

SPECIAL ISSUE

THE VALUES OF WETLANDS: LANDSCAPE AND INSTITUTIONAL  
PERSPECTIVES

Property rights and the utilisation of wetlands

W. Neil Adger \*, Cecilia Luttrell

*School of Environmental Sciences, and Centre for Social and Economic Research on the Global Environment,  
University of East Anglia, Norwich, NR4 7TJ, UK*

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**Abstract**

This paper argues that successful conservation of wetlands is fundamentally determined by the institutions and property rights associated with resource management decisions. Thus an understanding of property rights regimes, the constraints which they impose on users of wetlands resources, and the distribution of benefits of use among users and non-users are essential if the economic values of wetland ecosystems and functions are to be realised. We outline relevant theoretical perspectives on property rights and the sustainable utilisation of natural resources. We argue that wetland resources tend to have unique property rights regimes due to their ecological characteristics, namely, their multiple-resource characteristics, the indivisible nature of these resources, and the seasonal and cyclical nature of different wetland resource components. Case studies of property rights regimes in Indonesia and Vietnam are presented. These show that wetland resources are often managed as common pool resources, and that state appropriation of resources or the imposition of private property rights can contribute to unsustainable utilisation or conversion of wetlands to other uses. © 2000 Elsevier Science B.V. All rights reserved.

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**1. Defining rights and their importance in management**

There is little doubt that the global area of wetlands has decreased at an ever increasing rate in the course of this century (Matthews and Fung, 1987). This conversion to agriculture, urban and other uses has had profound ecological impacts at

local and global scales, as well as significant social and economic impacts on resource users. Examination of the causes of the trend towards conversion of wetlands demonstrates that the multiple actions that result in conversion are paralleled by multiple explanations of motivations and of the social and political context of such actions. Wetlands have traditionally been perceived by policy makers as ‘wastelands’ with no value unless drained. As argued by many, this pervading image has led to under-valuation of their potential, which, compounded by incentives to convert wet-

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\* Corresponding author. Tel.: +44-1603-593732; fax: +44-1603-250588.

*E-mail address:* n.adger@uea.ac.uk (W.N. Adger).

lands due to higher value uses, has often resulted in uncontrolled exploitation, conversion and degradation.

The under-valuation of wetland resources has led to a situation where many wetlands areas lack a long history of ownership, clear tenure rights or any official delineation of property rights. Furthermore, traditional land rights are frequently not recognised. The coexistence of customary and official systems is a common phenomenon in wetland areas resulting from the under-valuation of these areas, and official regulatory system which have recently often been imposed. This means that there has been less time for adaptation and negotiation between customary and legal management systems. Often lack of adaptation leads to a situation with great potential for conflict due to the overlapping property regimes between opposing interest groups at the local level as well as between the local and national or international interests.

The major causes of conversion are therefore hypothesised to be three-fold. They are (1) incomplete information on the ecological services and functions of wetlands; (2) the high opportunity costs of their maintenance, given prevailing prices of other goods for which there is effective demand; and (3) structural causes associated with who bears the costs and enjoys the benefits from maintenance or conversion of wetlands, and the lack of appropriate and recognised property rights.

The first and second of these hypothesised causes are emphasised by many of the ecological economic analyses of wetland use. It is often stated, for example, that wetland conversion is not a sustainable use of these wetland resources because of their functional linkages to wider ecological and economic systems (Mitsch and Gosselink, 1993). On the basis of this observation it is also frequently argued that improvements in understanding the economic value of wetland functions will result in more sustainable use:

Hopefully, as the economics of the environment emerges as a consistent and well recognised discipline, more and better applications of the valuation approach will be forthcoming. And

hopefully policy makers will also begin to take more of the results of these studies on board in making development decisions (Barbier, 1993, p. 31).

In the same vein, though in the general context of all natural ecosystems, Costanza and colleagues argue that:

because ecosystem services are not fully captured in commercial markets or adequately quantified in terms comparable with economic services and manufactured capital, they are often given too little weight in policy decisions (Costanza et al., 1997, p. 253).

In parallel with the utilisation principles espoused by the economic approach to wetlands above, conservationists also identify lack of information as a constraint on desirable use:

These havens of biodiversity are often endangered because they are hard to identify. Understanding their variable characteristics can lead to more successful conservation efforts (Kusler et al., 1994, p. 50).

This approach, illustrated by these pleas for 'more information' and 'better decision-making', is in essence arguing that rational economic decisions on conversion of wetlands are taken on the basis of incomplete information. In this line of argument, demonstration of these functional linkages and of the economic value of these functions will increase the chances of sustainable utilisation. When the economic values of the ecosystem functions are incorporated into full welfare economic appraisal, they must be compared to the alternative commercial resources uses. Thus the second cause of wetland conversion, that of their opportunity costs, becomes apparent. Given demand for the outputs of commercial agriculture, or the value of land for urban uses, conversion is often inevitable. This is due to the prevailing prices that are often distorted through, for example, the existence of perverse subsidies or regulations in the markets for alternative uses such as agriculture or urban development.

