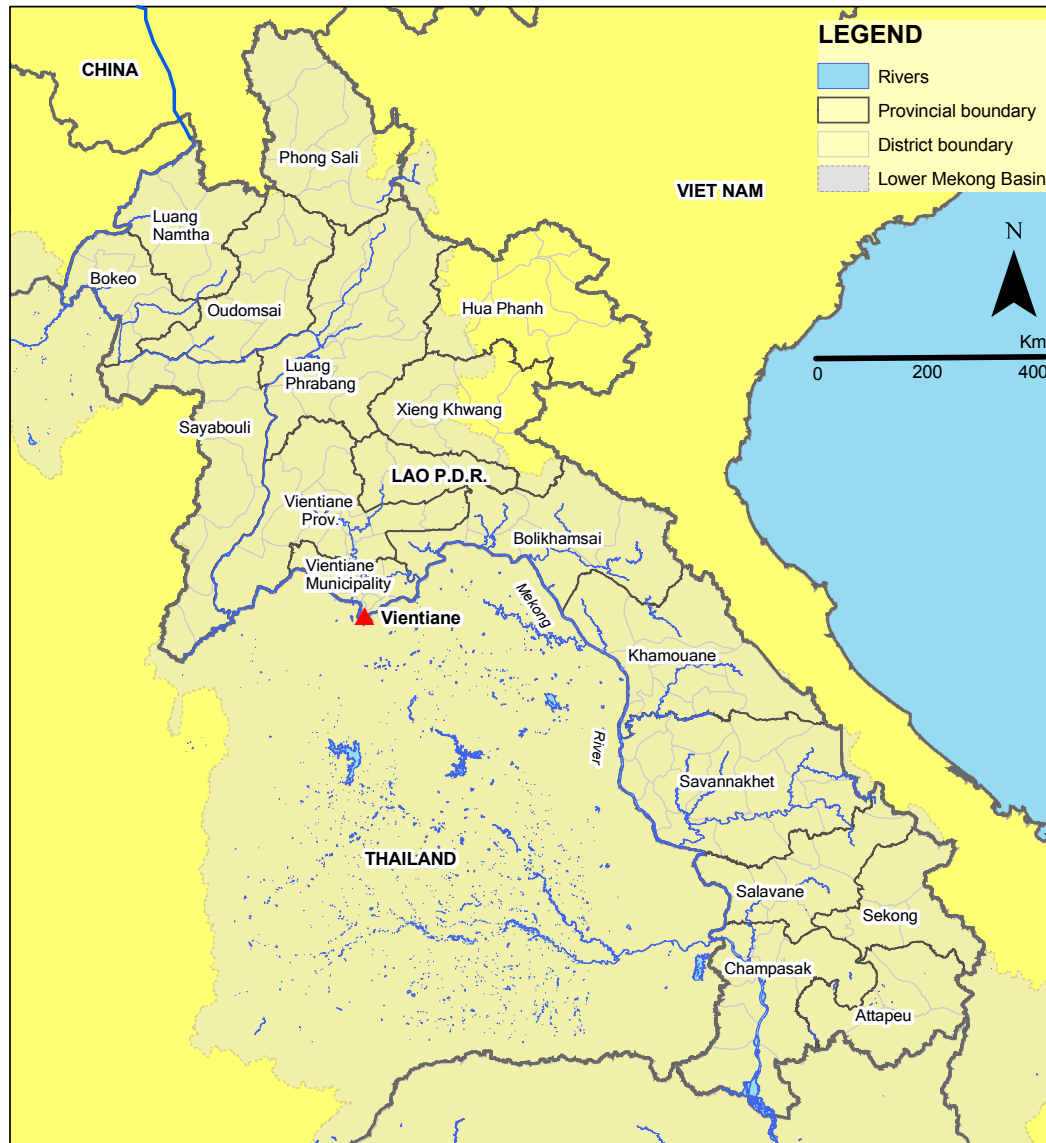


Figure 1-3 Lao PDR

## 1.6 Lao PDR

Lao PDR is a small landlocked country in the heart of the Mekong Basin (Figure 1-3). The country has a population of around five million people, the majority of whom live in rural, and often remote areas characterised by poor development indicators such as high infant mortality and malnutrition (UNDP 2001). As such the country is ranked among the poorest in the Southeast Asia in terms of both GDP and Human Development (ibid.). The predominantly rural subsistence based population is dependent on natural resources. However, these resources are coming under increased threat from the development of a market economy oriented to integration within the wider regional economy. Despite

nearly 20 years of market reforms the government remains one of the poorest in the world and highly dependent on international aid.

