

Parks



The international journal for protected area managers

ISSN: 0960-233X

Published three times a year by the World Commission on Protected Areas (WCPA) of IUCN – The World Conservation Union.

Editor: Paul Goriup
Assistant Editor: Barbara Creed
Translations: Oxford Brookes (French)
 Lilia Knight (Spanish)

Parks Advisory Board

David Sheppard *Chairman*
 (Head, IUCN Protected Areas Programme)
 Paul Goriup
 (Chairman, NatureBureau)
 Jeremy Harrison (UNEP/WCMC)
 Lota Melamari
 (Director General, Tanzania National Parks)
 Gustavo Suárez de Freitas
 (Executive Director, ProNaturaleza, Peru)
 Kenton Miller (Chair, WCPA)

Parks, 36 Kingfisher Court, Hambridge Road,
 Newbury, RG14 5SJ, UK

Fax: [+ 44] (0)1635 550230

Email: parks@naturebureau.co.uk

Subscription rates and advertisements

Please see inside back cover for details of subscription and advertising rates. If you require any further information, please contact the editorial office at the address above.

Contributing to Parks

Parks welcomes contributions for future issues. Potential authors should contact *Carolyn Karnath, IUCN, Rue Mauverney 28, CH-1196 Gland, Switzerland, e-mail: carolinkarnath@iucn.org* for details regarding manuscript preparation and deadlines before submitting material.

Parks is published to strengthen international collaboration among protected area professionals and to enhance their role, status and activities by:

- maintaining and improving an effective network of protected area managers throughout the world, building on the established network of WCPA;
- serving as a leading global forum for the exchange of information on issues relating to protected area establishment and management;
- ensuring that protected areas are placed at the forefront of contemporary environmental issues such as biodiversity conservation and ecologically sustainable development.

Ideas and viewpoints expressed in *Parks* do not necessarily reflect those of IUCN or their associates, collaborators or advisers. Moreover, the presentation of material and geographic designations employed do not imply any expression of any opinion whatsoever on the part of IUCN or their associates, collaborators or advisers concerning the legal status of any country, territory or area, or concerning the delimitation of its frontiers or boundaries.

All material may be reprinted unless it has been used in *Parks* from an identified source publication in which case no reprint is authorised except upon permission of the source publication. Reprinted material should bear the author's name and credit to *Parks* should be given. The Editor would appreciate two copies of any material so used.

Cover: *Ream National Park, Cambodia.* Photo: Stuart Chape.
Bamboo shoots emerge above low secondary forest cover in Vietnam. Bamboo is a forest product that is used extensively throughout the region. Photo: Paul Insua-Cao.
A villager in Ream National Park, Cambodia making roofing from palm leaves. Photo: Shaska Martin.
The Ankor Wat temple complex in Cambodia is one of the region's foremost tourist attractions. Photo: Ross Hughes.

© 2003 IUCN, Gland, Switzerland. Produced by the NatureBureau, UK.

Production of *Parks* is supported by the Taiwan Council of Agriculture and the United States National Park Service.



Editorial

JEREMY CAREW-REID AND KISHORE RAO



OVER THE PAST TWO YEARS, the governments of Cambodia, Laos, Thailand and Vietnam have led a broad partnership of national and international agencies in undertaking national reviews of protected areas and development. These countries and their two neighbours to the north – China and Myanmar – face a shared challenge: their protected area systems are expanding and receiving greater management attention, but biodiversity values continue to diminish. PAs appear as a drain on domestic and international budgets and an impediment to economic development without bringing sustainable conservation returns. The Protected Areas Development (PAD) Review¹ examines the growing tensions between economic and conservation objectives in the four countries and at regional level.

The articles in this issue of PARKS, based on the PAD Review regional analysis², provide a strong indication that, in future, the importance of protected areas will be measured in terms of their contribution to national and local economies. They will come under particularly sharp appraisal for their contributions in reducing poverty as part of national poverty alleviation strategies. Also, they will be assessed against the priorities adopted in the Mekong region as a whole for governance reform. All these new indicators of success in PA planning and management will require a re-expression of conservation needs in terms of the development benefits they bring. The goal is to create a broad alliance of support for the PA systems from those who benefit, new skills and approaches in their management, and to open up new sources of financing, all leading to better biodiversity conservation.

Protected areas as a strategy for development in the Lower Mekong region

For most of the past 15 years, protected areas in the Lower Mekong region (Figure 1) have been viewed as areas isolated and locked away from human use for the sake of conservation, with little apparent relevance to the massive development challenges facing the four countries. To this day, the legal frameworks governing protected areas prohibit extractive uses. In practice, communities have continued to take what they need from PAs, and governments have overridden PA restrictions when faced with choices between conservation and economic developments such as roads, power and irrigation schemes and agricultural expansion. The extraordinary political commitment in Mekong countries to establishing protected areas has not been matched by the kind of legal authority and financing needed to safeguard them from economic and development interests within and outside government.

This is understandable, given that the tools and capacities were not available to show what was at stake in development terms when PA values were degraded. Towards the end of the 1990s,

1 The PAD Review reports and related information is available on www.mekong-protected-areas.org.

2 The articles in this special issue of PARKS summarise sections of the PAD regional report (ICEM 2003a), one in a series of eight. While credited to individuals, each article draws from the extensive discussions and meetings which took place within each country and at regional level involving several hundred specialists from the region. The PAD Review team was led by Jeremy Carew-Reid. The team's sub-group on economics comprised David James, Bruce Aylward and Lucy Emerton. PAD Review country coordinators were Mao Kosal (Cambodia), Nguyen Thi Yen (Vietnam), Piyathip Eawpanich (Thailand) and Latsamay Sylavong and Emily Hicks (Laos). Country specialists were Kol Vathana and Charlie Firth (Cambodia); Chanthakoumane Savanh and Dick Watling (Laos); Andrew Mittelman and John Parr (Thailand); and Tran Quoc Bao, Nguyen Huu Dzung, Ross Hughes and Craig Leisher (Vietnam). Other team members were Kishore Rao (protected areas); Graham Baines (agriculture and marine protected areas); Nicholas Conner (water resources); Rob McKinnon (community development); Gordon Claridge (wetlands and fisheries), Shaska Martin (information technology); Jason Morris (poverty alleviation); Scott Poynton, David Lamb, Don Gilmour and Andrew Ingles (forestry); Guy Marris and Alison Allcock (tourism); Paul Insa-Cao (communications) with Patricia Halladay and Margaret Chapman assisting with editing.

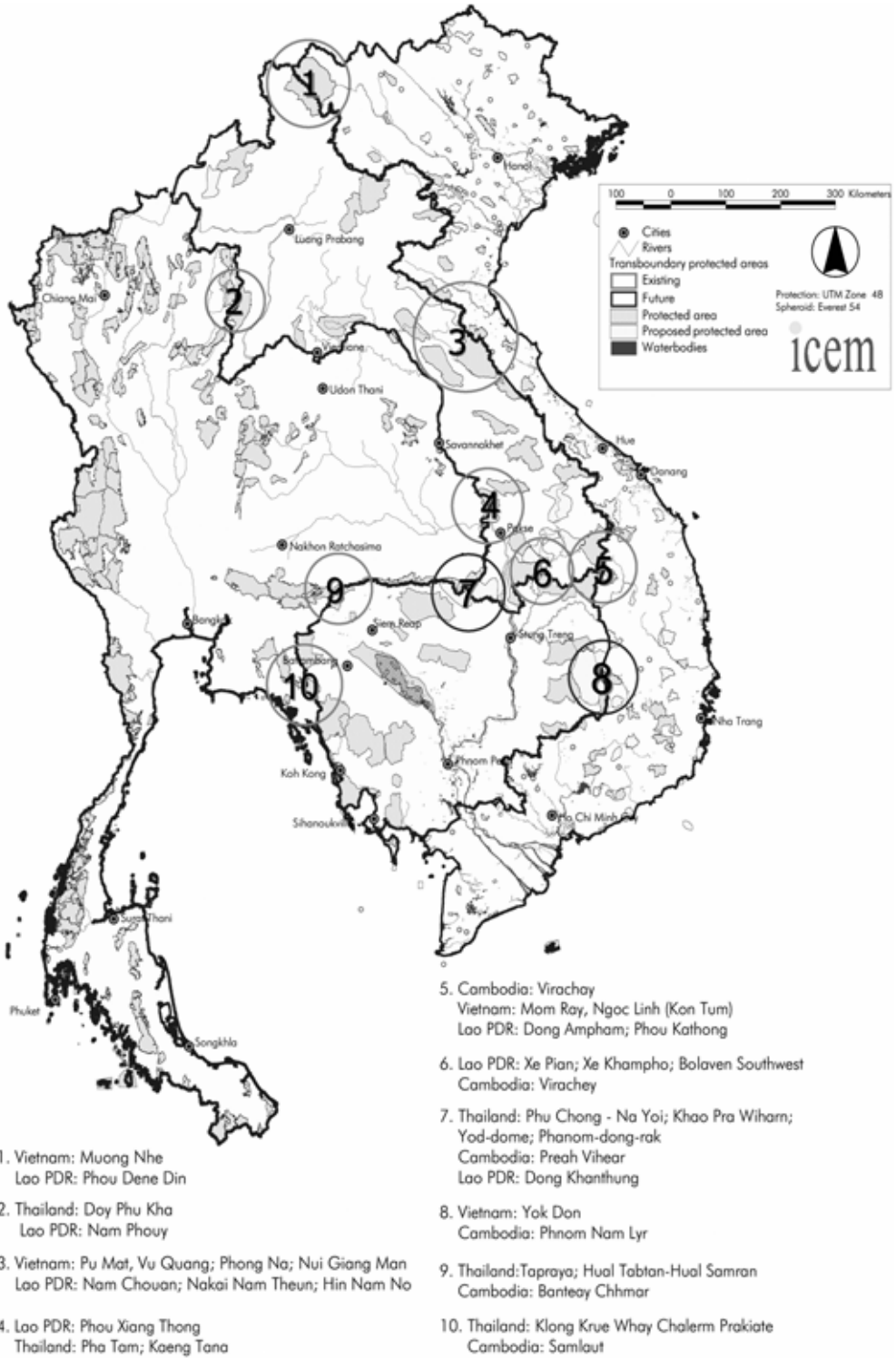


Figure 1. Potential transboundary areas in the Lower Mekong region: Cambodia, Laos, Thailand and Vietnam.

studies commenced which began to evaluate PAs from an economic perspective. They showed that many of the sectors, which are foundations of national and local economies, received services and products from PAs and that their economic worth was very significant indeed. The PAD Review field studies in each of the four countries had similar findings (ICEM 2003b). That first inkling of PAs in the region as important economic assets to be conserved for their development contributions has opened the way to a fundamental reorientation of how they should be planned and managed.

The PAD Review promotes the following directions for change in the Mekong region:

1. All PAs need to have their development values expressed in economic terms which can be communicated in annual and long-term budget submissions. Valuations should be part of PA management plans and any environmental assessment associated with development proposals affecting PAs.
2. Each sector needs to be made aware of the development benefits they do or might receive from PAs. Those benefits and their maintenance should be recognised in sector plans and budgets as a key strategy for sector productivity.
3. A more systematic application of the beneficiary or user pays approach in all sectors requiring supporting economic policies and instruments is needed. User pays arrangements already carried out on an ad hoc basis, for example, the Lao hydropower levies described in the article on energy, should be applied consistently and replicated in neighbouring countries.
4. Users of PAs need to become involved in their management and protection. New collaborative management approaches will be required relating to specific areas, resources and rights of access and to the services and products PAs provide.
5. Underlying all these new directions is the need to build the capacity, skills and budgets of PA managers. Strong PA authorities are essential to the kind of innovation and flexibility required if PA systems are to survive. PA managers must be given the authority, confidence and resources to build working relationships with development sectors and local communities.

The directions for change based on the lessons from the Mekong region have global application. Three issues require special attention because of their implications for economic development and conservation in the region:

1. **Trans-border cooperation** in protected area management provides development benefits to the participating countries. Uplands hold much of the region's natural wealth. They are relatively remote, forested, rich in biodiversity and concentrated in border areas. Effective trans-border cooperation in conservation management at the landscape level enhances local livelihoods and the quality and timing of water flows to downstream rice and fish producing regions, as well as to industrial and urban areas. The Review found that it promoted economic exchange while helping in the control of wildlife trade.
2. **A full range of protected area types** in national systems also generates development opportunities. Different types of protected areas serve different functions and objectives, and represent a gradient of human interventions ranging from the strictly protected to the settled and sustainably used areas. All are important and need to be viewed as part of a zoned development landscape of varying intensities of use and protection. Such a rational system of protected areas better serves development and fosters a better understanding of sector contributions in maintaining ecosystem services.
3. **Poverty reduction:** The role of PAs in poverty reduction will require special treatment. Poverty is a national and regional concern and needs to be addressed through targeted and integrated programmes across all sectors. The PAD Review found that too great an emphasis is being placed on protected areas as a solution to surrounding poverty. They are not. They can become an important part of the solution especially when major sectors begin paying their way for PA benefits they receive, but the management skills, authority and resources are not available to PA

agencies to treat poverty reduction as a principle objective along side biodiversity conservation. Governments need to take a comprehensive approach. Compensation, general adjustment assistance, financing and training programmes are needed that involve all sectors and levels of government on a coordinated basis; and if these schemes are to operate effectively, they must be part of the total economic and social planning framework for the regions concerned.

Finally, a comment on the PAD Review itself – it has been one step in a shared journey of investigation and action. “Shared” because there are now more than 800 people in the PAD network. The Review was undertaken as the initial activity of the PAD partnership.

The partnership operates within the four governments – involving different sectors and levels of government. Most important, it brings together the agencies managing PAs with those managing the economy. The active participation of the economic planning bodies has been impressive. Agencies such as the Ministry of Economic Planning in Cambodia and the National Economic and Social Development Board in Thailand were closely involved in field studies, joint task forces, the preparation of background papers and in overseeing drafting of the PAD national reports.

Several hundred national specialists have contributed through 12 national consultative meetings in the four countries and 15 meetings of the national core technical groups – all organised on the initiative of the lead government agencies – and two regional meetings convened by the Mekong River Commission. In 2003, delegations took the results of their national PAD reviews to the World Parks Congress.

The international arm of the partnership also brings together development and conservation organisations. UNDP, MRC and the Asian Development Bank, for example, have provided strong technical backing to the review. They are as concerned as their government partners to change the way we do business and to review their own agendas and approach. It is an active and open-ended partnership for the conservation of protected areas as an essential development strategy. A follow-up PAD programme is under design to support implementation of the national PAD reports.

References

- Carew-Reid, J. (ed). 2002. Biodiversity Planning in Asia. IUCN-The World Conservation Union, Sri Lanka, pp 594.
- ICEM. 2003a. *Protected Areas and Development in the Lower Mekong Region: Regional report*. Review of Protected Areas and Development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003b. *The Economic Benefits of Protected Areas: Field Studies in Cambodia, Lao PDR, Thailand and Vietnam*. Review of Protected Areas and Development in the Lower Mekong River Region. Indooroopilly, Australia.

Jeremy Carew-Reid is Director of the International Centre for Environmental Management in Brisbane, Australia. Email: jecr@icem.com.au.
Kishore Rao is Head of IUCN's Asia Region Protected Areas Programme. Email: parks-asia@hn.vnn.vn.

Protected areas as engines for good governance and economic reform in the Lower Mekong region

JEREMY CAREW-REID

By 2005, protected areas are expected to cover more than 20% of the Lower Mekong region including most of its remaining forest and upper watersheds. The maintenance of this extensive natural estate is an essential development strategy for the Mekong countries – Cambodia, Laos, Thailand and Vietnam. Yet, protected areas are not understood as productive components of national economies and their development contributions are degrading through low investment and expansion of other sectors. If this critical natural capital is to be conserved, protected area managers need to adopt the language of development and promote protected areas as engines for good governance and for economic reform, both priority concerns within the region. This article reviews the status of protected areas in the four Mekong countries, their links to population and development, and introduces key steps needed to have them recognised as critical assets in mainstream economic planning.

THE FOUR COUNTRIES of the Lower Mekong River region – Cambodia, Laos, Thailand and Vietnam – have established some of the largest protected area systems in the world as proportions of national territory. Many are national parks and nature and wildlife reserves in which no exploitative uses are permitted. Those restrictive national policies are coming under increasing strain faced with growing populations, especially the needs of poor communities living in and around protected areas. In reality, limited capacity and a lenient approach to communities at site level mean that most protected areas in the region are heavily used despite laws to the contrary.

Also, sector development such as roads, hydropower, tourism, fisheries and agriculture attracted to the natural resources and spaces covered by protected areas are pressing for access. For example, already more than 40 major hydropower schemes exist, are under construction, or approved with direct links to protected areas in the four countries and thousands more smaller scale units are located on streams originating in protected areas (ICEM 2003a).

There is growing evidence to show that protected areas and regimes of protection outside them are an essential development strategy for the Mekong countries and a foundation for the supply and servicing of the most important resources for the future – water, food and energy. The role of networks of protected areas has special significance in a region where the countries are so intimately bound together through shared forests, rivers and coastal systems.

The Mekong River and its 35 major tributaries and catchments is the dominant natural feature and unifying force in the region. It is the largest river in South-East Asia and the world's eighth largest in terms of water flow. With its source in the Tibetan Plateau, the Mekong River travels 4,800 km south through the Yunnan Province of China, becomes the international border between Laos and Myanmar, then continues between Laos and Thailand, before passing through central Cambodia and out through the southern tip of Vietnam to the South China Sea. The River demonstrates how artificial political boundaries appear when natural resource management needs are concerned, but how fundamentally important they are when it comes to taking management actions.

The relationship between the countries based on natural systems is being consolidated through massive investment in infrastructure development, with linking roads, power grids and telecommunications facilities increasing interdependence. The concept of an integrated Mekong region has been promoted politically and expressed in joint development programmes, first

through the Mekong River Commission (MRC) covering what is called the “Lower Mekong region” of four countries, and over the past decade through the “Greater Mekong Subregion (GMS)” of the Asian Development Bank (ADB), taking in China and Myanmar.

Protected areas status and trends in the region

Increasing protected area coverage

There has been a dramatic increase in the use of protected areas as a mechanism for natural resource management (Figure 1). The most significant expansions have occurred over the past decade, especially in Cambodia, Laos and Thailand, which are moving rapidly towards 25% protected area coverage of their collective territory. The entire protected area system in Cambodia and Laos was established in the 1990s, starting from scratch after war and political upheavals swept aside any institutional expression of the forest reserves defined under the French administration earlier in the century.

Increasing number of protected areas

In 1986, only ten years after the Vietnam-American war, 87 protected areas had been officially established in Vietnam, covering 3% of the country. That number has increased to 127. A notable feature of the region’s protected areas is that Vietnam has the greatest number distributed throughout the country but the least overall coverage. Many areas are of historic and recreational value but are too small for effective biodiversity conservation (ICEM 2003b). In Thailand, by the early 1980s, 67 protected areas had been established covering 6.9% of the country. That number has increased to 102, not distributed evenly but many concentrated in clusters often with contiguous boundaries and in regions of remaining forest (ICEM 2003c).

Increasing local government management

In Laos, a system of 18 large National Protected Areas (NPA) (or National Biodiversity Conservation Areas) was created in 1993, with two more areas added later. That system of 20 nationally designated National Protected Areas covers close to 13% of the land area of Laos. In 2000, the government devolved NPA management responsibility to the District Agriculture and Forestry Offices reflecting another important trend in the region – a rapid increase in the number and coverage of locally managed (and in many cases locally established) protected areas (ICEM 2003d). Since the mid-1990s, provincial, district and communal protected areas of various kinds have flowered in Laos taking the national system to 21% of the country, managed entirely at local level (Table 1).

In Vietnam, the national system also evolved through both centrally and locally established protected areas. Now, all but seven national parks have been devolved for management by the provinces. Significantly though, between 2000 and 2003 the number of “national parks” grew from

Figure 1. Growth in protected areas in the Lower Mekong region (as a percentage of national land area).

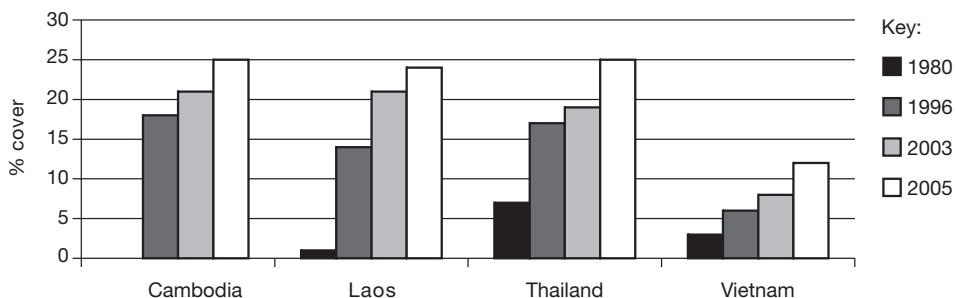


Table 1. Locally managed protected areas (2003).

	Cambodia	Laos	Thailand	Vietnam
Protected areas as a % of land area	21%	21%	19%	8%
Percentage of national system managed at local levels	1%	100%	2%	94%

Source: ICEM 2003a

12 to 25, as provincial governments reclassified nature conservation areas to raise their status and potential funding.

The growth of locally established and managed protected areas is just beginning in Cambodia, with many provinces expressing interest but awaiting the definition of a regulatory framework for the process. In Thailand, where there is a long history of central control of protected areas (until 2003, by the Royal Forest Department and now the Department of National Parks, Wildlife and Plant Conservation), decentralisation of responsibilities to regional offices, rather than devolution to local government is the current approach, although there is mounting pressure for the local Tambon Administrative Organisations to take a role.

Increasing investment in protected areas

During the past 15 years, there has been a dramatic increase in government and international investment in protected areas.

- Domestic investment, especially relating to recurrent costs associated with staff and maintenance has increased as new areas have been established.
- Overseas Development Assistance (ODA) for protected areas saw a rapid increase over the decade from 1990 but in recent years has fallen.
- Direct private sector investment in protected areas has been minimal and associated mainly with tourism facilities and hydropower schemes.

The increases in public sector and international funding have not been consistent throughout the period and from country to country. In the early 1990s government funding increased slowly and then quite rapidly towards the end of the decade. More recently it has levelled off or increased more gradually. International aid built up very rapidly, but in Cambodia and Laos dropped steeply in the second half of the 1990s because of political instability, a lack of measurable progress and ineffective controls on natural resource degradation.

Domestic investment in protected areas is still well under 1% of GNP, insignificant given the size of national systems and importance of the natural resources covered.

Protected area biodiversity values have diminished

Relatively little is known about ecosystems and species diversity in the Lower Mekong River region. Yet, the more information that comes to light, the more important the region becomes internationally for its biodiversity. The region falls within one of the world's 25 biodiversity hotspots (Mittermeier *et al.* 1998). It includes five of the world's Global 200 priority ecoregions (Balzer *et al.* 2001).

Despite the region's importance, the news on the status of biodiversity is discouraging. It is difficult to get an overall sense of rates of species loss but all evidence shows that populations of large mammals, many primates and birds, and many freshwater and marine species are in serious decline (MacKinnon 2002). In a situation of limited information at the species level, probably the best indicator of biodiversity loss is rates of habitat destruction. While figures vary the overall trends are clear. There have been major losses in area and quality of forests, wetlands and marine ecosystems. Reduction of forest in each country ranges from 46% to 75% of original area

(Table 2). The greatest losses have occurred in Thailand and Vietnam, which retain around one quarter of their original forests – Cambodia and Laos have more than half of theirs. Wetland loss through conversion to agriculture has been more extensive, a World Resources Institute estimate putting it as high as 99% in Vietnam for example.

An outstanding feature of forest loss in Cambodia and Laos, and to a lesser extent in Thailand and Vietnam, is that intensive illegal logging tended to continue outside protected areas. On the whole, the forests of officially designated protected areas ended the century in better shape than those around them. This is most remarkable in situations such as Cambodia where much of the PA system, established through Royal Decree in 1993, lacked field staff throughout the decade (ICEM 2003e).

Certainly, there continues to be many small-scale logging infringements within protected areas. Yet, despite a number of serious exceptions in all four countries, the level of destruction has been greatest in the landscapes around them. Forty-five percent of the region's forests fall within

Lao forest officials find evidence of logging activities in an NPA. Photo: Chris Flint.

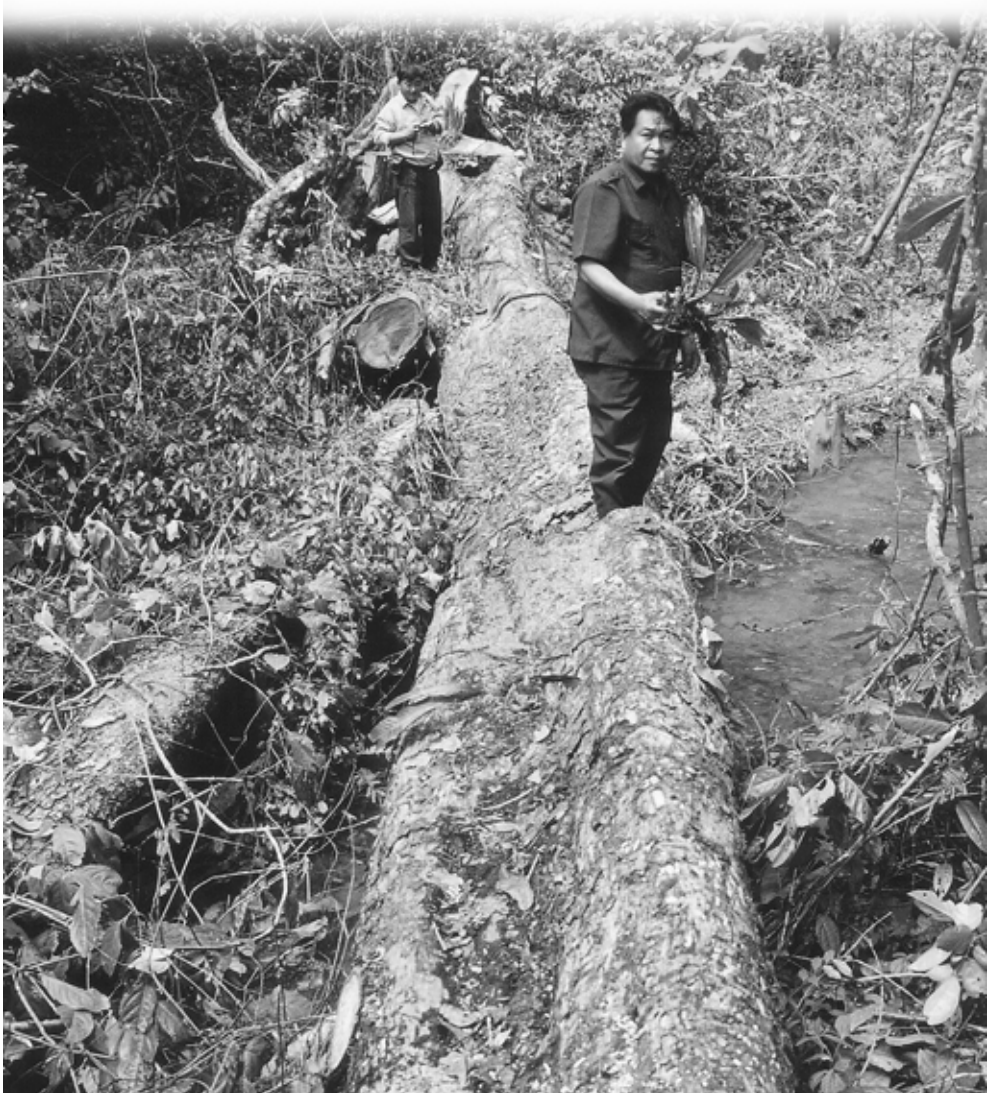


Table 2. Percentage losses in area of original forest, wetland and marine ecosystems.

