

Rights and Conflicts in the Management of Fisheries in the Lower Songkhram River Basin, Northeast Thailand

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Abstract A complex, pre-existing local property rights system, characterized by overlap and conflict, comprises the local basis for managing inland fisheries in communities of the Lower Songkhram River Basin (LSRB) of Northeastern Thailand. The components, conflicts and changes of the system are analyzed for fourteen communities, focusing on the auction system for barrages, an illegal and destructive, yet tolerated, fishery. These rights, adapted to gear type, seasonality, and habitat of the LSRB fisheries, are a critical social resource and proven management system that should be legitimized. Recommendations are made for both improving general inland fisheries policy and reforming the barrage fishery.

Keywords Fisheries management · Inland fisheries · Property rights · Local institutions · Fisheries policy · Barrage fishing

Introduction

Understanding property rights systems is basic to understanding the local management of resources. Yet, paradoxically, the loose definition and careless usage of terms, together with a general misunderstanding of the various types of “property,” has often impeded advances in theoretical thinking (Bromley 1992).

The issue of “collective goods,” a term that includes both public goods and common-pool resources, has been examined by political economists since the early 1950s (Ostrom 1998: 5–6), and yielded the policy prescription that to achieve their potential social benefits, collective goods must be administered by a centralized authority. Ostrom (1990, 1998) attributes that prescription to overspecialization and an enchantment with models that, based on unrealistic assumptions, grossly oversimplify reality. With its prediction that self-organization to manage common-pool resources is highly unlikely, the accepted theory of collective action has accentuated the presumed role of the State (Ostrom 1998). Worse, when units of a central or local government either fail to perform or are deemed incapable of performing, privatization, often in the form of ITQs in fisheries, for example, is recommended as an unconvincing panacea (Ostrom 1998: 6). Although government centralization ideas remain pervasive, the management paradigm shifted in the 1980s and 1990s from external coercion to public participation, community based management of “collective goods,” and co-management; changes that occurred within the context of broader new approaches to national development and assistance (Ruddle 2007a).

Also during the 1970s and 1980s, pre-existing rights-based fisheries management became an important topic. Both pre-existing—or customary rights (sometimes termed

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traditional and *de facto* rights) which are recognized by communities and often specific to them—and the rights prescribed by law (*de jure* rights), are crucial elements in fisheries management. Although they were clearly a well-understood problem for early colonial administrations in many locations (Ruddle 1995, 2007b), only in the last 30 years has the modern usefulness of pre-existing rights been acknowledged as an important factor in fisheries management (see, for example, Fa’asili and Kelokolo 1999; Hickey 2006; Johannes 1977, 1981, 1994, 2002, 2003; Johannes and Hickey 2004; Ruddle 1998a; Tiraa 2006; Veitayaki 2001). It has now been demonstrated in Samoa (Fa’asili and Kelokolo 1999), Solomon Islands (Aswani and Hamilton 2004), Vanuatu (Johannes 1998; Johannes and Hickey 2004), and Vietnam (Ruddle 1998b), among other places, that pre-existing rights may be used to design and exercise the rights of management and exclusion, which would work as an incentive in collective action for the improvement of fisheries use and management.

Research since the 1970s shows that pre-existing, local fisheries management systems, particularly for coastal-marine fisheries, are widespread in developing and industrialized countries. They are particularly common in the Pacific Basin (Ruddle and Akimichi 1984; Ruddle and Johannes 1985, 1990; Ruddle 1994a), and are widespread in insular Southeast Asia. More recently, inland water systems in continental Southeast Asia have been examined, especially in Cambodia (Degen and Thuok 1998; Kurien and others 2006), Laos (Baird 2006, 2007; Baird and others 2001, 2003; Tubtim and Hirsch 2005), and Thailand (Kuycharoen 2002). Elsewhere, research on lacustrine rights systems has been done in floodplain lakes in the Brazilian Amazon (McGrath and others 1993), Lake Biwa, Japan (Kada 1984), and Lake Titicaca (Levieil 1987), for riverine fisheries in Brazil (Begossi and others 1999; de Castro and Begossi 1995; Silvano and Begossi 1998, 2001), and in several locations in Africa, such as Lake Chad and adjacent areas of West Africa (Sand 1970; Sarch 1994; Neiland and others 1994).

Ostrom (1990) challenged both scholars and development practitioners with the essential need to “map the terrain” (Ostrom 1990: 214) for a family of models, and not just one particular model, in order to improve practical outcomes. In that direction alone is the escape from the “trap of omniscience.” In a criticism of reliance on narrowly-conceived models as the foundation for policy analysis, Ostrom (1990: 215) trenchantly writes that “[w]ith the false confidence of presumed omniscience, scholars feel perfectly comfortable in addressing proposals to government that are conceived in their models as omnicompetent powers able to rectify the imperfections that exist in all field settings.” In these models, pre-existing local systems of rules for property management are either

not recognized or willfully discarded (Ruddle 2007c; Ruddle and Hickey 2008). Worse, the models reinforce the role of government, often while masquerading as those aimed at decentralization! Not only does this toss aside perfectly viable management systems, it also adds to the tasks of governments that are either not competent to handle new challenges, or already absorbed with other tasks often erroneously perceived as more important.

