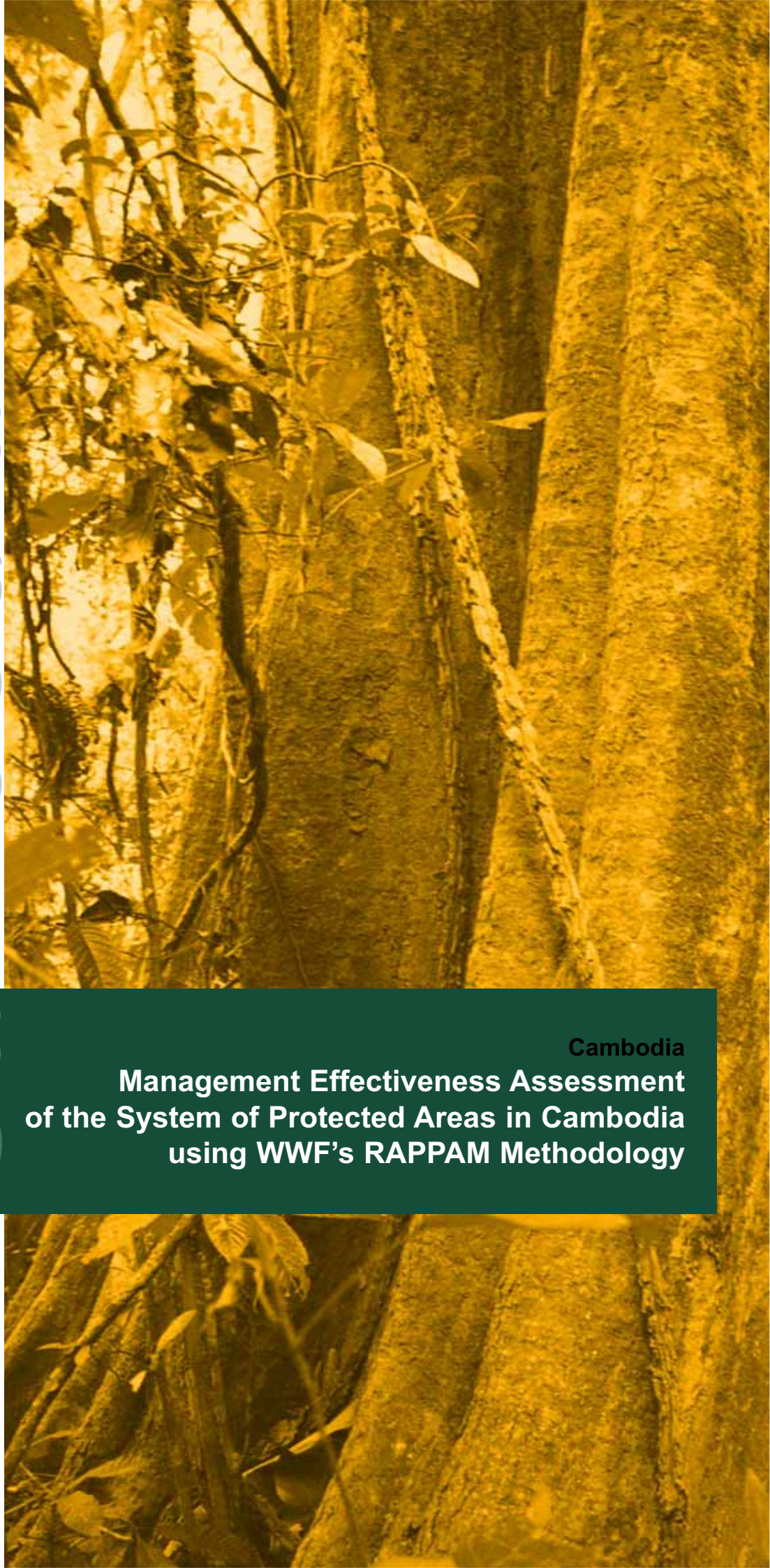
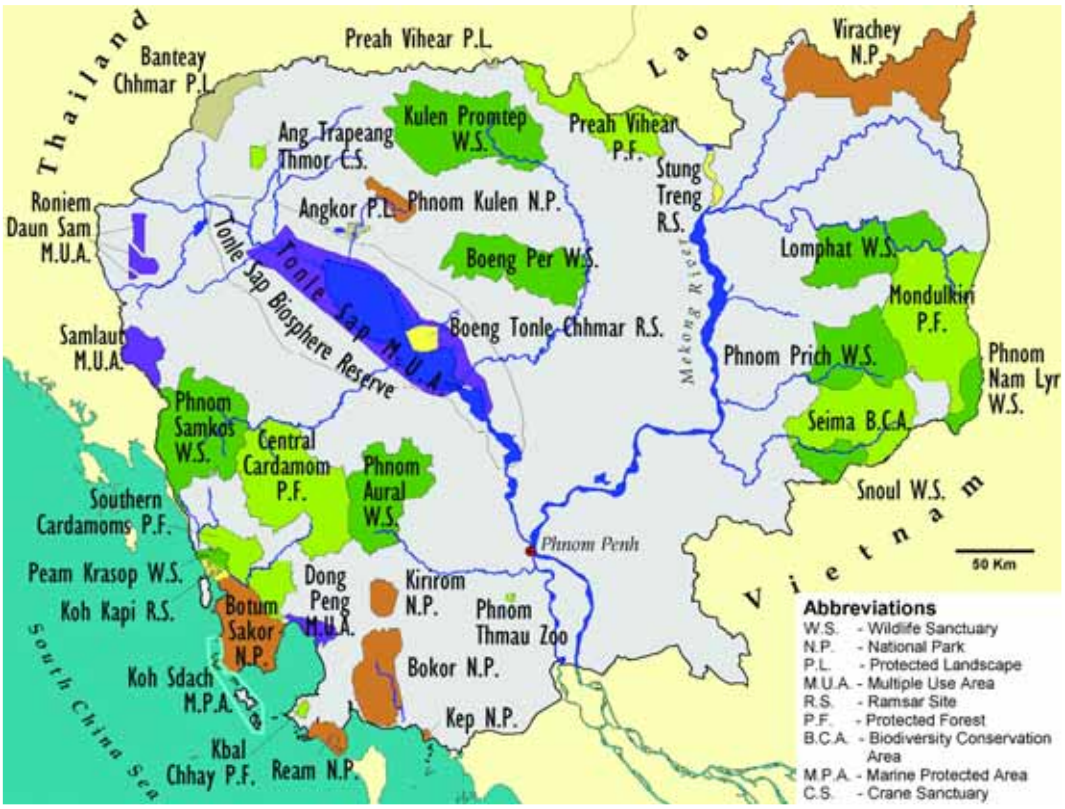


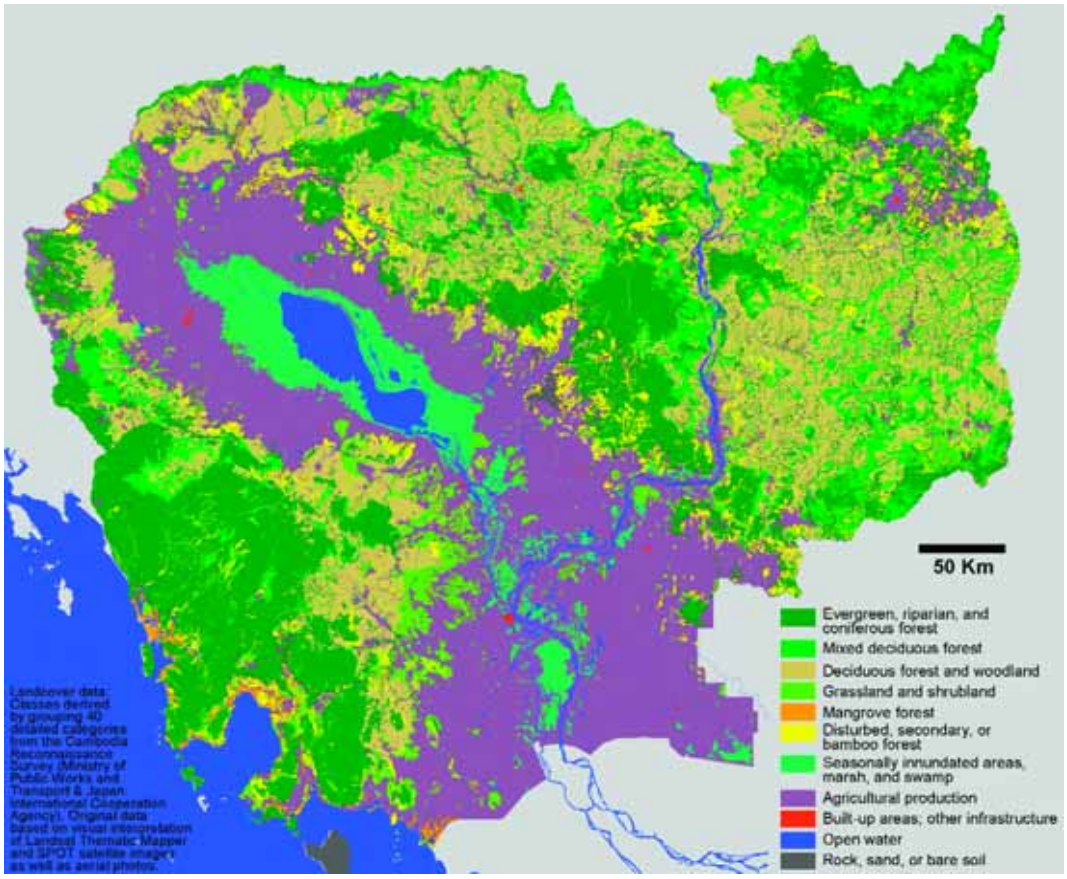
Cambodia

Cambodia

Management Effectiveness Assessment of the System of Protected Areas in Cambodia using WWF's RAPPAM Methodology



Map 1. Protected Areas of Cambodia.



Map 2. Landcover of Cambodia.

Lacerda, L., Schmitt, K., Cutter P. and Meas, S. 2004. Management Effectiveness Assessment of the System of Protected Areas in Cambodia using WWF's RAPPAM Methodology. Ministry of Environment, Biodiversity and Protected Areas Management Project, Phnom Penh, Cambodia.

Front Cover Photograph: Virachey National Park *J. Kitchens © BPAMP 2005*

Biodiversity
and Protected Areas
Management Project
(BPAMP)

CAMBODIA

Management Effectiveness Assessment of the System of Protected Areas in Cambodia using WWF's RAPPAM Methodology

L. Lacerda, K. Schmitt,
P. Cutter and S. Meas

Contents

Introduction and Background

Cambodia: home to the majestic and elusive banteng (Bos javanicus), a wild "cousin" of the Asian river buffalo - man's indispensable companion while toiling in rice paddies to build some of the world's most fascinating civilisations. Cambodia: seat of the mysterious Khmer temple of Angkor, one of mankind's greatest architectural accomplishments. The identification of Cambodia with these two icons (one natural, the other cultural) is a testimony to the importance of the protected area system of Cambodia as a guardian of the country's very soul. The highly endangered banteng is now only found in a handful of areas in Cambodia - most of them part of the protected area system. The Angkor temple complex is the oldest protected area in Asia and is now a Protected Landscape as well as a UNESCO World Heritage Site.

Situated at the heart of Indochina, Cambodia covers an area of 181,038 square kilometres. Within its borders is the majority of the Lower Mekong Dry Forests Ecoregion – identified by WWF as one of the "Global 200 Ecoregions" - the most biologically outstanding terrestrial and aquatic habitats in the world. The Cardamom Mountains ecoregion in the southwest of the country represents one of the largest continuous and relatively intact rainforests in mainland South East Asia (Shields *et al.* 2004) and is protected by one of the most extensive protected area complexes in the region, made up of the Phnom Samkos and Phnom Aural wildlife sanctuaries and the Central Cardamom Mountains Protected Forest. The Annamite Range Moist Forests and Mekong River Ecoregions also have significant representation in Cambodia.

Several important flagship species such as the Asian elephant, tiger, banteng, and wild water buffalo occur in significant numbers in Cambodia, as do more species of globally threatened mammals, birds, and fish per unit area than in any other SE Asian country (Tordoff *et al.* 2005). Although Cambodia's forests and coastal areas are some of the least disturbed in the region, nearly half of the 70 species of terrestrial mammals recorded for Cambodia have been listed by IUCN as globally threatened, near-threatened or data deficient.

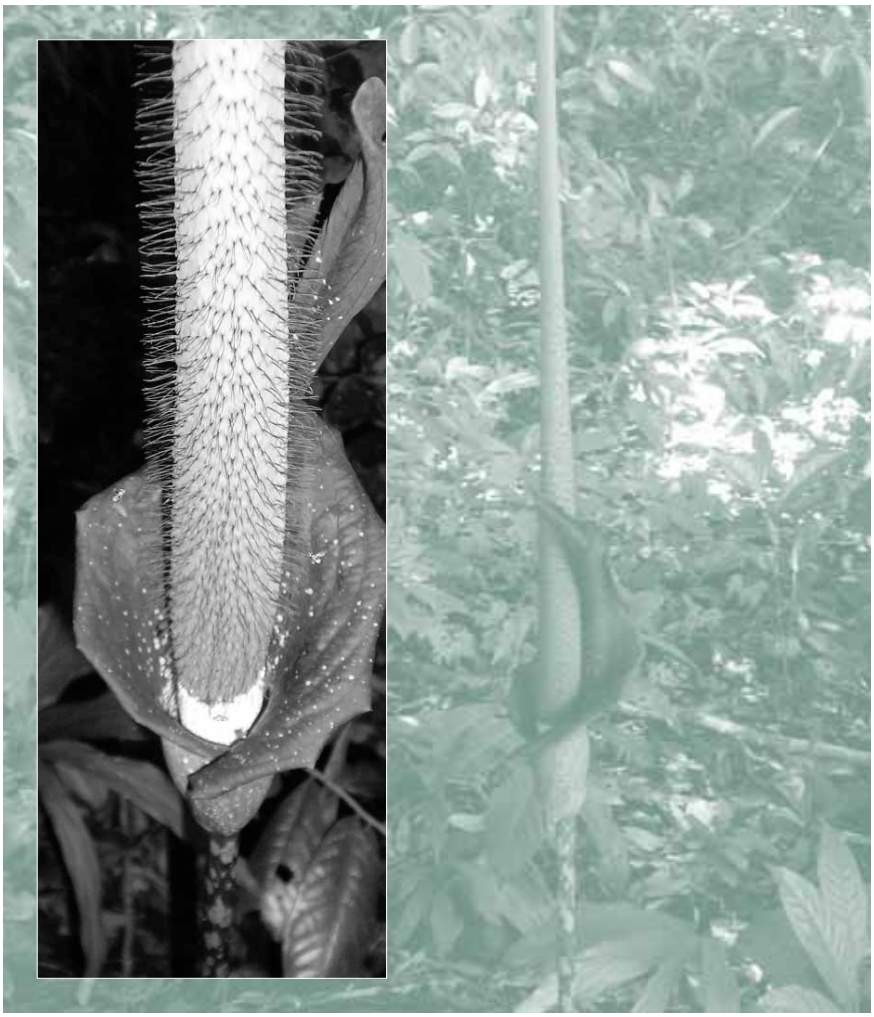
Cambodia pioneered the creation of protected areas in Southeast Asia in 1925 by setting aside the Angkor temple complex and surrounding areas for protection. In 1993, a Royal Decree established a national system comprising 23 protected areas classified under four major categories: National Parks, Wildlife Sanctuaries, Protected Landscapes, and Multiple Use Areas. The Ministry of Environment (MoE) has the responsibility for overseeing these 23 protected areas and 3 Ramsar sites, two of which are contained within the 23 protected areas. Combined, all of these areas cover 32,301 km² (tab. 1 and map 3). In addition to these areas, the Ministry of Agriculture, Forestry and Fisheries (MAFF) has set aside a number of areas within the nation's forest estate for biodiversity conservation, forest protection, genetic conservation, and wildlife habitat protection. Together, these areas represent an additional 14,860 square kilometres (Forestry Administration web site 2005, Shields *et al.* 2004, Cambodian Government 2004) under intentional protection (tab. 1and map 1). The country's entire system of protected areas covers 47,161 km² or about 26.1% of Cambodia's territory.