	Cambodia	Laos	Thailand	Vietnam
Forests	48%	46%	71%	75%
Wetlands	45%	30%	96%	99%
Mangroves	15%	NA	84%	37%
Coral reefs – severely threatened by human activities	100%	NA	77%	96%

Sources: WRI 1994, 2003; FAO 2001, ICEM 2003 b-e; Burke et al. 2002

protected areas. That figure is especially significant as protected areas now contain the bulk of the best quality forests and of the remaining original forests in the region. This is a positive perspective on a decade of negative trends for natural systems. In summary, forests and other biodiversity appear to have been safer when within protected areas, but by no means secure. Many factors continue to reduce its values and resilience.

Population dynamics and protected areas

The Protected Areas Development (PAD) Review found a number of important links relating to population. In each country:

1. protected areas tend to fall in the least populated locations;
2. protected areas are situated in regions of medium to high incidence of poverty;
3. there is increasing migration towards protected areas and regions of biodiversity wealth; and
4. there is a direct correlation between population density and the level of community pressure on protected areas.

At a regional level, population becomes a key driver for natural resource consumption patterns and international relations. Cambodia and Laos, with close to 50% of the Lower Mekong's quality forests and much of its water and hydropower potential, have a shared population of just 19 million surrounded by 230 million people who are experiencing increasing resource scarcity and demand. Since the 1960s, populations have doubled and may double again before levelling out over the next 50 years. Cambodia and Laos are facing a future in which the populations of their neighbours – Thailand, Vietnam, Myanmar and Yunnan province – will reach 300–400 million within several decades. There is great pressure on the Mekong nations to exploit their resources (and those of their neighbours) to cater for growing demand (ICEM 2003a).

Sector productivity and the protection of natural systems

To a greater or lesser extent, many sectors in the region are suffering from neglect of their natural resource base. This increasing threat to economic productivity provides an opportunity for protected areas and linked regimes of protection across landscapes to be recognised as critical development strategies. Yet, it is also placing protected areas under increasing stress as sectors seek to exploit their spaces, products and services without due regard to sustainability.

Natural system decay may be due to intentional and aggressive exploitation of the “consume and move on” type or because natural functions and contributions are taken for granted – but it has the same negative impacts on sector productivity. Examples of the immediate connection between sector productivity and the condition of the resource base in the region are easy to find. Fisheries, hydropower and agriculture illustrate the relationship:

- *Fisheries:* In Vietnam, Thailand and Cambodia coastal fisheries have collapsed. Also, throughout the region there has been serious loss of habitat and productivity in freshwater capture fisheries – and a transfer of investment attention to aquaculture.
- *Hydropower:* Although the situation varies greatly from one facility to another, the neglect of upper catchments is reducing overall productivity. Larger hydro schemes have much greater

capacity to absorb the effects of sedimentation and increasing fluctuations in water supply. Yet, in recent years, reservoir levels in smaller schemes have dropped so low during the dry season in some areas of Vietnam and Thailand that output was down to 10%.

- *Agriculture:* In the Sakae Krang watershed, situated in the central plain of Thailand, forest loss and poor agricultural practices have led to annual soil losses of up to 39 t/ha/yr (Eiumnoth 2002). Similarly, in Vietnam's Central Highlands some areas cleared of forest for coffee, mulberry and tea plantation experience 20 t/ha/year soil losses annually. Forest loss has also increased the seasonal variation in rice production due to increased lows and highs in water flow. In Thailand and Vietnam water quality and supply for agriculture is becoming more unreliable. In 1999, Thailand suffered its worst drought in many decades. Six million people in 44 provinces were affected. Thailand's plan to divert water from the Mekong River to irrigate its drought-stricken north-east was met with concern from its neighbours who also depend on the system's water resources.

These examples emphasise the critical importance of natural system maintenance in the regional economy. Increasingly, availability of energy, water, forests and arable land are the commodities constraining development. Countries that maintain the capacity to conserve and renew those resources will have a distinct competitive advantage in the long term.

Cambodia and Laos are sitting in the front seat in terms of potential water, forest and energy availability per head of population. They hold 37% of the region's renewable water resources, 52% of its hydropower potential and 47% of its forests but only 11% of its population. They retain a disproportionate share of the region's natural capital in the form of forest and wetland timber and non-timber products, wildlife and ecosystem services. Managing this development potential for the greatest benefits will require complex trade-offs and carefully negotiated economic relations with neighbouring countries and foreign companies. The market for these products and services

The PAD Review field study in Vietnam has shown that even this beer factory in Hue potentially derives benefits from the protected areas in Thua Thien Hue Province. Photo: Paul Insua-Cao.





North Vietnam. Where people live in or close to protected areas a landscape approach to PA management is vital.
Photo: Iris Uyttersprot.

is primarily in neighbouring countries, the wider region and global. Energy consumption per capita is around 25 times greater in Thailand and five times greater in Vietnam than in Cambodia and Laos.

A new protected area language

There are two ways of looking at protected areas – (i) as areas of natural resources under siege from development sectors and local communities or (ii) as productive units of the economy, integrated and maintained by it. In the Lower Mekong countries, governments have considered protected areas as unproductive in economic terms and PA managers adopted a siege mentality taking on the role of nature’s policemen. Those attitudes are changing. Yet, the question remains – how is the shift achieved in practice from protected areas as *conservation assets* to be protected from the economy, to protected areas as *economic assets* carefully conserved for the development benefits they provide?

In making that shift, one strategy underlies all others. For protected areas to be recognised as essential development strategies, PA managers need to adopt the language and approach of the dominant fields of development reform the four countries are promoting:

1. Reform of public administration and governance.
2. Reform to the economic system.

These two fields of reform are intimately linked and reinforce each other. They are the overriding preoccupation of the Mekong governments and receive the greatest political attention and budgetary support. There is a critical opportunity for protected areas to be seen as an important force for demonstrating and driving this primary government agenda and consequently to receiving a greater share of the public purse.

Prerequisites for applying the new PA language

Acquiring and using the new language requires of PA agencies:

1. active engagement in key government reform platforms;
2. formal working relationships with each of the principle development sectors;
3. reorientation of the information they generate to emphasise development contributions; and
4. greater use of budgetary cycles and submissions as a vehicle for change (Carew-Reid 2002).

PA agencies need to cultivate a new constituency among the main organisations and individuals shaping and determining government policy, development and budgetary priorities. They should use the annual and five-year budgetary cycles to promote and justify a greater share of the cake. And they need to ensure that they are sitting around the tables where government reforms are being discussed and implemented.

Protected areas as “engines” of good governance

There are three key areas in which the four governments are seeking to change the way decisions are made and plans and programmes carried out: (i) decentralisation, (ii) “democratisation”, and (iii) the rule of law. In practice the directions the reforms are taking include:

Decentralisation

- Devolution of planning responsibilities to local government.
- Devolution of budget management and revenue raising.
- Devolution to the private sector and increasing use of economic incentives to shape behaviour.

Democratisation

- Increasing opportunity for stakeholder and community involvement.
- Increasing mechanisms for cross-sector working links and links between regions (although this remains a challenge).

The rule of law

- Better defined and enforced frameworks of laws and regulations – leading, for example, to greater definition of rights over the use of land and resources.

Each of these directions for reform have great pertinence for protected areas in terms of how they are managed and the contribution they can make to the process. PA managers in the region are recognising the need to be pro-active in promoting themselves in terms of these top priority fields of government reform, and not remaining passive bystanders. **Protected areas should be seen as “engines” of good governance.** They need to be highly visible as adding significantly to the momentum of the reform process and to showing how it should be done.

Protected areas as “engines” for economic reform

Similarly, PA planners need to build on the momentum of government commitment and use the economic reform process to shift into the mainstream of development planning.

An important way to begin this change in perspective is to see protected areas as having zones of economic influence. **Each protected area has a development footprint** (Figure 2). Interesting findings of the PAD Review are that the size of a protected area is not always directly correlated to the size of its footprint. But when protected areas are managed in clusters across a landscape, it increases the size and significance of the collective footprint, allowing for specialisation, sharing and exchange to promote development functions.

The Review explored ways for economic and protected area planners to better understand and expand these zones of development influence and to having them recognised in local and national development planning and in national accounts.

The overriding principle to be applied in managing and expanding a development footprint is that **users pay for maintenance of the benefits they receive.** It is not merely “the user pays” principle, which is applied for example in Vietnam’s Natural Resources Tax. It is essential to link directly the use of the natural resource or service with the need for and cost of its maintenance. In Vietnam, collected natural resource taxes go directly to consolidated revenue, now mostly at provincial level. The link between use and conservation is lost.

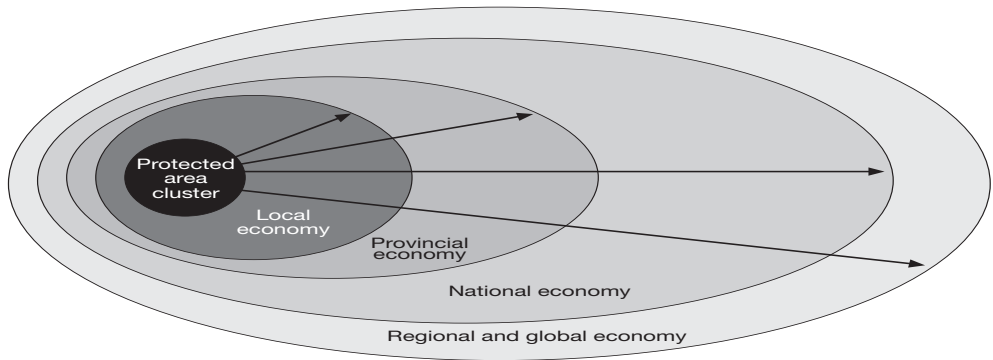


Figure 2. *The protected areas development footprint.*

In summary, key steps in managing the PA development footprint include:

1. defining the economic actors and activities connected to protected area resources and services;
2. identifying the PA development benefits they receive;
3. valuing those benefits;
4. working with sectors to reflect the benefits in their policies, budgets and staffing; and
5. introducing a framework of economic incentives and decentralised fund management arrangements so that payments for PA benefits are linked directly to their maintenance.

For many provinces and districts, protected areas can play a critical role in testing and demonstrating decentralised fund and budget management, the use of economic instruments and the involvement of local communities and other interests in the process. PAs offer a vehicle to build local capacity in development planning and financial management at a time when all four governments are giving this challenge the highest priority.

Conclusions

The governments of the Mekong region are facing a number of conundrums. They continue to establish protected areas to conserve important natural systems but diminish their values through contradictory and inconsistent policies, decisions and practice in other sectors. They are expanding the protected areas estate, but not providing the resources to manage it effectively. They promote economic development as the overriding priority but without recognising or investing in the massive development contributions protected areas are making in their natural state. Two arms of government – one concerned with conserving natural systems and one concerned with developing them – appear to operate without connection, despite the growing evidence that the wellbeing and productivity of one is inextricably linked to the other.

The weakness needing attention is the institutional, policy and procedural relationship between those arms of government. The linkage between development and conservation, being so clearly expressed in the condition of the region's natural systems, must be built up and strengthened in institutional terms. An essential start is for protected areas to be treated as productive economic assets with their goods and services valued and expressed in development language. The process of making protected areas and conservation activity mainstream in regional development begins with the two arms of government talking the same language and acknowledging their mutual interdependence. Policy incentives and procedures need to define and reinforce the relationship from day to day so that it is progressively understood and expressed both in natural systems terms – for example, as ecosystem services given and received – and in terms of development through development and conservation agreements.

Over the past two decades, a great imbalance has evolved. Budgets, staffing and overall investment in exploitative activities have grown rapidly while commitments relating to maintenance, conservation and restoration remain below 1% of GDP. In part the imbalance is intentional – following the “consume now conserve later” philosophy. More important it results from a single track mentality within sector agencies and among economic planners driven by narrow agency mandates which discourage full cost-benefit accounting. Either way the loss of natural capital in the Lower Mekong region and the serious impacts it is having in retarding development and accentuating inequities now show that the costs of many years of lopsided investment are high and the damage often irreversible.

Above all else, leaders in the region need to give much greater commitment and priority to conservation in national and regional development plans. The reason for this strategic reorientation of priorities is straightforward – it will bring the greatest long term development benefits to the communities and countries of the region.

Bibliography

- Baltzer, M.C., Doa, N.T. and Shore, R.G. (eds). 2001. *Towards a vision for biodiversity conservation in the forests of the lower Mekong ecoregion complex*. WWF Indochina/WWF US. Hanoi and Washington.
- Burke, L., Selig, L. and Spalding, M. 2002. *Reefs at risk in Southeast Asia*. WRI, UNEP-WCMC, Cambridge, UK.
- Carew-Reid, J. (ed.) 2002. *Biodiversity planning in Asia*. IUCN-The World Conservation Union, Sri Lanka.
- Eiumnoh, A. 2002. *Integration of geographic information systems (GIS) and satellite remote sensing (SRS) for watershed management*. School of Environment, Resources and Development, Asian Institute of Technology, Thailand.
- FAO. 2001. *State of the world's forests*. FAO, Rome.
- ICEM. 2003a. *Regional Report on Protected Areas and Development*. Review of Protected Areas and Development in the Lower Mekong River region, Indooroopilly, Queensland, Australia.
- ICEM. 2003b. *Vietnam national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003c. *Thailand national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003d. *Lao PDR national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003e. *Cambodia national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003f. *Lessons learned in Cambodia, Lao PDR, Thailand and Vietnam*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003g. *Lessons learned from global experience*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003h. *The economic benefits of protected areas: field studies in Cambodia, Lao PDR, Thailand and Vietnam*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- MacKinnon, John R. 2002. The status of biodiversity. In: J. Carew-Reid (ed.) *Biodiversity planning and Asia*. IUCN Sri Lanka. Chapter 2 pp 49–78.
- Mittermeier, R.A., Myers, N., Thomsen, J., Da Fonseca, G.A.B. and Olivieri, S. 1998. Biodiversity hotspots and major tropical wilderness areas: Approaches to setting conservation priorities. *Conservation Biology* 12: 516–520.
- World Resources Institute. 1994. *World resources 1994–1995: a guide to the global environment*. Oxford University Press, Oxford.
- World Resources Institute. 2002. *Earth Trends Environmental Information Portal*. World Resources Institute 2002.

Jeremy Carew-Reid is Director of the International Centre for Environmental Management in Brisbane, Australia. Email: jecr@icem.com.au

Poverty reduction and protected areas in the Lower Mekong region

JASON MORRIS AND KOL VATHANA

Most protected areas in the Lower Mekong region are located in regions of poverty. Given that poor communities frequently depend on protected areas for a wide range of goods and services, their future prospects are tied closely to protected area policy and practice. Protected areas have been seen as sources of conflict and opportunity-costs to poor communities. This article discusses how protected area conservation can be made more relevant to poverty reduction agendas by recognising and further developing the benefits that protected areas accrue to the poor. In particular, transfer payments are a promising avenue for more equitably distributing the costs and benefits of protected area conservation and generating revenue for remote areas.

THE CLEAREST LINK between poverty and protected areas is that many of the communities around protected areas are poor, often some of the poorest. These communities depend directly on protected area resources, as well as benefiting indirectly from its environmental services and other values. For better or for worse, the future prospects of these communities are tied in closely with protected area policy and practice. The Protected Areas and Development Review (PAD Review) in the Lower Mekong region, namely Cambodia, Laos, Thailand and Vietnam, found that PAs have a critical role in poverty reduction, although many of the emerging options explored in the Review have yet to be fully tested (ICEM 2003a).

This article, based on the Review reports, gives a brief overview of the links between protected areas and the poor and describes three main avenues by which the poor can and do accrue benefits from protected areas, namely:

- securing and sustaining livelihoods;
- capitalising on market opportunities; and
- exploring the potential for transfer payments.

Nam Et Phou Loei National Park Area, Laos – villages in the adjoining NPAs are heavily dependent upon local natural resources. Photo: Chris Flint.



Transfer payments, in particular, are seen as a strategy for attracting revenues to remote areas and for reaching a more equitable distribution of the costs and benefits of protected area conservation.

Poverty and protected areas in the Lower Mekong region

The PAD Review found that most protected areas in the Lower Mekong countries lie entirely within or overlap significantly with regions of “high” poverty. Table 1 shows that 44% of protected areas lie inside regions of “high” poverty and another 39% in regions of “medium” poverty. Over 80% of protected areas are located in areas of “medium” and “high” poverty according to country-specific criteria (SEI and ADB 2002). Only in Laos is the majority in areas of “medium” poverty, but Laos is already among the poorest countries in the world. Individual exceptions tend to occur where protected areas are close to major urban centres or regions of industrial development. But even those protected areas tend to be associated with poorer populations, such as the poor communities around Thailand’s protected areas in the Eastern Forests Complex, located relatively close to Bangkok and the industrial centre in Rayong Province. The correlation is particularly significant for the larger and more important protected areas. In Vietnam, the eight most highly ranked protected areas under consideration for potential World Heritage listing (TN Lan 1999) are located mostly or entirely within “high” poverty areas. In Cambodia, the larger existing and proposed protected areas feature prominently in the poorer north-east and north-west provinces.

A key reason for the high quality of biodiversity and natural habitat in these areas is also a reason for the high rates of poverty. Their distance from urban centres and difficult market access has kept them out of reach of commercial interests and other modern developments. Remoteness, which has been good for the environment, has clearly been a cause of poverty, creating an uncertain tension between poverty reduction and conservation (Box 1). But this is only one side of the story.

Another side is that these remote areas, rich in natural resources, are also the refuge of displaced communities and a “last resort” employer for some of the poorest and most powerless people. Often they have been forced to move higher up mountains, deeper into forests, or closer to sandy shorelines because of upheavals resulting from development in the lowlands, such as overpopulation, exploitation of new economic zones, and forced resettlement schemes for development projects (e.g. hydropower dams). Indeed, high levels of immigration have been noted in areas adjacent to the south-west cluster of protected areas in Cambodia (ICEM 2003 b and c). In Vietnam, migratory trends indicate significant population shifts from densely populated areas into “frontier” lands, such as natural forests (ICEM 2003d). Exploitation of these “New Economic Zones” has meant wealth for some, but it has also meant displacement for others and disruption in traditional uses of land and natural resources, particularly for upland ethnic minority groups. In these cases, remoteness and association with protected areas is the consequence of poverty and powerlessness. The advent of modern development has been the problem and remote areas have been the solution, albeit a sometimes temporary or inadequate one.

Table 1. Poverty and protected areas in the Lower Mekong region.

Protected areas in:	Poverty level			Total ^a
	Low	Medium	High	
Cambodia	13%	41%	46%	100%
Laos	18%	51%	30%	100%
Thailand	27%	28%	46%	100%
Vietnam	15%	34%	52%	100%
Average LMR	18%	39%	44%	100%

a. Errors due to rounding

Box 1. A description of a Chau Ma family inside Cat Tien National Park (Vietnam)

We are meeting Mrs N, who is a 25 year-old Chau Ma woman. Her house is practically empty with almost no furniture. She is sitting in the hammock when we arrive. Her husband is out cultivating upland rice on a piece of land far away. Before, they had 1 ha of wet rice fields until some Kinh people (i.e. ethnic Vietnamese) came and took the land away. They have written to commune authorities several times to get it back, but they have not had any response. So they stick to upland rice cultivation of some 2–4 ha.

This has been the land of the Chau Ma for many generations [although there has been much instability recently due to mass immigration by lowlanders]. They have memorial days for their ancestors, which they celebrate at home, and have close family in the *buon* (traditional village). People here still burn the forest to grow rice. An area of burnt-over land is used for one or two years and then abandoned. The difference now is that they do not move their houses any longer. Last year, they lost their harvest and got assistance from the State. For many years now they have had to endure periods of hunger. In fact, it happened one time that they were all near death in the *buon*. A high rate of death among children has been a great problem. In her husband's family, they were 15 siblings and 10 of them died when they were small. They do not know the reason. In the whole *buon*, only two children go to school. For the future, they would very much like to borrow money for breeding livestock and growing cashew. In fact, the whole *buon* would like to breed livestock, if they had any capital to invest.

Adapted from ANZDEC (1996)

Many local communities depend directly on protected area resources for foods, fuel, construction materials, medicines, fodder and readily available cash income (ICEM 2003b). These communities benefit from a wide range of ecosystem services, such as pest control and pollination, the regulation of water supply and quality for electricity and irrigation, and the maintenance of fish stocks. The cultural heritage and spiritual values of certain indigenous communities can be closely related to the landscapes and natural resources inside protected areas (Bann 2000a). Protected areas can also benefit the rural poor at a distance and even the urban poor (DFID *et al.* 2000, Satterthwaite undated).

Securing and sustaining livelihoods

Although local communities may depend heavily on resources from natural habitat, the contributions of these resources to local and national economies are often overlooked because they rarely pass through formal market channels. However, economic valuation studies in Ream National Park (De Lopez 2001a), mangrove forests and coastline in Koh Kong Province (Bann 2000a) and natural forests in Ratanakiri Province (Bann 2000b) in Cambodia, as well as in Nam Et and Phou Loie National Biodiversity Conservation Areas (NBCA) in Laos (ICEM 2003b), have shown that the economic value derived from natural habitat is substantial, often making up a major portion or even exceeding average household income or per capita GDP in the locality. Studies by De Lopez (2001a) and Bann (2000b) showed that conserving natural habitat was worth more than one-off timber harvesting and uncontrolled fishing, especially for poor communities (Box 2). The relationship is not universal, however. Studies in Khong Dien Nature Reserve in Vietnam and Khao Chamao-Khao Wong National Park in Thailand (ICEM 2003b) showed less substantial economic values for forest products derived from protected areas. Overall, the economic value of natural habitat appears most significant where life is most vulnerable and at subsistence levels.

At least as important as the *total economic value* of a protected area is *who* benefits from it (De Lopez 2001b). Even if natural habitat is converted for logging or aquaculture, for example, economic benefits tend to accrue more to wealthier stakeholders than the poor. Developments of

Box 2. Three paths for Ream National Park (Cambodia)

[T]he research team . . . determined the costs and benefits of three different management options [for Ream National Park]:

1. the **experimental park** scenario corresponds to the base case where some level of protection is achieved, but fisheries eventually collapse;
2. the **ghost park** scenario assumes that all timber and fish are harvested, destroying the area; and
3. the **dream park** scenario only allows subsistence activities, recreation, education and research.

At a 10% discount rate, the dream park has the highest net present value (US\$11.9 million). This compares with US\$10.0 million for the ghost park and US\$9.8 million for the experimental park. Although the dream park scenario has the highest net present value, it exceeds that of the ghost park by less than US\$2 million. However, protection scenarios allocate the bulk of the Park's benefits to local communities. The dream park case confers three times more benefit value to villagers compared to the ghost park case, that is, US\$2,729 per household versus US\$919 per household. The distributional analysis shows that local communities would stand to lose most if the Park was destroyed.

From "Park for the People, not for the Powerful..." (De Lopez 2001b)

these kinds have created conflicts and withdrawal of access for poor communities (Angelsen and Wunder 2003; WRM 2002; Sunderlin *et al.* forthcoming). Even conversion of forests into agriculture has been known to disenfranchise poor and vulnerable populations, as occurred around the south-west cluster protected areas in Cambodia. Villagers had been allocated equal shares of land, but many of them were without draft animals and finally abandoned the land to people who had the resources to cultivate it (ICEM 2003b). In the Central Highlands of Vietnam, many indigenous peoples were pushed deeper into marginal land areas as a result of agricultural expansion by lowlanders (H.T. Ba 1999).

It has been argued that natural habitat, particularly forests, shows little evidence of lifting the poor out of poverty, but may have an important role in sustaining the livelihoods of the poor and preventing further impoverishment (Angelsen and Wunder 2003; Arnold 2001). Natural forests have frequently been dubbed as "natural safety nets" for their role in helping households bridge seasonal food shortages, offering a ready source of cash income in times of crisis or emergency and providing refuge from oppression, conflict and war (Neuman and Hirsch 2000, DeBeer and McDermott 1996, Sunderlin *et al.* forthcoming). Diversity in natural habitat is also important for sustaining livelihoods with a comprehensive package of goods (DeBeer and McDermott 1996). Arnold (2001) has added that dependence on forest products tends to be replaced by modern alternatives as communities advance economically. But for many communities around protected areas, these alternatives are still a long way off. In the meantime, the continued existence of natural habitat is important.

Capitalising on market opportunities

Protected areas in the Lower Mekong region have also showed capacity to generate revenue through emerging markets. Many examples of nature-based tourism inside protected areas exist in Cambodia, Laos, Thailand and Vietnam. A valuation study of the Hon Mun Islands in Vietnam (recently gazetted as a marine protected area) showed that it generated more revenue to the regional economy in tourism than would a proposed upgrading of the Nha Trang Port, whose pollution was projected to decrease tourism by 20% (PK Nam and TVH Son 2002). The article by Marris and Allcock in this issue presents a more detailed and comprehensive overview of tourism in protected areas. The challenge for poverty reduction will be in increasing the capture of benefits by poor communities, while avoiding or mitigating the negative impacts of tourism.

A few successful examples of sustainable harvesting regimes for non-timber forest products (NTFP) from natural forests have also held much promise for integrating conservation and development, although overall expectations for NTFPs in poverty reduction have subsequently been criticised as unrealistic and, in some cases, counter-productive (Angelsen and Wunder 2003; Neumann and Hirsch 2000).

For market-based opportunities, experiences in the Lower Mekong region have shown that emphasising local empowerment, skills building and community development funds can be more successful in generating benefits for the poor and distributing them equitably. An IUCN NTFP Project in Laos (Box 3) demonstrated how the establishment of a marketing group and a community development fund helped a poor community secure higher prices for bamboo shoots and wild cardamom, while generating substantial communal benefits, such as an upgraded water system, a new school and loans to farmers (Nurse and Soydara 2002). In the Lao Community Fisheries and Dolphin Protection Project, over 60 villages were established with effective frog and fish co-management systems that gained additional revenues from tourism (Chape 2001). Similar examples exist for nature-based tourism, as in the UNESCO Nam Ha Ecotourism Project in Laos or the Population and Community Development Association in Chang Rai Province in Thailand (Marris and Allcock, this issue).