At present, fisheries resources in the Lower Songkhram River Basin (LSRB) of Northeastern Thailand are managed concurrently by local communities, based on pre-existing or *de facto* rights, and *de jure* by the Department of Fishery (DoF), according to the *Fisheries Law* of 1947. Further, according to the *Thai Civil and Commercial Law* of 1925, natural resources used in common, such as shores, streams and lakes, are State Property (RTG 1930). However, concurrently, local communities recognize that individuals have ownership of fishing rights in such areas, and that they also have the right to exclude others from fishing within them. The result is a complex and multiple set of overlapping, complementary and conflicting individual, common and state property rights within a single, small geographical area used as a fishing ground.

This article has several objectives. The first is to provide a case study of fisheries management in the Lower Songkhram River Basin of Northeastern Thailand that adds to the literature on pre-existing rights in inland fisheries in Southeast Asia. Second, by identifying the property rights exercised in fisheries and describing their intricate and often contradictory dynamics, we seek to advance the theory on common pool resources. Third, by defining the rights to access and exploit fisheries resources, the transferability of those rights, and how these local arrangements affect the performance of fisheries, we seek to contribute to improved fisheries management in the LSRB.

Methods

The field research on which this article is based was done in 14 fisheries communities of the LSRB from January to March, 2007. Primary data were collected through formal and informal interviews using matrices, checklists and structured questionnaires, from which guidelines were developed for interviewing such key informants as government officers, local officials and community committees, to begin documenting and evaluating existing fisheries management. A preliminary list of fishers for interview was prepared with the village heads and community leaders during primary data collection. A pre-tested questionnaire was used for in-depth interviews with 280 fisher households, plus an equal number of 20 respondent households per village, to obtain quantifiable data on attitudes and

Table 1 Characteristics of respondents to interviews

Characteristics	%
Respondent status	
Household heads	85.7
Housewife	6.8
Son/Son-in-law	7.5
Total	100
Gender	
Male	92.1
Female	7.9
Total	100
Birthplace	
Within sub-district	81.4
Elsewhere	18.6
Total	100

perceptions regarding fisheries management. Households were selected using a random sampling method, and the sampling size determined by stratified sampling techniques. All samples included both part-time and full-time fishers engaged in both large- and small-scale fishing. As shown in Table 1, most respondents were household heads (85.7%), and most were born in the communities where they now live (81.4%).

SPSS (Statistical Package for the Social Sciences) was used for the analysis of all quantitative data. Qualitative information on the characteristics of fishing communities and their institutional arrangements obtained by the survey and a literature search were analyzed using a cross-checking synthesis. Quantitative analysis was applied primarily to examine the attitudes and perceptions of fishers and households toward fisheries concession management and resource use. A weighted average index (WAI), used to analyze the perception and attitudes of the fishers in fisheries concession management, was computed by:

$$WAI = \frac{\sum (f_i * w_i)}{\sum f_i}$$

where *WAI* = weighted average index of attitude;

f_i = frequency, and

w_i = weighted.

The measurement of attitude data was quantified by using a Likert scale technique in questionnaire surveys. An index of awareness and opinion was used to measure the degree of awareness toward the impact of fishing gear. Values were calculated based on the frequency of responses using a 5-point scale of “very high,” “high,” “neutral,” “low,” and “very low.” A 5-point scale of “totally agree,” “agree,” “not sure,” “disagree,” and “totally disagree” was used to measure fishers’ attitudes toward enforcement and content of the existing *Fisheries Law*.

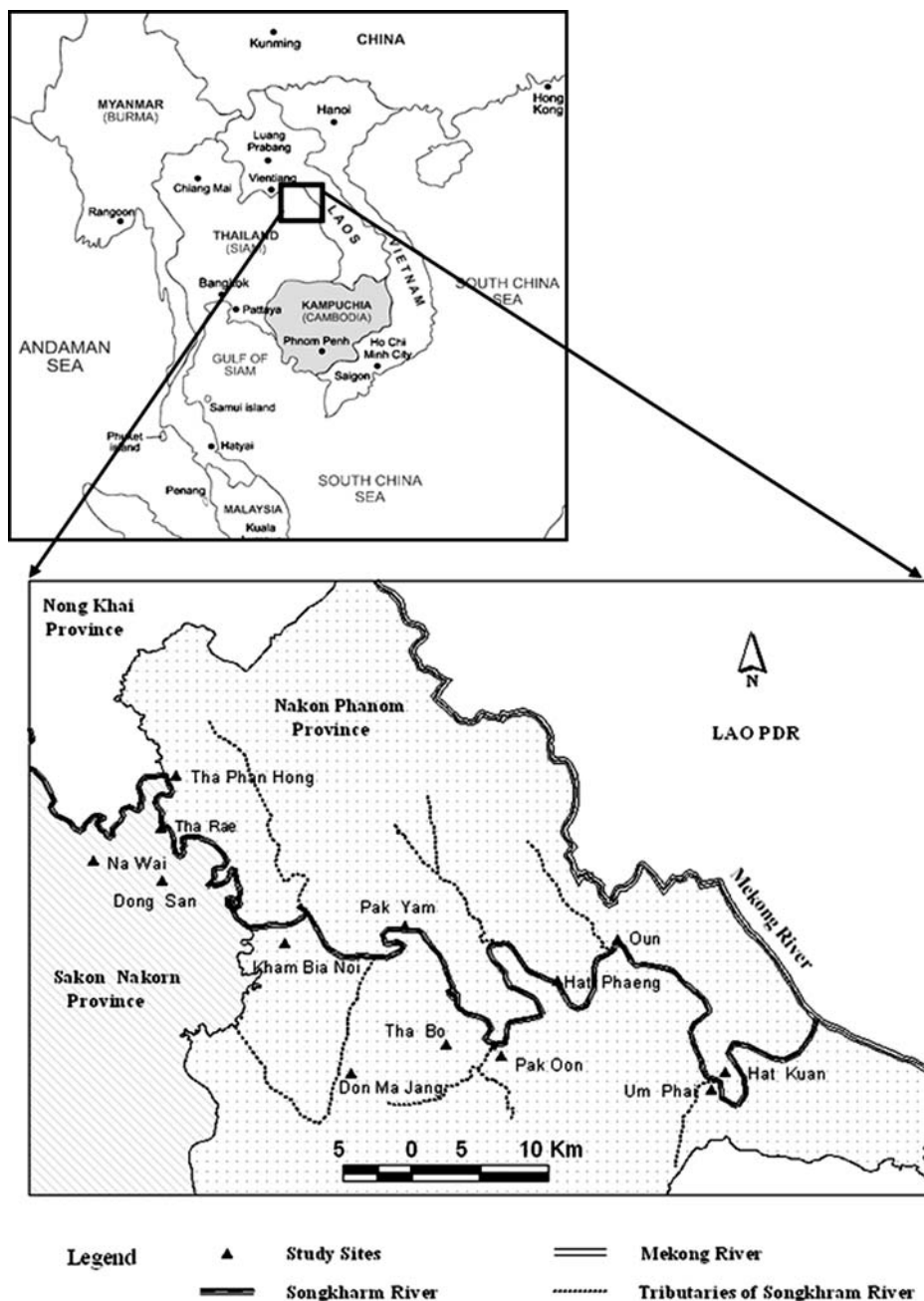
Fisheries Communities in the Songkhram River Basin