### **1.6.1 Poverty and the natural economy**

The country is rich in natural resources. Around half of the country's area remains under forest making it one of the most forested countries in Southeast Asia (Rigg and Jerndal 1996). Laos also provides the largest contribution to total discharge of the Mekong River, with an estimated 35% of total flow in the dry season and 80% in the wet season (Mekong Secretariat 1970). The various aquatic environments that exist in both upland and lowland areas across the country are an important resource for 80% of the population living in rural areas (UNDP 2001). Throughout the country there is a high dependence on natural resources. A lot of attention has been given to non-timber forest products across the country. Living aquatic resources have been given less attention, however fish and frogs have rated as important NTFPs and their importance is increasingly recognised. As Gordon Claridge (1996) describes:

In most rural parts of the lowland plains, as well as in much of the uplands, fish and other aquatic animals provide between seventy and ninety percent of the animal protein in people's diet. For many of these people, not yet or barely in the cash economy, there is no affordable substitute source of protein. (p.10)

The importance of living aquatic resources has been neglected in planning and policy. Very little information exists, with most policies based on anecdotal evidence (Coates 2002). No record of fish or fisheries has been kept by the National Statistic Office, despite a long inventory of agricultural production since the 1950s. Information that has been kept is often grossly inadequate. In an extreme example, market data of fish has been collected in major regional markets for many years. However, the data is summarised into two non-descript categories, *Carp 1* and *Carp 2*, rendering any meaningful analysis impossible.

The importance of natural resources such as NTFPs and living aquatic resources for basic subsistence is not widely recognised by government and non-government organisations alike. Where it is recognised these resources are often associated with poverty. It is estimated that income from NTFPs (of which fish is ranked the second

most important, see Foppes and Dechaineux 2000) ranges from 40% to 60%, and as high as 80% where alternative income sources do not exist (UNDP 2001). Despite this, the main development focus of the government and villagers alike is that of livestock and wet rice production. These are, in fact, the two main identifiers of poverty in rural Lao communities. As the Asian Development Bank funded Participatory Poverty Assessment outlined:

In general, the main priorities [of rural villages] are still centred around land and livestock, but with the added features of irrigation for paddy expansion and cash cropping, which can be interpreted as the beginnings of a trend towards realizing needs for economic growth beyond subsistence. (NSO 2001, p.71)

The transition to economic growth, from subsistence farming, is a central tenet of development in Lao PDR. The move from a natural, subsistence based economy to a market oriented economy is focused on agriculture and exploitation of the two most abundant resources, water and forests. The natural resource dependency of the population reflects the relative isolation of most communities and the abundance of dispersed and locally available food and income from forest and aquatic habitats. The UNDP (2001), in their *National Human Development Report*, argues that the diversity and complexity of these resources is the exact reason they have not been incorporated into government policy.

### **1.6.2 Economic transition**

Economic transition has meant that there is increased pressure on natural resources, especially those reliant on forests and water. The first steps toward market liberalisation and re-integration with mainland Southeast Asia after the 1975 revolution were made in 1986 with the inception of the New Economic Mechanism (NEM) or *Chintanakaan Mai* (“New Imagination”). This was followed in 1991 with support for a multi-sector market economy and culminated in 1997 with membership to the Association of Southeast Asian Nations (ASEAN). Through externally supported initiatives for economic liberalisation, Laos has been increasingly integrated within what the Asian Development Bank has termed the Greater Mekong Subregion (Rigg 1997). This has meant that the country has been drawn into the regional resource economies of countries such as Thailand (Hirsch 1998). The threat for living aquatic resources comes from two fronts. The first is the

development of hydro-power on Lao rivers disrupting fish migration. Impacts of dams such as the Theun Hinboun on fish populations are already acknowledged (Warren 2000). The second is from increasing export trade of fish to Thai markets (Bush 2004). Both threaten the sustainability of living aquatic resource use for rural Lao communities.