Exploring the potential of transfer payments

A key purpose of the PAD Review (ICEM 2003a) has been to demonstrate the substantial contribution of protected area goods and services across a range of economic sectors. These goods

Box 3. Marketing group and village development fund for bitter bamboo (Laos)

In the village of Nam Pheng, Oudomxai Province, villagers used to be very poor and could not produce enough rice to feed the community all year round. In the dry season they collected bamboo shoots for sale, but the income was never enough. The IUCN NTFP project assisted them to analyse their problems (Soydara 2000).

In a series of meetings, the community gradually realised that they could improve their sales if they would all team up and sell for a fixed price, in a fixed place, not measured per bundle but measured per kilo. The community continued to discuss this idea until every family agreed to join the village marketing group. The results were above all expectations. In five months, the village sold more than 50 tons of shoots and earned 50 million kip* (on average 1 million per family), at least

four times more than the year before. The community also gained 5 million kip in a village development fund, setting aside 100 kip for every kilo sold. As a result, the community started to be very interested in monitoring and managing its bamboo forests.

Between 1998 and 2000 the group fund accumulated 17,000,000 kip through sales of bitter bamboo shoots and later also cardamom. It was decided that funds from 1998–99 would be spent on improving the village's water system and for providing land for development of agriculture and livestock. In 2000, 15 families received loans from the fund for a variety of purposes, both agricultural and non-agricultural. Examples of items bought included generators, hand tractors and house-building materials. In May 2000, the development fund was put towards the building of a new school and this was made possible through the provision of extra materials from the IUCN NTFP project.

*One US\$ was 2,500 kip in the first half of 1998.



Bitter bamboo shoots are in high demand in Thailand, Laos and China. They can be an important and sustainable source of income in rural areas as has been shown in Laos.

Photo: Iris Uyttersprot.

From Nurse and Soydara, 2002

and services have been treated as “free,” with certain interests benefiting while others shouldered the costs of their maintenance. These “others” are typically the poor communities living in the “rich” natural areas. Increasingly, transfer payments are being used as a mechanism to target these communities. Without tangible benefits poor landholders and resource users are unlikely to be willing—or economically unable—to conserve protected areas. Transfer payment mechanisms are designed to ensure that the beneficiaries of protected area goods and services pay for their use. These payments, or a portion of them, are transferred to the local communities who provide services or bear the opportunity costs of conservation. Because rich areas are usually in remote locations, transfer payments may offer revenue-generating possibilities where income opportunities are often hard to come by.

The concept of transfer payments incorporates a wide range of mechanisms and vehicles for payment. They can be broadly differentiated according to whether they are implemented through commercial markets or require some degree of public or other intervention, as well as between those that remunerate poor communities directly and those that contribute indirectly to socio-economic development or poverty alleviation. In the Lower Mekong region, relatively few examples exist of environmental transfer payments that specifically target poor communities, although they are increasingly used to fund broader protected area management. Five broad categories of environmental transfer payments relating to protected areas are discussed below.

Direct transfer of income

Direct transfer of income ensures that direct income from the marketing or sale of biodiversity products accrues at the local level.

Fiscal instruments

Subsidies and other fiscal instruments can be used to support credit, technologies, training, prices or markets that will encourage biodiversity-conserving activities or stimulate a shift away from biodiversity-degrading activities. For example, Vietnam allows exemption from land tax for the poorest communes, including many located around protected areas. Similarly, Laos has reduced land taxes for stabilised land use and reforestation, and provided exemptions on turnover tax for afforestation activities. For more than a decade, Vietnam has also operated a user pays system through its Natural Resource Tax, which now goes directly to the provincial level.

Payment for environmental services

Payments to communities, resource users or landholders for the provision of environmental services can include the provision of biodiversity, watershed and carbon sequestration services. They can be from either public or private sector beneficiaries, such as hydropower providers, polluting industries, bio-prospecting firms and water users. In the Mae Chaem watershed in northern Thailand, CARE International has helped to broker agreements between the Royal Forest Department and Forest Conservation Committees in approximately 100 villages. These agreements involve recognition of local land rights on state forest land in exchange for abandoning shifting cultivation and respecting mutually agreed forest boundaries. In Vietnam, Forest Protection Contracts currently cover about 1.6 million ha, paying annual fees to nearly 250,000 local households to maintain and protect forest areas.

Opportunities to use the emerging global market for carbon sequestration services are currently under investigation in both Cambodia and Vietnam to negotiate payments for community agro-forestry, reforestation and afforestation around protected areas. In Laos, an innovative system of payment for watershed protection services is being piloted in two protected areas. Phou Khao Khouay NBCA currently receives 1% of gross revenues of power exports from a downstream hydropower dam, and the proposed Nam Theun 2 hydropower project will provide over US\$1 million a year for the management of the Nakai-Nam Theun NBCA.



Nam Theun River – site of proposed NT2 Dam, Laos. Photo: Stuart Chape.

Revenue sharing

In many parts of the world, protected area revenues raised from biodiversity-dependent economic sectors are shared directly with local communities, either as cash payments to individuals or as contributions to more general socio-economic development activities. These types of arrangements are beginning to emerge in the Lower Mekong region. In Cat Tien National Park in Vietnam, a trust fund is under development that would earmark 1% of Park entry fees for expenditure on community development activities in the buffer zone.

Targeted reallocation of public and donor budgets

In each of the Lower Mekong countries, central and regional government authorities make budget allocations to communities around protected areas. In many cases, the allocations target activities that are related to biodiversity conservation and poverty alleviation. In some cases, these expenditures are channelled through protected area authorities themselves. Yok Don National Park in Vietnam is in the process of finalising a Buffer Zone Investment Plan that will support biodiversity conservation among poor communities adjacent to the protected area and supplement expenditures from other line agencies.

Conclusion

The benefits or revenue-generating potential of protected areas to local communities are either overlooked or rarely explored. This article has focused on the importance of natural habitat in poor livelihoods, and ways that protected areas can generate revenues for local communities through emerging market opportunities and transfer payments. These opportunities may not always be feasible or indeed desirable for biodiversity conservation. Much depends on local factors, such as the size, objectives, fragility, accessibility, resources and attractions of the protected area. But unless such alternatives are explored further, opportunities to harness the full potential of protected areas in poverty reduction and build more solid ethical and practical foundations for their conservation may be lost. Transfer payments can help establish a more equitable balance between the financially better-off beneficiaries of protected area goods and services and poor

communities who bear the consequences of their conservation. Transfer payments can also help generate revenues for remote areas, which has been a key challenge to conventional poverty reduction agendas.

References

- Angelsen, A. and Wunder, S. 2003. Exploring the forest-poverty link: key concepts, issues and research implications – Occasional paper no. 40. CIFOR, Jakarta.
- ANZDEC. 1996. *Excerpts from the ANZDEC Proposal – re: Cat Tien National Park Area*. Biodiversity Conservation and Rural Development Project, Vietnam.
- Arnold, M. 2001. Forestry, poverty and aid – Occasional paper no. 33. CIFOR, Jakarta.
- Bann, C. 2000a. An economic analysis of alternative mangrove management strategies in Koh Kong province, Cambodia. Available at www.eepsea.org/publications.
- Bann, C. 2000b. An economic analysis of tropical forest land use options, Ratanakiri province, Cambodia. Available at www.eepsea.org/publications.
- Chape, S. 2001. An overview of integrated conservation and development approaches in the Lao People's Democratic Republic. *Parks – ICDPs: working with parks and people*. Vol. 11(2), p.24–32.
- De Beer, J. and McDermott, M.J. 1996. *The economic value of non-timber forest products in South-East Asia*. IUCN-The World Conservation Union, Netherlands, Amsterdam.
- De Lopez, T.T. 2001a. Policy options for Cambodia's Ream National Park: a stakeholder and economic analysis. Available at www.eepsea.org/publications.
- De Lopez, T.T. 2001b. Park for the people, not for the powerful: the case for protecting Cambodia's Ream National Park. Available at www.eepsea.org/publications.
- DFID, European Commission, UNDP and World Bank. 2002. Linking poverty reduction and environmental management – Consultation draft.
- Huynh Thu Ba. 1999. *Human migration and resource utilisation*. WWF – Indochina Programme, Hanoi.
- ICEM, 2003a. *Protected areas and development in the Lower Mekong Region: Regional Report*. Review of Protected Areas and Development in the Lower Mekong River region, Indooroopilly, Queensland, Australia.
- ICEM, 2003b. *Cambodia national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM, 2003c. *Field Studies: Economic benefits of protected areas*. Review of Protected Areas and Development in the Lower Mekong River region, Indooroopilly, Queensland, Australia.
- ICEM. 2003d. *Vietnam national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- Neumann, R.P. and Hirsch, E. 2000. *Commercialisation of non-timber forest products: review and analysis of research*. CIFOR, Bogor, Indonesia.
- Nurse, M. and Soydara, V. 2002. Conservation and development: finding the linkages. IUCN-The World Conservation Union, Bangkok.
- Phan Khanh Nam and Tran Vo Hung Son. 2002. Tourism makes conservation pay: the recreational value of the Hon Mun Islands in Vietnam. Available at www.eepsea.org/publications.
- Satterthwaite, D. Undated. The links between poverty and the environment in urban areas of Africa, Asia and Latin America. IIED.
- SEI and ADB. 2000. *Strategic Environmental Framework for the Great Mekong Subregion: integrating development and environment in the transport and water resource sectors*. Vol. 1. ADB TA 5783.
- Sunderlin, W.D., Angelsen, A. and Wunder, S. Forthcoming. Forests and poverty alleviation. CIFOR, Jakarta.
- Tran Ngoc Lan. 1999. "Phat trien ben vung vung dem khu bao ton thien nhien va vuon quoc gia." [Sustainable buffer zone development for nature reserves and national parks.] Agriculture Publishing House, Hanoi.
- World Rainforest Movement. *Mangroves: local livelihoods vs. corporate profits*. WRM, Montevideo, Uruguay.

Jason Morris is a poverty reduction and resettlement specialist working with WWF in Cat Tien National Park in southern Vietnam.
Kol Vathana, Deputy Director, Department of Nature Conservation and Protection, Ministry of Environment, Cambodia.
Email: kol_vth@hotmail.com

Managing tourism in the protected areas of the Lower Mekong region

GUY MARRIS, ALISON ALLCOCK AND KHAMLAY SIPASEUTH

Tourism development in the protected areas of the Lower Mekong region is often under-resourced and inadequately managed, resulting in lost economic opportunities for local communities and the protected area and in damaging social and environmental impacts. This is a pattern that can be reversed by building capacity and developing management plans at an early stage to take advantage of the significant opportunities that tourism in protected areas present for the socio-economic development of the region.

This article presents a brief rationale for the careful management of tourism activity in protected areas as synthesised from an assessment of tourism development issues and case studies in the region conducted as part of the Protected Areas Development (PAD) Review. Five key issues are identified: (i) building capacity of protected area managers and other stakeholders; (ii) the need for early planning and zoning; (iii) funding protected area tourism initiatives and management; (iv) managing impacts; and (v) developing partnerships with NGOs and the private sector. Examples of ways in which strategic tourism development can directly contribute to protected area management and biodiversity conservation objectives are given from the region.

TOURISM DEVELOPMENT currently rides high on the agendas of the governments and donors in the Lower Mekong region. International visitor arrivals to the ASEAN (Association of Southeast Asian Nations) region grew from 20 million in 1991 to almost 38 million in the year 2000 – a compound annual growth rate of approximately 7% (ASEAN Secretariat). In particular there is an increasing focus on the development of tourism which capitalises on the rich natural and cultural heritage of the region, much of which is to be found in protected areas. There is a note of warning however – the recent dramatic downturn in tourist numbers due to SARS (Severe Acute Respiratory Syndrome), the Iraq war and global terrorism highlight the inherent uncertainty of the tourism market and the need for caution in overestimating the sustained benefits that tourism can bring. In particular, nature-based tourism alone – even without fluctuations in the market place – will not provide the panacea to development and conservation issues as suggested by its most enthusiastic advocates. It needs to be considered more as just one component in a broader strategy to optimise the development potential of protected areas in alleviating poverty in rural communities and in meeting conservation funding needs.

The stakes remain high – well-planned, resourced and implemented nature-based tourism development in protected areas can yield considerable economic and social benefits for society, especially for disadvantaged rural communities, while also actively contributing to the protection of a nation's natural and cultural heritage. On the other hand the explosion of poorly planned and under-resourced nature-based tourism development in the region has already resulted in significant negative environmental and social impacts, provided few local benefits and at times undermined the economic sustainability of tourism itself.

Fortunately the industry is still relatively young in the region. Laos, Cambodia and Vietnam in particular have only just “opened their doors” to tourism over the last decade, and so there is time to be pro-active in the planning and management of nature-based tourism development.

During the research for the PAD Review a number of issues persistently emerged from experiences and lessons gained in the region as being central to meeting these challenges (ICEM 2003a). There is a need for:

1. a common understanding and awareness among tourism development stakeholders and the general public about the principles of sustainable nature and culture-based tourism;



Rapid and uncontrolled tourism developments on Koh Samet National Park in Thailand are a threat to both the wildlife and long-term tourism potential. Photo: Paul Insua-Cao.

2. careful national level strategic planning to ensure that the promotion of tourism development is balanced with the required inputs of human resources, capacity building and funding to manage it;
3. capacity building and participatory arrangements among stakeholders – especially at the site level – for effectively planning, managing and operating successful tourism initiatives;
4. clarification of institutional roles and responsibilities;
5. protected area management planning for tourism development;
6. supportive infrastructure and visitor information services;
7. tourism development to make active contributions, financially and in other ways, to the maintenance and enhancement of the PA resources that support it;
8. involvement and clear benefits for local communities;
9. quality product development that meets market demands; and
10. a process of monitoring, reporting and responding to the impacts of nature-based tourism.

Establishing the principles for sustainable tourism development in protected areas

Nature and culture-based tourism activity and development in protected areas is commonly labelled and marketed as ecotourism often with little understanding of the principles used to define the term. The label tends to be applied to any type of tourism activity taking place in natural surroundings regardless of the impacts and lack of benefits to local people. This misunderstanding or misuse of the term is regarded by many practitioners who participated in the PAD Review as a major underlying cause of unsustainable nature and culture-based tourism development in the region.

A widely acknowledged definition (IUCN 1996) says that ecotourism is: *environmentally responsible travel and visitation to relatively undisturbed natural areas to enjoy and appreciate nature and any accompanying cultural features – both past and present – that promotes conservation, has low negative visitor impact and provides for beneficially active socio-economic involvement of local populations.*

A vital first step in the development of sustainable nature and culture-based tourism is for the governments of the region to adopt a common agreement on the principles and standards of ecotourism operation and to disseminate it to local government, the private sector, media and the tourist public. This agreement is needed to provide the vision and a legal and policy framework for guiding ecotourism development throughout the region.

Five key issues for tourism and protected areas

Issue 1. Building capacity to manage and benefit from sustainable tourism development

Ideally, each community and local government should be equipped to determine its own tourism development goals and aspirations. For this to occur, they must have funding and access to information and professionally trained individuals as needed. Building capacity has been identified as an issue in many tourism development projects, including some that have received a relatively high input of resources and technical assistance (Lyttleton and Allcock, 2002).

Capacity and responsibilities of PA managers, tourism authorities and other stakeholders

PA staff training is conventionally oriented to forestry and PA management but many staff lack the technical ability to manage tourism. In many situations PA managers also have insufficient funding, staff numbers and authority to influence higher-level tourism development decisions that may be incompatible with conservation objectives.

Roles and responsibilities should be clarified at an early stage to ensure effective cooperation between agencies. It is also important that the appropriate agency is given the mandate to lead and coordinate the planning process to ensure that PA conservation objectives and regulations are met. PA management agencies should have the primary role for ensuring that tourism development is integrated with biodiversity conservation objectives.

The relative contributions of private and public sectors must be clarified to avoid situations where government staff become closely involved in implementing tourism operations and are unable to perform their core duties, or where PA staff control and monitor tourist activity but also rely on tourism revenue. Mechanisms are needed, such as concession systems, for separating the management of tourism development from park management functions while maintaining the flow of financial benefits to PAs.

Community participation and equity considerations

Community participation in the planning process will allow development of products that are sensitive to the needs and vulnerability of the destination. Bringing together all stakeholders, including managers, community residents, private sector partners and tourists allows ideas to be exchanged and increases the level of knowledge of tourism in the community. These interested parties should be kept involved throughout the process. Local cultures and communities are also important to the tourist experience.

One of the more challenging aspects of community participation is involving all members of a community, including women and children who provide many of the tourist services in and around PAs. Women are also the primary producers of handicrafts often sold to tourists.

Tourism development can provide communities with an immediate and significant source of much needed income, education and skills; however, these benefits do not automatically accrue to all members of the host community (Box 1).

Generally wealthier families with sufficient labour, relatively good health and who are able to communicate with the tour guides are those that benefit from tourism. In these situations, tourism can exacerbate inequities and precipitate conflict. It may also lead to the emergence of undesirable behaviours such as begging and aggressive selling of products and, in the process, ultimately threaten the viability of the tourism business. Active intervention may be necessary to assist a community to distribute benefits and lessen any impact of tourism development.

Issue 2. The need for early planning and zoning

Pressure for short term income and profits

The 'rush for the tourist dollar' at the expense of planning and management is a major threat to sustainable nature tourism development in PAs. This is especially true in those areas suffering a

chronic lack of government funding and where poorly paid government workers at all levels take advantage of alternative income sources offered by tourism at the expense of their professional and ethical responsibilities. Reform of government salaries is also seen as a critical component of institutional capacity building and the achievement of sustainable development goals.

Once tourism revenue comes on stream it can be politically difficult to contain the pressure to capitalise on short-term and high economic returns at the expense of long-term sustainability. Tourism revenue provides a considerable incentive to exceed management guidelines and undermine the tourism resource base and the industry itself.

Protected area zoning for tourism development

Although multiple use zoning of PAs through a participatory process is probably the most basic and effective strategy for managing impacts from tourism development, few PAs in the region have effective zoning for tourism.

This is due to insufficient information and capacity to map and analyse ecological and socio-economic priorities in the PA, unclear demarcation of PA boundaries and limited flexibility in the zoning classification system for promoting tourism development and its contribution to PA management objectives (Box 2). Strict adherence to regulations prohibiting tourism in poorly defined core zones, for example, may mean that tourism development potential and the socio-economic and conservation benefits that it can bring is unnecessarily lost from the PA. Similarly the blanket designation of buffer zones for tourism development, in the absence of detailed land use planning, may encourage high use and be incompatible with both conservation objectives and sustainable community development objectives.

Beyond PA boundaries there is often contiguous natural habitat that remains important to the maintenance of viable PA wildlife and fisheries populations and which should be included in the zoning plan. Careful zoning for tourism development on an ecosystem level also provides a

Box 1. Contributing to sustainable community development, Chiang Rai, Thailand

The Population and Community Development Association (PDA) is working with Ban Lorcha, a Phami-Akha ethnic village in Chiang Rai Province, Thailand, to develop a model for hill tribe based tourism that contributes to sustainable community development. A key component of the project is to strengthen the organisational capacity in the village to manage tourism and ensure that benefits are equitably distributed within the community and are used for development activities. This is achieved in a number of ways:

- A number of working groups have been set up in the village to manage the daily tasks associated with tourism including an Area Development Group, the Welcome and General Services Group, the Cultural Education Group, the Occupational and Product Development Group and the Finance and Book-keeping group.
- Income generated by tourism is deposited into a Village Bank in which all households are members.
- At the end of each year the funds in the Village Bank are divided into two parts. One part is invested for village development activities, including the education of needy children, financial assistance to the elderly, orphans and villagers who have no means of supporting themselves and for reinvestment back into the development of tourist activities. A second portion of the annual fund is distributed equally among all households for personal use.

The funds for developing the tourism enterprise were advanced to the village as a 'soft loan' from the Revolving Loan Fund established by the PDA. The Village Bank will have to repay the loan from income generated by tourism which will then be used to assist other villages to participate in sustainable tourism development initiatives.

management opportunity to redirect tourism development and high visitor numbers away from more sensitive or stressed sites inside the PA.

Issue 3. Funding protected area tourism initiatives and biodiversity conservation

An important requirement for biodiversity protection in the region is the provision of funds to support bioregional assessments, ecological research and the management of PAs which typically suffer from a lack of resources. Tourism development can present a significant opportunity for generating revenue to fund biodiversity conservation and associated community co-management programmes. At the very least, once the initial capital investment has been provided to start up tourism programmes in protected areas, there needs to be a sufficient return of revenue to cover the costs of managing tourism programmes at the protected area level to ensure their sustainability. Well-managed and successful tourism ventures should be able to generate surplus funds for enhancing protected area management operations rather than just covering costs.

Protected area managers need to consider a variety of methods for obtaining revenue from tourism including: direct pricing and charging on a user pays basis, indirect taxes, charges on goods and services and donations. Governments, on the other hand, need to ensure that protected area management agencies are able to capture an appropriate proportion of tourism revenue (as reflected by the actual management costs and value of the protected area resources) and reinvest it back into the protected area.

Entry fees for protected areas

Most studies have indicated that the fees paid for entry to PAs are much lower than the amounts that people are prepared to pay. This is especially the case for international tourists and there is an argument for charging foreigners a higher entry fee. Thailand has a national fee structure of: 20 Baht (50c US) for Thai adults, 10 Baht for children, and 200 Baht for foreigners (ICEM 2003b).

There is significant scope for increasing fees, creating a revenue stream that can be used to support infrastructure development and cover management costs. A comprehensive review of

Box 2. Protected area zoning for tourism development

The Cat Tien NP Tourism Management Plan (WWF 1999) has identified five zones for tourism development and conservation:

1. An 'Intensive Tourism Zone' is located around the Park headquarters where visitors enter the Park. It offers accommodation, services and information and is intended primarily for use by 'weekend' recreational tourists and educational groups (maximum 60 visitors per day). Activities include short scenic walks, boat trips and other recreational activities. The ecological value of this zone is relatively low.
2. An 'Ecotourism Zone' is for low impact, overnight excursions by small groups (3–7 visitors per destination per day) into PA areas where there are opportunities for bird and other wildlife watching.
3. An 'Expedition Zone' is meant for very small groups (five people/expedition) who want to experience the park's wilderness areas.
4. A 'Community Tourism Zone' intended for developing economic activities for several villages in the park. It is primarily for cultural based tourism but also offering short excursions into the forest with village guides. It is intended for small groups only (5–7 people/destination/day). Additionally the buffer zone is designated for community based tourism on a more intensive scale (a maximum of 200 people at any one time) to spread economic benefits and accommodate those tourists which exceed the carrying capacity at the Park Headquarters (a maximum of 200 people at any one time).
5. A 'Restricted Zone' that contains the core populations of rare and endangered mammal species including tiger, elephant and Javan rhinoceros. Only research is allowed in this zone.

(adapted from PDA 2002)



Ha Long Bay World Heritage Site, as viewed from a coal slag pile, is a major tourism attraction in Vietnam and sits uneasily next to major industrial developments in Quang Ninh Province. Photo: Paul Insua-Cao.

existing studies of willingness-to-pay could provide guidelines to PA planners and managers in the Lower Mekong region on pricing regimes, so as to appropriate more fully the tourism benefits that PAs yield (Box 3).

Other charging mechanisms

In addition to entry fees, various other kinds of charges can be applied to fund protected area management. Commercial operators should be required to pay commercially realistic license fees, rental charges, leases and concessions. Rights to operate within protected areas may be offered to the private sector on a competitive auction basis to optimise funding opportunities.

Donations may be sought from the general public or from corporate enterprises. Ecotourism operators may also be encouraged to contribute to PA management funds or to assist with ecological research.

Product development

With increasing interest in recreation and tourism from both domestic and international visitors most PA managers in the region should expect to cater to more than one market.

As with commercial products, tourism in protected areas should be developed and managed to serve a particular market or group. An unsuitable product, one that does not meet the needs or interests of the market, will be unsustainable. This could result in community expectations being disappointed and high financial and environmental impacts for the PA.

Budgetary support for environmental protection

Governments need to recognise the economic significance of interesting landscapes and ecosystems as a strong attraction for nature-based tourists in the region. Opportunities need to be explored for “earmarking” funds from tourism so that they go directly to establishing, enhancing and maintaining protected areas rather than to consolidated revenue. Special fund structures need to be considered for ‘clusters’ of protected areas on a multi-country basis. This would support regional strategies for protected areas and promote tourism based on natural attractions.

Issue 4. Managing impacts

The need for standards

A significant question for PA and tourism managers and communities is “What values do we wish to protect and how much impact or change to those values is acceptable in this area or in our community?” These impacts can be ecological, social or economic (Box 4).

Defining appropriate tourism requires agreement on the ecological and social standards desired for any given area or community. Even small-scale, low impact tourism can cause

incrementally small changes and may eventually lead to unacceptable impacts. Damage of this nature is difficult to detect until obvious degradation has occurred. Careful monitoring from a clear baseline is essential for detecting and mitigating environmental and social impacts.

Visitor management

Many ecotourists are sensitive to perceived overcrowding or environmental impacts such as littering and noise pollution. In some PAs, increasing visitation, coupled with insufficient funding and staffing, is resulting in serious impacts including widespread littering, vandalism to trees, trail erosion, disturbance to wildlife, reduced visitor satisfaction due to disturbance and overcrowding, and the removal of flora. Already, the reputation of those areas has been eroded through “word of mouth”, resulting in reduced visitation and loss of economic benefits.

Regulating the number of visitors and trips is one strategy for managing such impacts but even small numbers of visitors can cause significant damage to sensitive areas. Codes of conduct and trained guides are also effective for managing impacts.

Infrastructure development

Many organisations have prepared guidelines for tourism infrastructure development in protected areas. These usually advocate use of local materials and labour, minimal impact technology and recycling. The use of new technologies, such as solar panels and composting toilets, can be expensive to install but they are relatively cheap to maintain. A soft loan could be considered to fund initial costs.

Box 3. Implementation of a tourist fee system in Sa Pa, Vietnam

International visitors to Sa Pa are asked to pay a small fee at access points to three frequently visited villages. The money is used for salaries, English training and general development. However, no information is given to tourists on where the money is spent, and there is a perception that the collection of fees is ad hoc and the income is not returned to the local area.

The *Support to Sustainable Tourism in Sa Pa District* project commissioned a consultant to survey international and Vietnamese visitors and provide advice on what they were willing to pay. The study found that:

- fees are more readily accepted if tourists agree with how the money is used,
- tourists prefer that the money be spent either to help ethnic minorities in the region or for conservation of the natural environment of Sa Pa; and, most importantly,
- the fee could be raised from 5,000 (US 35 cents) to between 20,000 and 30,000 Vietnamese Dong a day if these conditions are met.