The third cause of wetland conversion highlighted above (that of the structure of property rights and access to wetland resources and the distribution of the impacts of conversion) therefore tends to be under-emphasised. However, as argued by Baland and Platteau (1996) and the institutional economics literature, these property relations and the institutions which give them authority, underpin and determine the values, the motivations, and the market structure under which unsustainable utilisation of natural resources such as wetlands takes place.

This paper lays emphasis on this third issue and addresses in particular the institutional arrangements under which wetlands are utilised. It outlines theoretical perspectives on what arrangements will enhance the likelihood of sustainable utilisation of wetland resources (recognising that such utilisation is itself a contested term), and examines specific property rights issues that are unique to wetland resources. The two key issues are the complexity of property rights associated with wetlands and the distribution of the economic rents associated with wetland utilisation. It has been hypothesised, for example, that a distribution of benefits that is considered equitable within a user group is a necessary condition for successful management. Increasing heterogeneity in user groups enhances the prospects for conflict and non-co-operative outcomes and undermines what are often termed 'traditional' uses (see Johnson, 1997, for example).

This paper illuminates these issues with reference to case studies of wetland utilisation and conversion in Indonesia and Vietnam. The Indonesian cases demonstrate that the local use of wetlands (their *de facto* property rights regimes) are determined by the unique ecological nature of wetland ecosystems, namely, the multiple use and indivisible nature of the resources and their temporal changes in the water regimes. These are compounded by institutional aspects such as the lack of clearly defined formal and informal property rights and official conservation policies. The *de jure* property rights, however, form a significant part of the individuals' decisions on resource use and can often undermine the *de facto* property regime. In the Vietnamese case, 1200 ha of tradi-

tionally managed mangrove forest are presently being converted for use in agriculture and aquaculture, although the previously operating system of common property resource management encouraged sustainability and exhibited the necessary conditions for successful common management. As the conversion to agriculture and aquaculture enhances inequality, the chances of successful common property resource management decline even for the remaining areas.

## 2. Property rights, sustainable resource use and distributional issues

The Ramsar Convention suggests that a common policy should be adopted for all wetlands, including ecosystems as diverse as reef flats, mangroves, peat bogs and swamp forests. It is debatable whether a single model relevant to all wetlands can be developed, given the danger of over-generalisation about an ecosystem with such an enormous cultural, institutional and biological diversity, without making the term wetland almost meaningless. Nevertheless, analysis in the following sections is structured around the assumption that there are some characteristics common to all wetland areas which result in unique features of the property rights regimes of such areas. These characteristics include the domination of the system by water, the multiple-resource nature of the ecosystem, the joint-production nature of many of these resources, the seasonal alteration of much wetland resource use and a vacuum of strong property rights.

Wetlands have the unique physical trait of being water dominated, which directly affects their uses and the institutional arrangements that dominate them. This means that many of the uses of diurnal tidal wetlands and seasonal fresh water wetlands are cyclical with the time scales of the cyclical use depending on the water regime. This adds complexity to the property rights structures of wetlands as they include aspects of management of marine or aquatic resources in addition to systems for land or terrestrial resources (Thomas and Adams, 1997). Hence wetlands exhibit the nested rights described for many forest and other

Table 1

The nature of wetland resources in relation to pervasive property rights regimes

	Easily excluded (low transaction costs)	Exclusion costly or difficult (high transaction costs)
<i>Stationary (terrestrial) wetland resources</i>		
Subtractible (rival in consumption)	Mangrove used for fuel, construction and other timber (often private property regimes)	Hunting for fauna or birds. Collection of medical plants, poisons, tannins, fertilisers
Non-subtractible (non-rival in consumption)	Recreational use of wetlands for tourism, bird watching	Ecological functions such as carbon cycling in terrestrial biomass. Coastal protection function of mangroves and salt marshes. Maintenance of habitats and refugia. Maintenance of micro-climates
<i>Fugitive (aquatic/marine) wetland resources</i>		
Subtractible (rival in consumption)	Fishing and aquaculture production in enclosed and seasonal wetlands. Agricultural production in seasonal wetlands	Fishing and aquatic product collection in open wetlands such as coastal areas
Non-subtractible (non-rival in consumption)	Recreational or other non-consumptive use of wetlands. Angling (often organised as club goods)	Marine and aquatic ecosystem services – regulation of food web dynamics; nutrient fluxes from water to atmosphere; sediment processes; marine biodiversity and habitats; ground water recharge

resource management situations (see for example Alcorn (1989) and Alcorn and Toledo (1995)). Analysis of the configuration of property rights between traditional users, the state and incoming users is, we would argue, vital for understanding whether the ecosystem functions (and their values as emphasised by the ecological economics research agenda) will actually be realised.