In addition to the areas shown in table 1, where the primary management objective is conservation, MAFF is responsible for the administration of the country's remaining forest lands. Of that, significant portions are under forestry concessions although these concessions are all currently under review. Much of the forest areas allocated for exploitation or production may at some time provide important connectivity between areas under formal protection.

Category	Main management objectives	Management Responsibility	Number of Protected Areas	Total area (km²)
National Park	Conservation of biodiversity, ecosystem conservation and recreation	MoE	7	7,453
Wildlife Sanctuary	Conservation of biodiversity, scientific research and wilderness protection.		10	18,913
Protected Landscape	Conservation of biodiversity and of specific natural and cultural features		3	970
Multiple Use Area	Conservation of biodiversity, sustainable use of resources in natural ecosystems		3	4,040
Ramsar Site	Protection of internationally significant wetlands		1[a]	161
Subtotal MoE			24	**32,301**
Protected Forest	Conservation of biodiversity, genetic resources and wildlife habitat	MAFF	8	
TOTAL			32	**47,161**

Table 1. Summary of Cambodia's protected area system.

[a] *One of the 3 Ramsar sites lies completely within a Multiple Use Area and one is partially contained within a Wildlife Sanctuary and a National Park. The non-overlapping area of Koh Kapi and the entire area of Stung Treng Ramsar Site are included here.*

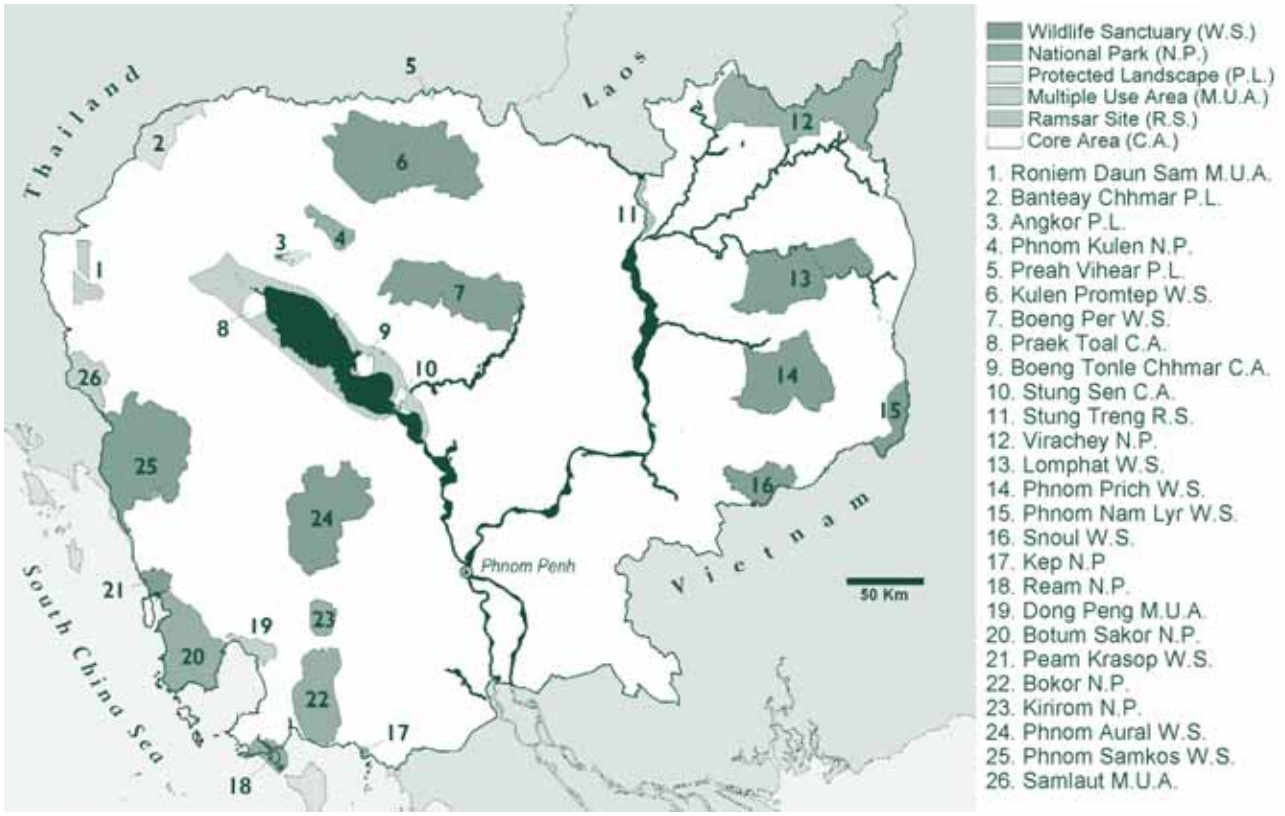


Virachey National Park

© C. Turner 2004

Scope and Coverage of the Assessment

This assessment covers the 26 protected areas (map 3) under the management responsibility of the Ministry of Environment. One of these, the Tonle Sap Multiple Use Area has three distinct management units that focus on its three core zones. The Assessment Team decided to consider these three sites as independent units. Two of the country's three official Ramsar sites overlap with MoE-administered sites already included in the analysis. For this reason, only the non-overlapping site (Stung Treng Ramsar Site) was included as a separate unit of evaluation in the analysis.



Map 3. The 26 protected area sites considered in this assessment.

Methodology

Rapid **A**ssessment and **P**rioritization of **P**rotected **A**rea **M**anagement (RAPPAM)

This assessment followed the Rapid Assessment and Prioritization of Protected Area Management Methodology - RAPPAM - (Erwin 2003) developed by WWF (World Wide Fund for Nature) RAPPAM is structured around the six key assessment elements recommended by the World Commission on Protected Areas (WCPA) Framework for Assessing Management Effectiveness (Hockings *et al.* 2000). RAPPAM has undergone extensive testing and development and has been successfully carried out in over 20 countries.

RAPPAM is a rapid and qualitative tool based on subjective assessments by individuals with extensive knowledge of the situation on the ground. This particular assessment was conducted during a three-day workshop in Phnom Penh (September 20-22, 2004) with 80 participants. Most of the participants were staff of the Ministry of Environment including most protected area directors, deputy directors, and other technical and support staff. Staff of the Biodiversity and Protected Areas Management Project (BPAMP) and representatives of international non-governmental organisations (NGOs) also participated, including Conservation International (CI), World Wide Fund for Nature (WWF), Fauna and Flora International (FFI), and the Wildlife Conservation Society (WCS).

The workshop included instruction sessions, presentations, group discussions, and plenary sessions. During the workshop, participants assessed the six key elements contained in WCPA's Assessment Framework. A questionnaire with 19 questions, subdivided into a number of more detailed items, was applied (Erwin 2003, p. 42-48).

Participants were divided into five groups, based on broad country-level biogeographic units: Eastern Protected Areas, Northern Plains and Forests, Tonle Sap/Mekong River Areas, Cardamom/Elephant Mountain Ranges, and Coastal Areas. Within each of the five groups one questionnaire was completed for each protected area. Detailed guidance notes were made available for explanation and clarification. Answers to the questionnaires were compiled during the workshop and the results summarised in charts and graphs. These were discussed in plenary sessions for peer review, validation and cross-checking.

The analysis of context included assessments at both the national level and the individual protected area level. On the national level, participants identified the most important pressures and threats to the system as a whole. Also assessed were such factors as the primary sources of vulnerability in the system and the general policy environment for protected areas in Cambodia. At the level of individual protected areas, participants assessed policies, legislation and regulations and applied relative scores for both the biological and socio-economic importance of each area.

In the analysis of design and planning, participants reviewed the adequacy of management and operational plans with respect to protected area objectives and the overall understanding of the objectives by protected areas managers and other stakeholders. They also rated the legal security of each area by assessing the degree of legal protection, the extent of boundary demarcation, and the existence and intensity of unsettled land disputes. Finally, they assessed the layout and configuration of each protected area, its zoning, and its degree of connectivity with other protected areas.

With respect to inputs, participants reviewed the quantity, quality, and adequacy of staff, the adequacy of communications systems, data collection and analysis in support of management, the existing infrastructure (such as facilities, means of transportation, equipment and maintenance), past and current funding levels, and the adequacy and transparency of financial management practices.

In assessing management processes, participants evaluated the existence and comprehensiveness of management plans, annual workplans, the management decision-making process, stakeholder participation, and the existence and effectiveness of research, monitoring and evaluation programmes at the site level.

Finally, in reviewing management outputs and conservation outcomes, participants looked at the specific products, services, and conservation results accomplished by the staff involved in protected area management. The adequacy of these products and results were then assessed against protected area objectives and priority activities that had been identified in management plans and workplans.

Further and more detailed information on the RAPPAM methodology can be found on the Internet at http://www.panda.org/about_wwf/what_we_do/ forests/what_we_do/protection/park_assessment/ download_centre.cfm

To complement the RAPPAM assessment, a one-day workshop focusing on the spatial aspects of protected area management was conducted immediately following the three-day RAPPAM exercise. Involving the same participants and working groups as the RAPPAM workshop, the primary focus of this additional exercise was on mapping values and threat patterns in each protected area. For ease of reference, this workshop is referred to as RAPPMap (Rapid Assessment of Protection Priorities through Mapping). Details about the RAPPMap workshop and methodology are given in the box below.

Rapid Assessment of Protection Priorities through Mapping (RAPPMap)

A one-day workshop was organised immediately following the RAPPAM workshop to complement the RAPPAM process by providing an explicit spatial component to the national protected area analysis. The Rapid Assessment of Protection Priorities through Mapping (RAPPMap) workshop involved the same participants as the RAPPAM workshop. As these activities had never been a formal part of a RAPPAM assessment, this was an opportunity to evaluate their appropriateness and effectiveness as a complementary activity in relation to the RAPPAM evaluation.

The primary focus of the workshop was on exploring spatial aspects of protected area management by interactively mapping values and threats in each of 26 MoE-managed protected areas.

The intended outcomes of the RAPPMap workshop were:

1. Protected area managers learn about the complexity and complementarity of Cambodia's protected area system.
2. Focal values and threats of each protected area are identified and mapped.
3. Protected area managers at both the protected area and national level understand the importance of the spatial dynamics of conservation targets and threats for protected area management.
4. Evaluation of the potential of RAPPMap as an additional input in future RAPPAM assessments.

Large format satellite image maps were the focal point of activity for the RAPPMap workshop. Individual maps were printed for each protected area (and surrounding lands) at a scale of 1:50,000 or 1:100,000. These maps was based on ASTER satellite imagery acquired between the years 2000 and 2004 (15 metre pixel resolution colour images) which were provided by NASA (National Aeronautics and Space Administration, Jet Propulsion Laboratory, California Institute of Technology). Protected area boundaries, villages and 2 km grids were also included for reference.

The first session of the workshop included time for studying and discussing the maps provided. Teams then used datasheets and maps to inventory and prioritise the top five conservation values and the top five threats in and around each protected area, including information on the category of value or threat, the spatial extent, etc. Once the datasheets were completed, each value or threat was mapped by drawing and labelling polygons, lines, or points (depending on the spatial nature of each phenomenon) on the maps and carefully labelling all map features with colour-coded sticker labels (see fig. 1). All mapping and documentation procedures were demonstrated in detail prior to the activity. Experienced map technicians and senior MoE staff facilitated the discussion, mapping, and associated documentation activities.

After the groups had completed the mapping exercise, all maps were displayed and all participants had time to comment on the various features mapped and recommend adjustments. Finally, groups presented their results and commented on the process in plenary.

The maps, which clearly showed spatial features (see fig. 1 for an example), stimulated discussions amongst and between working group members, and focussed the discussions and analysis on spatially identifiable features.

Based on observations of and comments from the participants, and an evaluation of preliminary data, the RAPPMap workshop was successful in achieving its primary goals. A spatial database of the results has been compiled and the results complement the results from RAPPAM. Furthermore, the RAPPMap outputs provide input into the ongoing gap analysis and system planning process initiated by the Biodiversity and Protected Areas Management Project under Cambodia's Ministry of Environment.

RAPPAM has been designed primarily for broad-level comparative purposes aimed at policy-level administrators. The RAPPMap process complements this output by providing specific spatial information at PA level. This information is particularly useful for PA managers, and can be used as a base-line for monitoring.