The information will be used to review the current fee structure and develop a more transparent system.

(adapted from Allcock 2003)

Box 4. Cultural do's and don'ts

In Muang Sing, northern Laos, community workshops addressed the question ‘what are the most important things to tell tourists if you don't speak English?’ The messages are displayed on a poster *A Message from Your Local Host* which encourages positive interaction with local people, the purchase of new handicrafts and payment for food and accommodation. It also discourages negative behaviour such as consumption of drugs or wildlife and purchase of family heirlooms. The poster has been well received and is distributed to travel agents and guesthouses throughout Laos.

The poster, written in English and Lao, is also useful as an educational tool in villages. This approach has also been used in Northern Thailand.

Infrastructure development may not be appropriate in all circumstances and concern has been raised in some protected areas that provision of small-scale infrastructure can generate demand for further facilities, thus adding to pressure on sensitive areas rather than relieving it. This underscores the importance of planning and zoning for PAs before infrastructure is considered.

Monitoring

Monitoring is an essential, yet much neglected, component of sustainable tourism development. It provides managers and communities with an early warning system for detecting ecological and socio-cultural stress before they become too difficult to address and it informs stakeholders on progress made in meeting the objectives of sustainable tourism development in PAs.

Monitoring systems are needed that are simple and resource-inexpensive to implement. In situations where there is low technical capacity, staff numbers and funding, as occurs in many PAs, sophisticated systems are likely to fail. NGOs, regional training institutes and research institutes have an important role to play in designing and disseminating user-friendly monitoring and evaluation systems. Both private and public sectors can assist in collecting and compiling monitoring data.

A stakeholder's board should independently evaluate monitoring reports to resolve emerging issues and improve existing operations. A stakeholder's board is also an effective forum for monitoring how public funds are used to enhance local PA management and community development objectives.

At the national level an appropriate agency should be allocated responsibility for analysing and synthesising monitoring results from all PAs and reporting them to policy makers in useful ways that promote management responses.

Once indicators have been selected for important characteristics, baseline data needs to be collected and target levels set which define acceptable limits of impact or desired results based upon agreed conservation, socio-cultural and economic objectives. Local communities have a key role to play in implementing monitoring systems.

In Khao Chamao–Khao Kong National Park (Rayong Province, Thailand) tourism activities are strictly controlled, giving visitors a pleasant and informed experience. Photo: Paul Insua-Cao.



Strengthening the legal framework and enforcement

A priority for all governments is to review and strengthen the legal framework for protecting PAs and communities from exploitation. Communities should be empowered to participate in and benefit from tourism development associated with PAs. This is very much linked to issues of citizenship for ethnic minorities and the allocation of land and resource use rights to communities living in and around PAs.

Enforcement of PA regulations however can be very time consuming for management staff, expensive to undertake and may not be an effective deterrent unless consistently and correctly applied. Managers should first consider the use of education and voluntary codes of conduct where possible as a more practical strategy.

All contracts and Memorandums of Understanding between the private sector, communities and the public sector should include mechanisms for resolving conflicts and ensuring compliance.

Issue 5. Developing partnerships with NGOs and the private sector

In many remote areas managers, communities and local private operators may not have sufficient funds, capacity or knowledge to develop, manage and market sustainable tourism products without external assistance.

NGO projects and poverty alleviation

The use of sustainable nature-based tourism as a strategy for poverty alleviation of rural communities is a policy objective of all countries in the region. In reality, PA communities are often marginalised from genuine participation in tourism development, or where they are involved, non-local operators and guides are taking most of the benefits. In other situations communities are being exploited by outside tourism operators resulting in little economic benefit and causing significant socio-cultural impacts. NGOs can provide critical support to local communities in establishing the skills and mechanisms for capturing the benefits of tourism development and in forging equitable working links with the private and public sectors.

The role of the private sector

The private sector is an essential partner in the development of nature-based tourism in protected areas throughout the region. It can contribute to the capital investment required for the development of products, capacity building of communities and small-scale local operators to manage tourism through joint ventures, the training of guides, marketing and promotion and the monitoring of impacts. In an unregulated environment, however, a proliferation of tourism operators interested only in financial gain threatens the sustainability of tourism development. This can be managed in a number of ways:

- the allocation of concessions or licenses to operate in PAs which are compatible with levels of use identified for each zone and which ensure there is a sufficient diversity of tourism products to meet market demands and optimise economic benefits;
- binding private operators to abide by regulations and codes of conduct. In return the contractor can be offered protection from unregulated operators. This can be a major incentive to reputable operators which, in an otherwise unregulated environment, will eventually have to compete in price-cutting wars with 'copy cat' operations;
- performance bonds can be applied to tourism operators that rely on natural areas as a tourist attraction or who operate infrastructure within protected areas. Under this arrangement, an up-front payment or financial guarantee is lodged with the relevant management authority as a condition of an operating licence. This ensures that, if environmental damage is caused, funds will be available for rehabilitation and compensation. Discounts can be given to operators that demonstrate compliance with codes of good environmental practice; and

- accreditation or certification schemes for 'eco-friendly' companies can ensure that reputable operations are given priority in the allocation of concessions to operate in PAs. To protect local interests and minimise economic leakage away from local areas it is important that regional and national accreditation schemes are sufficiently flexible to accommodate small-scale operators who may be unable to meet the strict requirements of the larger commercial companies. Additionally, regional and national schemes should consider criteria that require companies to form joint ventures with local communities and small-scale operators in the interest of returning benefits to local economies and building local capacity in tourism management.

Tourism as a strategy for enhancing protected area management and biodiversity conservation

Tourism can directly contribute to the conservation of protected areas in a number of ways other than through the generation of funding. Careful attention to planning and impact management is important for successful outcomes as most of these opportunities also carry risks. Opportunities identified in the region include:

- using community based ecotourism initiatives as a foundation for the development of collaborative management programmes with strategically important communities. This is most effective when tourism benefits are directly linked to wildlife conservation or specific ecological sites and when integrated into more holistic community development assistance programmes (Box 5);
- facilitating the creation of voluntary, community managed biodiversity reserves for tourism development which effectively diversify the tourism product and generate additional income for the community, while providing an additional incentive to communities to protect areas of high conservation value (Box 6);
- regularly assessing the total economic contribution of PA tourism to justify maintenance of PA values against competing land use options;
- including tourists and the private sector in management to assist with research and data collection, habitat restoration, and associated programmes (Box 7);

Ecotourism near Dong Hua Sao National Biodiversity Conservation Area, Champassak Province. Photo: Stuart Chape.



Box 5. Collaborative partnerships in community-based tourism to promote development and conservation, Kirirom NP, Cambodia

With assistance from the NGO, Mlup Baitong, villages in the Chambak commune of the buffer zone of Kirirom NP have prepared an Ecotourism Management Plan to develop and manage a waterfall tourism site that is becoming increasingly popular with domestic tourists. Tourism represents a significant opportunity for local communities to generate income and to help reduce their dependency on the use of natural resources in the NP. The plan, in addition to prescribing actions for developing and managing tourism, includes a number of initiatives to conserve and protect the natural resources of the NP. These include:

- local zoning of the tourism development area, including sub-zones for the conservation of bats and rare plants;
- patrol the site to prevent illegal hunting and tree-cutting activities;
- protection of waterways from tourism waste and pesticides;
- fire prevention by ensuring that tourists are always accompanied by at least one guide to patrol against accidental fires; and
- limits on the quantity and type of NTFPs collected by the villages in the area.

In return the community requests support from the Ministry of Environment, the PA management agency and Mlup Baitong to help with tourism infrastructure development, technical advice on natural resource management and in managing visitor impacts, guide and tourism management training and protection from demands to share income with local soldiers and from the operations of unlicensed private tour companies.

(adapted from MOE 2002)

Box 6. Conservation-tourism resource reserves, Laos

The village of Ban Nammat Kao in the Nam Ha PA of Luang Namtha province has created a 100 ha reserve within their village area for the purpose of tourism development and the conservation of bird and squirrel populations which are in rapid decline from over-hunting. Hunters guide tourists who visit the village on a nature trail in the reserve to view bird life and learn about the ecological knowledge of the Akha people. A natural history field handbook for the reserve is in preparation to assist the guides with tourist interpretation. Each of the village guides receives a fee that is built into the price paid by each tourist for the trek thus guaranteeing a steady source of income. The hunters are proud of their knowledge and abilities to track wildlife and this is readily observable in their interaction with the tourists. In this way the reserve is not only adding value to the trekking product but is also fostering an enhanced appreciation for local culture and so providing an incentive to the community to preserve their knowledge and traditions – a primary objective of ecotourism. The village has full authority for the management of the reserve and since its inception has taken it upon itself to establish penalties in the form of warnings and fines for enforcing the no-hunting regulations.

Tourism-based reserves also offer an opportunity to demonstrate to local communities the principles of natural resource management. With protection, time and simple monitoring techniques it should be possible for the people of Ban Nammat Kao to see increases in the abundance of NTFPs and bird and squirrel populations inside and around the reserve. In this way it can serve as a catalyst for the community to establish management systems for other economically important natural resources. Initiatives like this however require active facilitation by PA staff and/or outside organisations.

The employment of local hunters as guides helps to raise conservation awareness among the sector of the community that has the greatest influence on the levels of wildlife harvesting. Paying a reward to local hunter guides who are able to locate wildlife for tourists to observe may also contribute to the incentive to conserve wildlife populations in the reserve.

(UNESCO 2002)

Box 7. Tourism-based monitoring as a tool for enhancing PA management

In the Nam Ha PA, Luang Namtha, Laos, the Wildlife Conservation Society (WCS) has worked with the PA Management Unit to develop and jointly implement a wildlife and resource use monitoring programme with the Provincial Tourism Authority and local Guides Association along trekking trails and rafting rivers in the PA. The monitoring programme is intended to detect the long-term impacts, both positive and negative, of tourism on the wildlife populations and level of resource use in the PA. Additionally the regular visitation of guides and tourists to the PA and communities provides the under staffed PA Management Unit with valuable and regular patrolling information on urgent threats to conservation values that require immediate attention, such as the activities of wildlife traders, illegal logging and tiger-livestock conflicts in villages. The monitoring programme is also designed to be undertaken jointly with tourists offering them an opportunity to participate in PA management and, in the process, enhancing their interpretive and educational experience.

(UNESCO 2002)

- training guides to collect monitoring data for understaffed PA management units;
- managing tourist flows to act as a deterrent to 'outsiders' undertaking illegal activities, especially in areas where tourist security and safety is not a concern;
- employing local hunters as guides in ecotourism enterprises to reduce dependency (and capacity through a competing use of time and enhanced awareness of conservation) on the harvesting of wildlife (Box 6); and
- organising educational activities to raise conservation awareness and provide an additional source of income.

Conclusion

In recent years the level of tourism activity in the Lower Mekong region has increased dramatically and strong growth is expected to continue. Destinations with a large number of natural and cultural attractions within protected areas are receiving an increasing share of this growth. Yet, the development of tourism policy is often reactive – occurring in response to negative impacts of unplanned development, instead of pro-active – enabling communities and local government to ensure tourism development is environmentally and socio-economically sustainable.

Protected areas, and all the products and services they support, are an essential component of sustainable development of the tourism sector. Ensuring that nature-based tourism is professionally managed, and ecologically, financially and socially beneficial will maintain the importance of protected areas to local and national economies.

References

- Allcock, A. 2003. *Sustainable Tourism Development in Nepal, Vietnam and Lao PDR*. SNV Netherlands Development Organisation, The Hague.
- ASEAN Secretariat. 2000. *Workshop on Agenda 21 with an Emphasis on Ecotourism*. Bangkok, Thailand.
- ICEM. 2003a. *Protected areas and development in the Lower Mekong region: Regional Report*. Review of Protected Areas and Development in the Lower Mekong River region. Indooroopilly, Queensland, Australia.
- ICEM. 2003b. *Thai national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Queensland, Australia.
- Lytleton, C. and Allcock, A. 2002. *Tourism as a Tool for Development*. The UNESCO-National Tourism Authority of the Lao PDR Nam Ha Ecotourism Project. External Review. United Nations Educational Scientific and Cultural Organisation (UNESCO), Office of the Regional Advisor for Culture in Asia and the Pacific. Bangkok, Thailand.
- Marris, G. and Schipani, S. 2002. *Linking Ecotourism and Conservation: Experiences from the Nam Ha Protected Area, Lao PDR*. Internal Report UNESCO Nam Ha Ecotourism Project.
- Ministry of Environment. 2002. *Tuk Chrak Waterfall Ecotourism Management Plan*, Chambak Commune, Kirirom NP, Cambodia.
- National Tourism Authority of Lao PDR. 2002. *2001 Statistical Report on Tourism in Laos*, Vientiane.
- Population and Community Development Association. 2002. *Community-based Tourism Development Project at Ban Lorcha*. Presented as a case study at the Regional Conference on Community-based Ecotourism Chiang Mai, Thailand.
- Scott Wilson Asia-Pacific. 2002. *Yok Don National Park. Planning Support Document: Ecotourism Promotion and Development*. UNDP/MARD PARC Project, Vietnam.

UNESCO. 2002. *Nam Ha Ecotourism Program*, Luang Namtha, Lao PDR.
WWF. 1999. *Cat Tien National Park Tourism Management Plan 1999*. WWF Vietnam.

Guy Marris is a protected area management specialist working in South-East Asia, spending the last two years as an advisor to the UNESCO Nam Ha PA Ecotourism Project in northern Laos. He is currently in Cambodia directing a country programme for the International Crane Foundation, focusing on the conservation of wetland/forest ecosystems that comprise the habitat of the Eastern Sarus Crane throughout the Lower Mekong region. He can be contacted c/o International Crane Foundation, PO Box 1195, Phnom Penh, Cambodia. Email: guymarris@online.com.kh.

Alison Allcock is a tourism planner based in Vientiane, Laos. Email: alison_allcock@hotmail.com.

Khamlay Sipaseut, Lao National Coordinator, UNESCO Nam Ha Ecotourism Project, National Tourism Agency, Government of Lao PDR.

Protected areas and forestry: achieving forest conservation in the Lower Mekong region

DAVID LAMB AND DON GILMOUR

Protected areas (PAs) are the primary means by which biodiversity is protected in most countries of the world. But production forests outside these protected areas have an important complementary role. Though not offering the same degree of protection they can enlarge the areas of habitats available, provided they are well managed. They do this by providing buffer areas around and linkages between PAs enabling the continued movement of wildlife and plants across the landscape. They can also help generate economic opportunities for local people, thereby reducing pressure on the PA system.

The four countries of the Lower Mekong Basin (Thailand, Laos, Cambodia, Vietnam) have been richly endowed with forests. They differ markedly in demographic, economic and political circumstances but share a broad biogeographical heritage. This paper describes the state of forest protection and management in the four countries and explores ways both might be improved to enhance the protection of their biological diversity and improve the well-being of the people living in the region's rural areas.

ONCE PROBABLY COVERED BY FOREST, large areas of the Lower Mekong region have been cleared for agriculture and food production. This has been done by traditional forest dwellers and by immigrant newcomers. Table 1 shows that the remaining forest cover in the region ranges from around 29% of land area (Thailand) to 54% (Laos) with Cambodia and Vietnam falling between these. This represents a per capita forest cover of only 0.1 ha for Vietnam but 2.4 ha in Laos.

Many of these changes have occurred in recent years. The annual net deforestation rates are given in Table 1. These show large areas were lost in all countries between 1980 and 1990 although the rates appear to have declined between 1990 and 2000. In Vietnam the total area of forest actually

Logging platform, north of Nakai-Nam Theun, Annamite Mountains, Laos. Photo: Stuart Chape.



increased by 52,000 ha or 0.5% in the most recent decade. This is because these data represent net changes in forest cover and some losses of natural forest have been accompanied by increases in plantation coverage. The accuracy of some of these estimates of natural forest cover is sometimes disputed but the data reflect the general patterns of deforestation in the region.

The quality of the residual forest varies because some has been degraded by heavy logging. The areas of relatively undisturbed or “frontier” forest cover only 2% of the original forest cover of Laos and Vietnam, 5% in Thailand and 10% in Cambodia (Dauvergne 2001).

This reduction in forest cover and in the ecological integrity of the remaining forests means that the need for forest conservation – by which is meant the protection and wise use of forest resources – is widely accepted by all countries in the region. All countries have established management agencies to conserve forests and regulate logging. All countries have also established a formal network of PAs to protect biodiversity and watersheds. The overall area of forest in these PAs is very high by international standards (Table 2). However, parts of even these protected forests have been cleared or degraded by the agricultural activities of people living within PA boundaries or by illegal loggers.

Agriculture now occupies much of the former forest land. A significant amount of this land is part of the shifting cultivation cycle and much is effectively regrown forest. Some has degraded into grassland or shrubland particularly where the shifting cultivation cycle has been shortened so that the forest is prevented from regrowing. Statistics are difficult to gather but the areas involved are very large. Table 3 shows estimates of the areas of secondary forest in countries of the

Table 1. Forest area and loss in Lower Mekong countries (2000).

	Cambodia	Laos	Thailand	Vietnam
Original forest area (approximate) (in 000 km ²)	160	225	250	280
Forest area in 2000 (in 000 km ²)	93.3	125.6	147.6	98.2
Percentage of original forest area in 2000	52%	54%	29%	30%
Percentage of original forest relatively undisturbed and large enough to contain original biodiversity	10%	2%	2%	5%
Forest area per person (ha)	0.9	2.4	0.2	0.1
Plantation area (in 000 ha)	90	54	4,920	1,711
Annual deforestation 1980–1990 (in 000 ha)	131	129	512	137
Annual deforestation 1990–2000 (in 000 ha)	56	53	112	(+52)
Annual change in forest cover (1990–2000)	-0.6%	-0.4%	-0.7%	+0.5%

Source: FAO 1995 and 2001; Collins et al. 1991; Dauvergne 2001

Table 2. Forests and protected areas in the Lower Mekong countries.

	Cambodia	Laos	Thailand	Vietnam
Estimate of forest in existing and proposed PAs	40%	39%	65%	26%
Existing PAs as a percentage of land area	21%	21%	19%	8%

Source: ICEM 2003

Table 3. Secondary forests and degraded lands.

	Cambodia	Laos	Thailand	Vietnam
Secondary forest, low-medium density forest or fragments present in 1993. million ha (1)	9.8	7.7	1.4	2.1
Land potentially available for rehabilitation. million ha (2)	2.6	8.7	2.3	9.7

Source: (1) Mittlmann 2001; (2) Gilmour et al. 2000

region range from 1.4 million ha (Thailand) to 9.8 million ha (Cambodia) while the deforested areas potentially available for reforestation range from 2.3 million ha in Thailand to 9.7 million ha in Vietnam.

These data suggest that past approaches to forest protection and management in the region have not worked – or at least, have not worked as well as expected. Large areas of forest have been cleared. Many forests used for timber production have been so over-exploited and damaged that future yields will be greatly diminished. The protected area network has also been compromised, leading to loss of biodiversity and ecological integrity. All these changes are now causing unexpected and adverse consequences for people living both inside and outside the forest areas. There is evidence, for example, of erosion and river sedimentation that is now affecting other land uses lower in watersheds as well as industries such as hydro-electric plants. Likewise, the viability of other ecosystems such as wetlands is being threatened. Some recent trends concerning forest cover and management across the Lower Mekong region are summarised in Box 1.

Possible ways of dealing with these issues

The adoption of the following four approaches may address these problems (ICEM 2003).

1. Create a permanent forest estate

Forests in PAs are legally protected but the same is not necessarily true of forests outside the PA network now used for timber production. This points to the need to identify and protect a

Box 1. Key issues and recent trends in forest use and management across the Lower Mekong region.

Changes	Comment
Increased forest loss and fragmentation	Caused by illegal logging, unsustainable timber production, agricultural clearing, shifting cultivation on short rotations, fires.
Declining resource availability	Some countries are now net importers of timber and non-timber forest products
Increased threats to biological diversity and ecological integrity of PAs	Caused by forest loss and fragmentation, intensive unregulated logging, unsustainable use of non-timber forest products, over-grazing, trade in endangered species, fire.
Increase in areas of “degraded” land	Caused by inappropriate agricultural practices; intensive logging; war; fire.
Rural poverty	All countries now recognise the special needs of traditional forest-dwelling people. Policies are being developed to allocate land and overcome poverty.
Increased decentralisation of planning and resource use	Has sometimes led to a loss of management capacity because of reduced resources for staff at local level (though not necessarily management at national level); has sometimes led to new players (e.g. illegal loggers) moving in to occupy the vacuum.
Increased role of international organisations	International organisations such as World Bank, Asian Development Bank have begun to exert greater influence on policy developments because of their financial leverage.

“permanent forest estate” since there is little point in investing significant resources in regulation, management or protection if forests are to be subsequently cleared. The first stage of this process must be to get agreement amongst government planning agencies regarding future land uses, particularly in regions where significant areas of natural forests still remain. In many situations forestry is seen as a residual land use, meaning that forest land is that which is left over after other land uses have been decided. A better approach would be to identify those forests that should remain because of their economic, social or environmental value. That is, forests that should be safeguarded because of their potential to supply certain forest products into the future or because of their value in supplying other ecological services such as watershed protection. These decisions should then be given sufficient legal protection to not only prevent future clearing but also to shield these forests from subsequent sub-division or fragmentation by regional highways, electricity lines or other disturbances.

It may be difficult to include all remaining natural forest areas in this formal forest estate, especially in regions where little natural forest remains. It may be hard, for example, to be prescriptive about the permanence of small natural forest fragments or the boundaries of secondary or regrown forest areas. In these landscapes, fragmentation, land ownership/tenure, changing aspirations and market fluctuations may lead to more fluid spatial patterns of forest cover. Nevertheless, even in these situations, the onus should be on those proposing to clear forests to show that the social and environmental benefits of clearing outweigh those flowing from forest retention.

2. Develop better management systems

Good management is required for both production forests and forests in protected areas. If well designed silvicultural systems are in place it should be possible to undertake low-intensity logging or non-timber forest product resources harvesting in designated production forests while retaining biological diversity and maintaining ecological processes (ITTO 1993). Under these circumstances, production forests could complement PA forests and contribute to the overall conservation of forest biodiversity (Poore and Sayer 1991). All countries in the region have policies promoting forest conservation and sustainable forest management but the implementation of these policies has not always been successful. There are a variety of reasons for this, including:

- a lack of technical and silvicultural knowledge about the particular species or forests being managed (including regeneration needs and growth rates);
- a lack of resources or the capacity to design and regulate management practices in the field;
- an inability to enforce regulatory mechanisms or Codes of Practice designed to prevent over-harvesting and environmental damage; and
- a confusing and sometimes inadequate legal framework.

All of these are difficult to overcome in the short-term. One especially crucial piece of knowledge is the growth rate of the forest and hence the magnitude of the annual allowable cut or harvest. This requires an extensive network of regularly monitored sample plots to establish how rapidly forests are growing and how large a harvesting operation is sustainable. Without this data managers are simply unable to tell if sustainable harvests are being achieved or not.

But even modest logging activities can easily give rise to forest degradation if managers are unable to supervise what goes on in the field and regulate the way in which logging is carried out. An increasingly common way of dealing with this is to develop guidelines or Codes of Practice to provide a benchmark against which local activities can be compared (ITTO 1990, ITTO 1993). Such is the international interest in conserving forests that timber being produced from sustainably managed forests may command a higher market price and a number of schemes are being developed to certify sustainability (Forest Stewardship Council 2002).

Adequate numbers of regulatory staff are also needed to ensure the state receives the benefits from logging and harvesting non-timber forest products that it should. For example, Dauvergne (2001) quotes World Bank data from Cambodia for 1996 suggesting the Government should have received over US\$100 million from logging when, in fact, it received only US\$10.7 million that year. A similar pattern of legal concession holders and illegal loggers getting virtually all of the benefits from exploitation is all too common throughout the tropical world.

3. *Involve communities in forest management*

Many production forests and PAs in the Lower Mekong Basin have human communities living within them. These are often amongst the poorest communities in each state (Cuc and Rambo 2001; ICEM 2003). It is often difficult to exclude such communities from these forests and this would mostly be an inappropriate course of action even if it were possible. A variety of approaches have been tried to balance the need to improve community well-being with the need to conserve these remaining forests. One approach might be to affirm the primacy of certain management objectives (e.g. biodiversity protection, sustainable resource production and watershed protection) while allowing other land uses within certain prescribed areas of the forest as long as these do not compromise the primary objective.

Until recently these traditional communities have been ignored by most forest management agencies whether these were concerned with timber production or conservation. Professional forest managers found it difficult to accept that poorly educated village people with little technical training could possibly undertake any management task. But evidence is accumulating from various parts of the world to suggest otherwise (Arnold 1992, Fisher 1995, Borrini-Feyerabend 1996).

The most successful examples of where communities have taken over responsibility for forest management are those where large industrial scale operations are absent and where most harvesting is at a relatively low intensity. These are usually small forest areas that have already been logged and are of less interest to industrial logging groups. In these cases management is more concerned with regulating access rights and with simple silvicultural techniques such as thinning to remove less desired species.

A variety of community based management regimes might be adopted. These range from those where some kind of partnership is formed between a government agency (who provides technical assistance) and the community (who coordinate activities in the field) to those where the government has little involvement and the community has total management control.

Devolution of management authority does not guarantee success and some “community” forest management systems have failed because powerful individuals or groups in the village have taken over and manipulated the system to benefit themselves alone. Consequently certain factors need to be clarified. These include decisions on tenure and access rights, the composition of the decision-making body within the community, the extent to which governments will provide technical services and marketing advice, the relationships with external buyers of forest products etc. Communities also need financial and technical resources to enable them to achieve the jointly agreed upon objectives.