The multi-resource characteristic wetlands influence the structure of resource-tenure and management regimes. As the interface or boundary between several ecosystems, whether it is between marine and terrestrial or lake and forest, wetlands face huge demands for a multitude of uses and functions which often results in conflict between different users. The coexistence of contrasting communal and individual rights to resources, even within the same community, is a common feature (Netting, 1982). Wetland areas are also characterised by the indivisibility of many resources such as water, fish and seasonal or daily altering ecotonal habitats that are impossible to physically partition. This provides a challenge to

management as most management strategies are built around specific habitats or boundaries (Risser, 1990). As a non-fixed resource moves in and out of geographical boundaries, the definition of wetlands in terms of private property can become problematic (Burbridge, 1982). For example, as fish can be classified as fugitive resources (Table 1), activities in one territory will affect fish supplies in other areas.

These unique features of wetlands are not only a result of the specific ecological characteristics that make up a wetland areas, but also the historical, social and institutional contexts which interact with these ecological aspects. The inherent nature of wetland resources invites such friction, but often the institutional set-up exacerbates these conflict situations and is inadequate in dealing with them. The recent shift towards the recognition of the value of wetland areas came with an emphasis on wetlands as the 'water-source' and regulator of other large-scale functions. This culminated in the realisation of their ecological values and the wetland conservation

movement stimulated by the Ramsar Convention.<sup>1</sup>

Without doubt the Ramsar Convention represented an important and fundamental shift in wetland planning. However, in its initial stages it lacked an appreciation of the value of wetlands to local communities and did not attempt to legitimise wetland use by traditional and non-traditional users. The effect of ignoring the role of local resource users is particularly acute in the case of tropical wetlands which tend to be heavily utilised by subsistence users (Bailey, 1988). This emphasis has led to an external, often large-scale approach to planning for wetland areas, resulting in blindness towards the large populations of subsistence users in wetland areas. After the Ramsar Convention the primary conservation function of wetlands became their role as waterfowl habitats with biodiversity of global value. This approach to conservation, both in wetlands and in other situations, inevitably leads to conservation prescriptions based on regulation or specifically on the designation of protected areas (Ghimire, 1994). It is still very strong in conservation planning for many wetlands and very clear in the case studies presented later in the paper where current management is underpinned and justified by the idea of conservation for the biodiversity ethic alone. The rarity of many wetland habitats and their importance as refuges of biodiversity inevitably result in an increasing number of conflicts between conservation and local economic interests.

Major property rights issues therefore include: the underlying determinants of management, such as the changing role of the state; the physical prerequisites leading to diverse property regimes; and the opportunities for ‘creating’ commons management. The latter issue of creating partnerships between local users and the state, known as co-management, has become the focus of debate in the past decade. The management of local

commons also draws on the theory and application of the issues raised at other scales, such as transnational and global commons. For both local and global scales of analysis, key issues include the heterogeneity of user groups with diverse interests and the internalised and externalised impacts of resource use (Sandler, 1997). Indeed wetland utilisation itself results in both local and global impacts. Wetland conversion leads to a reduction in global-scale biological diversity as well as contributing to other global environmental change processes such as changes in the global carbon cycle. In turn, wetlands are impacted by the processes of global change (see Kusler et al., 1994; Adger and Beran, 1995; Michener et al., 1997).

As stated above, wetlands are unique in having the dual physical complexity of their water-related and terrestrial-related components. Table 1 shows that these property rights regimes for wetlands depend on the subtractible nature of the resource (whether stationary or fugitive) and the ease of exclusion of users (e.g. McKean, 1996). It follows a general typology of goods by McKean (1996) adapted for wetland resources following analysis of Buck (1989), Rönnbäck (1999), Holmlund and Hammer (1999) and others. Many wetland resources can be managed on a collective or private basis where the transaction costs of excluding other users are lower than the benefits of use. In Table 1 it is argued that use of timber resources, and even fishing and other aquatic resources, can be more easily protected than pure public goods such as the ecological functions that wetlands provide.

Each wetland component tends to have different property rights regimes associated with it. Property rights refer to specific rights to utilise, control and exchange assets (following Bromley, 1991). These rights are attenuated by various legal and customary restrictions defining limitations on the use or consumption of the good or resource. There is a large range of types of property rights, often decided by the intrinsic nature of the resource, and by cultural and social determinants. These range from open access to common property, state property and private property. Common managed systems have been documented for fisheries and terrestrial resources in all regions of

<sup>1</sup> The Ramsar Convention was held in 1971 in Ramsar, Iran. To date there are 114 signatory countries with 977 sites covering an area of 71 million ha (as of April 1999). Signatory parties recognise the economic, cultural, scientific and recreational value of wetlands and pledge to uphold the wise use of wetlands.

the world (see, for example, Ostrom, 1990; chapters in Berkes (1989) and Walters (1994)). Oceanic fishing resources and offshore oil resources, despite their apparent open-access nature, also tend to be ‘governed’, with varying degrees of success, through customary law or through bi-lateral or multi-lateral agreements between governments, such as the UN Convention on the Law of the Sea (Birnie and Boyle, 1992).

Research on property rights focuses on the implications for income of present property right holders; mechanisms of changing property rights to meet specific management goals; and the institutions that govern the allocation of rights (Hanna et al., 1996). The expanding literature on such issues highlights that both private and communal property rights can lead to undesirable environmental impacts, and that the important issue is the management and sustainability of the resources. In defining the domain where common property works best, empirical studies have converged on a number of factors: relatively small groups with shared needs and norms; clear boundaries for resource management; stability in the group undertaking management; and relatively low costs of enforcement (Table 1). This research necessarily involves the examination of the institutions and policy environment in which management takes place as a dominant theme, both in successful management and in the breakdown of common property management.