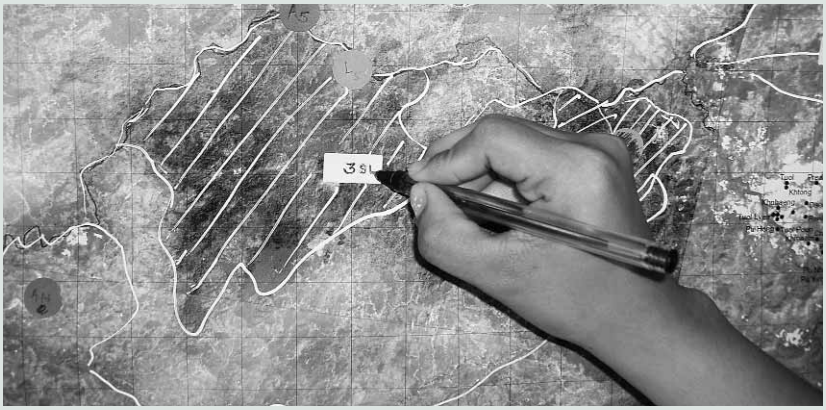


Figure 1. Example of values and threats mapped on an ASTER satellite image; Phnom Prich Wildlife Sanctuary.

Analysis and Findings

Pressures and Threats

Participants began with a brainstorming session to identify pressures and threats to the system, and then prioritised this list. For the purpose of this analysis, pressures are understood as processes, activities, or events that have already had a detrimental impact on the integrity of the protected areas, while threats are those processes, activities or events that might potentially lead to detrimental impacts, and that are likely to occur or continue in the future. Of over 20 pressures and threats identified, workshop participants selected the eight most widespread and pervasive for further analysis. These were: illegal logging, land encroachment, wildlife poaching, chamkar/shifting agriculture, infrastructure development, illegal fishing, mining, and harvesting of non-timber forest products. This list does not represent a full inventory of pressures and threats to each individual protected area; it is a prioritisation of the key pressures and threats that affect the system and that occur in the majority of the protected areas. In addition to the above list of eight pressures and threats, participants identified the presence of military personnel living inside or in the vicinity of various protected areas as representing an important pressure, particularly with regard to poaching and illegal logging.

The RAPPMap workshop extended and refined the evaluation of threats and pressures by adding a spatial element to the analysis. Patterns mapped in the RAPPMap workshop allow for an explicit spatial statement of the location, extent, and spatial form (e.g. point, line, or area) of selected pressures or threats. The RAPPMap results generally confirmed the types of threat identified in RAPPAM. In addition, it was found that the most serious threats occur over about 30% of the total area considered in this analysis (with an additional 465 km of 'linear' threats and 130 point-based threats). The layout of these threats can help managers focus limited resources in a more efficient and systematic way.

The following three charts and map are a synthesis of the analysis of pressures and threats.

Chart 1. Average pressures and threats to the Cambodian protected area system.

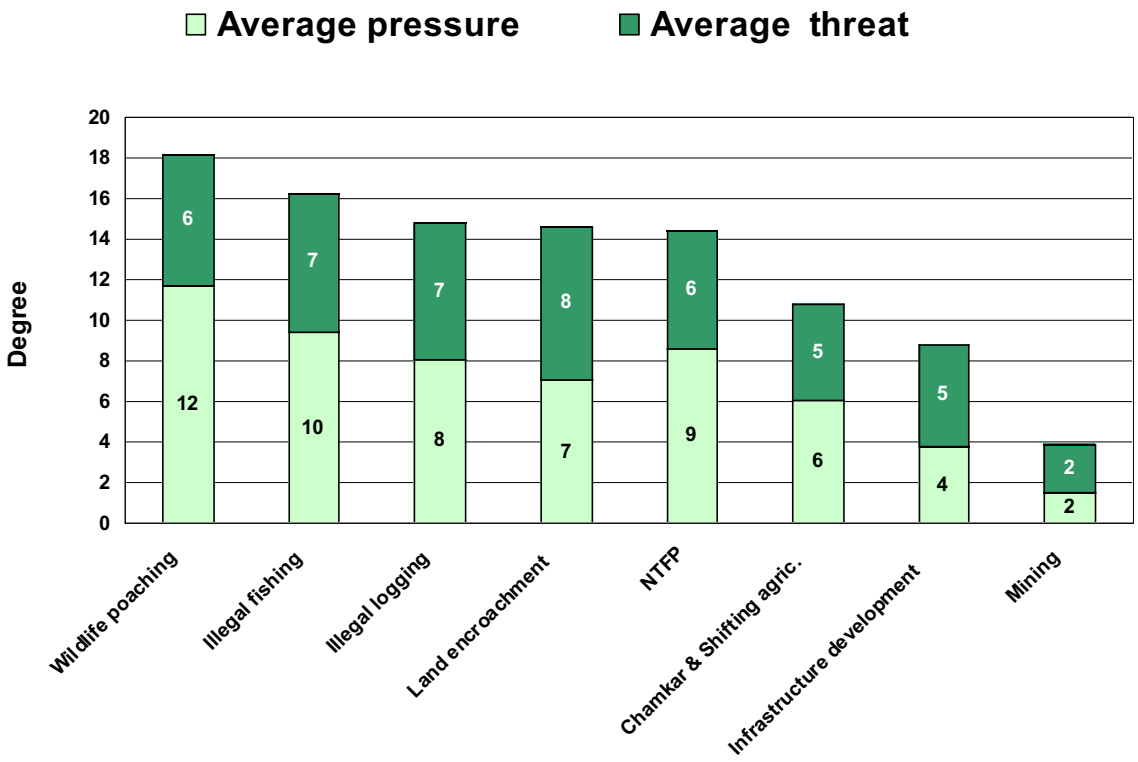
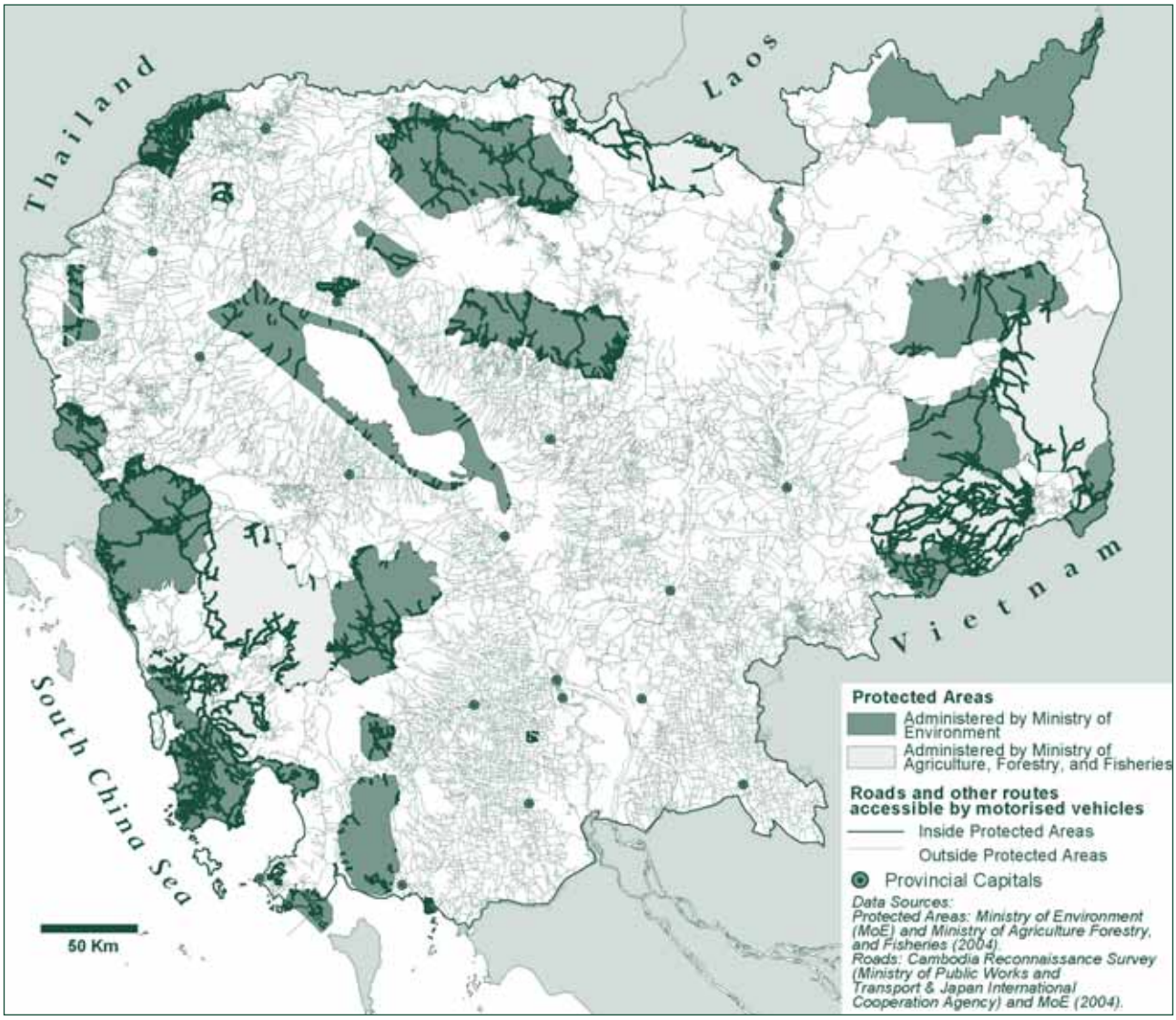


Chart 1 shows that, on average, unsustainable and/or illegal use of resources (poaching, fishing, illegal logging), land encroachment, extraction of non-timber forest products and chamkar/shifting agriculture are the most serious pressures that the Cambodian protected area system is currently confronting. In terms of severity, extent, and permanence of impact, the most important pressures are land encroachment and poorly planned infrastructure development, as they are leading to widespread and long-term impacts. Illegal logging, poaching, fishing, and extraction of non-timber forest products are also leading to some more specific impact on target species, particularly involving highly valued commercially-exploited species such as Aloewood trees (*Aquilaria krasna*), Lesser Adjutants and other large waterbirds, and a variety of turtle species. The RAPPMap evaluation confirmed this - 53% of the most severe threats identified in the protected area system were related to logging or clearing of forest.

The map below shows all protected areas in Cambodia and the main roads. An analysis of ASTER satellite imagery for each protected area in Cambodia shows that access in general, and particularly roads, are a major factor in fostering land encroachment (fig. 2). Sites of particular concern in this regard include Boeng Per, Kulen Promtep, and Samkos Wildlife Sanctuaries.



Map 4. The network of roads in Cambodia. Roads occurring inside protected areas are shown in bold.

Except for mining and, to a lesser extent, infrastructure development, the other pressures and threats are very widespread and occur practically in all protected areas—as illustrated in chart 2. The numbers in each column refer to the number of protected areas (n=26) that are affected by each pressure or threat.

Chart 2. Cambodian system of protected areas: occurrence of pressures and threats.

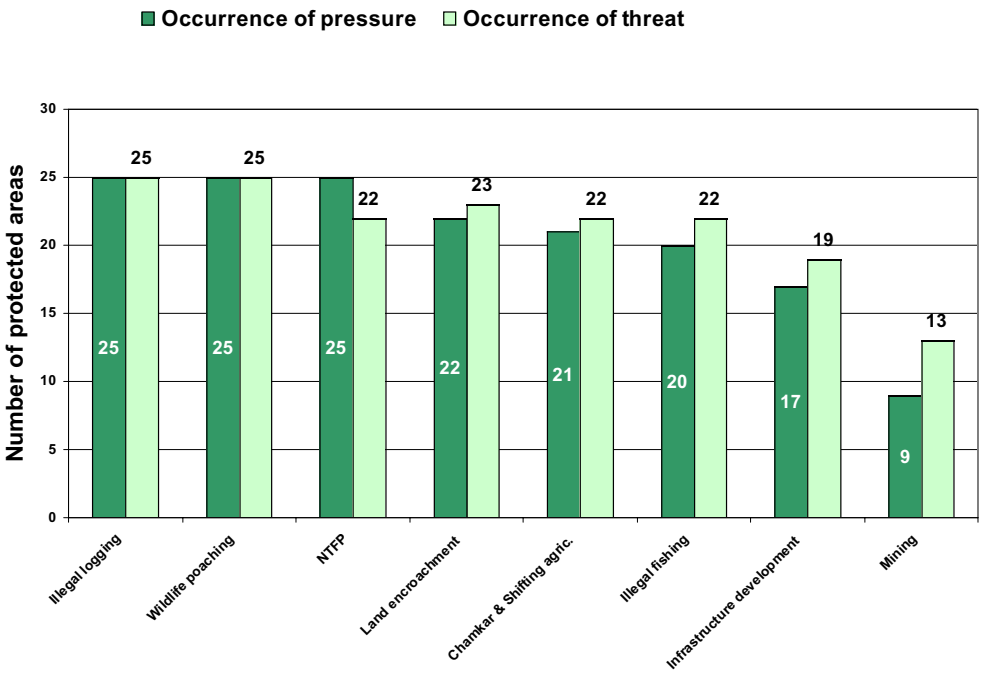
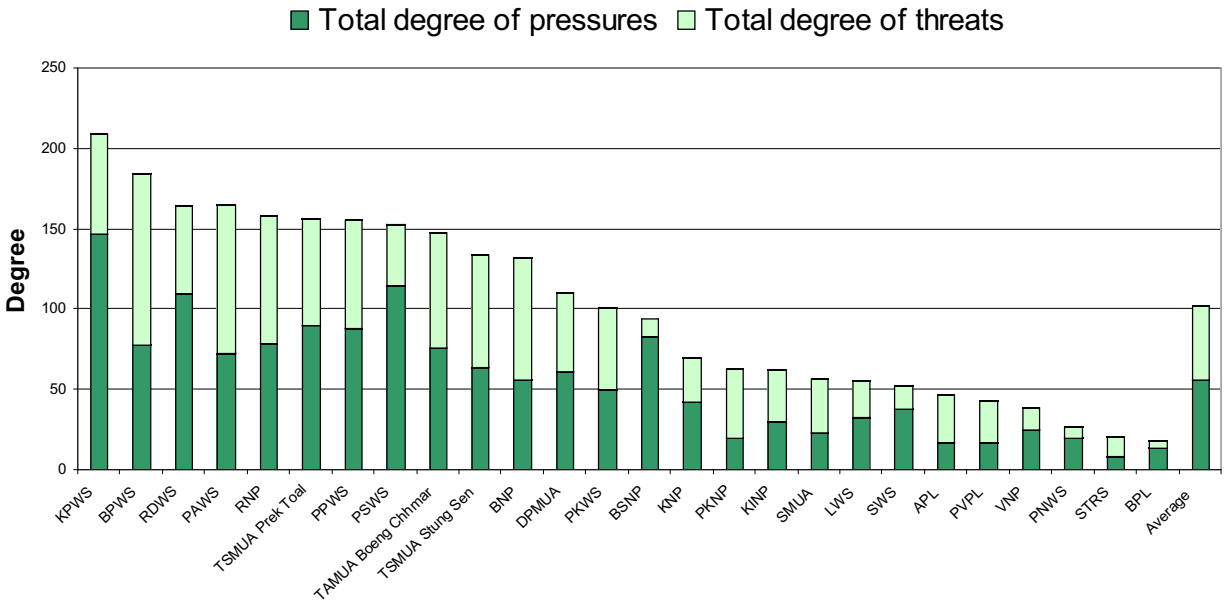