### **1.6.3 Aid Dependency**

Despite the market transition and attempts to procure export income the country remains strongly dependent on international aid. This dependence has a long history. In the years leading up to the revolution in 1975 massive amounts of technical and economic assistance poured into the country. It is estimated that between 1968 and 1973 an average of US\$74.4 million of foreign aid was pumped into the Lao economy every year, most of it going to the Vientiane controlled zone making the residents the highest per capita aid recipients in the world (Chanda 1982). The withdrawal of USAID in 1975 along with a number of other aid agencies left the country nearly bankrupt once more. Economic assistance was soon sought again and reached levels comparable to the Royal Government regime (Burley 1982). The source of this funding changed to eastern Bloc countries through the Council for Mutual Economic Assistance (CMEA) (ibid.).

The influx of international assistance has meant that the country is subject to international influences through both foreign direct investment and technical assistance. The result is that management and development of the country's natural resources, on which the population relies, is influenced by the large number of development organisations, each with different goals and agendas. For living aquatic resources this means that there are often competing aims and agendas which the Lao government has to negotiate. Knowledge, management and development of the natural environment and the livelihoods of the Lao population are therefore drawn into a highly politicised development arena.

## **1.7 Methodology**

This thesis continues in the tradition of political ecology by critiquing the relations between local realities with the power and influence of global orthodoxies. As there is very little information on living aquatic resources in Laos this thesis has sought to provide a strongly empirical research project. The methodology therefore uses a mix of quantitative and qualitative methods to understand the cultural, social, environmental,

political and economic factors influencing living aquatic resources. This draws upon what Simon Batterbury *et al.* (1997) refer to as hybrid research, integrating critical social science with a strong ecologically based knowledge. Each chapter uses specific methods including geographical information systems, market and food consumption survey techniques. The qualitative analysis employs semi-structured interviews, participant observation, focus groups and participatory research tools with villagers. Each method is outlined in the relevant chapters.

### **1.7.1 Triangulation, multiple methods and scale**

An overall aim of the research framework is to triangulate results from a number of sources and scales of investigation. Each of the following chapters communicates different knowledge and perceptions about the geography of living aquatic resources based on empirical research that uses multiple methods. The use of multiple methods is also a central part of a geographically focused political ecology approach as outlined by Karl Zimmerer and Thomas Bassett (2003). They argue that within a political ecology research framework:

Multimethod analysis of coupled political-ecological processes is needed to interpret these socio-environmental changes and the challenges they represent (p. 9)

Intrinsic in their approach, and in this thesis, is analysis that incorporates multiple actors operating at multiple scales. The following seeks to investigate and subsequently interpret the realities of the particular, placing them within larger political, economic and social contexts. By combining multiple scales and the complex relationships between them, the methodology aims to compare diverse realities at the local level with wider orthodoxies and knowledge. As Sara McLafferty (1995) argues:

...[By] coupling the power of the general with insight and nuance of the particular... research illuminates people's lives and the larger contexts in which they are embedded (p. 440)

This provides a framework for analysis around which this thesis is based. Each chapter operates at a different scale thereby integrating the multiple characteristics of aquaculture and capture fisheries with an understanding of the relative importance of living aquatic resources to rural Lao communities.

### **1.7.2 Rigour and reflexivity in the research process**

Rigour is defined by Baxter and Eyles (1997) as “the satisfaction of the conventional criteria of validity, reliability and objectivity” (p.506). This requires the researcher to critically reflect on their work, the analytic views of the interpretive community (in this case academia) and finally understanding the world the way those that are studied see it (ibid.). In order to maintain rigour the combination of multiple methods in this thesis required a high degree of reflexivity and continual internal ‘auditing’. In particular this required the continual negotiation of my position with a range of people in Laos from fishers and farmers as well as government and non government staff.

Reflexivity requires the researcher to identify all of the intrinsic biases of the researcher including their institutional setting, ethnicity, class and gender (Gubrium and Holstein 2000). This is encompassed within the ‘fallacy of empiricism’ outlined in Roy Bhaskar’s (2002) critical realism. The basic premise of his argument is that no research is empirical as it is mediated at some point by the active and politically oriented position of individuals and the institutions in which they work. The elucidation of biases in social research has deep roots within qualitative enquiries such as ethnography and participant observation, however have received less attention in geography (Limb and Dwyer 2001). Geographical research that seeks to reconstruct, communicate and critically analyse reality must be cognizant of any such biases. This thesis draws on this approach by taking a critical, reflexive view of the researcher/subject binary to understand the motivations behind both *what* and *why* information was being provided by respondents.