Located in the central part of the Mekong Basin (Fig. 1), and with a length of 420 km, the Songkhram River is the second longest river in northeast Thailand. The LSRB has an area of approximately 13,000 km². Formerly supporting tropical deciduous forest, the catchment has mostly been cleared for farming. Nowadays, about 39% is under rice and the balance under upland field crops, with only remnants of forest remaining (Blake 2006). About 54% of the lower basin catchment is wetland, including rice fields, that covers 108,000 ha during the June–October wet season (Blake 2006).

The Songkhram is the most fertile river, and has the highest biodiversity of any freshwater habitat in Thailand (Boonyaratpalin and others 2002). It supports a large capture fishery associated in particular with extensive wetlands, but where natural lakes, rice fields, reservoirs, and rivers are all fished (Hortle and Suntornratana 2008).

Fish biological research has been conducted by several institutions (Table 2). A high of 183 species was recorded (OEPP 1999), and low figures are 53 (KKU 1997) and 32–70 species (Yingcharoen and Vilapat 2000). Boonyaratpalin and others (2002) identified 149 species representing 33 families. The wide range reported reflects mainly differences in methodology and sampling sites, or differences in annual flood levels. Water level is particularly significant since most fish are migratory species whose arrival in and departure from inundated areas varies by family or lower taxonomic level (*cf.* Ruddle 1987). However, the fish diversity in the LSRB is higher than that of the Pong, Chi and Mun River Basin, where only 96 fish species representing 28 families were recorded (Sricharoendham and others 1998) and that of the Tha Chin Basin, where 77 fish species representing 21 families (Sricharoendham and others 1999) were recorded. A connection with the Mekong River, which permits the ingress of Mekong species, might account for the high diversity in the LSRB (Rainboth 1996).

The LSRB rainy season is from May to October, normally with a peak in August–September; the hot season occurs in March–April; and the relatively cool and dry period lasts from November to February. The migratory behavior of fish, and therefore the types of fishing gear used, is closely related to this seasonality. Three categories can be recognized, based on season and related water level (Fig. 2). First is the May to September period, when water levels increase with flow from the Mekong into the Songkhram. At this time, fish migrate with the flow for spawning and early growth, and are caught mostly with hook, long line, small trap, gill net, cover pot, casting net, spear, small bag net, and tube trap. The main fishing season occurs from September to November, when water levels

Fig. 1 Location of study area**Table 2** Summary of results of fish biological research in the LSRB

Researchers/year	No. fish species	No. fish families
Leelapat 1978	119	Not mentioned
Thachalanukit and others 1992	65	Not mentioned
KKU 1997	53	19
Vitayanon and others 1999	146	37
OEPP 1999	183	Not mentioned
Yingcharoen and Vilapat 2000	32–70	10–20
TBRN 2005	124	Not mentioned
Boonyaratpalin and others 2002	149	33

decrease with a return flow toward the Mekong, and large numbers of fish leave the creeks, small rivers and water bodies of the Songkhram system in a return migration toward the Mekong River. They are caught in large quantities using the barrage, trawl bag net, beach seine, lift net, and brush park, among others. Finally, the December to April low water level or dry fishing season is when such small-scale gear as the casting net, gill net, long line, and scoop net predominate.