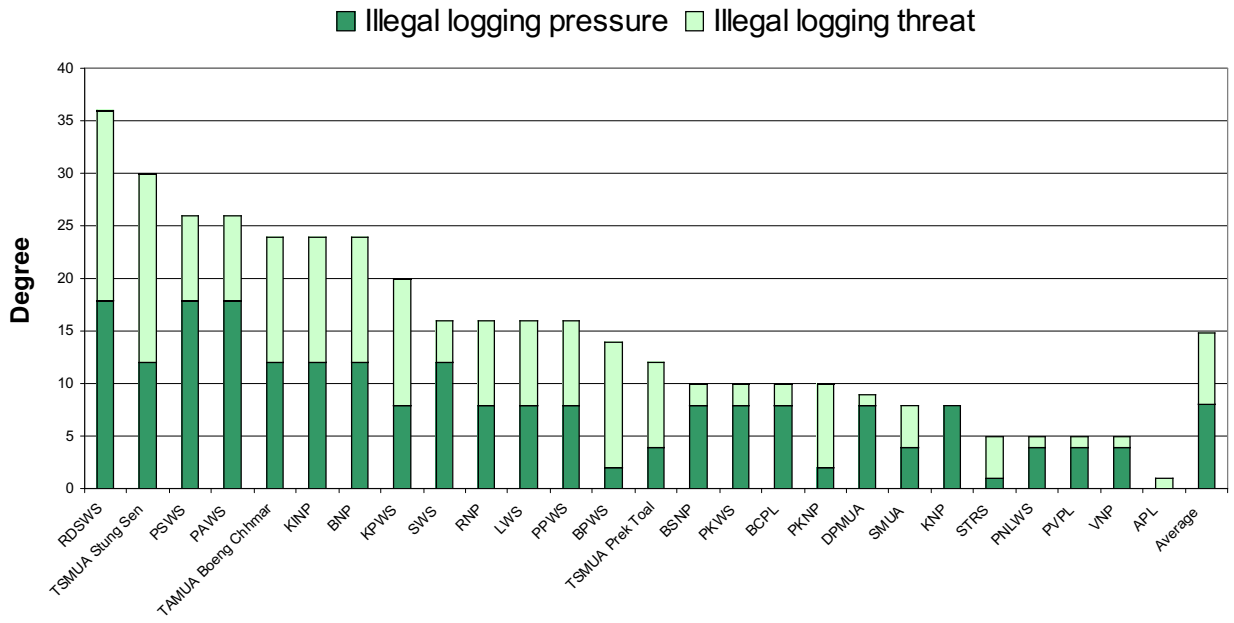
Chart 3 is a summary of the compounded eight pressures and threats that have been prioritised and analysed. The eight key pressures and threats were scored for probability, extent, impact and permanence using numeric values. Extent for example is scored as 4 (throughout >50%), 3 (widespread 15-50%), 2 (scattered 5-15%), and 1 (localised <5%) - for further details see Erwin 2003. Chart 3 shows the cumulative sums for all pressures and threats for each protected area. Areas that have already suffered most pressure and are most threatened are: Kulen Promtep, Boeng Per, and Roniem Daun Sam Wildlife Sanctuaries, Phnom Aural and Ream National Parks, and Tonle Sap Multiple Use Area. (Acronyms used in the text and in charts 3-10, 12 and 17 are explained on page 26). A complete threat analysis would call for the addition of the other specific pressures and threats that were not part of this system-wide analysis. In spite of this limitation, the analysis does represent a good approximation of the comparative degree of pressures and threats that are affecting biodiversity conservation across the Cambodian protected areas assessed.

Chart 3. Comparison of cumulative degree of pressures and threats for 26 protected areas in Cambodia. *(Acronyms used in this and other charts are explained on page 26)*



Charts 4 through 6 represent a more detailed analysis and comparison of specific pressures and threats. The first one looks at illegal logging across the 26 protected areas analysed. According to the information provided by participants, the Wildlife Sanctuaries of Roniem Daun Sam, Phnom Samkos, and Phnom Aural are the three protected areas currently most affected by illegal logging activities. Perceived future threats are also very high for Kirirom National Park, Bokor National Park, Kulen Promtep Wildlife Sanctuary, and Tonle Sap Multiple Use Area. Illegal commercial logging is part of a broader problem in the country—currently affecting both areas associated with the system of forestry concessions and many protected areas. Increasing demand for timber in Cambodia and neighbouring countries, poor enforcement, lack of alternative sources of income for local communities, occurrence of highly valuable timber species, and the presence of military posts either inside or in the vicinity of protected areas (with many of them involved in illegal logging operations and informal domestic and international trade) are all factors that contribute to a spiralling problem of illegality and corruption , and compound a situation of high risk for park rangers and managers.

Chart 4. Illegal logging threat and pressure: comparison among 26 Cambodian protected areas.



The protected areas that are currently most affected by land encroachment pressure are Roniem Daun Sam, Kulen Promtep and Boeng Per Wildlife Sanctuaries. In these sites, the extent and severity of habitat conversion inside the protected area is already very high. An example of forest clearing in Kulen Promtep is illustrated on the satellite image in figure 2 in the inside back cover of this report.

The expectation is that the threat of land encroachment will continue or even increase, particularly in areas where road access is available, and where the price of land and the population are likely to remain high or increase dramatically, such as Angkor Protected Landscape, Boeng Per Wildlife Sanctuary, Dang Peng Multiple Use Area, and Peam Krasaop Wildlife Sanctuary. Registering and disseminating the lessons learned on these sites will be extremely important for avoiding similar problems, particularly in face of large infrastructure development plans and increased access to areas that are now relatively remote.

Together with illegal logging, wildlife poaching is the most pervasive threat across the system, and it occurs in 25 of the 26 areas assessed. The pressure has been most acute in Kulen Promtep, Boeng Per, and Phnom Prich Wildlife Sanctuaries, and Botum Sakor and Bokor National Parks. High future threats are predicted for Bokor and Ream National Parks, as well as Roniem Daun Sam Wildlife Sanctuary.

Chart 5. Land encroachment pressure and threat: a comparison among 26 protected areas in Cambodia.

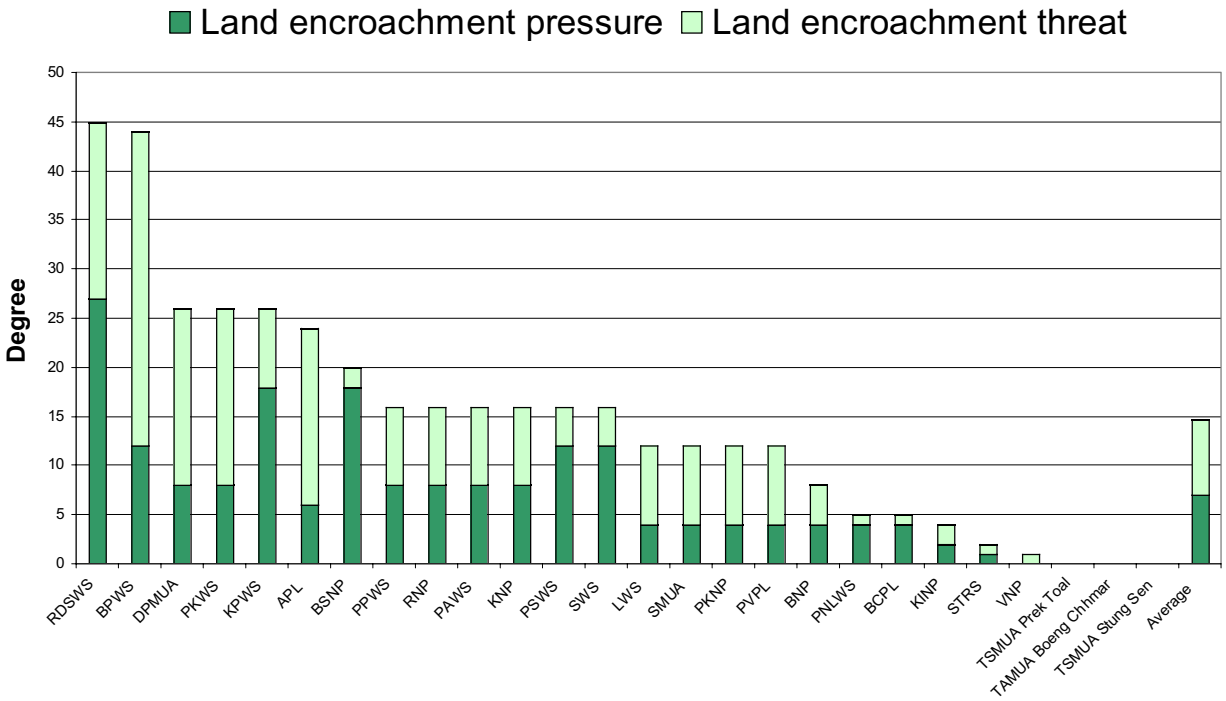
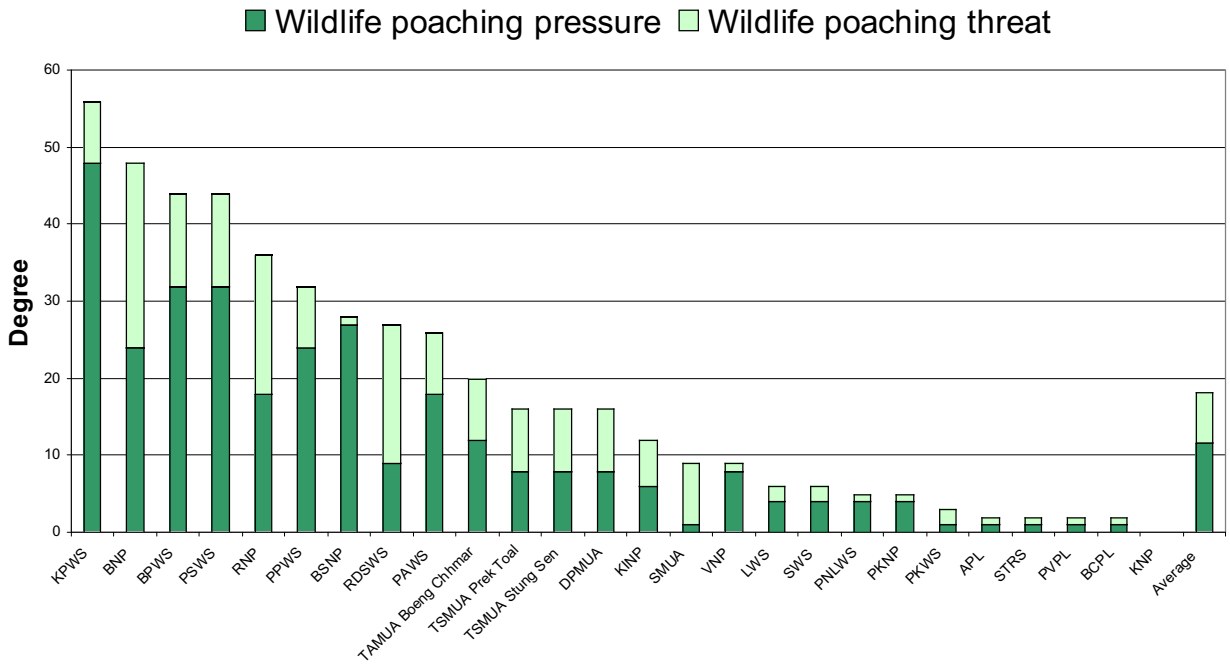


Chart 6. Wildlife poaching pressure and threat: a comparison among 26 protected areas in Cambodia.



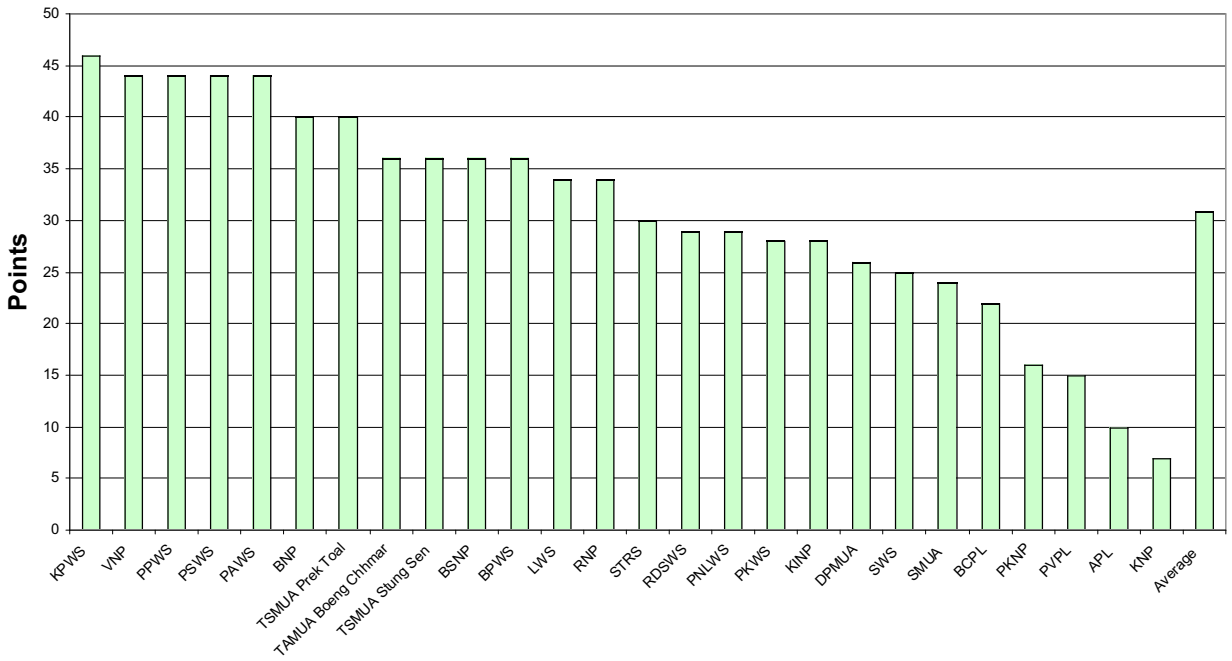
Biological and Socio-economic Importance

Biodiversity is not uniformly distributed across a sea or landscape. As part of the assessment, participants reviewed each protected area against ten different biodiversity criteria: presence of rare or endangered species, comparative levels of endemism, number of species, provision of critical landscape function, comparative range of plant and animal diversity, relative contribution to representativeness in the system of protected areas, presence of viable population of key species, consistency of structural diversity with historic norms, protection of ecosystems whose range have greatly diminished, and maintenance of the full range of natural processes and disturbance regimes. Chart 7 shows the cumulative values for the above criteria scored as 5 (yes), 3 (mostly yes), 1 (mostly no) and 0 (no). The same scoring is used for all subsequent charts.