Common property regimes are commonly observed in wetlands due to the intrinsic nature of the habitat and the difficulty in definition of boundaries and clear allocation of resources (see McCay (1978), Feeny et al. (1990), Vondal (1990) and McGrath et al. (1993)). The social benefits of common property management of wetlands tend to be undermined by conversion to private or state *de facto* property, leading to negative consequences in terms of the distribution of wealth and security of livelihood (Guha, 1989).

Common property is defined as property whose individual users tend to have higher incentives to co-operate with each other than to pursue individualist strategies, it is usually within defined boundaries and ruled through a group of individuals or organisations who enforce control over

access and use (Baland and Platteau, 1996). These incentives are often associated with aspects such as economies of scale in co-operative management compared to individual management. The rights to exploit such resources by any person are held in common with others and in some circumstances can be exchanged or inherited. Thus, common property can be compared with privately owned or state owned property and open access resources where no property rights exist as with the atmosphere and open oceans.

Common property management regimes are ‘a set of institutional arrangements that define the conditions of access to a range of benefits arising from collectively used natural resources (Swallow and Bromley, 1995, p. 100). The administrative systems may be centralised (e.g. a village committee) or be a diffuse set of actors, depending on historical and cultural factors. The underlying conditions determining the nature of the institutions administering common property are not static but rather evolve to incorporate external political or even influences of resource constraint (Shanmugaratnam, 1996). Under common property, users enjoy rights of exclusion and strategic interaction between well-defined users rather than direct subtractible use. In game theoretic terms their Nash or optimal sets of equilibria include the expected reactions from other users, thereby affecting the collective result (Baland and Platteau, 1996, p. 29).

The success of common property resource management, however, cannot be guaranteed. It needs to be gauged by reference to its efficiency, the sustainability of resource use and also by its success in promoting social goals such as equitable distribution of benefits and functions of social security. Most common property resources are not pure public goods in the sense understood by economists, that is, non-rival in consumption. Rather, they exhibit the property of ‘subtractability’: each user reduces the availability of the resource to others. Hence common property resources, often called ‘common pool resources’ in this context, can be used unsustainably when their rate of appropriation exceeds rates of replenishment.

Ostrom (1990) has defined one of the principles for successful communal management as a clear definition of the border of the resources and the individuals entitled to use them. As discussed above, this is problematic in wetland areas often resulting in attempts to demarcate territories. The use of territoriality can be the basis for instituting more restrictive regulations for resources in common areas and smaller groups of users. Individual resource users are often more co-operative in smaller groups than in larger groups (Olson, 1965; Messick, 1973; Komorita and Lapworth, 1982; Stroebe and Frey, 1982) and this can be explained because larger groups motivate people to act non-co-operatively as the chance of personal benefit is lower. In addition the larger the collective, the smaller is the impact of individual behaviour.

The distribution of benefits in a socially desirable manner is a key social goal or aspect of many common property management regimes (Shanmugaratnam, 1996). Even if private property could be implemented for a resource with all the perfect markets and zero transactions costs referred to above, Pareto improvement would only occur in privatisation of commons in certain circumstances. These would include all former users of the resource having their rights recognised and being compensated for their loss, as well as the returns to their labour from any new wage activity remaining at the same level. These conditions are seldom met in privatisation of commons, as shown in the case studies in the section below, where traditional users are rarely empowered to withstand privatisation or nationalisation and are often not compensated (Guha, 1989, for example). In addition Weitzman (1974) and Baland and Platteau (1996) have both shown that any compensatory returns to labour when former users are subsequently employed in privatised agriculture or forestry activities are inevitably less than under common property. Labourers tend to only receive wages at the marginal returns to labour under the privatised regime. Hence privatisation tends to have negative distributional consequences and is thus inferior to successful common property management in terms of this redistributory social goal.

A further aspect of property regimes relates to the role of the state in their management or in

enforcing the legal framework for use: whether there is a divergence between *de facto* and *de jure* property rights. The *de facto* property rights are those which are observed to be actually in operation and hence affect resource allocation and individual decisions. *De jure* property rights are the explicit legal ownership, trade and use rights as determined by the state, but which are only consistent with *de facto* property rights to the extent that they are enforced. Thus under the 'property rights school', which promotes private property as a solution to sustainable management, it is the divergence of *de jure* and *de facto* rights that causes unsustainable utilisation. It is clear that *de jure* rights are not a necessary condition for the existence of sustainable common property management, but the legal framework of property rights can be used to promote security and stability among resource users (as argued by Walters (1994) and Agrawal and Yadama (1997), for example). Thus the major issues concerning property rights for natural resource use in general centre on the structure of these rights and the distribution of benefits associated with these, and the role of the state in providing a framework consistent with their existing or traditional management.