It has not been demonstrated scientifically that fish resources in the LSRB have decreased. However, as part of this study, fishers' perceptions of trends in fish abundance

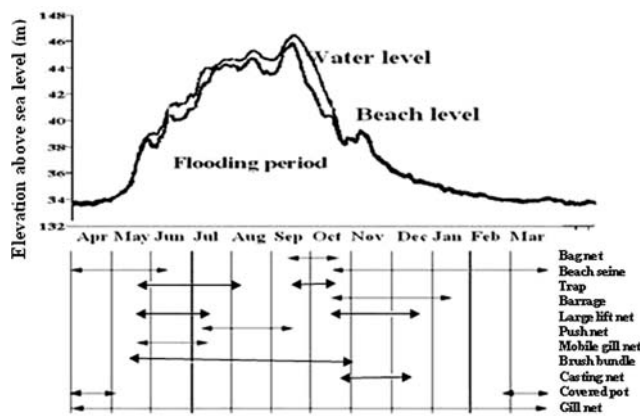


Fig. 2 Seasonal changes in hydrological regime and associated fishing gear in the LSRB

during the period 2005–2008 were examined. Most respondents (76%) claimed that a decline was evident. It is not certain to what extent this can be attributed to dam construction, since, although some tributaries have dams and two small dams have been built within the last five years along the middle reaches (Blake 2006), the lower Songkhram is without a dam. Thus its flow is still relatively undisturbed. However, large hydropower dams in China might exert an impact on the hydrological system and flood levels of the Mekong River and its tributaries (TBRN 2005; Wyatt and Baird 2007). Also, during the field research for this study, instances of unusual water level fluctuation in

the LSRB were reported, especially during recent dry seasons.

In the LSRB fishing and rice farming are the main occupations, supplemented by other local employment and migrating to other regions for work (Table 3). At an equivalent of US \$1845/yr, average household incomes are far above the Thai poverty line of >US \$588 equivalent/yr. The average household income from fishing is US \$458 equivalent/yr (Table 4) (NESDB 2004).

The LSRB population depends heavily on local fisheries for both household subsistence and cash income. Although fishing contributes little to cash income, it is crucial in provisioning the household. Most respondents (76.8%) fish part-time fish to satisfy household subsistence requirements, and for 23.2% fishing is the main occupation. There is a significant difference in fishing income among the three sectors of the basin, with the central basin having the highest (633 USD) and the lower basin the lowest (175 USD). There is no significant difference among the three sectors in either annual income from nonfishing activities or debt levels of fisheries households (Table 4).

LSRB fisheries are managed concurrently by the national Department of Fisheries (DoF) and, in many communities, by local institutions using pre-existing rights not recognized by the DoF. Compliance with local rules is high, because fishers participate in decision-making, whereas it is low with the DoF’s implementation of the *Fisheries Law*.

Most large gear used in the LSRB is illegal, according to the *Fisheries Act*, B.E. 2490 (1947), the main legislation governing fisheries in Thailand. This states that such stationary gear as large lift net, stow net, stake trap net, bag net, and barrage, can be used in Public Fisheries only if official permission has been granted. The barrage is prohibited by DoF because it is overly effective in catching all sizes of fish, as creeks and rivers are blocked with fences and mosquito nets during fish migration back to main-streams, as water levels recede from September onwards. Beach seines, electrical fishing and draining out of water are then used to harvest any remaining fish after water flow has ceased.

However, although illegal in the LSRB, barrage fishing is widespread (DoF 1953, 2005; Starr 2004), with, at the time field research, 63 barrages in operation in 14 villages. Although prohibited under the *Fisheries Law*, local DoF officers overlook the use of the barrage, because it is regarded as traditional by both local fisheries officers and operators alike. Fisheries management by the DoF is ineffective under such conditions, and both the government and the communities require a solution to the nationwide barrage fishery problem (Hartmann 2007; IFAMB 2006).

Table 3 Main occupations in the LSRB

Main occupation	Main occupations in the different parts of the LSRB (%)			Total (%)
	Upper	Middle	Lower	
Fishing	4.3	16.4	2.5	23.2
Nonfishing	24.3	26.4	26.1	76.8
Agriculture sector	11.4	7.4	12.5	31.4
Rice farming	7.2	4.6	6.1	17.9
Livestock	1.1	2.1	2.1	5.3
Watermelon cultivation	2.5	0.0	0.0	2.5
Rubber plantation worker	0.7	0.7	2.5	3.9
Cage culture of fish	0.0	0.0	1.8	1.8
Nonagriculture sector	12.8	19	13.6	45.4
Grocer	0.7	0.7	0.4	1.8
Fish trader	0.0	0.0	0.7	0.7
Community official/leader	1.4	3.6	0.4	5.4
General local employee	4.6	3.6	6.4	14.6
Migrant worker	6.1	10.7	5.7	22.5
Services	0.0	0.4	0.0	0.4
Total				100

Bold values represent the data for the sub-totals of the main occupations

Table 4 Average household income by economic sector, scale of fishery, and location

Averages income/debt	Groups of fishers (USD/household/year)		T-Test	Different parts of basin (USD/household/year)			One-way znova	Total
	Large-scale fishers	Small-scale fishers		Upper	Middle	Lower		
Total household income	2728	1610	4.540^a	1846	2011	1550	2.338	1888
Fishing income	1201	226	8.929^a	294	633	157	18.831^a	400
Nonfishing income	1492	1315	0.774	1480	1282	1326	0.561	1351
Agricultural	526	525	0.006	607	397	635	3.001	526
Nonagricultural	966	789	0.859	872	885	690	0.818	825
Total household debt	1928	1607	0.905	2144	1445	1545	2.246	1708

^a Significant at 95% confidence level

Bold values represent the data which has significant from T-Test analysis

Customary Rights over Fishing Grounds

In the LSRB communities recognize differing “bundles” of *de facto* rights over fishing grounds, the ownership of which is restricted to those families, relatives or partners with traditionally established user rights over particular water bodies. The principal bundles of rights are (1) Property Rights as an Authorized User, (2) Property Rights as a Proprietor, and (3) Property Rights as an Owner (Table 5).