In terms of biological importance, Kulen Promtep, Phnom Samkos, Phnom Aural, and Phnom Prich Wildlife Sanctuaries as well as Virachey National Park stand out as the most important among the sites of the Cambodian system of protected areas that were the subject of this assessment, while Angkor Protected Landscape and Kep National Park scored the lowest.

The RAPPMap evaluation showed that sites within protected areas identified for their biological significance (including large areas of exemplary plant communities, wildlife habitat, and other perceived values) cover approximately 6,289 km² or 19% of the entire area of the protected areas considered, 144 km of linear values and 77 point locations. The extent and layout of these features can provide an important input to zoning efforts designed to improve management effectiveness in protected areas.

Chart 7. Comparative biological importance among 26 protected areas in Cambodia.

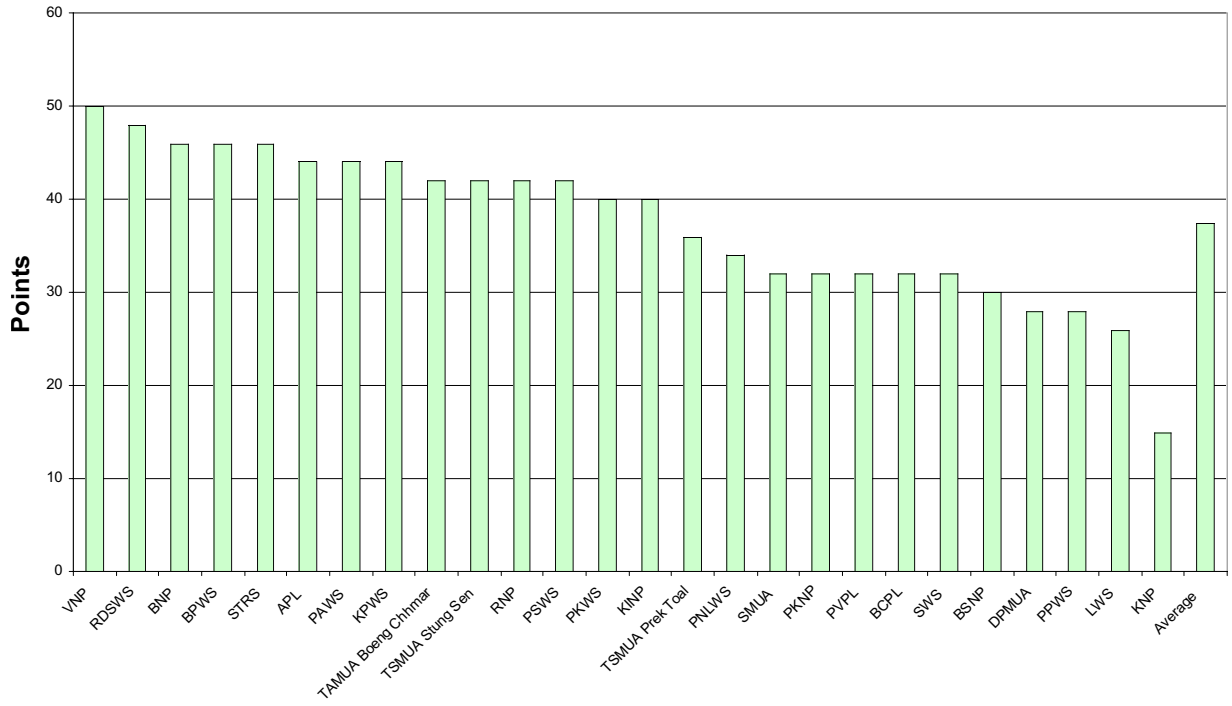


A similar comparative analysis was made with respect to the socio-economic importance of the 26 sites. Each protected area was assessed according to its importance as: a source of employment or natural resources for the subsistence of local communities, a creator of development opportunities through sustainable resource use, a spiritual or religious site, an area of exceptional aesthetic value, a haven for animal or plant species of high social, cultural or economic value, a site of exceptional recreational value, a provider of significant ecosystem services and benefits to communities, and a site of high educational or scientific value.

In general, most protected areas scored high for socio-economic importance with Virachey National Park, Roniem Daun Sam Wildlife Sanctuary, Stung Treng Ramsar Site, Boeng Per Wildlife Sanctuary, and Bokor National Park scoring highest. Angkor Protected Landscape also scored very high. Indeed, Angkor is one of the most emblematic

cases of a protected area whose tourism value has spurred very rapid and intense development - one of the highest and more sustained in Cambodia - and it has become a major source of income for tour operators, the hotel and transportation industries, and other associated businesses not only locally, but elsewhere in the country and even abroad. A 2003 investment report (UN 2003) lists Cambodia as being among only 4 least developed countries with tourism receipts exceeding $100 million per year and Angkor is clearly the primary driver of this important revenue stream. The case of Angkor illustrates the enormous potential that some protected areas in Cambodia may have in contributing to the country's poverty reduction and economic development, but experience has shown that such development must be well-planned and integrated as part of an effort that would include, at least, the Ministries of Tourism, Environment and Land Management.

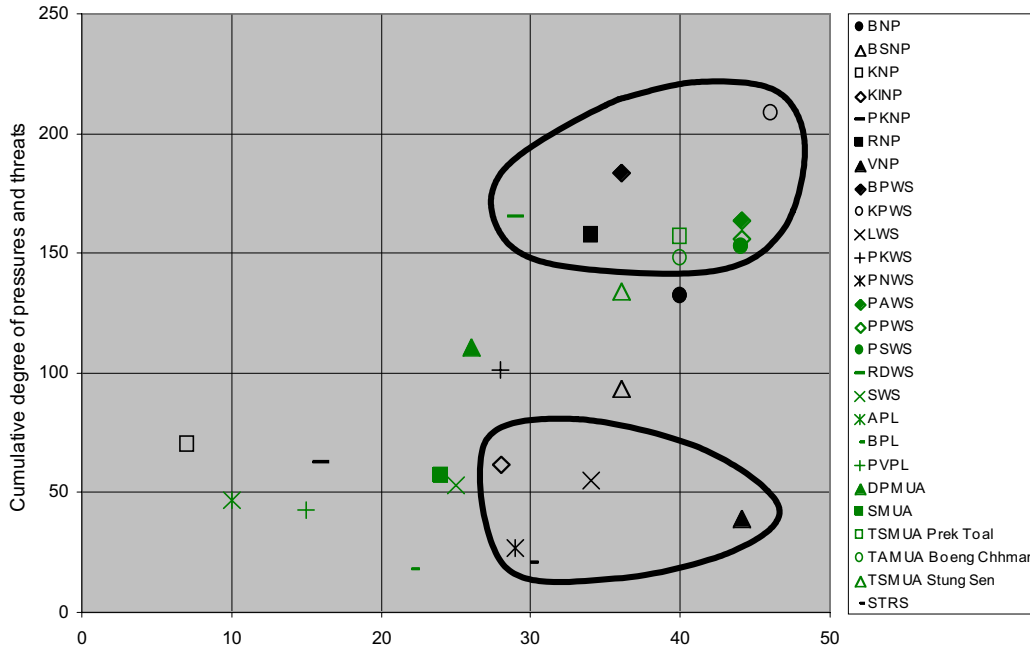
Chart 8. Comparative socio-economic importance among 26 protected areas in Cambodia.



A comparison between the cumulative degrees of pressures and threats (chart 3) and biological importance (chart 7) can be helpful in determining the conservation priorities among the sites. The result of such analysis can be seen in chart 9. The chart reveals a group of nine protected areas that are of high biological importance and that suffer from high cumulative pressure and threat. This group includes Kulen Promtep, Roniem Daun Sam and Boeng Per Wildlife Sanctuaries and the core zones of Tonle Sap Multiple Use Area in the northwest, Phnom Aural and Phnom Samkos Wildlife Sanctuaries and Ream and Bokor National Parks in the southwest, and Phnom Prich Wildlife Sanctuary in the east. These areas require urgent and focused activities designed for threat abatement with specific pressures and threats guiding remediation efforts. For example, in the north-western protected areas, priorities are preventing the negative effects of land encroachment, chamkar/shifting agriculture and poaching whereas in Phnom Prich threat abatement efforts must focus on curbing the negative effects of mining, infrastructure development, and poaching.

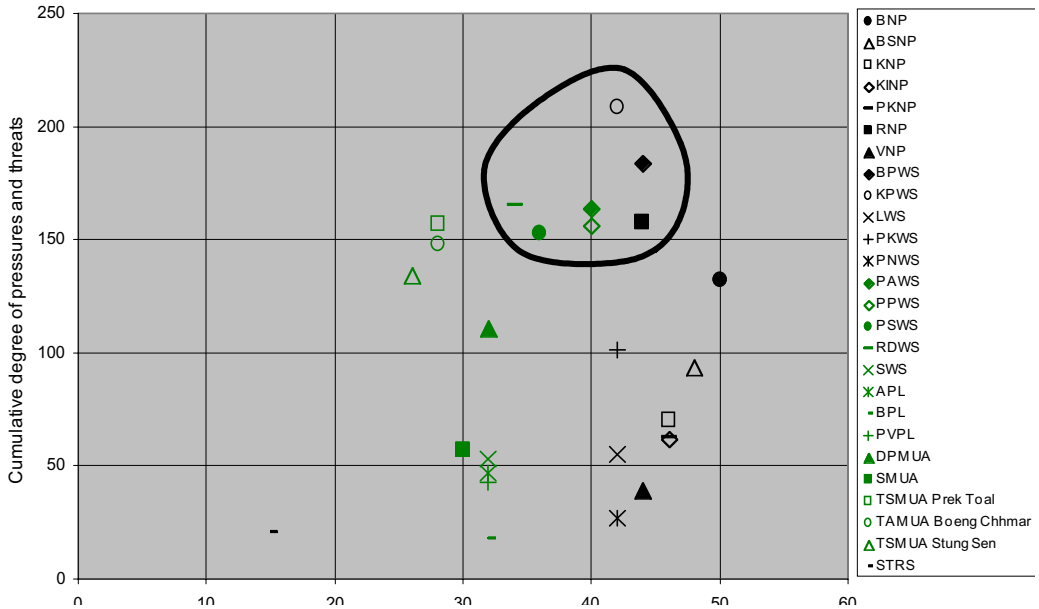
The chart also shows a second group of five protected areas with high biodiversity, yet with lower scores for external pressures and threats. This group is comprised of Virachey National Park, Lomphat Wildlife Sanctuary and Stung Treng Ramsar site in the north-east, Kirirom National Park in the south, and Phnom Nam Lyr Wildlife Sanctuary in the east. In these areas, the focus should be on preventive action to keep potential threats at bay.

Chart 9. Conservation priorities among 26 protected areas.



A similar analysis was carried out for identifying socio-economic priorities. A group of highly threatened protected areas that have been ranked high for their socio-economic importance stands out. This group includes areas distributed throughout the country including Kulen Promtep, Boeng Per, Roniem Daun Sam, Phnom Aural, Phnom Samkos, and Phnom Prich Wildlife Sanctuaries and Ream National Park. Priority activities for these areas should focus on resolving land disputes and implementing community development and poverty reduction strategies that are compatible with sustainable resource use.

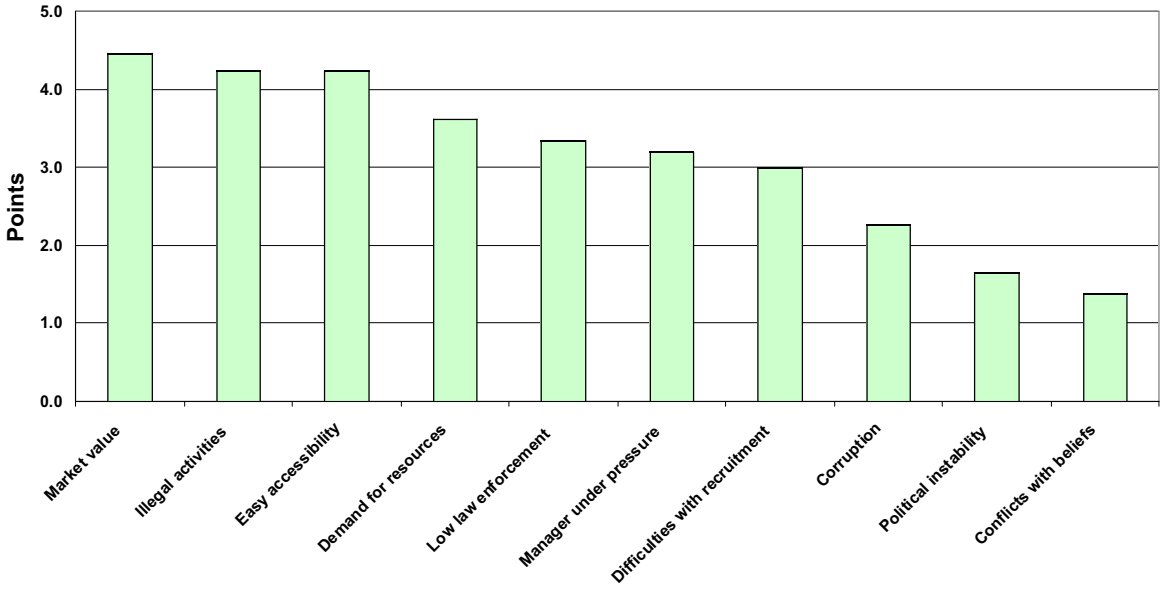
Chart 10. Socio-economic priority among 26 protected areas.