4. *Rehabilitate degraded lands*

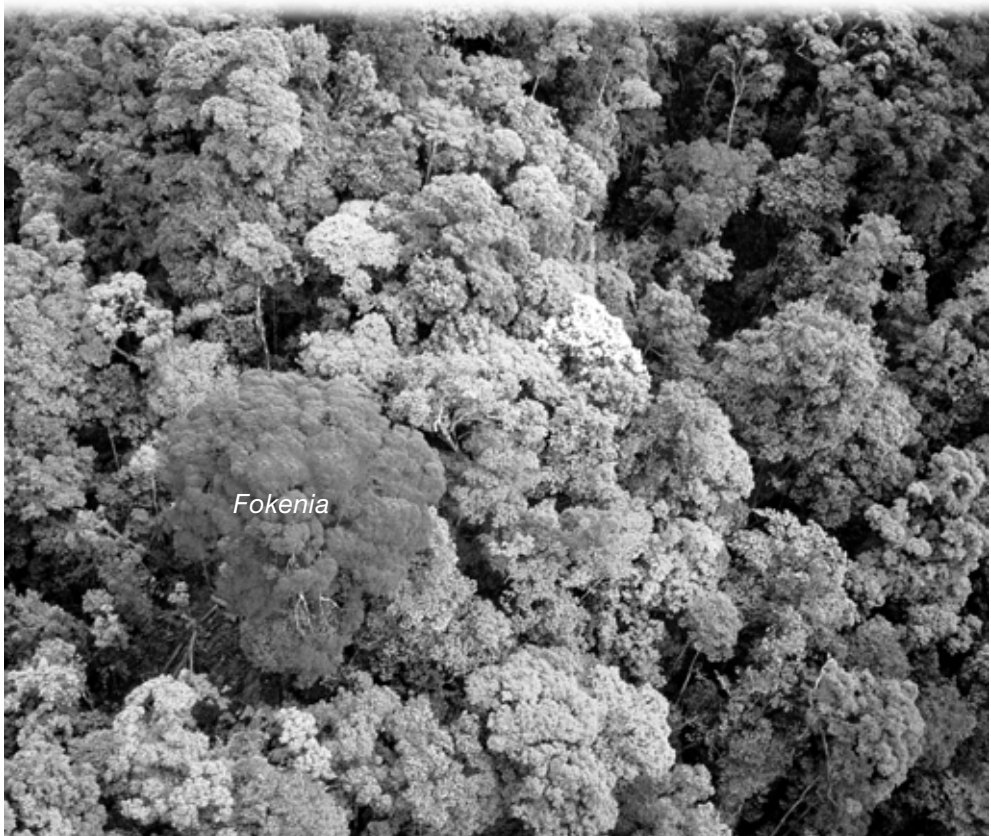
Until recently most degraded forest lands have been regarded as worthless. Governments expected little from these lands in the form of either goods or ecological services even though many local people continued to use them and recognised their value. This view is now changing because it is clear many of these areas can still supply a variety of goods such as timbers, fruits, nuts and medicinal species. In addition, many contain a significant degree of biological diversity and also protect hill slope stability.

Two types of degraded land can be recognised. The first is the secondary or regrowth forests found after heavy logging or as a consequence of shifting cultivation. Provided they are protected

from further disturbances these forests can have an important role supplying various goods and services. With time this supply is likely to grow as their biodiversity and ecological complexity increase. Sometimes these can be fostered by enrichment planting. This means secondary forests represent very important landscapes with a significant role to play in both the provision of social as well as conservation benefits. For this reason communities working alone or in collaboration with forest management agencies may have a particular role to play in managing secondary forests.

The second type of degraded, former forest land is that which is now largely occupied by grassland or shrubland. The areas of lands such as these in the Mekong region that might be rehabilitated are quite large (Table 3). Most reforestation of such grassland has been carried out using monoculture plantations of fast-growing, exotic species (e.g. *Eucalyptus*, *Acacia*, *Pinus* spp.). Although these are productive and are often tolerant of badly degraded or infertile sites they frequently benefit only industrial timber users such as pulpwood factories. The capacity of these plantations to supply other goods such as fruit, nuts, resins or medicinal plants is limited and they provide only a limited range of ecological services to local communities. Further, their contribution to biodiversity protection is small. In many cases the timber prices from species used in these plantations are also low and in recent years there has been a downward price trend for many of these species as more of the older plantations mature and are harvested. This is not to say that plantations should not be established using these species – in some degraded sites they may be all that can be established because of site conditions. Rather, it is to argue that they should not be seen as the only alternative for all degraded lands.

Pomu (*Fokenia* sp.), a high value timber extracted from the Annamite Mountains. Photo: Stuart Chape.



Another reforestation option has been to use high-value native species. This is of increasing interest in Thailand and Vietnam. Although the volume increment in these plantations may be lower than for the fast-growing exotic species the value increment is likely to be greater. That is, the higher timber values may compensate for the slower growth rates. Some of the ways these plantations might contribute to regional biodiversity are outlined in Lamb (1998, 2001).

In many degraded landscapes the best approach might be to use a variety of reforestation techniques depending on ecological or social circumstances. That is, a landscape might contain regenerating regrowth forest, monoculture plantations of several native species and perhaps some mixed species plantations. The end result of such an approach will be much different to that obtained using the more traditional approach which has tended to reforest entire areas using monoculture plantations of exotic species. This approach has been referred to as Forest Landscape Restoration (Lamb and Gilmour 2003). The advantage of these more varied methods of reforestation is that they are likely to generate a much greater variety of goods and ecological services and, hence, to be much more attractive to rural communities.

Some supporting strategies

However, these four approaches will only work if supported by several other strategies (ICEM 2003):

Maintain adequate supervisory and management regimes for production forests and protected area forests

Existing policies and regulations within the forest sector provide a reasonable basis on which to protect forests in the region. Yet it is clear these are still unable to prevent forest loss. In some situations policies exist within other sectors which contradict and constrain the ability of the forest sector to develop effective conservation measures. Ways must be found to harmonise government policies to achieve the dual outcomes of conservation and development. Also, more effective

Cutting logs into planks in a forest in Laos. Photo: Chris Flint.



enforcement of forest regulations are needed, including provision for more supervisory staff and more regular inspections, changes to taxation regimes, penalties for non-performance, penalties for environmental damage, and longer time periods for concession holders.

Provide sufficient resources to implement these policies

Good policies must be matched by an appropriate supply of resources – financial and human – to implement them. More resources could be made available if current logging concession agreements were more carefully policed and the prescribed resource rents or taxes were collected.

Improve the economic returns flowing to the community and state arising from these logging operations

One of the arguments for having production forests instead of placing all remaining forests in protected areas is that they are renewable resources capable of generating capital for regional and national development. But the experience of most countries is that neither local communities nor the state have received more than a fraction of the wealth generated by forest harvesting (either logs or non-timber forest products). Ways must be found to ensure that the owners of these forests get a more equitable share of the benefits from harvesting.

Devise a system of transfer payment to ensure beneficiaries of ecological services, provided by improved forest management, contribute to costs

Many users of the ecological services provided by forests are unaware of their dependency and contribute nothing to the cost of managing these forests. These beneficiaries include (but are not limited to) water supply authorities, hydro-electric authorities, agricultural communities and all those who gain from biodiversity preservation and carbon sequestration. This means that economic analyses of the value of forests are commonly incomplete and often show that other land uses are apparently more valuable. The real values of all forests need to be established taking account of the fact that different forests in various locations will have quite different values depending on the unique set of ecological services they provide. Further, the users of these services should be identified and ways should be found to help them contribute to the cost of management (or rehabilitation). Any system should also provide for means of dealing with situations where forest managers can no longer provide a service for which payment has already been made.

Create partnerships to support forest conservation

Effective forest conservation will increasingly require the development of various partnerships. Partnerships between government forestry or conservation agencies and forest dwelling communities have already been mentioned. Another is the partnership between forest management agencies and the users of goods and, most especially, ecological services. All those reliant on good forest management must be identified so they can become participants in the development of appropriate management practices.

Develop a monitoring programme to ensure specific social, economic and environmental goals are met and corrective responses are triggered when needed

The management of ecosystems as complex as tropical forests is difficult, especially when ecological and silvicultural knowledge is incomplete. Under these circumstances the best approach is to adopt what is often referred to as “adaptive management” by which is meant a system of management that learns from experience and which modifies practices when experience shows that certain management tools or approaches have not worked. Monitoring systems appropriate to the particular management objectives (e.g. biodiversity protection, watershed protection, timber production etc.) need to be developed together with an indication of the sorts of changes

which, when identified by monitoring, should trigger corrective management intervention (ITTO 1999).

Develop a better understanding of the biodiversity within the forests of the region together with its spatial variation and its environmental constraints

Not all forests in the region or in a particular country are similar but they are commonly treated and managed as if they were. Comparatively little is known of the composition of forests or of the distribution of the species they contain. This is true of both plants and animal species. Further, little is known of the environmental factors regulating these patterns of biological diversity across the landscape. Managers will only be truly able to conserve these forests when they have an adequate understanding of the nature of the ecosystems they are dealing with.

Develop complementary but simplified legal frameworks across the countries of the region to enhance cross-border collaboration in forest management

There are significant macro-economic drivers of forest degradation both within and outside PAs in the region. Markets have a large impact on the way forests are used or managed, especially in situations of under-development. These market forces are mostly beyond the control of forest managers and there may be advantages in seeking common solutions to these problems (de Silva 2001). The Mekong Basin forms a common ecological context in which to devise improved methods of forest conservation. However, the differences across the region in the extent of remaining forest cover, in economic situations and political structures mean there may be considerable advantages in simplifying legal frameworks and making them more complementary. This may be especially useful in light of the linkages that exist between the policy decisions of one country and the exploitation of timber and non-timber forest products in another country.

Conclusions

Forest conservation is unlikely to be achieved in the Lower Mekong region through reliance on PAs alone. Natural forests managed for timber production together with forests restored on degraded lands can also make a contribution. But there needs to be a much greater linkage between managers, traditional forest-dwelling communities and those segments of the community who currently benefit from the goods and services provided by these forests if this is to occur.

References

- Arnold, J.E.M. 1992. Community Forestry: ten years in review. FAO, Rome.
- Borrini-Feyerabend, G. 1996. Collaborative management of protected areas: tailoring the approach to the context. IUCN-The World Conservation Union, Gland, Switzerland.
- Collins, N.M., Sayer, J. and Whitmore, T.C. (eds). 1991. *The Conservation Atlas of Tropical Forests: Asia and the Pacific*. Macmillans.
- Cuc Le Trong and Rambo, A.T. (eds). 2001. Bright Peaks, Dark Valleys: a comparative analysis of environmental and social conditions and development trends in five communities in Vietnam's northern mountain region. National Political Publishing House, Hanoi.
- Dauvergne, P. 2001. Loggers and Degradation in the Asia-Pacific: Corporations and Environmental Management. Cambridge University Press, Cambridge, UK.
- de Silva, S. 2001. Regulation of the Trade in Timber and Non-Timber Products in the Lower Mekong Basin Countries. IUCN-The World Conservation Union, Bangkok.
- FAO. 2001. State of the World's Forests. Rome.
- FAO. 1995. Forest resources assessment 1990 – Global synthesis. FAO forestry paper 124. Rome.
- Filho, M.S. 2001. The tropical forest dilemma. The Third Jack Westoby Lecture. School of Resources, Environment and Society, Australian National University, Canberra, Australia.
- Fisher, R.J. 1995. Collaborative Management of Forests for Conservation and Development. IUCN-The World Conservation Union, Gland, Switzerland and World Wide Fund for Nature.
- Forest Stewardship Council. 2000. Website at: www.fscoax.org.
- Gilmour, D.A., Nguyen Van San and Xiong Tsechlichia 2000. Rehabilitation of Degraded Forest Ecosystems in Cambodia, Lao PDR, Thailand and Vietnam. *Conservation Issues in Asia*. IUCN-The World Conservation Union.
- ICEM. 2003. *Protected areas and development in the Lower Mekong Region: Regional Report*. Review of Protected Areas and Development in the Lower Mekong River region, Indooroopilly, Queensland, Australia.
- ITTO 1990. Guidelines for sustainable management of natural tropical forests. ITTO Policy Development Series No. 1. Yokohama.

- ITTO 1992. Criteria for the measurement of sustainable tropical forest management. Yokohama.
- ITTO 1993. Guidelines on the conservation of biological diversity in tropical production forests. ITTO Policy Development Series No. 5. Yokohama.
- ITTO 1997. Guidelines on fire management in tropical forests. ITTO Policy Development Series No. 6. Yokohama.
- ITTO 1999. Manual for the application of criteria and indicators for sustainable management of natural tropical forests. Part B-forest management unit indicators. ITTO Policy Development Series No. 10. Yokohama.
- Lamb, D. 1998. Large scale restoration of degraded tropical lands: the role of timber plantations. *Restoration Ecology*, 6: 271–279.
- Lamb, D. 2001. Reforestation – ways of retrieving biodiversity at degraded sites. Pp 97–108 In: S.A. Levin (ed.), *Encyclopedia of Biodiversity*. Academic Press, San Diego.
- Lamb, D. and Gilmour, D.A. 2003. Rehabilitation and Restoration of Degraded Forests. IUCN-The World Conservation Union, Switzerland.
- Leslie, A. 1987. A second look at the economics of natural management systems in tropical mixed forests. *Unasylva* 155 Volume 39: 46–58.
- Mittelman, A. 2001. Secondary forests in the Lower Mekong subregion: an overview of their extent, roles and importance. *Journal of Tropical Forest Science* 13: 671–690.
- Poore, D. and Sayer, G. 1991. The Management of Tropical Moist Forest Lands: Ecological Guidelines. IUCN Forest Conservation Programme.
- Prabhu, R., Colfer, C.J.P. and Dudley, R. 2002. Guidelines for developing, testing and selecting criteria and indicators for sustainable forest management. Website: www.cifor.cgiar/acm/pub/toolbox.html.

David Lamb is a member of the School of Life Sciences; University of Queensland; Brisbane 4072 Australia. Email: D.Lamb@botany.uq.edu.au.
Don Gilmour is a forest conservation advisor based in Brisbane and formerly head of IUCN's Global Forest Programme. Email: gilmour@txpress.com.au.

Energy and protected areas in the Mekong region

BRUCE AYLWARD AND SYLVIA TOGNETTI

A growing number of hydropower facilities existing, under construction, or planned in the Mekong region, are in or are downstream from protected areas (PAs). These facilities are affected by upstream land use and management practices that impact the flow of water and sedimentation levels, and that have implications for the functioning and life span of the dams. In some cases, hydropower reservoirs or dams are sited within PAs, with consequent impacts for aquatic and terrestrial habitat and species within the PAs. Also some hydropower facilities have important impacts on downstream PAs, particularly in terms of disruption of normal hydrological function for lakes or marine areas and the livelihoods of local populations. Historically, hydropower facilities have provided few if any benefits to local areas or populations – many of which remain rural and off-grid. This article discusses the nature of the hydropower-PA relationship, it identifies the types of problems that are likely to occur and will continue to occur if agreement on strategies are not reached. Drawing on recent advances in the field, particularly the work of the World Commission on Dams (WCD), the methods that could be employed to arrive at a more effective integration of PAs and hydropower development in the broader planning context are proposed.

HYDROPOWER IS THE SOURCE of most current or expected future sources of electricity in Cambodia, Laos and Vietnam, and is regarded as the driving force of economic growth. It is the most abundant energy resource in the region. However, over half of current energy consumption is from fuelwood and other traditional sources. Most fuelwood consumption occurs in the poorer countries, Laos and Cambodia, where it ranges between 80% and 90%, and is close to 100% of energy consumption in rural areas. In contrast, fuelwood and charcoal is around 37% and 17% of primary energy consumption in Vietnam and Thailand (FAO-RWEDP 2002; UNDP 2001), which also have greater reliance on foreign sources of energy. Yet, even in Thailand, fuelwood and charcoal remain the principal cooking fuel in rural and urban areas. In all four countries, the use of wood energy is still increasing (though not as rapidly as fossil fuels) leading to severe shortages.

The wood energy and hydropower sub-sectors receive significant services and products from protected areas. Those benefits can be maintained when resources are sustainably harvested, and when hydropower development is undertaken in the context of a comprehensive assessment and planning process in which all interests have been included and considered. Sustaining and enhancing benefits will require the development of mechanisms of compensation for trade-offs, and for maintaining ecosystem services needed by the sector.

Over half of the energy needs in the four countries is derived from petroleum products. These are for the most part imported and are expensive to transport to the inland and upland areas of the region. Economic and policy objectives are to reduce oil dependence.

Fuelwood is harvested above sustainable levels, impacting on protected areas, which are located in the regions of high remaining forest cover. In contrast, existing hydropower projects only exploit 5% of potential hydropower development for the Lower Mekong.

The most extensive hydropower development has occurred in Vietnam where in 1999 it accounted for 52% of electricity generation. Vietnam also has the highest expected future demand from hydropower with 27 schemes to be constructed by 2010. Even so, from 2015, it is expected to be importing electricity from neighbouring countries. Thailand has high future demand but limited capacity to add facilities. Instead, it is expected to increase its purchase of power from Laos and China. Laos and Cambodia have the highest potential for hydropower development but low present demand for it. Although both countries look to hydropower to support development, it could have significant adverse consequences given their dependence on natural resources to support livelihoods. Most hydropower generated in Laos and Cambodia is intended to help meet their needs for foreign exchange, through export to Thailand and Vietnam. For example, the two

dams under construction in Cambodia are expected to generate US\$57 million a year in net benefits. The Nam Theun 2 project in Laos is expected to generate around US\$100 million a year or 10% of GDP over its projected 25-year life span (Barnes 2002). All three schemes are linked to protected areas (ICEM 2003e).

The Nam Theun 2 scheme was delayed for six years by financial uncertainty and disagreement over the price to be charged for electricity on completion. This is in part related to a conflict over who should cover the cost of delivery – the investors or purchasers. It is also a result of lower than expected demand from Thailand for the electricity, and the expectation that Chinese dams under construction in the Yunnan province in the Upper Mekong will provide additional sources prior to its completion, driving prices even lower (Pongern 2001). Another cause of delay of the Nam Theun project was the controversy over potential impacts of the scheme on National Biodiversity Conservation Areas and local communities.

China covers the upper half of the Mekong, and has plans to develop a series of eight mainstream dams in the Upper Basin area. Already two have been completed and another is under construction. These dams are expected to supply 17% of China's electricity (Roberts 2001). Also planned is a navigation project that would permit year-round navigation for larger boats between the Yunnan province and the South China Sea. Two of the dams would involve the construction of large reservoir projects along the mainstream of the river. China has also agreed to sell 3,000 MW a year to Thailand, which will be transmitted through Laos, and which demonstrates Thailand's implicit agreement with these plans (MRC 2001).

The Chinese mainstream dams are expected to alter the flooding cycle that sustains downstream wetlands and flooded forests essential to fisheries productivity, and possibly disrupt fish migration between the upper and lower parts of the basin (Roberts 2001). Also, the transport of sediment from the Central Asian Highlands, that bring nutrients to the highly productive downstream floodplains, and which ultimately form the Mekong delta, will be affected (Gordon 2002). The dams may have contributed to severe flooding that recently occurred in Cambodia, Thailand and in the Yunnan

Children crowd around a small charcoal kiln in a village near Ream National Park, Cambodia. Throughout the rural areas of Cambodia, people are heavily dependent upon charcoal as a source of energy. Photo: Shaska Martin. Inset: Cooking with wood collected from a local forest, North Vietnam. Photo: Iris Uyttersprot.



province after the release of greater than normal amounts of water from reservoirs to avoid exceeding their capacity (Gray 2002). Although not a member of the Mekong River Commission, China has agreed to cooperate through the exchange of information, but the timing and content of these exchanges remains to be defined (Öjendal *et al.* 2002).

The relationship between hydropower facilities and protected areas

In the Mekong region most remaining natural forests are in upland areas and are covered by protected areas, the same locations with hydraulic potential for electricity production. All governments of the region recognise upland forest as important for ensuring water quality and minimum dry season flows. In Thailand and Vietnam, for example, low dry season flows, increased reservoir sedimentation, and increased severity of floods and droughts are attributed to forest loss. Both countries have imposed moratoriums on logging of natural forests and have long supported substantial national reforestation programmes for degraded watersheds within and outside protected areas. Dam construction projects have often included provisions for watershed protection even though these have been difficult to enforce (ICEM 2003c and d).

Over 40 major existing and proposed hydropower projects are linked to protected areas (ICEM 2003a). In Vietnam for example, dams such as Tri An, or others in the planning stages, are immediately downstream from PAs. The reservoirs under construction in Nahang Nature Reserve and Bach Ma National Park are within protected areas.

Several thousand smaller-scale hydropower facilities operate within or close to protected areas. For example, numerous hydropower facilities use water from streams rising in Nam Et Phou Loei National Biodiversity Conservation Areas in far north-eastern Laos (ICEM 2003g). A 60 kW scheme on the Nam Et River supplies nine villages and a 250 MW dam on the Nam Sat supplies Vienthong District Centre and ten villages. A medium-scale scheme on the Nam Peun has a capacity of 36 MW and at least 1,000 households in Houaphan Province rely on more than 850 micro hydro units on streams originating in Nam Et Phou Loei NBCA.

Having a revenue generation source, in this case hydropower, located in or below a protected area may be beneficial for conservation in financial terms, for it provides the opportunity for

Theun Hinboun Dam, Laos, under construction. Photo: Stuart Chape.



consistent investment by the sector over the long term. The maintenance of protected area assets and the continuing flow of benefits from them to the energy sector depends on effective management actions and funding to support their implementation.

Impacts on PAs of hydropower projects built in or downstream from PAs

The performance and life span of hydropower dams can depend on upstream land use and management practices when these *significantly* affect the flow of water and sedimentation rates at the dam site. As a general rule, they can benefit from maintenance of existing natural forest cover and practices that maintain existing flow regimes and background sedimentation rates. Whether these benefits are economically significant, and whether they also benefit from restoration of forests will depend on a more complex set of site-specific factors and how these interact. At the same time, reservoir development in or adjacent to a protected area can have a number of negative impacts, including:

- forest clearance and flooding and displacement of populations from reservoir areas that store water;
- resettlement of displaced populations, creating more pressure on remaining forested areas and fallow slash and burn agricultural areas; and
- modification and/or destruction of aquatic habitat, though reservoirs can become important fishing areas.

To the extent that the negatives involve livelihood issues and concern upstream populations and their interactions with PAs, as a basic principle hydropower projects should 'compensate' local ecosystems and communities by providing for reinvestment in watershed management in PAs and buffer zone areas. This compensation should be adequate to cover the costs of rehabilitating relocated communities.

Impacts of upstream hydropower projects on downstream PAs

For PAs located downstream from hydropower facilities the situation is more complex. Dams serve as barriers and disrupt the natural physical flows within a basin, which has follow-on impacts in chemical, biological and ecological terms. Alteration of timing and flow amounts for rivers, storage of sediment and nutrients in reservoirs, blockage of migratory fish passage and a range of other direct impacts can affect rivers and even coastal areas far downstream. Flooding cycles that sustain wetlands, floodplain forests and deltas are disrupted, with direct impacts on biodiversity, fisheries and agriculture. Mangroves and near-shore marine areas can also degrade if seasonal freshwater pulses and sediment loads are affected. Such impacts undermine local livelihoods and increases pressure on accessible resources, particularly within PAs. For example, all dams in the Mekong Basin are likely to have combined cumulative impacts on the Tonle Sap, where annual flooding of the Mekong River is part of a cycle that sustains wetland habitat for over 500 endemic species of fish (Degen *et al.* 2000). They may also have impacts on coastal protected areas in the Vietnam delta, where mangroves rely on seasonal pulses of freshwater.

In the case of protected areas downstream from hydropower projects, careful planning is needed to avoid, reduce or mitigate the impact. Financial investment can be made to reduce problems through altering the structure and hence the costs and benefits of the project, or through mitigation components that also add to project costs. The level of investment should be adequate to establish a risk and relief fund to provide for the long-term security of the ecosystem and those potentially affected. Ongoing investment from the sale of power will be required as a critical element of any mitigation programme.

A special challenge for the Mekong countries is that projects have been approved in an incremental (one by one) fashion. In this situation, it is difficult to properly assess and account for the cumulative impacts of developing a series of hydropower facilities on a river or in a basin.

Longer range and integrated basin planning becomes essential, though obviously more difficult, particularly when a number of countries share the basin.

Key challenges

In the absence of inclusive stakeholder participation in a comprehensive region-wide planning process, basin development tends to be dominated by the most tangible economic interests – hydropower for example – to the detriment of other sectors and livelihoods (Barrow 1998). Such approaches largely ignore the critical issue of maintaining and enhancing a diversity of development benefits provided to many sectors and communities by protected areas and other natural systems within the basin, for example, the hydrological services by upstream areas such as PAs to downstream hydropower facilities. Ignoring these benefits results in overstating the net benefits of hydropower developments, especially where they result in degradation and detrimental impacts on local communities. The key challenges here include:

- *identifying ecosystem services of protected areas* for both downstream hydropower facilities and local populations and allowing the total economic value of these services to be understood and taken into account;
- *identifying damage caused to protected areas* from upstream hydropower facilities, so they can be evaluated and the compensation principle applied in multi-sectoral planning;
- *developing a system of payments* or transfers to maintain and enhance those ecosystem service benefits; and
- *developing supporting institutional arrangements* for transfer mechanisms, for example, by defining appropriate forms of rights to ecosystem services and responsibilities for providing them, that are regarded as fair and that give stakeholders an incentive to collaborate.

Future directions

Hydropower financing to maintain PA benefits

Protected areas, as well as displaced communities and negatively affected downstream areas, receive few if any benefits from hydropower, which instead tends to benefit urban areas, industrial facilities, and outside investors, in a one-way outbound flow of revenue. This is in stark contrast to the potential benefits that effective PA management can provide to these facilities including:

- maintaining existing regular flows of water;
- maintaining minimum dry season flows;
- prolonging the life span of hydropower facilities by reducing the sedimentation of dams; and
- reducing or preventing diversion of water for other uses that can reduce the flow of water to hydropower facilities.

The extent to which the benefits of PAs for hydropower facilities are economically significant will depend on a range of site-specific factors and the scale of the impacts. That economic contribution will be one important factor in determining how much a hydropower project should pay for PA benefits. This is not always clear cut. For example, whether reduced sedimentation as a result of maintaining forest cover in a PA will significantly prolong the life of a dam will depend on whether the natural background rates are high or low, the capacity of the dam to store sediment, and the size of the protected area relative to the rest of the watershed, particularly when it is degraded. A relatively small protected area in a large watershed will generally not, by itself, provide measurable hydrological services or reduction of downstream sedimentation, although it may control erosion from the specific site. High background sedimentation rates in the Upper Mekong Basin area in China have already brought into question the projected life of the dams regardless of upstream land use practices (Roberts 2001).

The assessment of what a hydropower project should pay for natural system management will depend on the level of benefits it receives and on the level of its negative impacts. It is important

that policy, regulations and implementation distinguish clearly between maintenance of benefits received and mitigation of negative impacts. Compensation and compensatory activities aimed purely at mitigating environmental impacts or impacts on livelihoods are different from payments for environmental services – i.e. payments that improve hydrological or other conditions that in turn lower operating costs or increase production potential.

The inadequacy of investment in mitigating the human and environmental impacts of dams has been the root cause of the controversy in their development (WCD 2000). This remains a contentious area – i.e. how to set an appropriate level of mitigation or compensation.

On the other hand, the idea of paying for environmental services is relatively recent and remains to be widely accepted or applied. To determine the policies and detailed structure of the payment mechanism for benefits, critical issues to be resolved up front concern whether levies on hydropower facilities should be:

- based on site-specific voluntary agreements on a case by case basis or required as a matter of policy and following specified procedures and standards;
- required of all hydropower facilities for watershed services or just relate to the presence of protected areas;
- based on an analysis of PA management needs;
- a lump sum up front and/or regular payment based on the sale of electricity;
- allocated only according to a PA management plan or another planning process; and
- used in part to benefit local communities.

Responses to these policy questions will determine the most appropriate economic instruments and institutional arrangements to facilitate the user pays process.