Rights as an Authorized User

An “authorized user” has the *de facto* rights to place small fish traps and long lines across watercourses. The first occupants of these fishing grounds at the beginning of each fishing season are recognized as the sole rights holders for that season only, and others are not permitted access. These are simply operational rights for authorized users to access and catch fish in designated areas, and do not allow participation in collective action to determine operational rules for harvesting or exclusion, which are defined by local community members, based on custom.

Rights as a Proprietor

Communities recognize as a “proprietor” those of their membership who own large vertical cylinder traps, seine nets, and large lift nets, all relatively efficient gear, the effectiveness of which depends mainly on fishing location. Because of their large size, these gear types usually require permanent installations on a dedicated patch of land. In general, those recognized as proprietors are first occupants. The most suitable grounds for these gear types are all owned and fished each year continuously by the same proprietor. Since these rights are generally inviolable, locations available to newcomers are rare, except when proprietors do not exercise them for 1–2 years. Proprietors can transfer the rights to their children or other relatives, but rights cannot be sold.

Rights as an Owner

Rights holders of grounds for stationary trawl bag nets and barrages are regarded as “owners,” of fishing grounds that are just like plots of rice land. Because these two large gears target fish during their return migration to

Table 5 *De facto* rights to fishing grounds in the LSRB by gear type and status of user

Gear type	Type of right				Status of user
	Access and withdrawal	Management	Exclusion	Alienation	
Small fish trap	X	–	–	–	Authorized users
Long line	X	–	–	–	Authorized users
Large vertical cylinder trap	X	X	X	–	Proprietor
Seine net	X	X	X	–	Proprietor
Brush park	X	X	X	–	Proprietor
Large lift-net	X	X	X	–	Proprietor
Stationary trawl bag net	X	X	X	X	Owner
Barrage	X	X	X	X	Owner

(Adapted from Ostrom and Schlager 1996). Note: X indicates right possessed

mainstreams, their proper placement is the main determinant of harvesting rates. As a consequence, all the best locations have long been owned. The basic features of these rights are that (1) owners can exclude others from their fishing ground, and (2) the rights can be sold, rented or inherited.

Returning Rights from Private to Common Property in Barrage Fishing

As has been widely noted (e.g., Ruddle 1994b), economic, political, and related change triggers an alteration of property rights regimes. This has occurred throughout Thailand since the late-1950s, as the rural economy, including fisheries, changed from local subsistence and barter to external market-oriented commercialism. Then, in the 1980s, the Thai political system was decentralized, and Sub-district Councils and Administrative Organizations were authorized to manage natural resources.

The barrage fishery is the most lucrative commercial fishing gear used in the LSRB, with an annual income ranging from 1516 to 31,513 USD, and catch sizes between 50 and 100 kg/day, depending on barrage size and location (Ngoichansri and Thongpun 2003). Annual operating costs are in the range 176–2352 USD, mostly for bamboo, ropes, nets, and salt for processing fish, and the auction cost varies from 88 to 8823 USD. The barrage fishery yields an average rate of return of 150% on total investment costs (i.e., operating plus auction costs).

As a result of both administrative change and the evolution of the Thai rural economy since the 1950s, major changes have occurred in the barrage fishery in LSRB. Formerly, barrage fishing grounds were owned by individuals as a private property. But from 1986 this fishery was reclaimed by communities, and converted to a common property. The reclamation idea was agreed to in 1986 by the community leaders (villages heads [*Phu Yai Ban*] and sub-district heads [*Kamnan*]). They wanted the barrage fishery changed from an individually-owned, private property, to a common property managed by communities, because (1) income from barrages was required to supplement limited official budgets for community development, and (2) barrage fishing grounds are part of a community's territory, so the entire community should benefit from the income generated, and not just individual and mostly nonresident rights-holders.

However, full implementation of the leaders' decision required 12 years (1987–1999). First, cancelation of individual rights was agreed in 1986, and it was further agreed that from 1987–1995 operation of barrages would rotate alternately between original rights owners and communities, after which the right would be held by the

communities alone. But implementation during 1987–1995 was difficult. Although the original right-holders lost their benefits as a result of the agreement, they continued to regard barrage fishing as their heritage. Consequently, conflicts and negotiations continued until 2000, when District Officers entered the negotiations, and arranged an agreement among community members and individual owners. Nowadays, most small and low-yielding barrages grounds are still held by individuals, who donate money to the communities. Large barrages are owned by communities, who manage them through an auction system.

The Barrage Fishery: Local Institutions Governing a Common Property

Following reclamation of the fishery, many communities decided to auction the right to operate large-scale barrages and use the income generated for community purposes. The process begins in April–May, when the community meets to decide the details of the auction. Preparations are then made to disseminate auction information, either by official letter or during the monthly community committee meeting. The auction is announced for 5–7 days in June. Bidding takes place before September, at either Village Halls or Sub-district Council Offices. Both Village Committees and Sub-district Administrative Organization members (*Or-Bor-Tor*) act as committees to monitor the bidding, to which DoF staff are invited as observers. After the auction, the highest bidder is announced, and contracts signed between the Village Head of the community in which a barrage is located and winning bidder. Normally, the contract defines the rules of barrage operation and bid price payment.

Village heads then announce the exclusion of nonrights holders from barrage areas for at least one month before the successful bidder begins fishing. That announcement signifies the temporary return of the common property rights (barrage fishing grounds) to a private property rights regimes (highest bidder) for about seven months, the exact time depending on the water level during the period contracted, from when the auction ends until the end of barrage fishing period. After fishing has finished, barrage areas return to a common property status, and can then be fished by all community members, whose activities must accord with the *Fisheries Law*.