Vulnerability

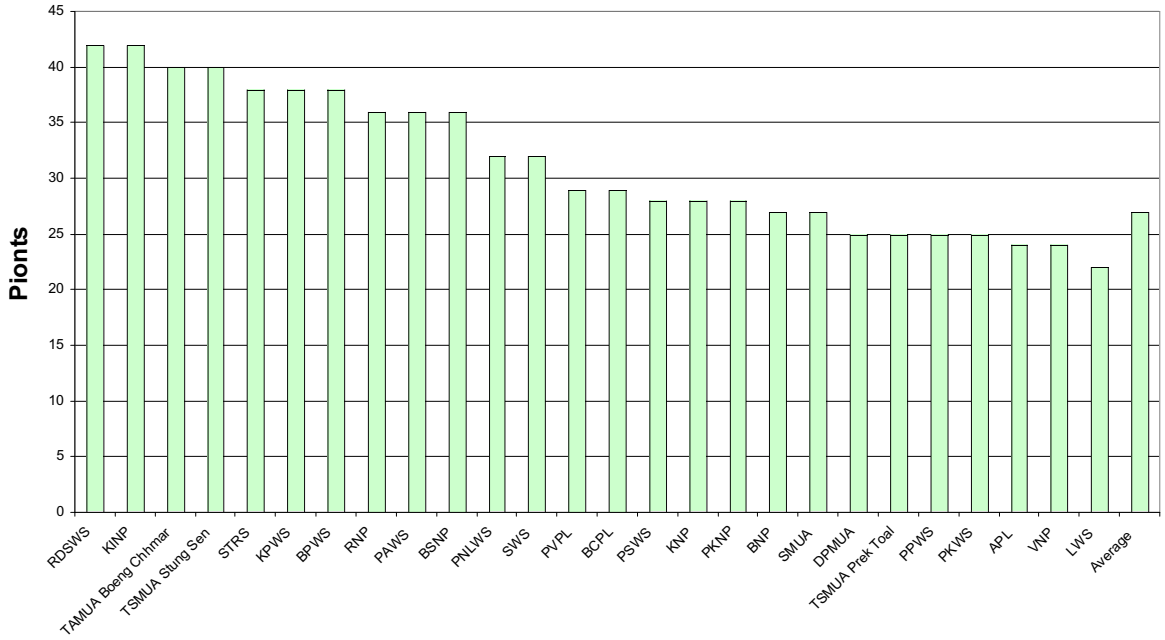
Widespread poverty in Cambodia creates a high demand for resources, including those located inside of protected areas. Vulnerability is higher particularly in areas where access has been made easier due to the construction of roads that cut through them or reach their vicinity (see also map 4 and figures in the inside of the back cover). The relatively high market value of land and the ease of access to natural resources—especially in the most populated parts of the country—function as incentives for land encroachment and illegal exploitation of resources such as timber and wildlife. This problem is compounded by a lack of enforcement. This is illustrated in chart 11, which shows the relative importance of the ten causes of vulnerability assessed as an average for all 26 protected areas. Chart 12 compares the different degrees of vulnerability across the protected areas. Roniem Daun Sam Wildlife Sanctuary, Kep National Park, and the core zones of the Tonle Sap Multiple Use Area stand out as the most vulnerable areas in the system. Additionally, the RAPPMap analysis revealed that of the most significant threats to protected areas, 41% are driven by subsistence-scale motivations, 32% by full commercial exploitation, and 27% driven by local-scale economics.

Chart 11. Average vulnerability of protected areas.



Virachey National Park

Chart 12. Degree of relative vulnerability of protected areas.



Management

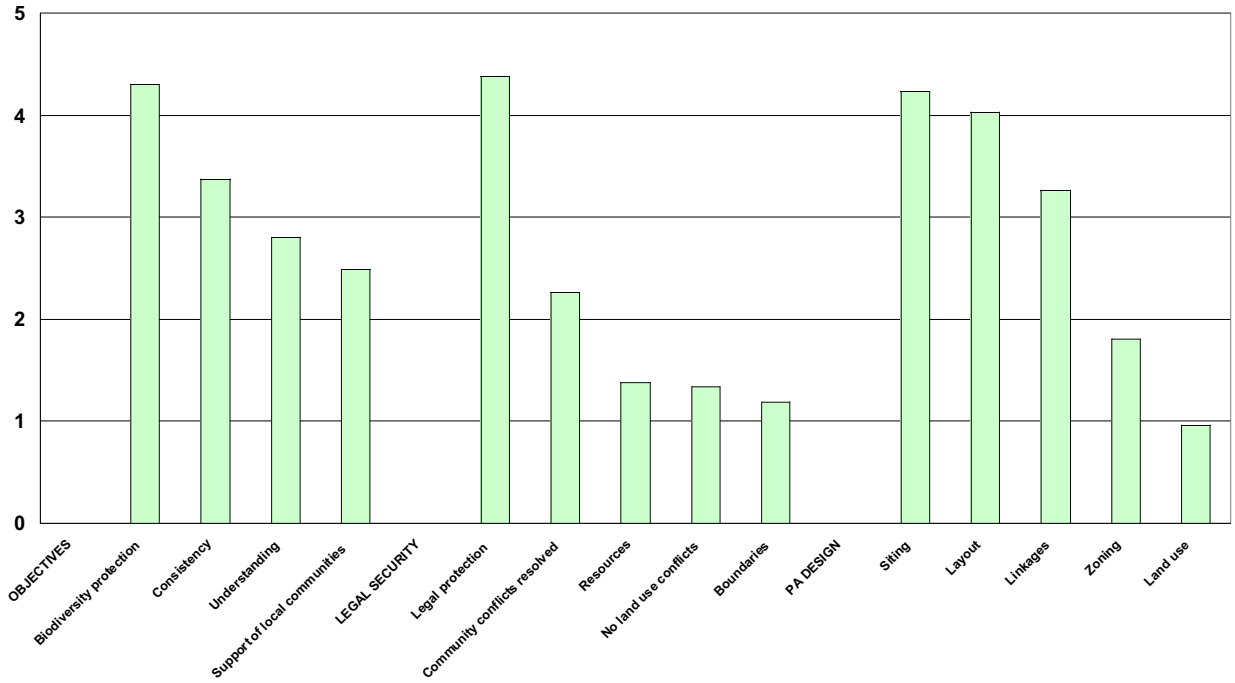
Workshop participants reviewed the most critical aspects of management of the system of protected areas in Cambodia. Charts 13 through 16 represent a synthesis of the findings.

With respect to overall planning in terms of objectives, legal security and protected area design, chart 13 highlights key strengths and weaknesses of the protected area system.

Some of the strengths of the system are:

- The overall design and layout of the system is very good. There are clear “clusters” of protected areas that in many cases are connected by intact natural vegetation. In several cases, blocks of protected areas provide continuous protection throughout a cluster through the complementarity of protected areas under MoE and Protected Forests under MAFF (e.g. the Central Cardamom Protected Forest ensures connectivity between Phnom Aural and Phnom Samkos Wildlife Sanctuaries, the Mondulkiri Protected Forest and Seima Biodiversity Conservation Area ensure connectivity between Lomphat, Phnom Prich and Snoul Wildlife Sanctuaries). Connectivity is also provided by the existence of protected areas in neighbouring countries: Virachey National Park is contiguous with Mom Ray Nature Reserve in Vietnam and Dong Ampham Protected Area in Laos P.D.R., Samlaut is contiguous with Klong Krua Wai Wildlife Sanctuary and Namtok Klong Keow in Thailand, and Banteay Chhmar Protected Landscape is contiguous with Dta Phraya National Park in Thailand.
- In terms of legal security, The only area considered in the assessment without long-term, legally binding protection is the Stung Treng Ramsar Site. However, pending protected area and wetland legislation is likely to address this by providing explicit legal machanisms for protection of this area.

Chart 13. Overall planning of protected areas system wide.



Bokor National Park © *BPAMP*

Some of the weaknesses of the system are:

- With the exception of Virachey National Park, practically all areas lack up-to-date management plans. For that reason, very few areas have defined clear and specific biodiversity-related objectives that should provide guidance to management. They also lack a zonation which would enable management to direct proposed development activities away from zones designated for higher levels of protection.
- Staffing and financial resources are often insufficient to conduct critical law enforcement activities.
- The boundaries of many protected areas have not been demarcated at the site-level. This is a factor that enhances the uncertainty about land ownership, leads to land use conflicts, and greatly increases the vulnerability of individual sites.
- The marine habitat is poorly represented in the overall system, as practically all protected areas in the system are terrestrial[1].

The design and configuration of one protected area, Roniem Daun Sam Wildlife Sanctuary, was identified as a major concern at PA level, and should be revised, with a view to find a solution to existing land use and ownership conflicts.

[1]At the time of the RAPPAM workshop, marine ares were poorly represented within the protected area system. However, the recent designation of Koh Sdach Marine Protected Area represents a significant improvement in marine habitat protection.

The analysis of inputs in terms of staffing, communication, infrastructure and facilities, and financing (chart 14) reveals a system that is chronically lacking resources in practically all levels of management.

Chart 14. Summary of overall inputs to the system of protected areas.

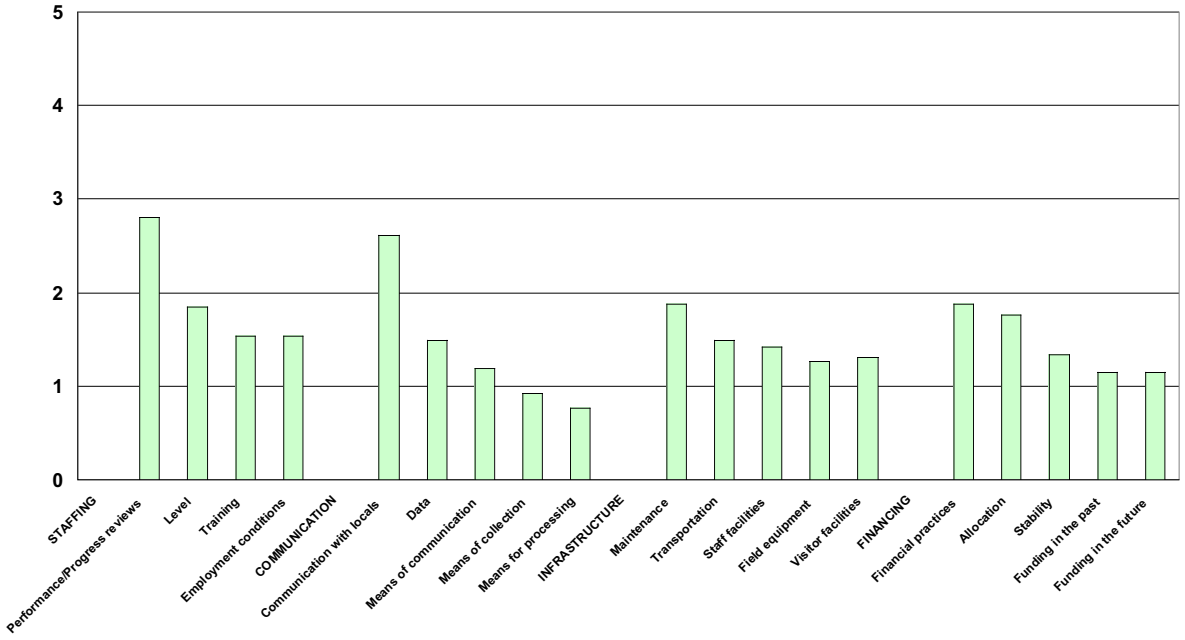
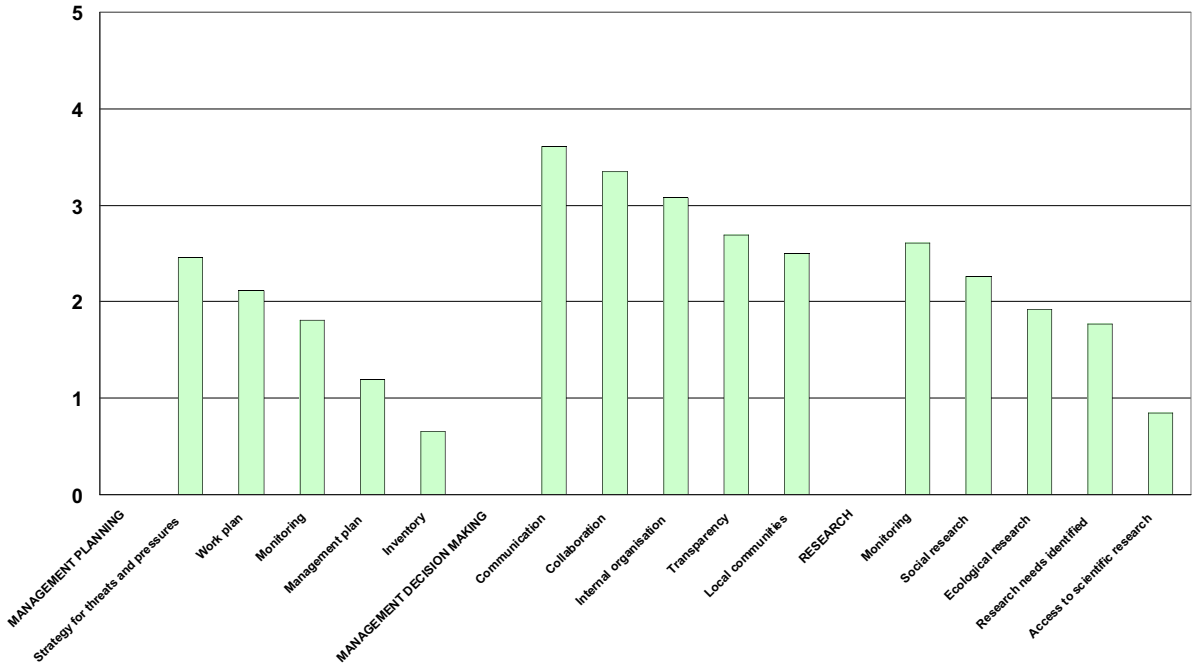


Chart 15. Summary of overall process in the system of protected areas.



The analysis of process (chart 15) in terms of management planning, decision-making and research, shows that there is an increasing level of cooperation between protected area managers and local communities and other partners, as well as good communication between protected area staff and the national administration. Some areas highlighted for improvements are:

- Currently, there is no overarching legislation for protected areas in Cambodia. A draft Protected Areas Law has been prepared, but negotiations for final approval have been delayed by protracted discussions between the various agencies involved in protected area management . This lack of clear legislation for protected areas jeopardises their legal and institutional security, particularly when faced with court cases and development proposals.
- Most protected areas are surviving with short-term planning only, represented by the annual operational plans. There is a pressing need to develop longer term management plans.
- Very few biodiversity inventories have taken place in the protected areas. This puts constraints on the development of management plans, as well the set-up of monitoring and evaluation programmes for the areas.