Sharing of revenue from hydropower facilities can be used to support the establishment of PAs and create incentives for communities to collaborate in their sustainable management. However, the support and cooperation of stakeholders and the determination of priorities for allocating revenue will require an understanding of the ecosystem services that PAs provide, and their economic significance, both for hydropower facilities and for communities that depend on them. Better understanding and appreciation of the values of ecosystem services can be used to help determine the level of social and financial commitment that can be justified to protect them. The next steps are to identify appropriate management actions needed to ensure that these services continue to be provided, and that buyers know what they are getting and are willing to pay for it.

Policy principles

Experience from other regions suggests that hydropower schemes in the Mekong region should be developed and operated according to the following set of policy principles:

1. all hydropower facilities should pay for the ecosystem services they receive and for the ecosystem services they degrade;
2. in cases where those services are provided in part or in full by one or more protected areas, those payments should go to the rehabilitation, maintenance and enhancement of the natural systems protected; and
3. all hydropower developments should lead to net benefits for local livelihoods and well-being in ways that contribute to and enhance their involvement in the conservation of ecosystem services and products.

A small number of pilots of mechanisms are underway or planned through which the economic benefits of hydropower can be at least partially redirected towards protected areas. This will work towards creating incentives for local communities to benefit from conservation practices. For example, the Nam Leuk facility in Laos pays 1% of its revenue to the Phou Khao Khoouay NPA, as a condition of assistance provided by ADB, but also retains the authority to decide how the funds

will be spent. The proposed Nam Theun 2 project has an agreement to pay US\$1 million per year for management of the Nakai-Nam Theun NPA and associated community development activities. However this represents less than 0.5% of projected annual power sales and is considered low given the management needs of the affected PAs. In addition, the Nam Chat/Nam Pan Provincial Conservation Forest "Nakai-Nam Theun Extension" was recognised as suitable habitat to protect as "compensatory mitigation for habitat lost to the NT2 reservoir", which links hydropower development directly to the creation of new PAs (ICEM 2003b). In Vietnam, a proposal is pending approval for investing US\$2 billion a year of tax revenues from the Hoa Binh hydropower facility in protection of the catchment area, which contains four PAs; and for the Dong Nai 8 and Tri An hydropower facilities to support protection of their upstream catchment area, which contains the Cat Tien National Park (ICEM 2003c).

Conclusions

This article has examined the interface between energy development and protected areas in the Lower Mekong. The relative economic importance and potential of hydropower dominates the regional agenda. However, there is little connection between development planning and operation in this sector and others and less on the relationship with protected areas. There is potential to marry PAs and hydropower development where the PAs are upstream from hydropower facilities, or where the facilities are located in PAs. In such cases, there exists the possibility to identify and value the ecosystem, particularly the hydrological services supplied by PAs to hydropower facilities at the regional level. Compensation or payment systems can then be employed to ensure that watershed management in upland areas is consistent with that necessary to optimise hydrological conditions for power operations. Quite often in the Lower Mekong region this will involve working with less fortunate and vulnerable groups to ensure that PAs and buffer zones are also managed to produce sustainable livelihoods that avoid unnecessary environmental degradation.

In this manner, the trade in hydropower that is likely to continue and expand within the region can bring the benefits of electric power consumption in far away cities all the way to rural villages in the interior. There remains a long list of best practices concerning integrated planning that need to be embraced and practised in the region (as set out in the IEA and WCD reports) specifically with respect to the development of water resources and hydropower projects.

Hoa Binh Dam. The largest dam in Vietnam currently derives unpaid benefits from PAs upstream. Photo: Iris Uyttersprot.



The fundamental concern – most powerfully evoked by the WCD – that such projects need to address the tendency for the poor and disadvantaged, as well as the environment, to bear a disproportionate cost of development while having limited access to the benefits, can often go unaddressed. A more integrated approach to planning and development, which seriously addresses upstream/downstream relationships between PAs and hydropower will be an essential part of a comprehensive and cost-effective solution.

Bibliography

- Aylward, B. 2002. Land-use, Hydrological Function and Economic Valuation. Paper read at UNESCO Symposium/Workshop on Forest-Water-People in the Humid Tropics, July 31–August 4, 2000, at Kuala Lumpur, Malaysia.
- Aylward, B. and Tognetti, S. 2002. Valuation of hydrological externalities of land use change: Lake Arenal case study, Costa Rica. Rome: FAO. <http://www.fao.org/landandwater/watershed>.
- Bangkok Post. 2002. Mekong is not only a source of energy. *Bangkok Post*, October 7, 2002.
- Barnes, W. 2002. Laos drowns big dam debate in flood of feel-good prose. *South China Morning Post*, 1 November, 2002, 3.
- Barrow, C. 1998. River Basin Development Planning and Management: A Critical Review. *World Development* 26 (1):171–186.
- Degen, P., van Acker, N., van Zalinge, N., Thuok, N. and Vuthy, L. 2000. Taken for Granted: Conflicts over Cambodia's Freshwater Fish Resources. Paper read at 8th Biennial Conference of the International Association for the Study of Common Property, May 31–June 4, 2000, at Indiana University, Bloomington Indiana.
- EIA. 2000. International Energy Annual 2000 (online). Washington, D.C.: Energy Information Administration, US Department of Energy. <http://www.eia.doe.gov/emeu/iea/contents.html>.
- FAO-RWEDP. 2002. Regional wood energy development program of Asia. www.rwedp.org.
- Gordon, J. 2002. Damming the consequences. *Vietnam Economic Times*, 11 June 2002.
- Gray, D. 2002. Chinese dams, channel blasting may spell disaster for mighty Mekong River. *Associated Press*.
- ICEM. 2003a. *Lessons learned in Cambodia, Lao PDR, Thailand and Vietnam*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003b. *Vietnam national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003c. *Thailand national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003d. *Cambodia national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003e. *The economic benefits of protected areas: field studies in Cambodia, Lao PDR, Thailand and Vietnam*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003f. *Lao PDR national report on protected areas and development*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM. 2003g. *Lessons learned from global experience*. Review of protected areas and development in the Lower Mekong River region. Indooroopilly, Australia.
- ICEM, 2003h. *Regional Report on Protected Areas and Development*. Review of Protected Areas and Development in the Lower Mekong River region, Indooroopilly, Queensland, Australia.
- IEA. 2000. Hydropower and the Environment: Present Context and Guidelines for Future Action. Montreal: International Energy Agency, Implementing Agreement for Hydropower Technologies and Programmes.
- MRC. 2001. MRC Hydropower Development Strategy. Phnom Penh: Mekong River Commission, Water Resources and Hydrology Program.
- Öjendal, J., Mathur, V. and Sithirith, M. 2002. Environmental Governance in the Mekong: Hydropower Site Selection Processes in the Se San and Sre Pok Basins. Stockholm: Stockholm Environment Institute. www.sei.se.
- Pongern, S. 2001. Nam Theun II in Laos faces continuing delay. *Reuters*, 8 June 2001.
- Roberts, T.R. 2001. Downstream Ecological Implications of China's Lancang Hydropower and Mekong Navigation Project. Paper read at Biodiversity Management and Sustainable Development: Lancang-Mekong River in the New Millennium. International Symposium on Biodiversity Management and Sustainable Development in the Lancang-Mekong River Basin, December 4–7, 2001, at Xishuangbanna, China.
- Rojas, M. and Aylward, B. 2002. The Case of La Esperanza: A Small Private, Hydropower Producer and a Conservation NGO in Costa Rica. Rome: FAO. <http://www.fao.org/landandwater/watershed>.
- UN FAO. 2002. Land-Water Linkages in Rural Watersheds Electronic Workshop. 18 September–27 October 2000. Rome: Food and Agriculture Organization of the United Nations. <http://www.fao.org/landandwater/watershed>.
- UNDP. 2001. Human Development Report 2001: Making Technologies Work for Human Development. New York: United Nations Development Programme; Oxford University Press. <http://www.undp.org/hdr2001/>.
- WCD. 2000. *Dams and Development: A New Framework for Decision-Making. The Report of the World Commission on Dams*. London: Earthscan Publications.
- WRI. 2002. *Earth Trends Environmental Information Portal*. World Resources Institute 2002 [cited 10-11-02 2002]. Available from <http://earthtrends.wri.org/>.

Bruce Aylward was Senior Economist with the World Commission on Dams and is now Programme Director for the Deschutes Resources Conservancy in Oregon, USA. Email: bruce@deschutesrc.org.

Sylvia Tognetti is an independent consultant in natural resources and energy issues based in Takoma Park, Maryland, USA. Email: sst@sylviatognetti.org.

This article summarises parts of the energy chapter from the PAD Review regional report (ICEM 2003h).

Protected areas and water resource management in the Lower Mekong region

NICHOLAS CONNER

Protected areas (PAs) in the Lower Mekong region safeguard the biophysical functions provided by natural environments which determine water volume, quality and regularity of flow. However, these functions, and the ability of PAs to safeguard them, are highly vulnerable to development pressures. Poor planning, inadequate protection, and poor resourcing and management of PAs can compromise the ability of natural environments to perform these functions. This will lead to a loss of the economic benefits that local and national economies derive from the biophysical services provided by these environments.

If this situation is to be avoided, water resource managers and economic planners will need to better understand the contribution that PAs can make to water resource development, and to incorporate PA establishment and management into an integrated approach to water resource management and national economic development. Equally, PA managers need to engage with water resource managers to promote the benefits of PAs for water resource management programmes. Some issues that should be considered in incorporating PAs into water resource management are also discussed in this article.

MANY PAS IN THE LOWER MEKONG REGION play a key role in protecting and enhancing the availability, quality and quantity of water resources provided by natural environments, and thus provide economic benefits to local, provincial and national economies. This is done through protecting biophysical functions such as water storage and regulation of seasonal flow, flushing of pollutants, and microclimate impacts on surroundings. These functions provide economic benefits to a wide range of downstream activities such as energy production, agriculture, in-stream and estuarine fishing, transportation and navigation, and recreational and tourism uses of water.

North Vietnam. Water supply regulation by protected areas can be essential for irrigated rice agriculture. Photo: Iris Uyttersprot.



Some economic benefits of PAs for water resource development identified in the Protected Areas Development (PAD) Review are shown in Table 1 (ICEM 2003).

Development pressures on protected areas in the Lower Mekong countries

Economic development programmes in this region depend on the availability of secure, and high quality, water resources. However, despite the importance of water resources for economic activities and economic development, only a small proportion of these resources are incorporated in PAs. A number of institutional and economic factors are having profound effects on the capacity of these areas to continue to provide development benefits. These include the following:

Table 1. Economic benefits of protected areas for water resource-based development.

PA environments	Biophysical functions	Economic contribution
Headwaters Watersheds	Catchment protection	Avoided costs of flood damage
	Smoothing of peak flows and reduction of downstream flooding	Water available for additional cropping (e.g. second rice crop)
	Provision of flows during dry seasons, climate and moisture regulation through evapotranspiration	Less arid microclimates for crop production
	Prevention of soil erosion through reduction in velocity of precipitation and increased percolation, and maintenance of soil moisture	Retention of soil fertility, savings from reduced need to apply artificial fertilisers
	Water filtration and protection, improvement of water quality for downstream processes including domestic consumption	Avoided costs of alternative methods of water filtration, economic benefits to industries dependent on high quality water for processing and production
	Provision of environments for ecotourism/ tourism	Low cost/free input of goods and services for recreation experiences
Instream	Provision of habitats for commercial fish species	Moderation of water temperature and water chemistry for healthy growth of commercially valuable species, free source of food supply for commercial species
Wetlands	Nursery grounds	Supply and maintenance of suitable free input into growth and reproduction of commercially valuable species
	Habitats for animals and plants	Source of commercial aquatic species, e.g. crab, shrimp
	Source of fibres and plant products	Source of commercially valuable raw materials e.g. plants
	Wastewater treatment and nutrient removal	Provision of biological wastewater treatment functions as alternative/ supplement to structural engineering treatment methods
Estuaries	Provision of habitats for fisheries e.g. mangroves, flushing, sediment replacement	Commercial value of fisheries and non-timber forest products, improved growth performance for farmed/ harvested species from less polluted growth environment, commercial benefits of maintaining aquatic food sources for commercial species



Much of the Tam Giang-Cau Hai lagoon in Thua Thien Hue Province is a proposed protected area. Aquaculture in the lagoon will benefit from the protection of mangroves which act as nursery areas for aquatic life in the lagoon. Photo: Paul Insua-Cao.

The costs and benefits of water

A fundamental factor affecting the relationship between PAs, water, and economic development is the status of water as a 'free good', in economic terms. This influences the way water is seen in institutional planning and national economic development.

Water resources share many of the features of other natural resources, such as soil, air, and oceans, in that they have typically been treated as 'free goods' by the market, i.e. there is no clear relationship, which can be regulated by the price mechanism, between the supply of the resource and the levels consumed. This means that the full (social) costs of the consumption of the resource are generally not paid by those obtaining the direct benefits from the use of the resource. The indirect costs (and benefits) arising from the consumption of the resource are borne by third parties. Therefore, there is no financial pressure on users to consume water resources efficiently, or to ensure their long term availability or quality for themselves or other parties, through paying for the upkeep of the areas protecting these functions (i.e. PAs).

For example, the economic costs associated with construction of large-scale dams to collect water for irrigation are typically not acknowledged in the tariffs charged to irrigation water users. In many cases, tariffs do not cover the full costs of providing the infrastructure. ACIAR (1999) notes that in the Red River Delta in Vietnam, current revenues from water charges fall far short of the current cost of US\$11/hectare/year needed to ensure proper maintenance and replacement of assets. Other social costs of irrigation include the costs of protecting catchments to ensure adequate water volume and quality for storage which are borne by PA agencies or private landusers, and the socio-economic costs to local communities from environmental changes which affect subsistence livelihoods.

Modification of the water cycle and water balance

Major infrastructure works to control floods or store water for dry season agricultural use create significant impacts on the natural hydrological cycle of the Lower Mekong region water resource

systems. In addition, increasing levels of abstraction are altering flow patterns. Draining of wetlands, clearing of mangroves, and replanting of catchments (often with exotic species) also substantially interfere with the water cycle and water balance. Changes to flow regimes will also affect water temperature, with effects on organic and inorganic processes influencing water chemistry. Such changes can also lead to significant social and economic impacts on communities, as mentioned above.

Land clearing and sedimentation

Sedimentation due to erosion of topsoil, associated with land clearing in poorly protected catchments, is another major issue of concern which threatens the integrity of water resources in the region. For example, sedimentation can shorten the effective life of storages used for irrigation and hydropower by 10 to 50 years. Sedimentation is also associated with raising river beds, leading to increasing flooding during high flow periods.

Pollution affecting water quality

Water quality is deteriorating as catchment and river bank erosion (largely associated with deforestation) increases sediment loads, municipal and industrial waste discharges pollute both rivers and groundwater, and conversion of wetlands to agricultural lands release acid sulphate into rural water supplies. Agricultural intensification is accompanied by higher levels of pesticide and fertiliser use, polluting water available to downstream users (Badenoch 2000).

Poor integration of protection at regional level

The protection of water resource systems for equitable and sustainable use by the countries sharing them is one of the most complex natural resource issues facing the Mekong region. For example, since 1986, China has begun to build eight hydro-electric dams and two reservoirs on the Upper Mekong in Yunnan. One of these will be China's largest hydro-electric scheme after the Three Gorges project on the Yangtze River (Chen Liang 2002). Ratner (2000) notes that in the case of the Mekong: "Obstacles to improved cooperation for managing this shared ecosystem are daunting, stemming from differences in national interests between upstream and downstream users, the weakness of international institutions charged with forging agreements and a history of broader political conflict among basin countries".

The increasing incidence of trans-border and even trans-provincial issues relating to access to water resources in the Mekong (and other regions, see De Villiers, 2000) threatens to compromise the role of protected areas in maintaining the biophysical functions of natural habitats.

Without better protection, and appropriate transfer of the costs of managing PAs, especially from downstream beneficiaries, development threats of the kind outlined here will continue to reduce water quality and security of water supply.

Managing impacts

There is a need for greater levels of protection to safeguard the natural processes which provide and protect water resources. This protection should be part of an integrated planning and resource management approach which links PAs with regional water resources. Some key issues that should be addressed in such an approach include the following:

The need for a systems approach to protection and management

According to Badenoch (2002), a natural systems perspective towards defining and implementing management strategies is essential to provide a comprehensive view of "cause-effect linkages, supply-demand dynamics, and human ecosystem interactions, while possessing a flexible, responsive and specialised capacity to understand local conditions".

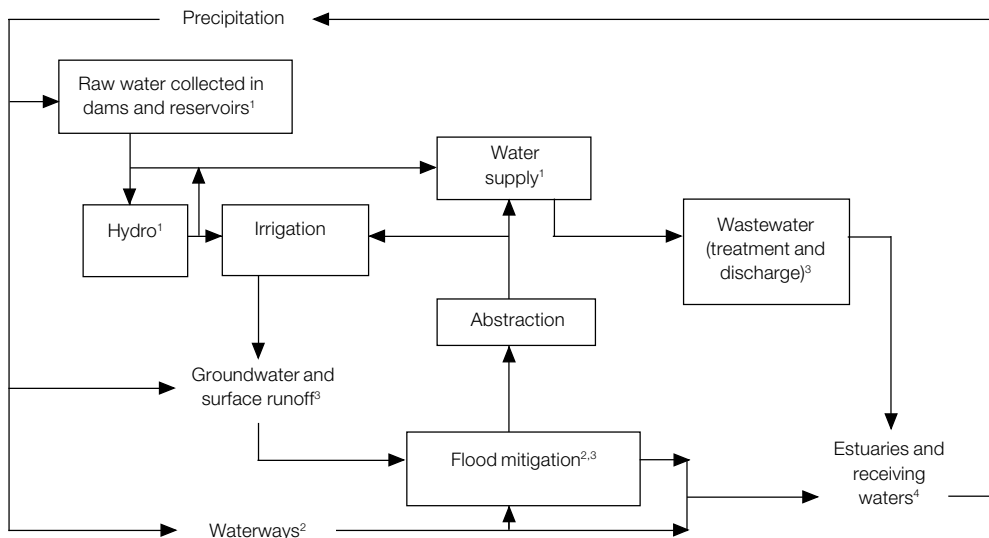
A simple example of a systems approach to water resource management which involves PAs is shown in Figure 1 (ICEM 2003). This diagram shows how PAs can be related to different parts of the water cycle. For example, protected forested catchments can be used to assist in collection and storage of raw water for hydropower or water supplies, wetlands can be used for flood regulation and wastewater treatment etc.

The need to reorientate the role of protected areas to emphasise the protection of water resources

For much of the last 100 years, the creation of PAs for natural and cultural heritage conservation has provided the principal vehicle for the protection of biophysical processes such as the water cycle, cycling of nutrients, climate control and even natural selection. However, PAs could also be established specifically to protect biophysical functions. This type of PA would correspond to IUCN Category VI, as an example of a managed resource protected area (IUCN 1994).

From a policy and institutional point of view, the water resources sector could look to PAs as a key development strategy by emphasising and promoting their water system protection functions. This could be done through a collaborative programme with PA managers to define a PA network throughout the Mekong region aimed specifically at the rehabilitation and maintenance of water resource systems. One example of such collaboration can be seen in Sydney, Australia, where protected water catchments are jointly managed by the NSW National Parks and Wildlife Service and the Sydney Catchment Authority (Sydney Catchment Authority and National Parks and Wildlife Service 2001). Such a programme should involve greater investment by the water resource sector in existing PAs and the establishment of new areas where water systems are not adequately covered by the existing protection regime.

Figure 1. A systems view of water management.



Potential role for protected areas in water resource management

1. Protected forested watersheds and catchments assist raw water collection for hydropower and water supplies
2. Waterways assist flood mitigation and sediment transport
3. Wetlands assist water flow control and wastewater treatment
4. Estuaries and receiving waters assist sediment transport and deposition, flushing, and wastewater treatment

Using economic instruments

Another component of an integrated approach which links PAs with water resource management can be to use economic instruments to encourage more economically efficient allocation of water resources. Economic instruments can be used here to establish markets for the biophysical functions safeguarded by PAs. The design and operation of markets for these functions depend on the specification of property rights and the institutional underpinnings to support them.

There is a wide choice of economic instruments for application to PAs and water resource management. The main types of instruments are:

- adjustments/corrections to the price users are charged by government agencies for the supply of water (which depend on the biophysical functions protected by PAs);
- creation of special markets in the rights to use resources under the management of government authorities;
- pricing to account for 'external effects' of production and distribution of water services and products. Economic instruments provide a mechanism for ensuring that the beneficiaries of an activity actually pay the full costs of that activity, and so internalise them;
- creation of markets for trading in permits/licences; and
- various kinds of economic incentives to encourage particular types of behaviour, e.g. performance bonds.

Developing a regional perspective

The hydrological and biophysical functions provided by natural environments in the Lower Mekong region cannot be effectively protected by any single country as most major watersheds cross national borders. In addition, the impacts of national policies and economic activities in sectors such as trade, energy production, forestry and agriculture also cross national boundaries.

One mechanism for implementing an integrated approach to water resource management in the Mekong region will be to develop and implement cross-border/regional strategies. These strategies should be underpinned by inter-country agreements setting out institutional arrangements and commitments, operating principles and priority actions.

Strategies should include charging schemes or the placement of caps on particular functions of the water resources system, such as the level and type of pollutant discharges, allowable rates of water extraction, diversions for inter-basin transfers, and maintenance of minimum flows for environmental protection purposes. One example of such a system is being implemented among different States in the Murray-Darling Basin in southeast Australia, and involves inter-State agreements relating to caps on water extractions and cross-border trades in water (Murray-Darling Basin Commission 2003).

Some key features of an integrated approach (Table 2) which can operate at local, national and regional levels are:

1. Identification of the specific products and services which are provided by water resource systems and which need to be protected through incorporation in a system of PAs;
2. Identification of the sectors and users which benefit from those services and products;
3. Definition of the regional water resource system in question in terms of planning units based on water cycle functions (Figure 1).
4. Determination of existing levels of protection in each subregion, and identification of subregions in need of greater protection.
5. Development of criteria for prioritising subregions needing protection.
6. Identification of appropriate forms of protection for priority subregions (e.g. multiple use biospheres, or IUCN Category VI—managed resource-protected areas).
7. Identification of appropriate functions, powers and responsibilities to be carried out at regional, subregional, national and local levels, including designation of appropriate agencies (see Table 2) for provision of required levels of protection.

Table 2. Elements of an integrated regional approach to water management.

	Function ¹	Actions	Possible tools	Type of protection	
Planning unit	Local	1. Making government agencies more accountable to the interests of local residents, especially ethnic minority groups, to ensure equity considerations are met	Implement local schemes e.g. through biosphere reserves	Intra-country agreements e.g. inter-basin water transfers	Multiple-use reserves, e.g. biosphere reserves, community conservation areas, local wetlands
		2. Establishing and protecting local PA systems			
	National	1. To implement regional and subregional PA planning and management within national legislation	Individual countries to identify appropriate PA strategies to protect their parts of the catchments in conjunction with others, and implement their national planning programmes	Inter-state strategic agreements re export of water resources.	Transboundary PAs, including biosphere reserves, peace parks etc., e.g. on navigation, transportation
		2. To broaden stakeholder representation to ensure equity considerations are met			
Sub-regional	To implement a framework for establishing, maintaining and resourcing a network of subregional PAs designed to protect water resources and biophysical services	Regional body e.g. River Basin Commission, to identify and map regional planning units e.g. bio-regions, watersheds etc. and set up inter-country catchment boards in vulnerable areas identified as being gaps in the protection framework	Regional caps on water resource development, credit schemes between bio-regions, major watersheds etc.	Bio-regional systems, special protected areas such as PAs for water resource conservation to manage flooding, droughts, water regime modification	
Regional	To strengthen the framework for regional cooperation on transboundary river systems in the region and cross-border impacts of water resource use	To be managed by regional authority, e.g. River Basin Commission. Member states to agree to principles	Special fund for restoration of regionally important river systems	River system development plans, international agreements, principles and guidelines e.g. for water quality throughout the system	

¹ Adapted from Ratner, 2000

8. Examination of appropriate management mechanisms, including economic instruments, to promote the required type and level of protection in priority subregions (e.g. levies, environmental offset schemes, tradeable permits, user pay schemes etc.).

Conclusions

This paper has briefly described some of the economic benefits that natural environments can provide through biophysical functions which determine water volume, quality and flow. PAs help to safeguard the provision of these benefits. However the ability of PAs to continue to do this will be compromised unless PA managers, water resource planners and development economists seek to develop integrated approaches to natural resource management which acknowledge the crucial role of PAs. This will require two fundamental actions:

- protected areas managers need to demonstrate to water resource agencies and national development economists that PAs can play a major role in water resource management, and thereby provide economic benefits to local and national communities; and
- incorporating the role of PAs into water resource management will require the development of an integrated approach to water resource planning with local, national and regional dimensions. Cross-border initiatives such as transboundary PAs (see Sandwith *et al.* 2001) may also be a valuable mechanism for protecting regional water resources.

Bibliography

- ACIAR. 1999. Management of Irrigation Areas – Irrigation Management in the Red River Delta of Vietnam. Research Notes RN22 12/99. Australian Centre for International Research, Canberra.
- Badenoch, N. 1999. Watershed Management and Upland Development in Lao PDR: a Synthesis of Policy Issues. World Resources Institute, Washington D.C.
- Badenoch, N. 2002. Transboundary Environmental Governance: Principles and Practice in Mainland Southeast Asia. World Resources Institute, Washington D.C.
- Chen Liang 2002. Xiaowan Dam, a reservoir for progress, IPS-Rockefeller media fellowship programme 'Our Mekong: A Vision amid Globalization.' VietGATE <http://www.viet.net>.
- De Villiers M. 2000. Water – The Fate of our Most Precious Resource. Houghton Mifflin Company, New York.
- ICEM. 2003. Protected areas and development in the Lower Mekong region: Regional Report. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia.
- IUCN. 1994. Guidelines for Protected Area Management Categories. CNPPA, with the assistance of WCMC. IUCN-The World Conservation Union, Gland, Switzerland.
- Murray Darling Basin Commission. 2003. The Pilot Interstate Water Trading Project. <http://www.mdbc.gov.au>
- Ratner, B. 2000. Watershed Governance: Livelihoods and Resource Competition in the Mountains of Mainland Southeast Asia. World Resources Institute, Washington D.C.
- Sandwith, T., Shine, C., Hamilton, L. and Sheppard, D. 2001. Transboundary Areas for Peace and Cooperation. IUCN, Gland, Switzerland and Cambridge, UK.
- Sydney Catchment Authority and NSW National Parks and Wildlife Service. 2001. Special Areas Strategic Plan of Management. Sydney Catchment Authority, Penrith, NSW, Australia.