### 3. The nature of property rights in wetlands: examples from south east Asia

#### 3.1. *The mangrove areas of west Java, Indonesia*

The north coast of west Java previously supported important areas of mangrove forest along the coastline and estuaries of the major rivers. Surveys within the past twenty years describe the 'luxuriant growth of mangrove forests' in the Muara Gembong delta (Sukardjo, 1980). However, a survey in 1994 revealed that almost all natural mangrove forest has been destroyed (Luttrell, 1994). Traditionally, mangrove has played an important role for rural coastal populations who earn their livelihood through fishing and other activities such as the collecting of various plant and faunal products. Most of this area is under the jurisdiction of a state forest corporation

(Perum Perhutani), and under national and provincial legislation the clearance and utilisation of mangrove areas is forbidden. Despite this, the area is heavily populated and has mostly been converted to alternative uses such as brackish water aquaculture as the returns are increasingly being identified. Land status and ownership is complex due to the out-of-date administration of land titles, ambiguous allocation procedures and the large numbers of different institutions involved in mangrove areas. These problems are intensified because official forest boundaries are vague or non-existent and cannot discredit illegal claims.

The 1967 Forest Law classified land with some tree cover as Production, Protection or Conversion Forest. Most mangrove areas in Java are owned by the state-owned company, which manages 77 000 ha of mangrove as 'Production Forest' (Perhutani, 1991). However, much of the 'Production Forest' has been converted to other uses (DGF, 1991). Many mangrove areas, which were designated as Forestry land, were utilised by local villages prior to 1967. Under Indonesian agricultural law, traditional land ownership is acknowledged (van Diepen and Fiselier, 1990), but these traditional owners have to be prepared to release their land for 'national or regional interests' and compensation, if granted at all, is always lower than the true value of the land. A strong conservation-utilisation conflict is reflected in the tension between the activities of the local population and the state forest company's social forestry programme that refuses to acknowledge traditional land use rights of local mangrove users.

The state forest enterprise initiated the social forestry programme in 1976 in mangrove areas aiming to integrate forest management with fish production. The programme uses the system of '*tumpang sari*' or *taungya*, which is seen as the most appropriate management technique for disputed land as it allows for crops to be grown while protecting the forest and optimising land use. '*Tambak tumpang sari*' is a modification for mangrove areas which aims to fill 80% of the ponds with trees, leaving 20% for fish production. Each farmer is allowed to farm a maximum area of five hectares. This system is clearly constructed

as a compromise to solve conflicts between the forestry and fishery sector where fish are bred in the deeper part of the pond along the dikes while mangrove species are planted in the shallow portion. Much of the literature about this system of '*tambak tumpang sari*' emphasises the positive aspects of the system (Sastroamidjojo, 1992; Wahyono, 1995), reporting good responses from the communities involved. Aquasilviculture is regarded by social forestry programmes as a multiple-use system that promotes a harmonious coexistence between fishery and mangrove trees while maintaining protection of coastal areas and ecosystems (PCARRD, 1991; Bacongus, 1993). Information from interviews carried out in 1993 and 1994 (Luttrell, 1994) contradicts this view. Conflict is observed between the local users, many of whom have long been resident in this area, and the State Forestry Company which perceives the local mangrove users as illegal occupiers of the land and their aquacultural activities as unjustified violations of state forestry land under the 1967 Forest Law.

This intensification of aquaculture is reflected in the pond ownership patterns emerging in the area of northwest Java. In the areas nearest Jakarta, where land values are highest due to proximity to the markets, most ponds belonged to absentee owners with little economic rent reaching the local tenant farmers. Traditional law states that the right to use land converted from mangrove only accrues to those who directly clear the land. Yet this is being breached in reality as many mangrove areas are being cleared on behalf of absentee owners. As Bailey (1985) points out, it is a common feature of many mangrove areas for local élites to stake personal claims over resources used by local residents. These resources can easily be allocated to outsiders as local residents tend to be politically and economically marginalised (Collier, 1979). This results in the situation, described by Bailey (1985), where a complex ecosystem supporting multiple use is transformed into a greatly simplified system that becomes the private property of a small number of individuals.

It is often the perceived scarcity or increased value of a resource that leads to the delineation of *de jure* property rights (Demsetz, 1967). In the

mangrove area of northwest Java such a property rights vacuum is being filled by a rush of claims from the huge aquacultural potential of some mangrove areas is realised; or from the landless in search of land. Much of the recent degradation of the mangrove areas is caused by the realisation of the potential of such areas for aquaculture production, as well as by the increasing global commercialisation of the shrimp industry due to the expansion of regional and global markets for its outputs. Throughout Indonesia the area of brackish water aquacultural production increased by 73% between 1980 and 1990 (DGF, 1980, 1985 and DGF, 1992, in Bailey et al. (1995)). Efforts to develop wetland resources more intensively have often led to a breakdown in previously existing controls over land use and to the over-exploitation of the resource base, reducing its value and in turn encouraging conversion. Between 1979 and 1989 the value for frozen shrimp exports increased more than three times from about USD200 million to over USD670 million (DGF 1990, Biro Pusat Btastistik, 1991, in Bailey et al., 1995).