The analysis of overall Outputs (chart 16), based on 10 criteria assessed, reveals that the most significant outputs have been in the areas of environmental education and outreach, as well as wildlife and habitat management. Key areas for improvement are staff training, planning, and visitor management.

Chart 16. Analysis of overall outputs of the system of protected areas.

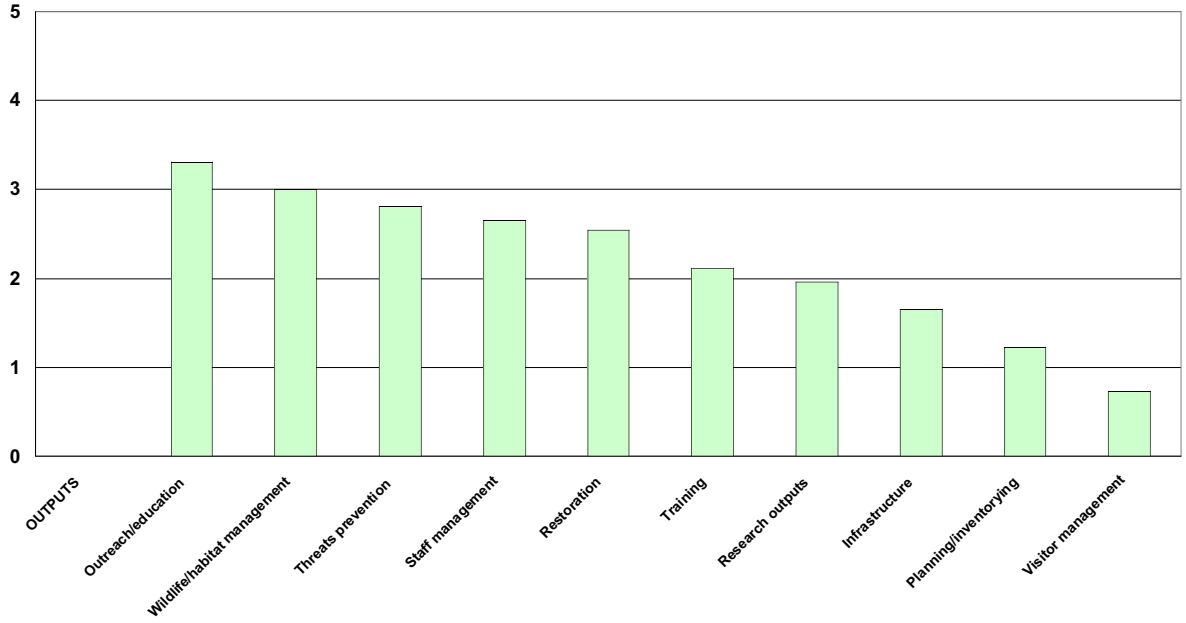
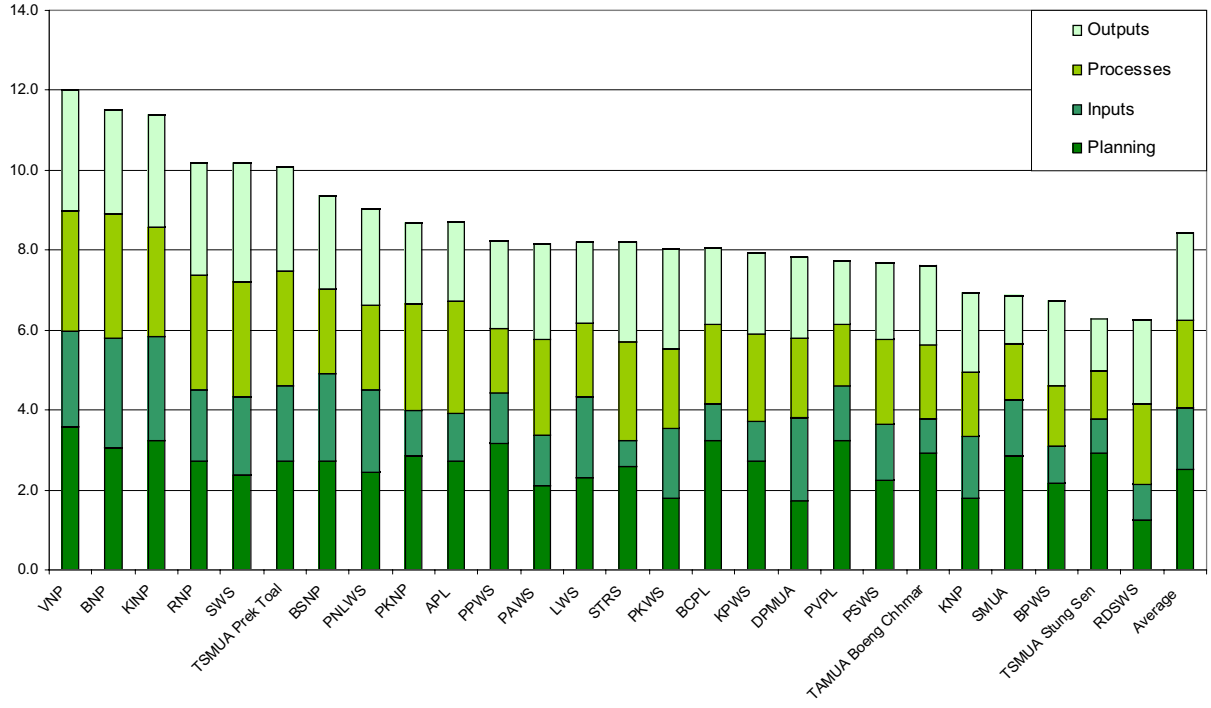


Chart 17 is a synthesis of the overall management effectiveness across the protected areas assessed in Cambodia combining the results of planning, process, inputs, and outputs (charts 13 - 16) at the level of each individual site. Virachey, Bokor, Kirirom, and Ream National Parks stand out as the most effectively managed parks in the system, while Roniem Daun Sam and Boeng Per Wildlife Sanctuaries, the Stung Sen core zone of the Tonle Multiple Use Area, Sap Samlaut Multiple Use Area and Kep National Park are the least effectively managed.

Chart 17. Analysis of overall management effectiveness of the system of protected areas.



Kavet People, Virachey National Park

J. Kitchens © BPAMP 2005

System-level Issues

During the assessment workshop, a full day of group and plenary discussions was dedicated to the analysis of issues such as system-level design, protected areas policies, and the overall policy environment in Cambodia (questions 17 - 19 of the RAPPAM questionnaire, Erwin 2003). Key system-wide issues raised during this day are summarised below:

Legal Framework

The system of protected areas of Cambodia is still missing its "backbone". Protected area specialists involved in the assessment of the system of protected areas in Cambodia urge the Ministry of Environment to find solutions to the institutional issues of competing mandates and attributions and finalise the draft Protected Areas Law, and to facilitate its approval by the Council of Ministers as soon as possible.

Management Plans

Protected area management plans are essential to ensure effective management and to enable comprehensive evaluation of management actions. The lack of up-to-date management plans and clear zonation concepts is a major obstacle to effective management. Development of management plans, which clearly designate where various strategies for preservation, conservation management and sustainable use will best accomplish management objectives, is a key priority for most protected areas in Cambodia.

Boundary Demarcation

As a matter of urgency, a nation-wide effort should be made to demarcate all protected areas in the system by the end of 2005, including those under the responsibility of the Ministry of Agriculture, Forestry and Fisheries. This target should be a top priority of the Strategic Plans of both Ministries. If current funding is not sufficient for ensuring the delivery on this target, potential donors should be identified and proposals submitted as soon as possible. The donor community, including government aid agencies and international environmental NGOs, are invited to consider contributing to the achievement of this critical target. In addition, the MoE should consider gazetting Stung Treng Ramsar Site formally as a protected area according to the existing national system.

Inter-ministerial Cooperation

Participants of the assessment called for the strengthening of collaboration between at least four ministries: Ministry of Environment, Ministry of Agriculture, Forestry and Fisheries, Ministry of Public Works and Transport, and the Ministry of Tourism. Additional coordination should also be sought with the Ministry of Water Resources and Meteorology, Ministry of Land Management, Urban Planning and Construction, Ministry of Industry, Mines and Energy, and Ministry of Interior. Although some of this coordination has already been an objective of the DANIDA-funded National Capacity and Development Project, it has targeted only a subset of the above and has not focused specifically on protected area management. As a practical step, it was suggested that a pilot project involving a task force with representatives from each of these ministries be established to pursue a limited set of goals with regard to protected areas in the Lower Mekong Dry Forest ecoregion.

Cooperation with the Ministry of Defence

Some individuals in the Cambodian military are currently alleged to be involved in illegal exploitation and trade of natural resources (particularly logging and hunting) in protected areas. These individuals are damaging the national and international reputation of the whole Cambodian military corps, and causing the environmental degradation of some key protected areas in the system. The Ministry of Environment and MAFF should actively engage in negotiations with the Ministry of Defence to garner high level support for resolving pending issues, particularly in the areas where military bases are located inside or in the vicinity of protected areas.

Transboundary Cooperation

One of the positive aspects of the design of the system of protected areas in Cambodia is that some of the protected areas form larger blocks of relatively intact habitats due to their connectivity to other protected areas in neighbouring countries. In order to maximise the conservation potential of these areas, and at the same time to reduce the negative impacts of illegal international trade in timber and wildlife species, the Ministry of Environment was asked to lead an effort, in cooperation with the Ministries of Interior and

Foreign Affairs, and relevant authorities in neighbouring countries, to develop transboundary protected area cooperation agreements. Furthermore, a task force should be put in place to strengthen enforcement of environmental regulations at transportation check points along international borders. In addition, regular meetings for joint planning and coordinated enforcement should take place in transboundary protected areas.

Management Structure

There are currently two major actors responsible for the planning and implementation of the national system of protected areas in Cambodia: the Department for Nature Conservation and Protection (DNCP) of the Ministry of Environment, and the Forestry Administration (FA) within the Ministry of Agriculture, Forestry and Fisheries. This should not lead to problems, if responsibilities are clear and complementary, and efficient coordination mechanisms are in place.

The current structures of the Ministry of Environment and MAFF are not conducive to planning, implementing, monitoring and evaluating the national system of protected areas in a coordinated and effective way. Some of the problems are: conflicting mandates, absence of a clear coordination function and structure, potential conflicts of interest between forest protection and production functions, particularly at MAFF-level, and very low salaries for high ranking staff. This last trend often results in qualified people pursuing work with other governmental and non-governmental organisations—sometimes with conflicts of interest.

These issues should be addressed through improving cooperation between the two agencies and ensuring that roles and responsibilities are clarified. In addition, four options have been proposed how these issues can be addressed through institutional change (Shields et al. 2004, p.106-109):

Option 1: Operating with the same agencies. The Forestry Administration of MAFF would be responsible for forestry production objectives, while an empowered DNCP, with a similar status as the FA, would be responsible for forest conservation objectives as part of its broader mission of biodiversity conservation, which also includes freshwater and marine habitats. This option would imply the transfer of the Protected Forests from MAFF to MoE.

Option 2: Reorganise within one of the existing Ministries. This option would involve merging and putting under the same umbrella the forestry production and conservation objectives, under either MAFF or MoE.

Option 3: Creating a new Ministry, the “Ministry of Environment and Forestry”. This option would combine the forest conservation and production objectives under one institutional framework.

Option 4: Establish a new agency, the “Forest Resource and Conservation Agency” which will be autonomous and independent from any Ministry. One of the disadvantages is that it would still put under the same umbrella both forestry conservation and forestry production objectives. In theory, these two could be complementary and mutually reinforcing. In practice, particularly where systems of governance are weak, these two objectives can be conflicting, with the conservation aspects typically bending to powerful economic interests.

To ensure the effective management of the national protected area system, option 1 seems the best solution according to which DNCP would be strengthened to assume primary responsibility for *in-situ* biodiversity conservation throughout the country.

In the long-term a modified option 4 might be considered. An autonomous “Cambodia Protected Areas Agency”, exclusively responsible for the conservation objective could be created, while the forestry production objectives would be retained under MAFF. This would be an effective solution, particularly if this agency could count on the support of a donor coordination unit.

Cluster Approach to Management

The assessment showed that the level of financial and other input into the Cambodia system of protected areas is very low. It also revealed some regional patterns of common pressures, threats, opportunities, etc. These two characteristics are favourable to the development of a ‘Cluster Approach’ that would build on “economies of scale” to address issues such as threat abatement, training, monitoring and evaluation, research, etc. This approach could help maximise the limited resources, foster interaction and collaboration among protected areas and institutions, and increase the impact and scale of interventions. Examples of larger areas that could function as

major “clusters” are the dry forest protected areas in the east, the Cardamom Mountains area, and the coastal areas. DCNP should consider designating responsibility for individual “protected area clusters” to its deputy directors. Collaboration with partners and NGOs should be explored for implementing the various priority recommendations suggested in this report. Such a collaboration could also be used, in the short-term, to address the conflicting competencies and absence of a clear coordination function and structure discussed above. Inter-ministerial and inter-organisational conservation-oriented advisory committees could be formed for the “clusters”. These committees should have primarily technical functions and thus could contribute to a better integration of inputs from all stakeholders and to effective coordination of conservation actions.

Coordinated Approach to Fundraising

Insufficient funding is a fundamental constraint to the effective management of the system of protected areas in Cambodia. Participants suggested that MoE take the lead in creating a Protected Area Subcommittee to represent a consistent protected area agenda at the annual Consultative Group Meeting. This Subcommittee would have the responsibility for framing the role of protected areas within the context of socio-economic development and poverty reduction. It would also be responsible for seeking and providing funding support for the protected areas system, according to jointly agreed priorities. The Protected Area Subcommittee should meet at least twice each year, and it should consist of high level representatives from MoE, MAFF, key bilateral and multilateral aid agencies, and international environmental NGOs. It should report to the larger Donor Committee once a year, and it should use this to increase the base of support and funding for protected areas in the country.

Training and Building Capacity of Rangers and Managers

Despite of its overall low level of funding, and when compared to countries in similar situations, the Cambodian protected areas system features a reasonable number of rangers. What is lacking are mid-level managers, and support staff. Staff numbers alone cannot be used to assess effective conservation in the field. This can be partly achieved through a strong programme targeted at training and building capacity of rangers and managers. Training needs should be identified and funding should be sought and committed. Additional management and support staff need to be recruited and trained. A key area for which protected area managers and rangers asked for urgent training is on raising awareness about their role in law enforcement. The need for additional training on laws and policies applicable to protected area management and enforcement was also identified.