Nicholas Conner is Principal Conservation Economist with the New South Wales Department of Environment and Conservation, and is a member of the WCPA Taskforce on Economics and Protected Areas and the joint WCPA/CEESP Theme on Indigenous and Local Communities, Equity and Protected Areas. Email: nicholas.conner@npws.nsw.gov.au.

This article is based on research carried out for the Lower Mekong Region Protected Area Review. The issues discussed here are considered in greater depth in reports published at the Review website <<http://www.mekong-protected-areas.org>>. The views expressed here do not necessarily reflect those of the NSW Department of Environment and Conservation.

Freshwater fisheries and protected areas in the Lower Mekong region

GORDON CLARIDGE

Freshwater capture fisheries make an important contribution to the economies of the Lower Mekong Basin countries as well as being crucial elements in food security and poverty alleviation for a significant proportion of the population. Maintenance of key environmental values, such as hydrological functions and important aquatic habitats, is essential to the continuation of fisheries productivity, but has received little real support until now. Protected areas (both those established primarily for biodiversity conservation and fisheries-specific areas) are an essential component of any long-term fisheries management strategy, but unfortunately their full significance for maintaining the region's fisheries is not generally recognised. Areas under conservation management need to be both expanded and better managed in order to achieve their full potential for supporting fisheries productivity. A first step in creating awareness of the contribution of protected areas should be a series of case studies to identify and quantify the economic value of specific protected areas to the fisheries sector.

THE FRESHWATER CAPTURE FISHERY in the Lower Mekong River Basin is one of the most important commercial and subsistence activities in the region (Hill and Hill 1994) with an estimated two million tonnes of fish and other aquatic animals consumed annually (Sverdrup-Jensen 2002). Fish products are the major source of animal protein in the diet of the population, together with rice forming the basis for food security for the 60 million people living in the Lower Mekong Basin.¹

The total consumption and proportion of animal protein derived from aquatic organisms varies depending on the location of particular communities within the catchments. Average annual fish consumption ranges from between 10 kg and 30 kg per capita in mountainous areas to 70 kg around the Great Lake (Tonle Sap) in Cambodia. The overall average for the region is 36 kg per capita (Sverdrup-Jensen 2002). A similar variation is found in the proportion of total animal protein coming from fish. For example in Laos, fish as a percentage of total animal protein consumed may vary from only 10% among hill tribes to 90% among the population in the lowlands (FAO 1999). This figure does not include consumption of aquatic protein from sources other than fish (e.g. frogs, insects, molluscs) which are very significant, especially for isolated poor communities. In the remote north-eastern mountainous region of Thailand for example, fish comprised about 50% of the animal protein intake (Hill and Hill 1994).

For many families, aquatic animals constitute a source of animal protein and other nutrients that they cannot afford to replace from other sources. For example, small fish, consumed fresh or as dried or fermented products provide the most important source of calcium in the diet of a very large part of the population of the region (MRC 2001). Similarly, fishing provides a source of employment and cash income that would be very difficult to replace – in Cambodia, which has a relatively well developed commercial freshwater fishery, 47% of the total catch is taken by family fishers.

Of the fish consumed in the region, at least 1.5 million tonnes² originates from catches in natural water-bodies and 240,000 tonnes from catches in reservoirs. Although the Mekong and its major tributaries make up an important part of the fishery, many people in the lower basin do not have access to these water bodies and subsist by utilising local sources of fish such as streams, swamps, ponds and rice fields, all of which are connected to the Mekong by water flows and fish migrations (Meusch 1996).

1 MRC Press Release No. 1/00 8/2/00: <http://www.mrcmekong.org/media/press2000/press001.htm> 25/05/02.

2 This is almost certainly an underestimate, see for example, van Zalinge (2000).

It is at the poorer end of the social spectrum that the freshwater fisheries assume their greatest significance in terms of nutrition, employment and social stability. For example, in Laos most rural families fish primarily as a subsistence activity, but it is most important for the poorer households (Smith *et al.* 2000). According to Smith *et al.*, fishing is likely to remain a vital source of livelihood for the poorest of the poor even while others benefit from development and move on to other forms of livelihood. This is consistent with the results of studies in Cambodia which have shown a tendency for people displaced from other forms of livelihood to move into fishing as a survival strategy (Schouten in press). It is also consistent with experience worldwide in the marine fisheries, which are well known to attract those displaced from other forms of subsistence livelihood. During the 1990s, in the south west of Cambodia, poor communities dependent on timber and other forest products shifted into fisheries as access to forests was restricted by concessions and as forest products within Ream National Park were either exhausted or their illegal exploitation better controlled. The pressure on the Park was transferred from the terrestrial to the aquatic (in this case marine) systems (ICEM 2003).

This role of capture fisheries in poverty alleviation has growing significance for fisheries policy makers and protected area managers, particularly in Laos and Cambodia with their comparatively high population growth rates. As population growth outpaces growth in alternative job opportunities among the largely rural populations, the increase in the number of people depending on fishing for their livelihoods is going to put greater pressure on the resource, and thereby increase the importance of the role of protected areas for supporting fish stocks.

Threats to fisheries in the Lower Mekong Basin

The main threats to the fish resources in the Lower Mekong Basin are changes in hydrological flows and water quality resulting from deforestation and construction of dams (which also block fish migrations).

Seaweed farming by local people between Bokor and Ream National Parks in Cambodia. Photo: Shaska Martin.



In the last 35 years, more than 30 major dams have been built across tributaries of the Lower Mekong as well as an additional 20,000 small dams and weirs, particularly in Thailand (Schouten in press). In the late 1990s, the Lao government had a backlog of many hundreds of small irrigation projects awaiting funding which may eventually add to this impact on fisheries (none of these was subject to environmental impact assessment). Small-scale irrigation projects are typically planned and implemented with no consideration given to impacts they might have on aquatic ecosystems or fisheries. The cumulative impact of these many small dams has never been assessed.

Protected areas tend to be favoured sites for hydropower dams. Many PAs are in upper catchments and rugged terrain with relatively few people, thus providing suitable dam and reservoir sites. Dams have impacts on protected area values as well as on downstream fisheries, but impact assessment of large-scale dams in the region is generally well below international best practice. A study of all available pre-impoundment assessments of the fisheries impact of the larger dam projects in the four Mekong River Commission (MRC) countries found that of 46 dam projects few such assessments were carried out and only one could be considered a “modern era” Environmental Impact Assessment (EIA) study. In most cases baseline studies of fish populations had been “far too short, cursory and incomplete to provide an accurate and reliable baseline” (MRC Annual Report 1997).

There are two further problems with impact assessments in the region, particularly in relation to large dams. First, there has been no attempt to consider cumulative impacts of additional large dams. Typically each development is considered in isolation. Second, impact assessments are frequently limited in their geographical scope, not considering impacts which might be well downstream of the immediate development. The combined effect of these two shortcomings has already led to degradation of the aquatic environment, with serious consequences for fisheries.

To a large extent deforestation and dam construction threats can be sourced to a lack of cross-sectoral planning across critical geographic areas, combined with a general lack of recognition of the importance of freshwater fisheries. Little regard is given to the possibility that what may be an opportunity for one sector can constitute a threat to another. If not properly positioned and designed, development activities in catchment areas can decimate aquatic resources. Rural communities are left the poorer, with negative implications for the overall economy (MRC Annual Report 1999).

Indeed the general lack of recognition by national governments of the significance of fisheries at the local and national levels, combined with the tendency to focus management resources on aqua-culture, is among the most significant threats to freshwater fisheries in the region.

Other important threats include alteration of aquatic habitats, such as spawning grounds or dry season refuges (for example by dredging, removal of rapids, or sedimentation resulting from removal or alteration of vegetation), over-harvesting, use of destructive fishing practices, and displacement of native species by introduced species (Schouten in press; Sverdrup-Jensen 2002). These threats are already degrading fisheries throughout the region.

Key factors in fish productivity requiring protection

Several factors account for the significance of the freshwater fishery in the Lower Mekong Basin and protected areas have an essential role in their maintenance. These are:

- the patterns of migration among the fish populations in the basin;
- the regular and extensive flooding of the floodplain³; and

3 Floodplains are low-lying alluvial lands bordering rivers that have been constructed by sedimentation from the movement of the river over the area, and by the widespread deposition of sediment over the plain when the river is flowing outside its banks. Floodplains are typically frequently inundated, with strong flood flows over the area, and indeed part of the function of the floodplain is to store and carry floodwaters during times of flood (Hollis 1993).

- recharging of floodplain wetlands, and certain other key habitats (including deep pools and rapids).

These factors support the high fisheries productivity in the region and constitute the most sensitive aspects of that productivity. If they are not maintained then fish productivity will decline.

The significance for fish migrations

The separation of fish life-cycle habitats in time and space forces the majority of Mekong fish species to migrate, and virtually all migrations involve some time on the floodplain. Some species migrate only short distances between permanent and seasonal water-bodies (e.g. snakeheads, gouramis and *Clarias* species of catfish). These constitute about 40% of the total catch. Other species migrate long distances from dry-season refuges in pool habitats within river channels. This group includes most of the carp (*Cyprinids*) and river catfishes (*Pangasids*). Most economically important fish in the Mekong are highly migratory, with some migrations stretching over 500–1,000 km and often crossing national borders. These long distance migrants form about 60% of the total catch (Sverdrup-Jensen 2002; MRC 2001; van Zalinge 2000).

While there is this broad level of knowledge of migration patterns, there is only limited knowledge of the ecology of the aquatic environment in the Basin. Basic information on the life-cycles of most fish species in the Mekong Basin is lacking (Schouten in press). Most knowledge of fish migrations in the region is derived from studies carried out on the Mekong mainstream, though more recently there has been some research into migrations in the major tributaries. Though fishers consistently report (and rely on) fish migrations even in the very highest tributary streams, these remain virtually unstudied, and their ecological and economic significance is unquantified. Similarly, there has been no comprehensive quantitative analysis of the likely impacts of stream and river flow alteration on migration and thus on fish production.

The precautionary principle needs to be applied, with conservation regimes which include permanent protected areas in critical locations along the migration routes together with seasonal closure areas, perhaps managed collaboratively with fishers and local communities.

The protection of key habitats

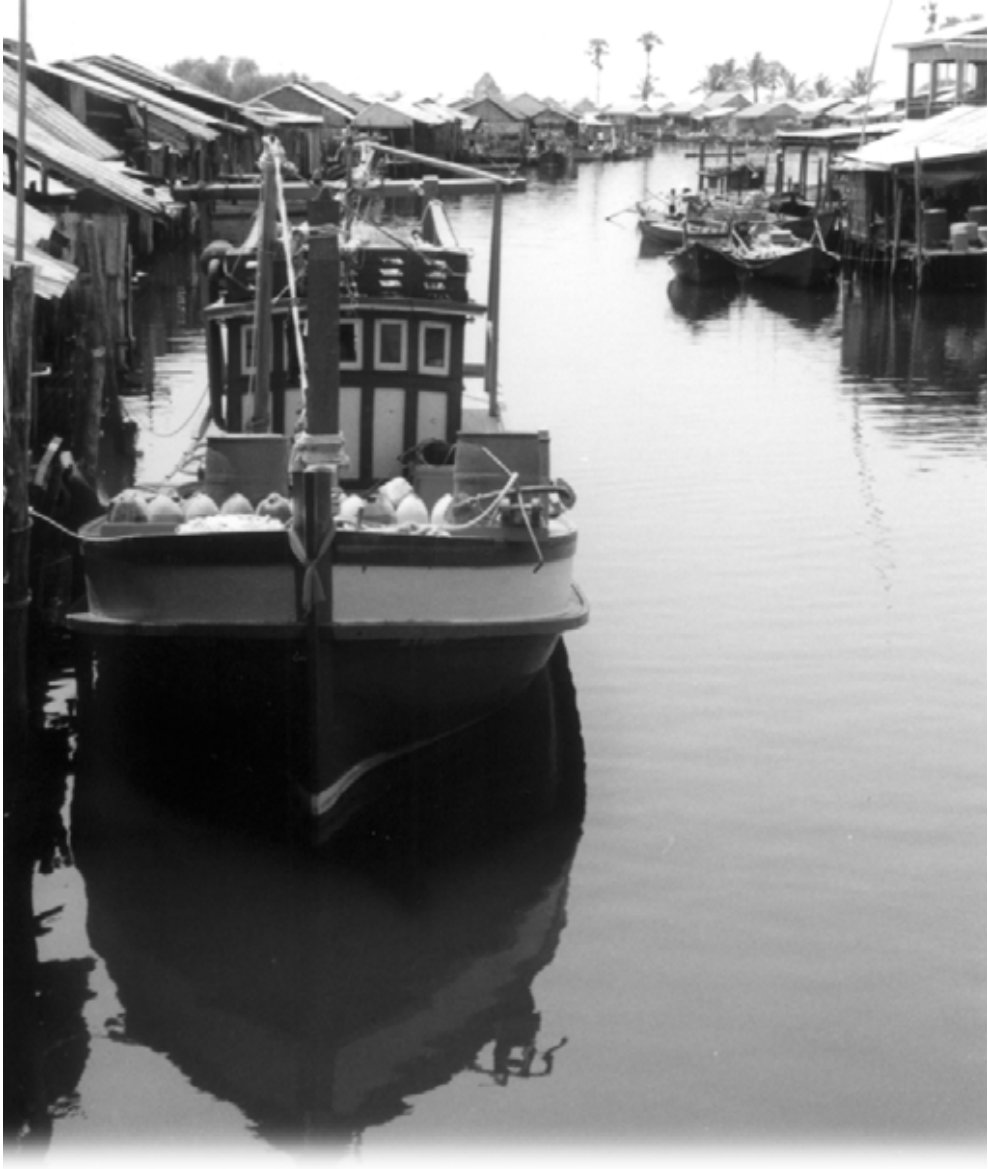
The migrations are an ecological link between important fish habitats, all of which are necessary to the maintenance of the high fisheries productivity. For example, the huge fish production in Tonle Sap cannot be sustained if the spawning grounds at Stung Treng, some 500 km upstream from the Lake, are not protected (MRC Annual Report 1999).

During the flood season most Mekong species take advantage of the floodplains for feeding, breeding and rearing their young. Outside the flood season fish stay in dry-season refuge habitats, mainly in permanent lakes and ponds, or within river channels. Certain stretches of the Mekong and its tributaries contain deep pools which are particularly important as dry season refuges (Sverdrup-Jensen 2002). Some species rely on rapids during important stages in their life-cycle. These critical habitats are briefly discussed below.

Floodplains

While the connection between fisheries productivity and the flooded forests in Cambodia and the far south of Laos has long been suspected, it is only recently that the importance of other (and much more extensive) floodplain habitats of the Mekong system have been recognised. It is now clear that one of the key aspects of the fish stocks in the Basin is their dependence on the cycle of flooding and drying of vast floodplain areas (MRC Annual Report Fisheries Program 2000–2001).

Floodplains cover approximately 700,000 km² (about 11% of the total area of the LMB) (Sverdrup-Jensen 2002). The annual flooding of the Basin generates much of the biotic production



The fishing village in Ream National Park, Cambodia. Photo: Shaska Martin.

of the wetlands by transferring millions of tons of nutrient-laden, suspended and dissolved solids. Flooding also releases nutrients from the vegetation and from inundated organic debris. This leads to blooms of plankton, macro-vegetation and insect larvae which are available to fish migrating to the inundated areas for spawning or feeding. After spawning, the flooded habitat serves as a nursery area for fish fry, and as the flood waters recede most fish return to the rivers and recharge the fish stocks there.

Research on the *dai* fishery in the Tonle Sap downstream of the Great Lake shows that the level of fish stocks in any year is highly dependent on the flood height (and therefore, critically, the area of inundated floodplain) in that year (Schouten in press). This relationship will hold true for all of the floodplain areas throughout the Basin – if the floodplain area is reduced, there will be a corresponding reduction in the fish production.

Similarly, different habitats in the floodplain (e.g. flooded forest and flooded grassland) have different levels of productivity and are important to different fish species. Alteration or removal of floodplain habitats will affect the overall productivity of the aquatic ecosystem.

Surveys carried out under the MRC Fisheries Program indicate that the productivity in a floodplain, which is typically flooded 4–6 months per year, is more than double that of a permanent lake of the same area. It is also several times higher than the productivity per area in the most productive marine areas of the world. It is the periodical shift between flooded and dry conditions which is particularly beneficial (MRC Annual Report 1999) and it is this alternation that is at risk if the annual cycle is changed by upstream engineering works that obstruct water flow.

Deep pools

Deep pools in the mainstream of the Mekong would appear to be the primary rearing and dry season refuge for large catfish and carp (Hill and Hill 1994). Such deep pools are also known to occur in the major tributaries.

Because of the huge increases in water flow during the height of the floods, these deep pools are effectively self-cleaning, despite the large volumes of sediment that must pass through them each year. However any change in total flow, and particularly the rate of flow, will be likely to undermine this scouring mechanism, so that the holes can silt up fairly rapidly.

Many deep pools in the Mekong mainstream are already under legal or community protected status of some kind.

Rapids

Rapids are very important to the health of a river – out of all proportion to their physical extent. They perform several vital roles: oxygenation of water, and of organic matter carried into the rapids which is also physically broken up, allowing its entry into the food chains of higher organisms. Rapids also provide enormous surface area for growth of attached plants and associated insects and other invertebrates, as well as spawning and feeding grounds for many fish species. Of all river channel habitats rapids probably have the highest primary production and biodiversity.

Large complex rapids occur frequently on the mainstream of the Mekong and its tributaries, though the total extent of this habitat is quite small. These rapids support a diverse assemblage of fish species, some of which are specifically adapted to life in this habitat. Many of the fish species which spawn or find their early life-cycle refuges in rapids spend the remainder of their lives in other wetland types (Schouten in press; Hubbel 1999).

Very few of the rapids in the Mekong mainstream or major tributaries are protected and even where they are within some form of protected area they are not given special management attention.

The critical role of protected areas in freshwater fisheries

The failure to recognise the full significance of the freshwater capture fisheries has meant that there has been a corresponding lack of attention given to the contribution of protected areas as an essential component of the management strategy in the fishery sector. A range of protected area types can contribute to the fisheries sector in important ways.

Protected areas which contribute to the fisheries sector

Protected areas established primarily for biodiversity conservation contribute to fisheries productivity primarily through the maintenance of hydrological functions, though they typically also contain many river and stream habitats that are important to fish populations.

In addition, a variety of reserve types has been established for fisheries-associated reasons. These are almost the only protected areas that occur on the region's floodplains and they contribute directly to the maintenance of the productivity of the aquatic environment.

In 1989 the Cambodian Ministry of Agriculture established Fisheries Reserve Areas over all deep pools along the Mekong in Sambor District (Kratie Province) and Stung Treng Province, where all

fishing is prohibited (Chea and Sean 2000). Similar Reserve Areas were established in the deeper parts of the Great Lake. Also, there is a long tradition of community-established protected areas, such as those in Luang Prabang Province in Laos (Sjorsley 2000). In the latter case 37% of villages have a conservation zone near the village – frequently associated with deep pools within the river.

The Luang Prabang protected areas are traditional approaches to fisheries management. Community fisheries reserves have also been established recently with the support of NGOs, generally working with government agencies. For example, between 1993 and 1997, Fish Conservation Zones were set up in 59 Lao villages (again these were largely associated with deep pools in the Mekong mainstream) (Baird *et al.* 1998).

Cambodia (and formerly Thailand) adopted a system of “fishing lots” which are a form of fisheries-oriented protected area. The system has both spatial dimensions and habitat and resource protection measures. Each lot has a set of specific rules and regulations for management which include the conditions under which local communities have fishing access to the lot and how the flooded forest is to be protected.

The fishing lots in Cambodia have existed since the latter half of the 19th Century. There are five types of fishing lots located in the Great Lake and the major floodplains of the Mekong and the Bassac River systems (along the Tonle Sap and Mekong Rivers downstream of the lake), and in the upper Cambodian section of the Mekong in Kampong Cham and Kratie Provinces. The system is potentially highly effective and is regarded by some specialists as a good example of “best practice” for the region (Coates 2001).

The effectiveness of this system (the fishery appears not to have been seriously reduced in more than 125 years of operation) has been eroded in recent years by extensive and deep-seated corruption affecting the management of the lots and the associated community access areas. This has created an overlaid informal system of capture fishery management that is directed mainly to allocation of maximum benefit to favoured large operators and is undermining the sustainability of the fish stocks. The informal system exists because of inadequacies in fisheries policies and regulations, lack of transparency in resource management institutions, lack of monitoring and accountability, and problems with capacity and political will in law enforcement agencies (Ly *et al.* 2000).

In the face of growing criticism of the mismanagement of the fishing lot system and growing inequities, the Cambodian government recently drew back from further developing the fishing lot approach to protection of fish stocks and habitat. The government cancelled 53% of the lots in the Great Lake to make them available for community fisheries, theoretically under a system of community management. Unfortunately, neither the Fisheries Department nor the local communities had the capacity to take on these new responsibilities, leaving a management vacuum in many areas.

Future directions

The wild freshwater fish stocks and their habitats in the Lower Mekong should be the focus of a systematic and coordinated strategy of rehabilitation and protection if productivity in the sector is to be maintained. A network of multiple-use and fisheries-specific protected areas in upper catchment, floodplain and mainstream environments needs to be a central part of the fisheries sector development strategy. Already, the sector has done more than any other to promote the use of protected areas in helping safeguard its resource base. Now it needs to extend this protection regime as part of an ecosystem approach to the management of fish stocks.

A regional strategy for fisheries protection

A regional strategy is needed for protecting fish resources and productivity in the Lower Mekong Basin. Such a strategy should recognise that the future of fisheries is closely tied to sustainable water resource and habitat (including forest) management within the context of a network of existing and

new protected areas. It should also recognise that the sector is at serious risk unless hydropower, irrigation and flood control infrastructure is planned, built and operated so as to minimise or avoid damage to fisheries. There are three key concerns: (i) the maintenance of hydrological functions; (ii) the control of destructive activities, in particular destruction of vegetation; and (iii) the protection and renewal of critical fish habitat. PAs have the potential to be vehicles for bringing a collaborative cross-sectoral management approach to specified geographic areas and resources.

Extension of the fisheries sector PA system to take in critical fisheries habitats would be an important part of the effective management of wild fish stocks. In certain key sites, multiple-use PAs can involve users and government in collaborative protection regimes. Emphasis should be given to the floodplains, and in-channel habitats such as deep pools and rapids. However it must be recognised that not all of the floodplain habitat can be incorporated into protected areas, and an equally significant requirement is the adoption of cross-sectoral approaches to floodplain management that allow fisheries values to be taken into account in decision-making.

The strategy should be prepared under the umbrella of the MRC with analysis of its implications for the Greater Mekong Basin, but with the primary purpose of helping to shape the Basin Development Plan due for completion by 2005. The strategy should include:

- guidelines on the kinds of fisheries environment which need to be subject to conservation management;
- a listing and mapping of existing fish sanctuaries and of other protected areas contributing to the fisheries sector;
- criteria for the selection of sites having high priority for protection because of their contribution to the sector;
- identification of an initial list of additional sites having regional fisheries significance but which are not yet adequately protected;
- definition of the different categories of protected areas to be applied in the fisheries sector and basic management guidelines for each category;
- guidelines for the identification, establishment and management of protection zones within fishing concession areas and lots;
- details of a system of protection financing based on the beneficiary pays principle (bearing in mind that the beneficiaries of fisheries conservation are a much wider group than just the fishers);
- guidelines for the protection of fisheries values in significant habitats (particularly floodplains) that are outside protected areas; and
- adoption of a more cross-sectoral approach to planning and implementation of development activities.

Survey of critical fisheries habitat and values

As a first step a survey should be undertaken to:

- identify habitats and values which make important contributions to fisheries productivity;
- from this list, identify those areas that are not under protection regimes but should be so;
- set priorities for action in terms of the protection, rehabilitation and more effective management of critical areas; and
- make recommendations for adjustments to the existing protected areas, including changes to management strategies to incorporate fisheries goals and, where appropriate, extension of the existing areas to cover critical areas currently unprotected.

Valuation of protected areas' contribution to fisheries

The contributions of protected areas to fisheries are currently better understood in ecological terms than in terms of their development or economic values. This needs to change if additional fisheries-related protected areas are to be established and fisheries agencies are to justify and receive a share

of national budgets which is consistent with their contribution to food security and the national economy.

One way of beginning to achieve this changed awareness would be to demonstrate the economic value of services and products provided to the fisheries sector by natural systems within existing protected areas. These should include examples of both biodiversity focused protected areas and those established for fisheries purposes.

A network of protected sites within the basin should be subject to rapid assessment as the basis for estimating fisheries-related economic contributions of individual protected areas, or of wider landscapes or catchments in which a number of protected areas are located. Cases of upland, floodplain and mainstream protected areas need to be included in the study.

Such a valuation would be a useful first step toward redistributing sector budgets, and would contribute to determining appropriate systems of economic instruments within the sector to ensure that concessions, fees and other charges begin to reflect the cost of maintaining protection functions of natural habitats.

Bibliography

- Baird, I.G., Kisouvannalath, P., Inthaphaysi, V. and Phylaiavanh, B. 1998. The Potential for Ecological Classification as a Tool for Establishing and Monitoring Fish Conservation Zones in the Mekong River. *Technical Report No. 2*. Environmental Protection and Community Development in the Siphandone Wetland, Champasak Province, Lao PDR.
- Chea, V. and Sean, K. 2000. Fisheries preservation in the Mekong River pools in Stung Treng and Kratie Provinces. In: N.P. van Zalinge, T. Nao and S. Lieng (eds) *Management Aspects of Cambodia's Freshwater Capture Fisheries*. Eleven presentations given at the Annual Meeting of the Department of Fisheries of the Ministry of Agriculture, Forestry and Fisheries, 27–28 January 2000. Mekong River Commission and Department of Fisheries, Phnom Penh. pp105–109.
- Coates, D. 2001. Biodiversity and Fisheries Management Opportunities in the Mekong River Basin. Blue Millennium Conference Paper. Assessment of Mekong Fisheries Component of the MRC Fisheries Program. Technical Paper. Mekong River Commission, Phnom Penh.
- FAO. 1999. Fishery Country Profile: Lao PDR. FAO, Bangkok. Downloaded from: http://www.fao.org/fi/fcp/FICP_LAO_E.asp on 18/05/02.
- Hill, M.T. and Hill, S.A. 1994. Fisheries Ecology and Hydropower in the Mekong River: An Evaluation of Run-of-the-River Projects. Mekong Secretariat, Bangkok.
- Hubbel, D. 1999. Food for the people: natural fisheries of the Mekong River. *Watershed*. 4(3):22–39.
- ICEM, 2003. The Economic Benefits of Protected Areas: Field Studies in Cambodia, Lao PDR, Thailand and Vietnam. Review of Protected Areas and Development in the Lower Mekong River region. Indooroopilly, Australia.
- Ly, V., Yin, D. and Degen, P. 2000. The management of the freshwater capture fisheries in Cambodia: Legal principles and field implementation. In: N.P. van Zalinge, T. Nao and S. Lieng (eds) *Management Aspects of Cambodia's Freshwater Capture Fisheries: Eleven presentations given at the Annual Meeting of the Department of Fisheries of the Ministry of Agriculture, Forestry and Fisheries, 27–28 January 2000*. Mekong River Commission and Department of Fisheries, Phnom Penh.
- Meusch, E.N. 1996. Participatory Assessment of Ricefield Fisheries Inatsaphangtong District, Savannakhet Province, Lao PDR. MSc thesis, Auburn University, Alabama.
- MRC. 2001. MRC Hydropower Development Strategy. Phnom Penh: Mekong River Commission, Water Resources and Hydrology Program.
- Schouten, R. (in press). Ecological Requirements for a Healthy Fishery in the Lower Mekong Basin. MRC Technical Paper. Mekong River Commission, Phnom Penh.
- Sjorsley, J. (ed.) 2000. A Fisheries Survey of Luang Prabang Province, Lao PDR. AMFC Technical Report. Mekong River Commission, Phnom Penh.
- Smith, L.E.D., Nguyen-Khoa, S., Garaway, G. and Lorenz, K. (2000). Impact of Technical Change on Rural Livelihoods in a Semi-subsistence Economy: Irrigation Developments and Aquatic Resource Use in Laos. Imperial College, Cambridge. Downloaded from: <http://www.wye.ac.uk/AgEcon/ADU/eaaeannc/smith.pdf> on 12/6/02.
- Sverdrup-Jensen, S. 2002. Fisheries in the Lower Mekong Basin: Status and Perspectives. MRC Technical Paper No.6. Mekong River Commission, Phnom Penh.
- van Zalinge, N. 2000. Status of the Cambodian Inland Capture Fisheries Sector. Downloaded from www.mekonginfo.org on 3 June 2002.