The process demonstrates that communities are able to ensure that fishers comply with state law by involving the Or-Bor-Tor (Sub-District Administration) and the DoF in the bidding process, because they know that both have authority in natural resources management according to both the Thai Constitution (of 1997 and revised in 2007, but with the sections relating to local management

Table 6 *De facto* rights of the different categories of rights holders under the barrage auction system during both auctioned and nonauctioned seasons

Category of rights-holder	Rights during auctioned season (September–January)	Rights during nonauctioned season (February–August)
1. Communities	Collective choice rights that regulate use patterns and sale as well as exclusion of nonrights holders	Management by maintaining constant rate of use to fit the legal requirements
2. Highest bidders	Access & withdraw rights as authorized users; fishing and transfer or sale of harvesting rights allowed	Access & withdrawal rights under both state and customary laws that allow harvest of both fish and other wild foodstuffs
3. All other residents	Access rights; collecting of wild foodstuffs except fish	Access & withdrawal rights under both state and customary laws that allow harvest of both fish and other wild foodstuffs

unchanged) and The *Fisheries Law* of 1947. Although DoF officers are loathe to become involved officially in the process, because the barrage is an illegal fishery, their presence as observers indirectly ensures the auction system functions smoothly. The village committees and Or-Bor-Tor members play different roles; definition of the barrage locations to be auctioned and establishment of minimum bid prices are the responsibilities of the villages committees, whereas Or-Bor-Tor members are involved in making the bidding arrangements and allocating income from the auction.

Essentially, the auction system represents the formal collective agreement of the community members to pursue those common interests that have no negative effect on any of them. Their decisions are based on a consideration of three main factors: (1) the budgetary requirements for community development, (2) the locations of barrages to be auctioned (they should be far from the village and have the community members' consent), and (3) the number and minimum bid prices of barrages to be auctioned. This fluctuates depending on regional water levels. Fewer barrages are auctioned in years with below average rainfall and lower than average regional water levels, so as to permit all community members to fish and thereby maintain a supply to all households. These decisions are made by the community members at the meeting preceding an auction.

Because of the high costs incurred in operating a barrage, in former times city-based capitalists were usually the highest bidders at auctions, and it was difficult for poor people to participate. To overcome this, in 1997 the auction committee revised the rules on auction payments. Now a winning bidder can pay 50% of the total bid price on signing the contract, and the balance either one month later, for outsiders, or after the fish harvest, for community members. As a result, more community members now are able to make the highest bids, either as individuals or as a partnership of 5–7 persons who share the investment and labor.

Since 1987, income from the auctions has been shared among communities, sub-district councils and district offices, although the share proportions have changed during the last 20 years. During the initial period (1987–1992) revenues were shared at a ratio of 40:40:20, respectively. From 1993 to 1996, when the government promoted a decentralization policy, the District Office received no share, and income was shared between the communities and sub-district council at a ratio of 60:40. Then, in 1997, the Or-Bor-Tor was established to replace the Sub-District Council Office, and the sharing between village and Or-Bor-Tor was re-set at a ratio of 70:30. In 1999 the share was changed yet again, and since then all income from barrage auctions goes just to the communities (the only exception being in Phon Klam Sub-district, Sakhon Nakhon Province, where 10% of the income goes to the Or-Bor-Tor).

Nowadays, possession of the *de facto* rights for the barrage fishery alternates between the community and individuals. Communities collectively agree to auction barrages and decide access and use rules for them. Winning bidders are the authorized users, since they have only operational rights of access and withdrawal, and cannot establish management and exclusion rules. However, they can transfer and sell their harvesting rights, as when they sell them to small-scale fishers, and others may access the barrage areas for collecting wild foodstuffs, but not for fishing. Finally, after barrage operations cease the fishing grounds again become a common property open to the entire community (Table 6).

Conflict Between Local and Legal Rights in Fisheries Management

Serious problems have occasionally arisen since communities began auctioning the rights for barrage fishing, such that most fishers believe that the system has had more negative than positive impacts. A particular grievance is that the system enables a few wealthy individuals to exploit

Table 7 Attitudes of large and small-scale fishers toward enforcement of the current fisheries law in three locations of the LSRB

Clause of fisheries law	Scale of fisher			Basin location of fisher communities						Total		
	Large		Small		Upper		Middle		Lower		WAI	LA
	WAI	LA	WAI	LA	WAI	LA	WAI	LA	WAI	LA		
Section 9, 13: Fishing or aquatic animals culture are prohibited in the legal conservation zones, without permission of the Director-General of DoF	1.45	TA	1.60	TA	1.65	TA	1.61	TA	1.35	TA	1.60	TA
Section 17: Any structure and plantations are prohibited in public water bodies, without official permission	0.05	A	0.79	A	0.63	A	0.44	A	1.12	TA	0.64	A
Section 18: Draining water from public waters bodies for fishing is prohibited without official permission	0.83	A	1.18	TA	1.23	TA	1.02	TA	1.12	TA	1.11	TA
Section 19, 20: Fishing with poison, chemical, bomb and electricity prohibited, except for officially permitted research	1.70	TA	1.71	TA	1.87	TA	1.74	TA	1.42	TA	1.71	TA
Section 20 bis: Trading prohibited in aquatic animals, known to have been acquired using poison, chemical, bomb and electricity	1.31	TA	1.40	TA	1.40	TA	1.41	TA	1.25	TA	1.38	TA
Section 22: Construction of dam, screen fence, fishing nets or other activities that obstruct migration of aquatic animals is prohibited without official permission except for agricultural purposes on private land	0.14	A	1.10	TA	1.06	TA	0.71	A	1.07	TA	0.89	A
Section 32 (5) Fishing prohibited during the spawning or breeding season for freshwater aquatic animals from May 16 to September 15, unless for scientific research	0.51	A	0.52	A	0.61	A	0.43	A	0.88	A	0.58	A
Section 32 (2) Use of seine, trawl, push, and surrounding nets prohibited in public water bodies	0.04	A	0.04	A	0.98	A	0.85	A	1.07	TA	0.93	A
Section 32 (2) (4) Use of trawl, seine, surrounding, and push nets and similar gear operated with motorized vessels prohibited in public water bodies	0.88	A	0.09	A	0.98	A	1.02	TA	1.02	TA	1.01	TA