System Design and Representativeness

Overall, the design and coverage of the system of protected areas is very good. During the RAPPAM the only area identified for expanding the system was in the marine environment. However, the recent designation of Koh Sdach Marine Protected Area has addressed this deficiency in a substantial way.

A RAPPAM assessment is not meant to be a substitute for more objective and comprehensive methods for identifying strategic actions with regard to protected area systems. It is, by design, a rapid and therefore “coarse-filter” process. Much of it relies on subjective assessments and integrity from a limited number of people with extensive on the ground experience. Within these limitations, RAPPAM provides clear patterns and allows for the identification of specific strategic actions at the system level, and in some cases at the site level. Because it is cost-effective in terms of both time and resources, it is an appropriate tool for more frequent monitoring and prioritisation of actions.

A more detailed analysis following well-established gap analysis and system planning methods will provide a higher level of resolution and address many issues that the RAPPAM process cannot address. Such an endeavour is more resource-intensive and will not likely be feasible at regular intervals. Planners and managers will ultimately benefit by seeing both RAPPAM and higher-resolution system planning as part of a comprehensive strategic planning cycle with the same ultimate goal: improving conservation decision-making to achieve national conservation and development objectives.

Recommendations

Recommendations based on the RAPPAM assessment are listed below. Responsible parties and target dates for completion of the recommendation are given in brackets.

Legal Framework

Finalise a clear and comprehensive Protected Areas Law and get approval from the Council of Ministers (Ministry of Environment in coordination with other relevant ministries and agencies, December 2005).

Management Plans

Finalise the manual "Participatory Development of Management Plans for Protected Areas in Cambodia" and distribute it to all protected area directors, MoE, relevant NGOs and donors (BPAMP, March 2005).

Seek funding for the development of management plans for at least 5 protected areas (Ministry of Environment, December 2005).

Boundary Demarcation

Carry out on-the-ground surveys to establish ground control points in protected areas where this has not yet been completed (Ministry of Environment, June 2005).

Seek funding for the physical demarcation of the boundaries of at least 10 protected areas (Ministry of Environment, December 2005).

Inter-ministerial Cooperation

Establish a task force with representatives from at least four ministries (Environment; Agriculture, Forestry and Fisheries; Public Works and Transport; and Tourism) to pursue a limited set of goals with regard to protected areas in the Lower Mekong Dry Forest ecoregion (Ministry of Environment, October 2005).

Cooperation with the Ministry of Defence

Draft and adopt a clear code of conduct for military personnel operating inside protected areas. The code should include specific policies for border, coastal, and other areas (Ministry of Environment and Ministry of Defence, December 2005).

Transboundary Cooperation

Develop a transboundary cooperation agreement for the Virachey - Mom Ray - Dong Ampham Protected Area Complex as a model for other transboundary protected areas (Ministry of Environment, December 2005).

Management Structure

Explore the feasibility of empowering DNCP to become exclusively responsible for the natural resource conservation objectives, with forestry production objectives retained under MAFF (Ministry of Environment, Ministry of Agriculture, Forestry and Fisheries, December 2005).

Cluster Approach to Management

Put in place mechanisms to coordinate management, use of resources, training, and monitoring and evaluation in "protected area clusters" (Ministry of Environment, June 2005).

Explore the feasibility of establishing inter-ministerial and inter-organisational conservation-oriented advisory committees for "protected area clusters", with the aim to better integrate inputs from all stakeholders and to effectively coordinate conservation actions (Ministry of Environment, December 2005).

Coordinated Approach to Fundraising

Lobby for the establishment of a Protected Area Subcommittee to represent a consistent protected area agenda at the annual Consultative Group Meetings with the aim to seek funding for the protected area system (Ministry of Environment, Ministry of Agriculture, Forestry and Fisheries, environmental NGOs and bilateral and multilateral aid agencies, October 2005).

Training and Building Capacity of Rangers and Managers

Develop a national training curriculum for rangers and protected area mangers in cooperation with NGOs (BPAMP and Ministry of Environment, December 2005).

System Design and Representativeness

Finalise and adopt the National Protected Area System Plan (BPAMP and Ministry of Environment, June 2005).

References and Acknowledgements

Cambodian Government 2004: Sub-decree Number 65 on the Designation of the Southern Cardamoms Protected Forest.

Erwin, J. 2003: Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology. - WWF. Gland. Switzerland. 49 pp.

Hockings, M., Stolton, S. and Dudley, N. 2000. Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas. - IUCN, Gland Switzerland and Cambridge UK. x + 121 pp.

Shields, D., Hobley, M., Boscolo, M., Miller, F., Monan, J. and Turton, C. 2004: Cambodia Independent Forest Sector Review. - GTZ, JICA, DFID, DANIDA, World Bank, Phnom Penh. 119 pp.

Tordoff, A. W., Timmins, R. J., Maxwell, A., Keavuth, H., Vuthy, L. and Hourt, K. E. 2005: Biological Assessment of the Central Indochina Dry Forest Ecoregion. - WWF Cambodia Programme, Phnom Penh.

UN 2003: United Nations and International Chamber of Commerce. An Investment Guide to Cambodia: Opportunities and Conditions. - United Nations, New York and Geneva.

Abbreviations used in this report:

Wildlife Sanctuaries

BPWS	Boeng Per
KPWS	Kulen Promtep
LWS	Lomphat
PKWS	Peam Krasaop
PAWS	Phnom Aural
PNLWS	Phnom Nam Lyr
PPWS	Phnom Prich
PSWS	Phnom Samkos
RDSWS	Roniem Daun Sam
SWS	Snoul

National Parks

BSNP	Botum Sakor
KNP	Kep
KINP	Kirirom
BNP	Phnom Bokor
PKNP	Phnom Kulen
RNP	Ream
VNP	Virachey

Protected Landscapes

APL	Angkor
BCPL	Banteay Chmar
PVPL	Preah Vihear

Multiple Use Areas

DPMUA	Dang Peng
SMUA	Samlot
TSMUA	Tonle Sap

Ramsar Sites

STRS	Stung Treng
BTCRS	Boeng Tonle Chhmar
KKRS	Koh Kapi

The authors would like to thank the following individuals for their invaluable contribution to this assessment:

Ros Thoeun, Peou Bunthan, Thorn Kim Hong, Ly Sun Eang, Phut Choup, Im Chhoeun, Yen Mouny, Kong Sophal, Kang Sieng Theng, Nou Karun, Ngiel Thun, Meng Text, Chork Sokvichbout, Khouy Khun Chanrath, Chrim Vutha, Dork Sothea, Sao Sithoun, Meas Ngiem, Ty Ouy Song, Mao Kunthea, Oung Someourn, Vin Chay, Mam Kosal, Khim Rongdan, Chou Sokphany, Sou Sovouth, Heng Chan Thoeun, Kheng Socheat, Meng Savuth, Hong Daravuth, Ouk Seiha, Y Lavy, Long Kheng, Chey Pichrathna, Kong Kimsreng, Ngor Hour, Koch Savath, Kol Vathana, Ek Sery Sopheap, Touch Vina, Chou Sophark, Oum Saven, Chea Kimsien,Nick Cox, Eang Pirun, Steven Schonberger, Mudita Chumroeun, Sok Vong, Kim Nong, Sam Chamroeun, Soun Punlork, Phon Khemrin, Men Ounmonic, Meas Sarim, Lic Vuthy, So Kadeth, Mi Keo Thera, Than Chanthou, Chheang Bopha, Lay Khim, Joe Walston, Sok Mary, Sok Sothea, Oun Honghak, Thuk Thavet, Tong Bunthoeun, Pich Koeveasna, Sam Samom, Ken Sereyrotha, Ung Sokhakun, Sok Kheng Novin, Sok Vuthea, Soun Mean, and David Ashwell.

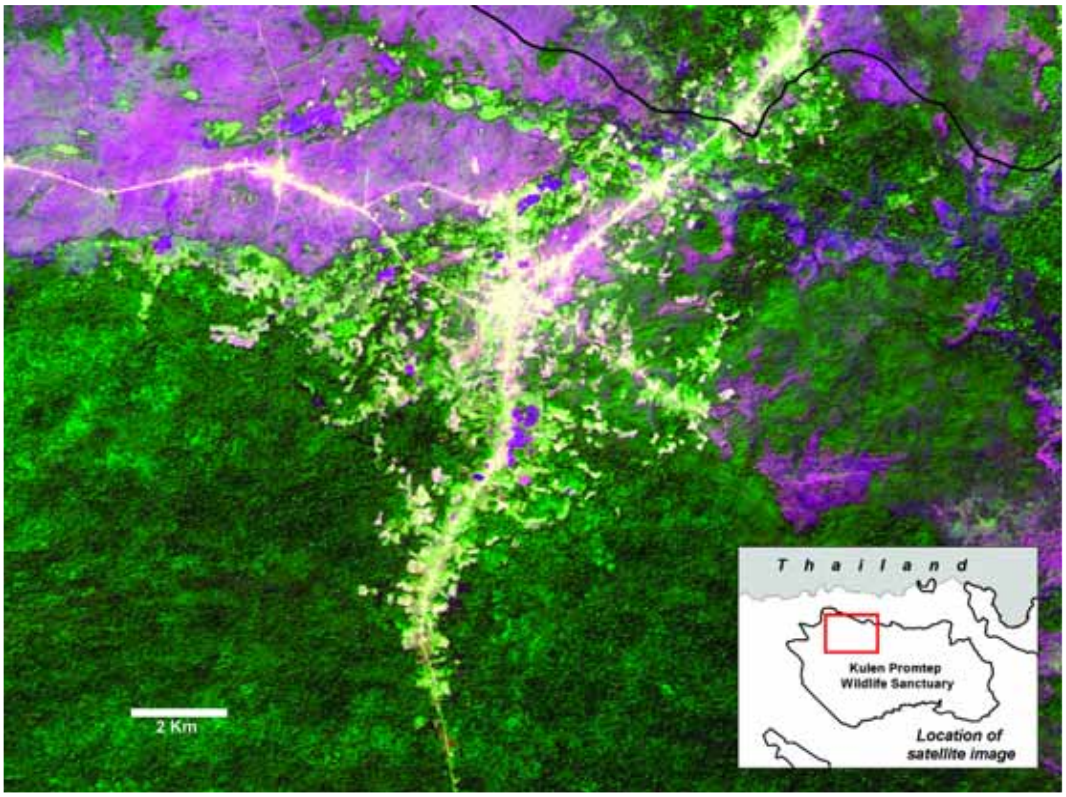


Figure 2. Aster satellite image showing forest clearing associated with a road in the northwest of Kulen Promtep Wildlife Sanctuary.

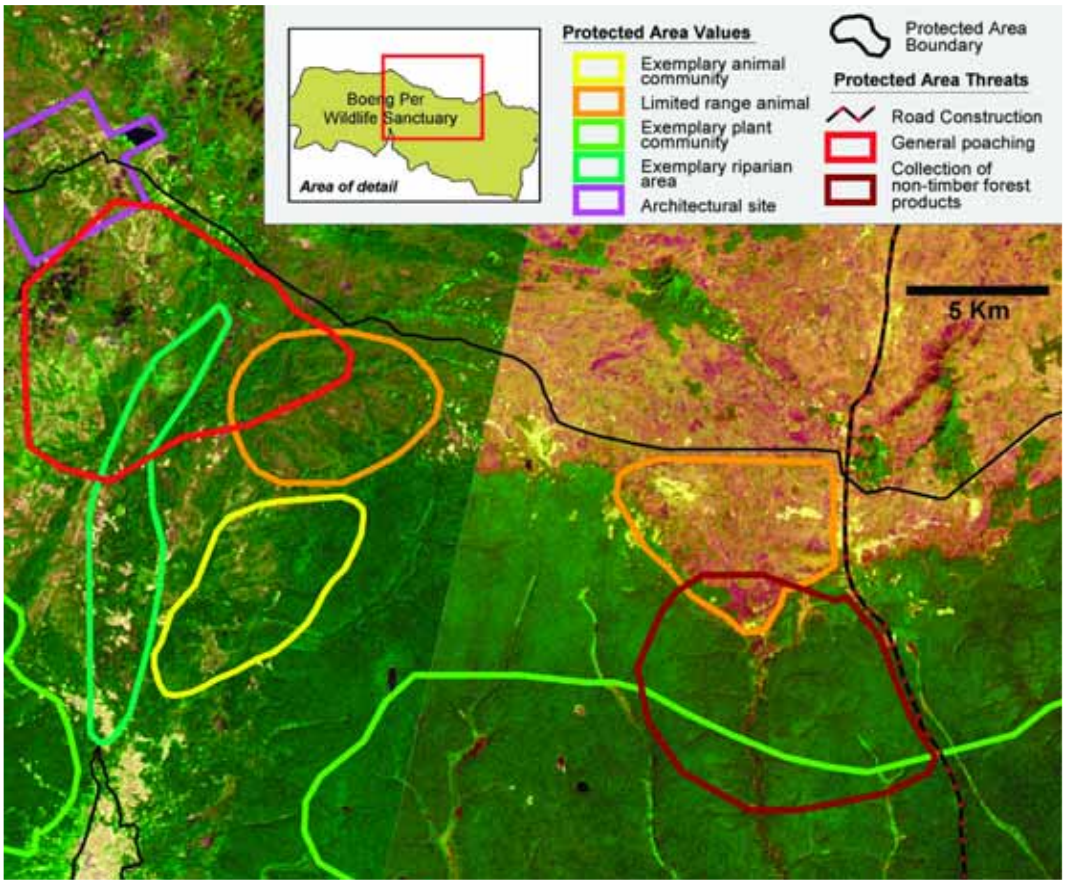


Figure 3. Example of spatial data compiled during the RAPPMap workshop. Values and threats were mapped with points, lines, and polygons depending on the nature of the phenomenon and the level of knowledge available.

Cambodia

Biodiversity
and Protected Areas
Management Project
(BPAMP)

Project Liaison Office
Biodiversity and Protected Areas Management Project (BPAMP)
Department of Nature Conservation and Protection, Ministry of Environment
#48, Samdech Preah Sihanouk, Tonle Bassac, Chamkarmon, Phnom Penh, CAMBODIA
Tel/Fax: (855) 23 213 900 **E-mail:** BPAMP@online.com.kh