Gordon Claridge is a natural resource management consultant with a particular interest in multiple-use management of protected areas and participatory resource management and community development processes. He began working in the Lower Mekong Basin area in 1993. Email: claridge@xs4all.nl

Résumés

Les aires protégées comme moteurs de réformes administratives et économiques dans la région du bas Mékong

JEREMY CAREW-REID

D'ici 2005, on compte que les aires protégées (AP) couvriront plus de 20% du bas Mékong, y compris la plupart de ses forêts restantes et de ses bassins-versants. L'entretien de ce vaste domaine naturel est une stratégie de développement cruciale pour les pays du Mékong, le Cambodge, le Laos, la Thaïlande et le Vietnam. Pourtant, les AP ne sont pas considérés comme étant des éléments productifs des économies nationales et leur contribution au développement se dégrade peu à peu à cause du peu d'investissements et de l'expansion des autres secteurs. Si l'on veut conserver ce capital naturel essentiel, les administrateurs des AP doivent adopter le langage du développement et promouvoir les AP comme moteurs de réforme administrative et économique, toutes deux préoccupations prioritaires dans la région. Cet article passe en revue le statut des APs dans les quatre pays du Mékong, leurs liens avec la population et le développement, et introduit des mesures clés pour les faire reconnaître comme atout majeur dans la gestion économique dominante.

Réduction de la pauvreté dans les aires protégées

JASON MORRIS ET KOL VATHANA

La plupart des APs du bas Mékong se trouvent dans des régions défavorisées. Étant donné que les communautés défavorisées dépendent fréquemment des AP concernant toute une série de biens et de services, leurs perspectives futures sont étroitement liées à la politique et à la pratique appliquées aux AP. Les AP sont considérés comme sources de conflits et de dépenses par les communautés défavorisées. Cet article envisage de quelle manière la conservation des AP peut être rendue plus pertinente pour les programmes de réduction de pauvreté en reconnaissant et en développant mieux les aides qui reviennent aux pauvres dans les AP. En particulier, le transfert des paiements constitue une approche encourageante pour la distribution plus équitable des coûts et des bénéfices engagés par les AP, ainsi que pour générer un revenu pour les régions éloignées.

Gestion du tourisme dans les aires protégées : le Laos, le Vietnam, le Cambodge et la Thaïlande

GUY MARRIS, ALISON ALLCOCK ET KHAMLAY SIPASEUTH

Le développement du tourisme dans les AP du bas Mékong est souvent défavorisé et géré de façon inadéquate, ce qui résulte dans une perte d'opportunités économiques pour les communautés locales et les AP, et dans l'endommagement des impacts sociaux et environnementaux. C'est une tendance que l'on peut inverser en développant des capacités d'accueil et en développant des plans de gestion très tôt, afin de profiter des opportunités extraordinaires que le tourisme des AP offre au développement socio-économique de la région.

Cet article est un bref plaidoyer pour une gestion attentive de l'activité touristique dans les AP. Il est la synthèse d'un rapport sur les questions posées par le développement du tourisme et d'études de cas effectuées dans la région dans le cadre du bilan sur le développement des AP (PAD Review en Anglais). Cinq valeurs centrales ont été identifiées : (i) développer la capacité d'accueil pour les administrateurs des AP et autres investisseurs ; (ii) demander que les plans d'aménagement du territoire soient faits précocement ; (iii) financer les initiatives de tourisme et de gestion des AP ; (iv) gérer les impacts ; et (v) développer les partenariats entre les ONG et le secteur privé. Nous donnons des exemples de moyens par lesquels le développement du tourisme stratégique peut profiter directement à la gestion des AP. Nous donnons aussi des exemples d'objectifs de conservation de la biodiversité provenant de la région.

Aires protégées et sylviculture : accomplir la conservation des forêts dans la région du bas Mékong

DAVID LAMB ET DON GILMOUR

Les AP sont les premiers moyens de protection de la biodiversité dans la plupart des pays du monde. Mais la plantation d'autres forêts en dehors de ces AP joue un rôle complémentaire important. Bien que ces forêts n'offrent pas le même degré de protection, elles peuvent élargir les zones habitables disponibles à condition d'être bien gérées. Elles y parviennent en établissant des zones tampons entre les forêts des AP et en établissant des liens entre ces AP, autorisant ainsi le mouvement continu de la faune et de la flore à travers le paysage. Elle peuvent aussi générer des opportunités économiques pour les habitants locaux et par conséquent diminuer la pression qui pèse sur le système des AP.

Les quatre pays du bassin du bas Mékong (la Thaïlande, le Laos, le Cambodge et le Vietnam) sont largement pourvus en forêts. S'ils sont sensiblement différents en termes de démographie, d'économie et de politique, ils n'en partagent pas moins un vaste héritage biogéographique. Cet article décrit l'état de la protection et de la gestion des forêts dans ces quatre pays et examine les moyens par lesquels les deux pourraient être améliorés afin d'accroître la protection de leur diversité biologique et améliorer le bien-être des habitants des zones rurales de ces régions.

Énergie et aires protégées dans la région du bas Mékong

BRUCE AYLWARD ET SYLVIA TOGNETTI

Un nombre croissant d'équipements en énergie hydroélectrique déjà existants, en construction, ou en prévision se situent à l'intérieur ou en aval des AP. Ces équipements sont affectés par l'utilisation des terres en amont et par la gestion des territoires, et cela a un impact sur le débit de l'eau et les taux de sédimentation qui n'est pas sans conséquences pour le fonctionnement et la durée de vie des barrages. Dans certains cas, les réservoirs hydroélectriques ou les barrages sont situés à l'intérieur des AP, ce qui a des conséquences importantes pour les milieux et les espèces terrestres et aquatiques de ces AP. De plus, certains équipements hydroélectriques ont un impact important sur les AP qui se situent en aval, particulièrement en termes de perturbation du fonctionnement hydraulique normal des lacs ou des zones maritimes, ou si l'on considère la vitalité des populations locales. Historiquement, les équipements en énergie hydroélectrique n'ont apporté que peu ou pas d'avantages aux zones locales et à leurs populations, dont la plupart reste rurale et en dehors du réseau électrique. Cet article présente la nature des relations entre énergie hydroélectrique et AP. Il identifie les problèmes qui se poseront sans doute, et continueront de se poser si l'on ne parvient pas à un accord sur les stratégies à adopter. A partir des découvertes récentes, et surtout du travail de la Commission Mondiale des Barrages (WCD en anglais), nous suggérerons quelques méthodes que l'on pourrait employer afin d'arriver à une intégration plus efficace des AP et du développement des énergies hydroélectriques dans un contexte de développement plus large.

Les aires protégées et la gestion des ressources en eau dans la région du bas Mékong

NICHOLAS CONNER

Les AP du bas Mékong sauvegardent les fonctions hydrauliques et biophysiques fournies par les milieux naturels qui déterminent le volume de l'eau, la qualité et la régularité du débit. Toutefois, ces fonctions, ainsi que la capacité des AP à les sauvegarder sont très vulnérables aux pressions que le développement leur fait subir. Une mauvaise planification, une protection inadéquate, et une mauvaise gestion des ressources dans les AP peut compromettre la capacité des milieux naturels à accomplir ces fonctions. Ceci mènera à une perte des avantages économiques que les économies locales et nationales tirent des services hydrauliques et biophysiques rendus par ces milieux.

Si l'on veut éviter cette situation, les administrateurs des ressources en eau, et les gestionnaires financiers devront mieux comprendre la contribution que les AP peuvent rendre au développement des ressources en eau et devront intégrer l'établissement et la gestion des AP dans une approche intégrée de la gestion des ressources en eau et du développement national. De même, les administrateurs des AP doivent s'engager avec ceux des ressources en eau afin de promouvoir les bienfaits des AP pour les programmes de gestion des ressources en eau. D'autres questions qui doivent être posées sur l'incorporation des AP à la gestion des ressources en eau sont aussi envisagées dans cet article.

La pêche en eau douce et les aires protégées dans la région du bas Mékong

GORDON CLARIDGE

Les établissements piscicoles et les zones de pêche en eau douce contribuent largement à l'économie des pays du bassin du bas Mékong. Ils sont également un élément crucial dans la sécurité alimentaire et le soulagement de la pauvreté pour une proportion importante de la population. L'entretien des valeurs environnementales clés, telles que les fonctions hydrauliques et le maintien de certains milieux aquatiques importants, est essentiel pour la continuation de la productivité de la pêche, mais jusqu'à présent, il n'a reçu que peu de soutien réel. Les AP (à la fois ceux établis originellement pour la conservation de la biodiversité et ceux des zones de pêche spécifiques) sont un élément essentiel de toute stratégie de gestion de la pêche à long terme, mais malheureusement, leur pertinence dans le maintien des établissements piscicoles de la région n'est pas généralement reconnu. Les régions étant sous le régime de la conservation doivent être à la fois étendues et mieux gérées, afin d'accomplir leur potentiel de soutien de la productivité de la pêche. Un premier pas vers la réalisation de la différence que la contribution des AP pourrait faire devrait être une étude de cas, dans le but d'identifier et de quantifier la valeur économique de certains AP pour le secteur de la pêche.

Resúmenes

Áreas protegidas como máquinas para el buen gobierno y la reforma económica de la región del bajo Mekong

JEREMY CAREW-REID

Para 2005, se espera que las áreas protegidas (APs) cubrirán más del 20 % de la región del bajo Mekong incluyendo la mayoría de los bosques que aún quedan y la línea divisoria superior de las aguas. El mantenimiento de este estado natural tan extenso es una estrategia esencial de desarrollo para los países del Mekong: Camboya, Laos, Tailandia y Vietnam. Las APs todavía no se entienden como componentes productivos de las economías nacionales y sus contribuciones al desarrollo están disminuyendo a través de una baja inversión y la expansión de otros sectores. Si este crítico capital natural ha de conservarse, los administradores de las APs necesitan adoptar el lenguaje de desarrollo y promover las APs como máquinas para el buen gobierno y para la reforma económica, ambos asuntos de prioridad dentro de la región. Este artículo revisa el estado de las APs en los cuatro países del Mekong, sus vínculos con la población y el desarrollo, e introduce pasos claves necesarios para que sean reconocidas como valores críticos a integrar en la planificación económica.

La reducción de la pobreza y las áreas protegidas

JASON MORRIS Y KOL VATHANA

La mayoría de las APs en la región del bajo Mekong están situadas en regiones pobres. Dado que las comunidades pobres dependen frecuentemente de las APs para una extensa variedad de bienes y servicios, sus posibilidades futuras están enlazadas con la política y práctica de las APs. Estas áreas han sido vistas por las comunidades pobres como fuente de conflicto y de costos oportunistas. Este artículo expresa como la conservación de las APs puede hacerse más relevante para los asuntos de reducción de la pobreza por medio del reconocimiento y el desarrollo de los beneficios que las APs pueden acumular para los pobres. En particular la transferencia de pagos es una avenida prometedora para una distribución más equitativa de los costos y beneficios de la conservación de las áreas protegidas y la generación de ingresos para las zonas remotas.

Administrando el turismo en las áreas protegidas: Laos, Vietnam, Camboya y Tailandia

GUY MARRIS, ALISON ALLCOCK Y KHAMLAY SIPASEUTH

El desarrollo del turismo en las APs de la región del bajo Mekong está frecuentemente administrado de manera inadecuada y con pocos recursos, resultando en una pérdida de oportunidades económicas para las comunidades locales y el área protegida, en un daño social e impactos medioambientales. Este es un modelo que puede ser invertido por medio del aumento de la capacidad y el desarrollo de planes de administración en una etapa temprana y así tomar ventaja de las significantes oportunidades que presenta el turismo en las APs para el desarrollo socio-económico de la región.

Este artículo presenta un breve racional para la administración cuidadosa de las actividades turísticas en las APs, como síntesis de una evaluación de los asuntos del desarrollo del turismo y de los casos estudiados en la región y llevados a cabo como parte de la Revisión del Desarrollo de las Áreas Protegidas (PAD Review). Se identificaron cinco cuestiones claves: (i) aumentar la capacidad de los administradores de las APs y de otros participantes; (ii) la necesidad de un temprano planeamiento y zonificación; (iii) proveer fondos para las iniciativas del turismo de APs su administración; (iv) administración de los impactos; y (v) desarrollo de asociaciones con ONGs y el sector privado. Se dan ejemplos regionales del modo en que el desarrollo estratégico del turismo puede contribuir directamente al manejo del área protegida y a los objetivos de la conservación de la biodiversidad.

Las áreas protegidas y la ingeniería forestal: logrando la conservación de la selva en la región del bajo Mekong

DAVID LAMB Y DON GILMOUR

Las APs son los medios primordiales por medio de los cuales se protege la biodiversidad en la mayoría de los países del mundo. Pero los bosques de producción por fuera de estas APs tiene un papel complementario importante. Aunque no ofrecen el mismo grado de protección, pueden agrandar las áreas de hábitats disponibles, siempre y cuando estén bien administradas. Hacen ésto porque proveen zonas amortiguadoras alrededor de las APs y vínculos entre estas APs, permitiendo el continuo movimiento de la vida silvestre y las plantas a través del paisaje. Pueden también ayudar a generar oportunidades económicas para la población local y así reducir la presión en el sistema de APs.

Los cuatro países de la cuenca del bajo Mekong, (Tailandia, Laos, Camboya y Vietnam) han sido dotados abundantemente con bosques. Difieren notablemente en las circunstancias demográficas, económicas y políticas, pero comparten una amplia herencia biogeográfica. Este informe describe el estado de la protección de los bosques y la administración de los cuatro países y explora las formas en que ambos pueden mejorar y realzar la protección de su diversidad biológica y mejorar el bienestar de la gente que vive en las zonas rurales de la región.

Energía y áreas protegidas en la región del Mekong

BRUCE AYLWARD Y SYLVIA TOGNETTI

Un número creciente de instalaciones para la energía hidroeléctrica ya sean existentes, en construcción o planeadas en la región del Mekong, están dentro o río abajo de las APs. Estas instalaciones se ven afectadas por el uso de la tierra río arriba y por prácticas de administración que tienen impacto en el flujo del agua y en los niveles de sedimentación y tienen implicaciones para el funcionamiento y la vida útil de los diques. En algunos casos, los embalses o diques para la energía hidroeléctrica, están situados dentro de las APs y como resultado hacen mucha mella en el hábitat acuático y terrestre y las especies dentro de las APs. Algunas instalaciones de energía eléctrica producen también impactos considerables en las APs río abajo, particularmente en términos de interrupción de la función hidrológica normal de lagos o áreas marinas y el modo de vida de las poblaciones locales. Históricamente, las instalaciones de energía hidroeléctrica suministraron pocos o ningún beneficio para las áreas locales o poblaciones, muchas de las cuales siguen siendo rurales y fuera de la red. Este artículo trata acerca de la naturaleza de la relación entre la energía hidroeléctrica y el área protegida, identifica los tipos de problemas que pueden ocurrir y continuarán ocurriendo si no se llega a un acuerdo en cuanto a las estrategias. Haciendo uso de recientes avances en este campo, particularmente en el trabajo de la Comisión Mundial de Diques, se proponen métodos que pueden ser empleados para llegar a una integración más efectiva de las APs y el desarrollo de la energía hidroeléctrica en un campo más amplio.

Áreas protegidas y la administración de recursos acuáticos en la región del bajo Mekong

NICHOLAS CONNER

Las APs en la región del bajo Mekong protegen las funciones hidrológicas y biofísicas proporcionadas por los entornos naturales que determinan el volumen del agua y la calidad y regularidad del flujo. Sin embargo, estas funciones, y la habilidad de las APs de protegerlas, son altamente vulnerables a las presiones del desarrollo. Un planeamiento pobre, una protección inadecuada y un manejo insuficiente de la provisión de recursos, pueden comprometer la habilidad del entorno natural de desempeñar estas funciones. Esto llevará a una pérdida de los beneficios económicos que las economías locales y nacionales derivan de los servicios biofísicos e hidrológicos suministrados por estos entornos.

Para evitar esta situación, los administradores de los recursos acuáticos y los planeadores económicos necesitarán comprender mejor la contribución que las APs pueden hacer al desarrollo de los recursos hidráulicos e incorporar la administración y los establecimientos de las APs dentro de una aproximación integrada hacia el manejo de recursos acuáticos y el desarrollo económico nacional. Igualmente, los administradores de las APs necesitan vincularse con los administradores del agua para promover los beneficios de las APs en los programas de manejo de los recursos hidráulicos. En este artículo también se discuten algunas de las cuestiones que deberían ser consideradas cuando se incorporen las APs en la administración de los recursos hidráulicos.

La pesca de agua dulce y las áreas protegidas en la región del bajo Mekong

GORDON CLARIDGE

La pesca de captura en aguas dulces contribuye considerablemente a las economías de los países de la cuenca del bajo Mekong y es también un elemento crucial en la seguridad alimentaria y en el alivio de la pobreza para una proporción significativa de la población. El mantenimiento de los valores claves del medio ambiente, tales como las funciones hidrológicas y los hábitats acuáticos importantes, es esencial para la continuidad de la productividad pesquera, pero hasta ahora ha recibido muy poco apoyo real. Las APs (tanto aquellas establecidas primordialmente para la conservación de la diversidad como las áreas específicas de pesca) son un componente esencial de una estrategia de manejo de la pesca a largo plazo, pero desgraciadamente su importancia total para el mantenimiento de la pesca de la región no es generalmente reconocida. Las áreas bajo una administración de conservación necesitan ser extendidas y mejor administradas, a fin de lograr su potencial total en el sostenimiento de la productividad pesquera. El primer paso para crear una conciencia de la contribución de las APs debería ser la ejecución de una serie de estudios para identificar y cuantificar el valor económico de APs específicas para el sector pesquero.

The International Forestry Review

is a peer-reviewed scientific journal that publishes papers, research notes and book reviews on all aspects of forestry and forest research.

It is published four times per year. Theme editions, such as the Special Issue on Illegal Logging, are a regular feature and attract a wide audience.

The International Forestry Review is available online. The full text of all papers is available free to members. Non-members can view abstracts free and the full text on a pay-per-view basis.



Subscription rates: Individual Members £50; Institutions £150.

For more information visit our website at www.cfa-international.org/IFR.html



Wetlands International is an independent non-profit organisation dedicated to the promotion of wise use and conservation of wetlands

We have offices all over the world, including in Asia: Indonesia, Malaysia, Thailand, Japan, China and India.

The livelihood of many of Asia's poor communities depends on wetlands because of their value as hydrological buffers, transport corridors, tourism areas, and in providing e.g. food, water and construction materials. Wetlands are also important in transboundary water management, mitigating climate change (especially peatlands), and for global biodiversity conservation. However, pressures on wetlands are severe.

Rural poverty in developing countries is increasingly a factor in over-exploitation and degradation of natural resources and biodiversity. Successful conservation initiatives therefore should contribute to alternative development. It should be noted that wetlands do not necessarily provide the way out of poverty, but that poverty will increase if wetlands are degraded.

Wetlands International recognises the crucial link between sustainable wetland management and development. Local communities in developing countries, especially also women, are part of the solution. Our Wise Use and Capacity Building programmes represent Wetlands International's means for addressing wetlands-poverty issues in developing countries.

For more information on our programmes, please visit our website www.wetlands.org or contact one of our offices in your region.

Wetlands International, PO Box 471, 6700 AL Wageningen, The Netherlands. Tel: +31 317 478854 Fax: +31 317 478850 Email: post@wetlands.org www.wetlands.org



IUCN – The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership: over 950 members in all, spread across some 139 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

IUCN, Rue Mauverney 28, CH-1196 Gland, Switzerland

Tel: ++ 41 22 999 0001, fax: ++ 41 22 999 0002,

internet email address: <mail@hq.iucn.org>

World Commission on Protected Areas (WCPA)

WCPA is the largest worldwide network of protected area managers and specialists. It comprises over 1,300 members in 140 countries. WCPA is one of the six voluntary Commissions of IUCN – The World Conservation Union and is serviced by the Protected Areas Programme at the IUCN Headquarters in Gland, Switzerland. WCPA can be contacted at the IUCN address above.

The WCPA mission is to promote the establishment and effective management of a worldwide network of terrestrial and marine protected areas.

IUCN – Union mondiale pour la nature

Fondée en 1948, l'Union mondiale pour la nature rassemble des Etats, des organismes publics et un large éventail d'organisations non gouvernementales au sein d'une alliance mondiale unique: plus de 950 membres dans 139 pays.

L'IUCN, en tant qu'Union, a pour mission d'influer sur les sociétés du monde entier, de les encourager et de les aider pour qu'elles conservent l'intégrité et la diversité de la nature et veillent à ce que toute utilisation des ressources naturelles soit équitable et écologiquement durable.

Afin de sauvegarder les ressources naturelles aux plans local, régional et mondial, l'Union mondiale pour la nature s'appuie sur ses membres, réseaux et partenaires, en renforçant leurs capacités et en soutenant les alliances mondiales.

IUCN – Unión Mundial para la Naturaleza

La Unión Mundial para la Naturaleza, fundada en 1948 agrupa a Estados soberanos, agencias gubernamentales y una diversa gama de organizaciones no gubernamentales, en una alianza única: más de 950 miembros diseminados en 139 países.

Como Unión, la IUCN busca influenciar, alentar y ayudar a los pueblos de todo el mundo a conservar la integridad y la diversidad de la naturaleza, y a asegurar que todo uso de los recursos naturales sea equitativo y ecológicamente sustentable.

La Unión Mundial para la Naturaleza fortalece el trabajo de sus miembros, redes y asociados, con el propósito de realizar sus capacidades y apoyar el establecimiento de alianzas globales para salvaguardar los recursos naturales a nivel local, regional y global.

- **Each issue of *Parks* addresses a particular theme, in 2004 these are:**
 Vol 14 No 1: Durban World Parks Congress
 Vol 14 No 2: Global change and protected areas
 Vol 14 No 3: War and protected areas
- ***Parks* is the leading global forum for information on issues relating to protected area establishment and management**
- ***Parks* puts protected areas at the forefront of contemporary environmental issues, such as biodiversity conservation and ecologically sustainable development**



Subscribing to *Parks*

Parks (ISSN: 0960-233X) is published three times a year and is produced and managed on behalf of WCPA by the NatureBureau. Subscriptions are £28.60 in UK, £31.15 in Europe, £35.65 in rest of world; reduced rates for 10 or more copies delivered to a single address. To subscribe online go to www.naturebureau.co.uk/parks/

Some back issues are still available, at £8.85 (UK), £9.40 (Europe) or £10.95 (rest of world) each (postage included). For PDF format go to www.naturebureau.co.uk/parks.htm and click on 'online subscription form'. Please contact parks@naturebureau.co.uk for a list of back issues.

Published by the World Commission on Protected Areas (WCPA) of IUCN – The World Conservation Union. *Parks* aims to strengthen international collaboration among protected area professionals and to enhance their role, status and activities.

To advertise in *Parks*

Camera-ready copy/electronic files:
 full page (210 × 135 mm) £240;
 half page (105 × 135 mm) £138;
 quarter page (52 × 135 mm) £80.

Black and white reproduction of photos £10 extra each. VAT extra, where applicable.

For further details please email:
parks@naturebureau.co.uk

Order form/Invoice proforma

Return to: *Parks*, 36 Kingfisher Court, Hambridge Road, Newbury, RG14 5SJ, UK. Each subscription lasts for a year (three issues), and includes postage and packing. There is a reduced rate for multiple subscriptions.

Please enter _____ subscription/s to *Parks* for _____ (year/s)

1-9 subscriptions:

- UK:** £28.60 each
- Europe:** £31.15 each
- Rest of world:** £35.65 each

10+ subscriptions to a single address:

- UK:** £18.30 each
- Europe:** £22.00 each
- Rest of world:** £26.30 each

I enclose a cheque/money order in £ sterling made payable to The Nature Conservation Bureau Ltd.

I wish to pay by Visa/Mastercard, please charge to my account no.

□ □ □ □	□ □ □ □	□ □ □ □	□ □ □ □
---------	---------	---------	---------

Expiry date _____

Name on card _____

Signature _____

Delivery address: (please print clearly)

Name _____

Organisation _____

Address _____

Post/Zip Code _____ Country _____

Protected Areas



© 2003 IUCN, Gland, Switzerland
ISSN: 0960-233X

Editors: JEREMY CAREW-REID AND KISHORE RAO

CONTENTS

Editorial	
JEREMY CAREW-REID AND KISHORE RAO	1
Protected areas and development in the Lower Mekong region	
JEREMY CAREW-REID	5
Poverty reduction and protected areas in the Lower Mekong region	
JASON MORRIS AND KOL VATHANA	15
Managing tourism in the protected areas of the Lower Mekong region	
GUY MARRIS, ALISON ALLCOCK AND KHAMLAY SIPASEUTH	23
Protected areas and forestry: achieving forest conservation in the Lower Mekong region	
DAVID LAMB AND DON GILMOUR	36
Energy and protected areas in the Mekong region	
BRUCE ALYWARD AND SYLVIA TOGNETTI	46
Protected areas and water resource management in the Lower Mekong region	
NICHOLAS CONNOR	54
Freshwater fisheries and protected areas in the Lower Mekong region	
GORDON CLARIDGE	62
Résumés/Resumenes	71
Subscription/advertising details	inside back cover