Poffenberger (1990) has argued that the intensifying conflict between state land policies and locally operating forest use systems is a major cause of deforestation and mismanagement of forest resources. The challenge facing the State Forestry Department in this area is how to bring about practices that are genuinely beneficial to the community which are inherently difficult to achieve without the clarification and strengthening of resource rights for users. The aim of the social forestry programme is initially unclear. It has been acknowledged that there are no plans for commercial forestry management of mangroves on Java (Government of Indonesia/FAO, 1990). The local population has been, however, denied user-rights to tree products. In addition, the monocultural planting and the heavy pesticide use leads to a depleted environment. The social forestry programme can therefore be viewed only as a means of claiming back the land from traditional land-use by imposing trees, as symbols of the Forestry Department's ownership, upon land over which there is some dispute. The conservation of biodiversity is a convenient excuse for the denial of resource-rights to traditional users.

This case-study shows that many of the current conflicts and resource degradation in this wetland area are a result of the past under-valuation of the mangrove which has resulted in poorly clarified tenure regimes. The recent realisation of the value of such areas has led to conflict between local users and the state in terms of both utilisation and conservation, thus demonstrating the centrality of the distribution of rights in wetland areas as a key parameter in their sustainable utilisation.

### 3.2. *Seasonally-flooded forest in west Kalimantan, Indonesia*

Danau Sentarum is a seasonally flooded inland wetland area on the upper reaches of the Kapuas River, west Kalimantan. Ninety-five percent of the area is inundated during the flood season, creating a network of rivers and lakes, during the dry season there is an average 12 m drop in water level. The area is presently designated as a Wildlife Reserve, where conflict between different social groups and resource-regulation traditions illustrates the complexity of *de facto* property rights. At least three overlapping regulatory regimes can be identified:

- The Forestry Department which, under national legislation, should enforce this area as an uninhabited nature reserve.
- Utilisation in the dry season by the Iban who practise shifting cultivation and forest management (Padoch, 1992) in the encircling hills, and view the lowland lake area as their own 'back-yard'.
- The management of the lowland lake area by the predominantly Melayu fisherfolk under usufruct rights recognised by the Iban. These people are relatively new arrivals to the area and depend upon both fish and forest products.

Both the latter groups have specific and overlapping territorial claims and mechanisms for resource regulation, and relations between these groups are therefore strained. The Iban distinguish between the right to control use, usufruct rights and rights to collect (Dudley and Colfer, 1993). They see the area under their ownership and therefore assume that they have the right to control use, but that they have given the usufruct

rights to the Melayu. Therefore, they often do not ask for consent to fish in what the Melayu view as their areas on which they have ownership rights. Discrepancy in rules between villages has also led to conflict among the Melayu themselves, especially as fish are a mobile resource and move between the village territories. Tenure regimes and territories are a result of negotiations between different villages.

The designation of Danau Sentarum as a wildlife reserve prohibits most human activities under Indonesian law. In spite of this the permanent human population was estimated in 1987 to be between three to four thousand (Giesen, 1987) with the number increasing annually and a huge explosion of seasonal migrants during the peak fishing season. The population depends on the area for fish, forest products and game, the very resources which the conservation project seeks to protect. In regional and national terms the area plays an important role in the production of timber and fish and the maintenance of hydrological processes, especially the buffering of downstream flooding (Klepper, 1994). This reflects the common situation in many wetland areas where the area is valued differently by different groups for various functions and there is a variety of levels of legitimacy over claims to the different products.

In the Danau Sentarum Wildlife Reserve different villages have very well-defined territories and different resource-use rules. Boundaries have evolved after a long process of negotiation between neighbouring villages. Settlement in the lake region of Danau Sentarum occurred from the end of the 19th century onwards when people began to move from the Kapuas settlements. During this process boundaries were demarcated around the settlements and fishing territories were claimed by the local community. As part of the *hukum adat* (traditional law) a complicated system of regulation and laws exists regarding natural resources. All villages have a set of regulations regarding fishing (Giesen, 1987; Dudley and Colfer, 1993) and regulations over plant resources seem to be rapidly developing. Practices vary between villages; some villages have strong rules over the size of fishing net mesh, the fishing

season and harvesting location to protect spawning fish while other villages have no regulations and in these villages streams will be blocked off with gill-nets. The village of Sekolat holds an annual lottery for the right to fish stretches of river, as there are over 100 households and only 19 rivers. Winning a lottery allows one to place nets across that river for one year. There have been some serious disputes over fishing territories within the forest because of the net size, the use of certain fishing equipment and the length of the fishing season. Fortmann and Nihra (1992) suggest that new rules may grow out of changing circumstances such as increase in population, perception of a resource supply crisis or the loss of an essential tree species. Therefore, as more immigrants enter the area, increasing pressure on resources can be expected to produce more conflict, which suggests that new rules of swamp use will have to be formulated.