WAI = weigh average index, LA = level of attitudes, 1–2 = totally agree (TA), 0 to 1 = agree (A), –1 to 0 = disagree (D), –2 to 1 = totally disagree (TD)

Table 8 Attitudes of fishers toward impacts of fishing gear used in the LSRB

Type of fishing gear/Impacts	Damage to juveniles		Damage to other gears		Damage to habitats		Damage to broodstock	
	WAI	LI	WAI	LI	WAI	LI	WAI	LI
1. Gill net	0.23	L	0.21	L	0.22	L	0.23	L
2. Vertical cylinder trap	0.31	L	0.24	L	0.25	L	0.36	L
3. Push net	0.56	M	0.52	M	0.42	M	0.48	M
4. Surrounding net	0.71	H	0.50	M	0.53	M	0.70	H
5. Barrage	0.81	VH	0.58	M	0.53	M	0.81	VH
6. Stationary trawl bag net	0.71	H	0.54	M	0.42	M	0.72	H
7. Large lift net	0.37	L	0.30	L	0.28	L	0.40	M
8. Small lift net	0.15	N	0.12	N	0.03	N	0.05	N
9. Casting net	0.02	N	0.01	N	0.02	N	0.04	N
10 Long line	0.21	L	0.09	N	0.06	N	0.07	N
11 Small fish trap	0.03	N	0.06	N	0.01	N	0.01	N

WAI = Weigh Average Index, Level of Impact (LI) 0.01–0.20 = No impact (N), 0.21–0.40 = Low impact (L), 0.41–0.60 = Medium impact (M), 0.61–0.80 = High impact, 0.81–1.00 = Very high impact (VH)

Bold values represent the data for the barrage fishery

Table 9 Catch of barrage fisheries compared to other large-scale fishing gear used in the LSRB in 2001–2002

Large-scale gear types	Number of gears	Days of fishing (day/year)	Catch (kg/gear/day)	Total catch (ton)
1. Barrage	64	110	77.0	522.5
2. Stationary trawl net	136	35	34.7	149.1
3. Beach seine	56	105	36.1	245.5
4. Large cylinder trap	5,584	120	0.30	181.4
5. Large lift net	177	50	35	278.8
6. Push net	24	30	40	24

Data Source: Boonyaratpalin and others 2002

fisheries resources commercially and destructively while excluding the many small-scale, subsistence fishers. That inequality of access has led to conflict among fishers and their community representatives; between local communities and local DoF officers; between small- and large-scale fishers; between bidders (rights-holders) and nonrights holders over barrage fishing grounds; and among communities with and without barrage fishing rights.

Although most people agree with the *Fisheries Law* concerning the illegality of the barrage fishery (Table 7), nevertheless, the fishery is widespread in the LSRB, where it has gained increased political and economic importance under the auction system. This indicates that the local institutions are in conflict with the legally constituted national institutions, and whenever DoF Officers attempt to enforce the law, conflict immediately arises between them and local communities. Consequently, as the field research reported here demonstrated, barrage fishing is tolerated by government even though it is known to threaten the sustainability of fisheries resources in the LSRB.

That raises the issue of the sustainability of fisheries under the auction system. Most fishers and Fisheries Officers regard barrage fishing negatively, for both ecological

and social reasons. Fishers regard it as the most destructive fishing gear in LSRB, because it harvests juveniles directly, and damages brood stock and fish habitats, which result in a long-term decline of fish stocks. Further, it is socially deleterious because it obstructs other fishing gear and therefore excludes other fishers (Table 8).

However, barrage fishing produces the highest fish yields of all large-scale gear used in the LSRB (Table 9). Since this is important to the local communities' objective of maximizing revenue, rules are relaxed when applied to barrage fishing, and local DoF officers do not monitor compliance. As a result, barrage fisheries are operated with little apparent regard for the long-term sustainability. Further, although the auction system is based on collective agreement and the principle of equally shared benefits, because barrage management is confined to just a local community it does not take into consideration the need for sustainable management of fish stocks throughout the entire Songkhram Basin. Moreover, our survey findings show that most fishers do not agree on the barrage auction system, because (1) barrages are the main cause of fisheries degradation; (2) the auction system excludes small-scale fishers, who depend heavily on the fisheries resources; and

(3) auction income is no longer important for community development, which, following decentralization, is now funded by the Or-Bor-Tor, and because the income from auctions has been declining in tandem with the decline in fisheries resources.