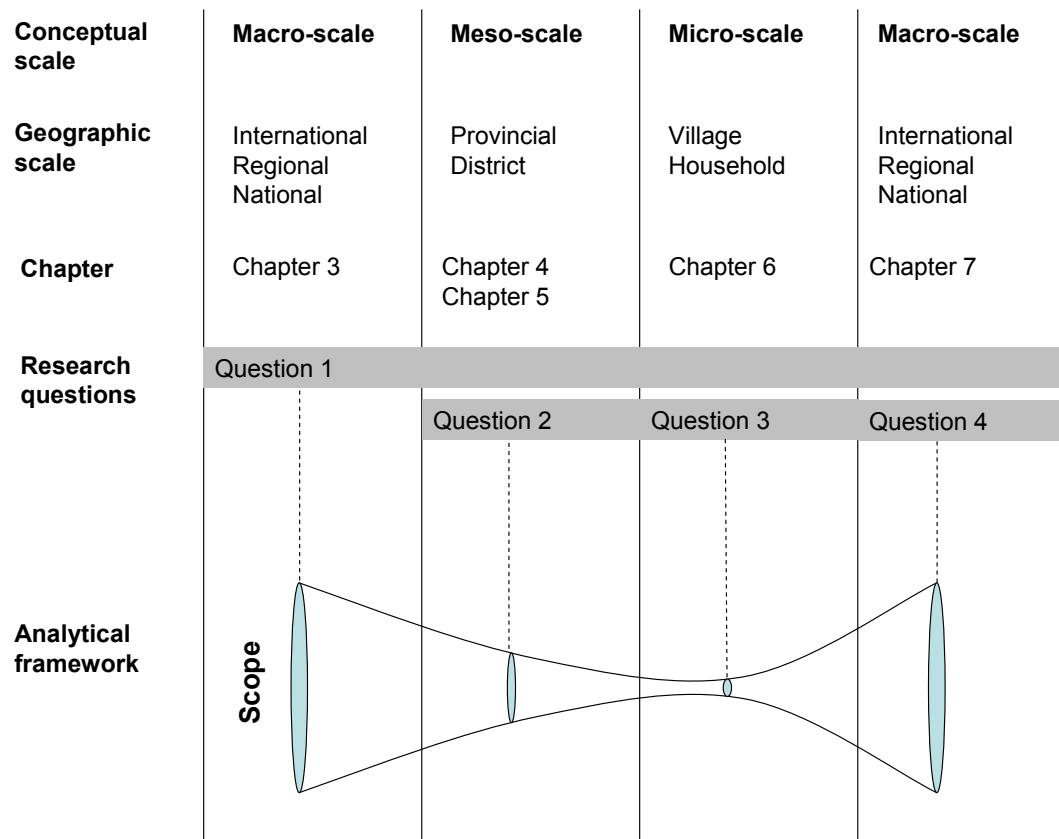
The nature of the research meant that a large and diverse number of people were interacted with both formally and informally. As a result a high degree of reflexivity was called upon in order to position myself as a foreign, male researcher within a range of social and cultural circumstances dealing with people ranging from fishers, farmers, traders, and government officials ranging across all demographics in district, provincial and national scales. Although I was always an ‘outsider’ to the people and government of Laos I was able to continually negotiate my position in a range of social and cultural circumstances. A primary strategy was the long time spent in-country. The 18 months of field-work in Savannakhet and Vientiane meant that strong friendships were developed with both the subjects of the research and government staff, the ‘gate-keepers’

of access to information under the socialist system. These friendships developed a strong sense of trust between me and the subjects of the research which proved an important factor in obtaining information in Laos where civil society is limited by government control.

At every opportunity there was consideration of the position of the researcher and the subject. A number of social and cultural barriers were negotiated through my extensive interaction with the research subjects over the field work period and my ability to speak Lao language. Nevertheless, a concerted effort was given to socially positioning myself ‘underneath’ participants by referring to myself as *Nong* (or younger brother) when in conversation. This pronoun was used in all circumstances, even when it was not clear if the subject was younger or older than me. This was an important method of breaking down formal barriers created by alternative titles given to me such as *seosan*, meaning expert, or *ajan*, a title of respect given to teachers.