The multi-resource characteristic of the Danau Sentarum wetland ecosystem and the resulting tendency towards common property management are illustrated in the utilisation of forest products. Peters (1994) describes how rattan is one of the most 'accessible' resources, and most communities allow inhabitants of other villages to collect it in the village territory as long as permission is sought, and that some villages control commercial trading in it. The collection of timber is more tightly controlled and for the most part people from other villages are forbidden from collecting it even if it is not intended for sale. Honey is at the most extreme end of the property spectrum because the bee trees (*lalau*) and honey boards (*tikung*) are owned privately and rights are inherited. In the South Kalimantan example of Desa Satu (Vondal, 1990) owners encourage duck flocks to move to resource-abundant sites and the efficiency of this resource use provides an important reason for maintaining swamplands as common land. There are two exceptions to the rules of common property access in this area: that of water immediately adjacent to other people's homes and that of fish found in a section of river that runs through an individual's private property.

An important feature distinguishing wetlands from other ecosystems is the seasonal nature of many inland wetland sites. Most of these sites have annual flooding regimes resulting in a drastic alteration to the landscape and a shift in resource-use throughout the year. This seasonal shift creates unique characteristics and requires an adapted management approach. Seasonal variation in tenure is a common feature of seasonally-flooded areas, showing the ability of users to match appropriately the resource with the regime (Wade, 1986, 1987; Acheson, 1989). The Desa Satu swamplands in South Kalimantan possess a dual property classification with private, regulated land in the dry, rice-growing season which, once flooded, becomes an open-access resource for fishing and duck hunting. In the dry season only the permanently inundated swamp is effectively common property. Seasonal variations are an outcome of water level in Danau Sentarum where the large seasonal difference in the water level results in very different seasonal activities for inhabitants of the area. Fishing takes place all year round, although when in flood yields are lower and activities shift to exploitation of forest resources. Harvesting of timber from valuable species such as *Fragrea fragrans* and *Shorea balangeran*, which occur in low-lying habitats, is restricted to low water periods, which means these logs can be transported (Peters, 1994). As the water rises *Dryobalanops abnormis* is harvested; this fetches a lower price, but its collection does not conflict with fishing periods (Peters, 1994). Seasonal migration is a key feature in wetlands where there is seasonal flooding and may result in a huge fluctuation of human population levels and in problems of regulation and property rights. Seasonal fishermen migrate into the Danau Sentarum region from the Kapuas towns, each of which has links with particular lake villages. In theory they must obtain permission to fish in a village's territory and, if they follow the rules, such permission is usually granted.

The multi-resource and seasonally-changing characteristics of the Danau Sentarum ecosystem have resulted in very specific effects upon the spatial distribution of resource-use, resource tenure and management regimes. Tensions over

resources have arisen as a result of the differing uses of the area by local users as well as between the state and local users. However, in this case sophisticated systems of resource regulation are emerging as a result of increased pressure on resources.

### 3.3. *Mangrove conversion in Vietnam: equity issues*

The conditions for successful common property regimes, as outlined in Section 2, include high dependency of users on the resource, clearly defined groups and a distribution of the benefits among the users considered to be equitable within the group. Changing the management regime therefore affects the livelihood system dependent on the resource, and these issues can be investigated empirically through examination of property rights and the dynamics of inequality and income sources. In Quang Ninh Province in northern Vietnam, mangrove forest and associated wetlands are being converted for agriculture and aquaculture expansion. User's rights are dependent on utilisation of the areas for agriculture and, in designated areas, for aquaculture. The land converted to agriculture in this case is allocated by the central government to settlers from outside the Province of Quang Ninh. This case, elaborated in Adger et al. (2000), demonstrates the potential impacts of conversion of mangroves. Agricultural settlers convert the mangroves to agriculture and horticultural use and exploit remaining mangroves as open access resources.

The reliance of the present mangrove user group on commonly managed mangrove resources is estimated as approximately 11% of total household consumption. Thus the loss of a proportion of the accessible mangrove ecosystem in this area reduces the reliance of the population on this resource. Although this is an inevitable consequence both of conversion and perhaps of the diversification of livelihood systems, nevertheless Adger et al. (2000) find that this impact of conversion in itself reduces the probability of sustainable common management of the remaining mangrove areas for two reasons. First, the unconverted mangrove area remains a commonly managed

resource, but represents a less important source of livelihood to a smaller proportion of the population. Second, the expectation of further conversion in the future is observed to lead to over-exploitation of the remaining mangrove areas.

Fig. 1 summarises the major factors enhancing or undermining effective common management in the mangrove management. First, the benefits from the remaining mangroves are less equally distributed, creating conflict among resource users. Second, as shown in Fig. 1, residents of Le Loi Commune who have lost their own commonly managed mangrove area have increasingly become involved in extracting resources from the neighbouring mangroves in Thong Nhat. The remaining mangroves are, in effect, becoming open access as exclusion of outsiders by Thong Nhat residents is difficult. Institutions of co-operative management have not developed among the users and the expectations of further over-exploitation increase the pressures on the remaining mangrove areas.