Conclusion

Fisheries resources in the LSRB are managed under a complex multiple-rights property regime, by which individual, common, and state property rights are defined and both combined and separated. This has resulted in overlap, conflict and complementarities, and in a varied performance. Changes in external economic and political contexts led to change in LSRB property rights, via a lengthy process characterized by struggle and negotiation, as both original individual rights holders and communities adjusted to the evolving new institutional arrangements. In many instances, however, problems within communities were resolved by coercion from external government. Further, as has been demonstrated here by the example of the barrage fishery, changes in property rights regimes may be multi-directional, as when it changed from a common property right to either individual or collective rights, and then alternated between individual and community rights.

That institutional arrangements also change concurrently with property regimes, owing to structural changes in rights and duties that link people and resources systems, has been demonstrated when LSRB communities established new fisheries management institutions, by combining national institutions with village committees and Or-Bor-Tor. Moreover, communities also respect multiple types of property rights allocated locally to both individuals and communities. In other words, they neither rely on one particular kind of property rights regime nor clearly distinguish among the types of property right. This provides incentives to participate in fisheries management through collective action.

On the other hand, without specific rules that situation does not guarantee sustainable fisheries management, as demonstrated by the barrage auction, when the communities' desire to maximize income in turn drives winning bidders to seek maximum profit from the fishery during their very brief exclusive tenure. Without rules aimed specifically at sustainable use, overexploitation and the eventual collapse of the fishery is inevitable.

Rights to manage fisheries have varied sources and are exercised differently. Although the Thai Constitution supports natural resources management by communities, there are neither guidelines for practical implementation nor clearly defined authority and roles. For example, national law may grant LSRB communities *de jure* rights of access

and withdrawal, while reserving for government the formal rights of management, exclusion and alienation. Yet concurrently the communities hold *de facto* rights to manage fisheries within their boundaries. Thus there is duplication and mismatch between local and state institutional arrangements for fisheries management.

Fisheries management in the LSRB would be enhanced by a more effective property rights system. Although a tortuous and time-consuming process, as an essential first step local rights must be legitimized. And local authority, roles and management structures, together with strategies for allocation of fishing rights, should be specified clearly in policy guidelines. Regardless of the type of property rights regime adopted, it is vital to acknowledge that the context within which the rights are exercised will vary according to location and habitat within the LSRB. This could be accomplished by the DoF acknowledging *de facto* rights within its legislation and policies. Management could then become the joint responsibility of community members and DoF staff. Past DoF attempts to ban the barrage fishery failed, and now both fishers and communities have requested a review and amendment of legislation. From the research reported on here it can be concluded that management of LSRB fisheries resources requires a multiplicity of rights that would restrict gear types and harvest sizes, times and locations. However, resources should still be owned in common rather than individually.

The study has also demonstrated some of the basic issues and general requirements for improving inland fisheries management throughout Thailand. These coalesce around community management of local resources. First, the complex nature of the fisheries examined in the LSRB demonstrates the inconsistencies inherent in trying to impose blanket legislation over diverse resources. Such a situation calls for the involvement of local communities in management. Second, the lack of precise physical boundaries to river basin fisheries makes it difficult to police access, even if unambiguous property rights have been clearly assigned. This reinforces the need for communities to be involved in the basic policing of resource use in their local areas. Third, management regimes without government involvement require a high level of community capacity, which, in turn, requires specific inputs to either create management skills from scratch or to enhance existing ones. On the other hand, full state control would require more financial resources and skills than are now available, is generally considered undemocratic, and has nowhere proven effective in fulfilling fisheries management objectives.

Four basic points emerge from this case study for the improvement of national policymaking for decentralized fisheries management. First is that a re-definition of the

objective of fisheries management policy is required, since objectives differ between local communities and the state. The management objective of the state is conservation to maintain sustainable levels of resource use, whereas that of local communities is rational economic performance to serve their livelihood interests. Thus, both major stakeholders need to re-define a set of common objectives, and decide whether the management objective is improving sustainability in the fishery or enhancing rural livelihoods. The latter will be the more pertinent for the small-scale fisheries, and should be reflected in policies and practices. Second is the need to formulate and implement fishery policy based on some form of co-management. Local communities play an important local management role, supported by both government and local organizations, while the DoF plays the dominant role at a higher level. Local authority, roles and management structures, together with strategies for allocation of fishing rights, should be specified clearly in policy guidelines. Third, a clear and appropriate legal framework is required, with mandates and responsibilities specified for the different fisheries management authorities at both central and local levels. Finally, decentralization of fisheries management must be implemented step-by-step, with the gradual transfer of selected responsibility and authority for management functions. Cooperation between the central and local institutions is fundamental, and must be ensured by the central government.

The illegal barrage fishery is of nationwide importance, since efforts by the DoF to prohibit it have never succeeded anywhere in Thailand, and because inland fisheries communities, realizing the harm that it does, have requested a review and revision of existing legislation. The findings of the LSRB study suggest how the problem of the barrage fishery might be addressed. The main finding is that management measures for barrage use must be acceptable to both local communities and authorities, and must ensure sustainable fisheries resources use. Management measures should be based on scientific stock assessment and related biological studies, that also integrate complementary information based on the long experience of local fishers. The requisite social and economic studies are also important, and particularly specialized research to determine use rules that would make barrage fisheries ecologically less detrimental in a way acceptable to both fishers and authorities. After that process is complete, management plans and detailed implementation measures are required for each geographical area, to ensure effective management. Implementation should be a gradual and informal process, based on *de facto* rules, and begin with a closely monitored and co-managed pilot activity that would permit adjustment of management measures over the course of the fishing season (i.e., adaptive management).

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