### **1.7.3 Analytical framework**

The analytical framework of this thesis draws on the notion of ‘progressive contextualisation’, developed by Andrew Vayda (1983) to describe human-environment interactions within wider and deeper contexts. This is applied by contextualising development orthodoxies with grounded empirical research across a series of contiguous scales. Vayda argues for no *a priori* assumptions to be made about the systems being studied. Nevertheless, most research carried out over multiple scales usually take a ‘conical’ approach, either starting with the general and then ‘zooming in’, or starting with particular and ‘zooming out’. The analytical framework of this thesis is a hybrid between these two more traditional scale sensitive frameworks by adopting an ‘hourglass’ approach (see Figure 1-4). The central question of this thesis addresses the scaled linkages between global orthodoxies, environmental policy and the local ‘realities’ they govern. Analysis therefore starts at macro spatial and temporal scales and progressively ‘zooms in’ to meso and micro scales of empirical research before once again ‘zooming out’ to the macro scale at which policy is formulated.



**Figure 1-4 Thesis structure and analytical framework**

Analysis begins at a wide spatial and temporal scale in order to contextualise living aquatic resources development in Asia, Southeast Asia and finally in Lao PDR. Empirical research is then presented at three scales progressively throughout the thesis. First, at a meso-scale which includes provincial and district administrative units where management decisions are derived. Attention is then drawn to village level empirical research. The final chapter critically analyses the development of policy and planning over living aquatic resources in light of the relationship between orthodoxies and grounded realities. Drawing on Vayda’s work, knowledge, use and management of the resources are gradually contextualised from broad to local scales as the thesis progresses.

### **1.8 Outline of Thesis**

The thesis is organised into eight chapters including this introduction. The structure reflects both the multiple scales used in the analysis and the empirical research carried out at local, regional (district and province) and national levels. The aim of this structure

is to provide a broad analysis of the main orthodoxies of living aquatic resources management and development relevant to Lao PDR.

**Chapter Two** reviews the literature on political ecology and rural livelihoods and presents the basis of a geography of living aquatic resources that forms the theoretical framework of the thesis. Particular attention is given to the role of political ecology. The discussion concludes that a stronger understanding of ecology is needed within human-environment relations and especially within political ecology. It is argued that ecology therefore forms the basis for both grounded and nuanced understanding of living aquatic resources in predominantly subsistence rural Lao communities.

**Chapter Three** provides an historical analysis outlining the development of perceptions and knowledge governing living aquatic resources in Laos and the Mekong Basin. This chapter focuses on the role of international actors in creating and maintaining central development orthodoxies that influence the management and development of living aquatic resources development in Laos.

**Chapter Four** introduces the field sites on which the rest of the thesis is based. The chapter also outlines the first empirical research component of the thesis, providing a meso-scale analysis of the development of aquaculture in three districts of Savannakhet Province in Southern Laos. The analysis outlines how environmental factors influence the location of fish ponds as well as the level of investment in aquaculture across the three districts. This provides a starting point for contesting central orthodoxies supporting the role of small-scale aquaculture in poverty alleviation and rural development.

**Chapter Five** continues a meso-scale analysis focusing on the contribution of culture and capture fish to markets in Savannakhet Province. This contributes a wider understanding of the significance of aquaculture in the development of the national economy and providing protein for rural populations. The chapter begins to challenge the way in which aquaculture and capture fisheries are represented in Laos within wider discourses of poverty alleviation and national development.

**Chapter Six** outlines the difference between material representations of living aquaculture and capture fisheries within wider cultural and social context of rural Lao communities. As such this chapter provides the major focal point of the thesis. It is argued that representations of ‘importance’, such as fish consumption, reveal a narrow picture of the overall significance of either aquaculture or capture fisheries. In the absence of empirical information, living aquatic resources are politicised by the social importance placed on aquaculture.

**Chapter Seven** ‘zooms out’ to review the ways in which living aquatic resources are framed in both public policy and development agendas of non-government organizations. This chapter reflects on the empirical research of the thesis and critiques the way in which both aquaculture and capture fisheries are framed within major development narratives such as conservation, rural development and poverty alleviation. Analysis and discussion focus on the ways in which both aquaculture and capture fisheries are produced and reproduced by local representations and wider orthodoxies of the global fisheries crisis.

**Chapter 8** presents the key findings of the research and reflects on the role of a more ecologically focused political ecology within the wider project of a geography of living aquatic resources.