The distributional impact of conversion of mangroves resources in coastal Vietnam in this area therefore further undermines sustainable common management of the remaining mangrove areas. The change in livelihood structure at the community level is such that the benefits from resource use are being more unevenly distributed. A survey of households shows that the commercial agriculture and aquaculture activities which are compulsory on 'reclaimed' mangrove land are presently increasing inequality, whereas fishing and utilisation of the mangrove areas is a relatively equitable activity in terms of its impact on income distribution. The move towards effective privatisation of land and other resources is enhancing the inequality in the distribution of income. This increases the heterogeneity within the resource user group and lessens the likelihood of co-operative management. The ability of the community to maintain sustainable common property management of the remaining mangrove and fishing areas is undermined by becoming open access resources and through the reduction of fairly shared benefits among remaining users.

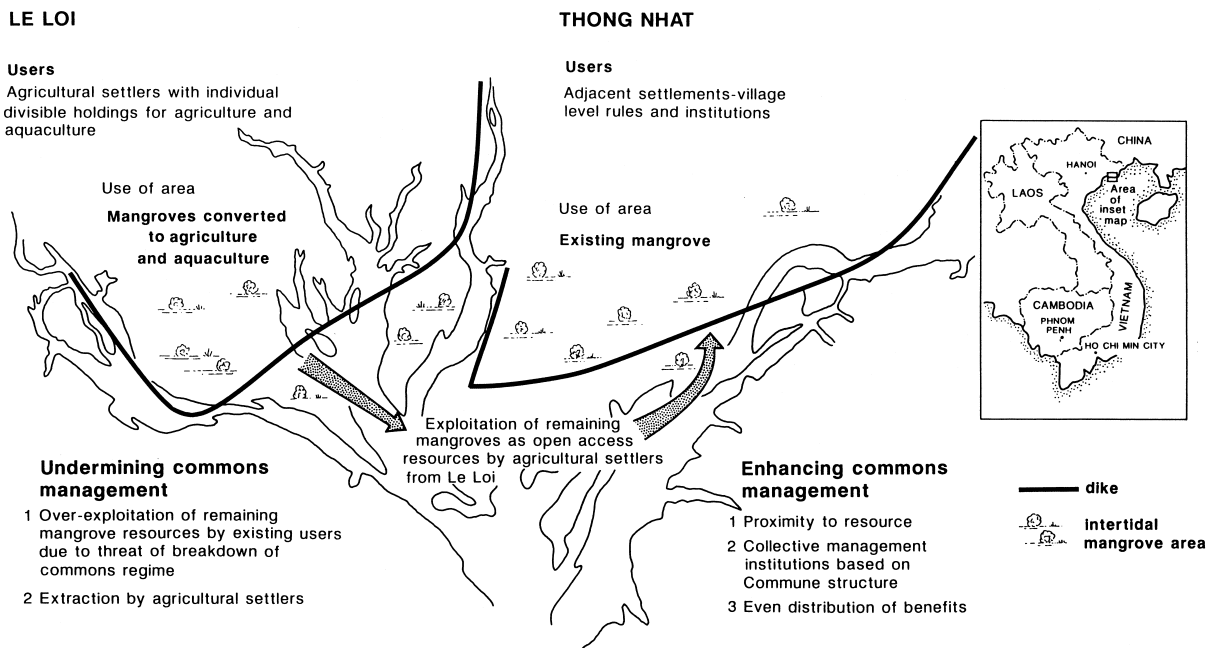


Fig. 1. Property rights regimes and conflicts in mangrove conversion in Quang Ninh, northern Vietnam.

#### 4. Conclusions

This paper argues that analysis of institutions and management is a necessary prerequisite to understanding the management and the global conversion of wetlands. Only by understanding the property rights and the constraints on individual decision-makers will the functions and services of wetlands (and their implicit value in terms of human welfare as recognised by ecologists and economists) be realised. The issues of tenure and security of use-rights are fundamental to sustainable resource use, but in the case of wetlands the importance of such issues is exacerbated by the lack of clear formal or informal rights interacting with historic under-valuation of such areas. The multi-resource and often seasonal characteristics result in wetland areas becoming the focus of conflict between different users at the local level and between local, national and global functions. The physical indivisibility of some of these resources results in specific management problems and often results in a tendency towards over-exploitation. We argue that the indivisibility of wetland resources leads to common-property regimes or complex territorial regimes being adopted for such resources.

Mermet (1991) claims that wetland management should not be understood as a rational control by one actor, but as a process in which many actors are striving to control the wetland or some parts of it. Management techniques and planning developed to deal with the multi-use situation commonly found in wetlands have tended to involve zoning for conservation, utilisation and reclamation areas in an attempt to reconcile the different functions. However, the extent of many wetland areas, and the regional and global services that wetlands provide demand larger-scale approaches and co-ordination beyond the capacity of purely local management. This realisation that wetlands cannot be managed in isolation from upstream inputs must lead to the development of policies and management that are meaningfully and effectively co-ordinated between the local and national levels. From our examples in South East Asia, it is clear the imposition of national level policies on agricultural expansion

and forestry, population and settlement, or even of conservation designations, can undermine lower level management efforts. It is therefore essential that there is policy co-ordination between the conservation and utilisation perspectives and that there is amalgamation of local and national perspectives on the rights of wetland user groups.

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