



Prek Toal Core Area Tonle Sap Biosphere Reserve

Management Plan
2007-2011



PLAN PREPARED BY THE TONLE SAP CONSERVATION PROJECT
IN ASSOCIATION WITH MINISTRY OF ENVIRONMENT
AND MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES

Foreword

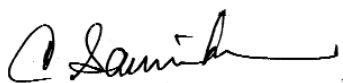
As defined by UNESCO, Biosphere Reserves are "areas of terrestrial and coastal/marine ecosystems, or a combination thereof, which are internationally recognized within the framework of UNESCO's Programme on Man and the Biosphere (Statutory Framework of the World Network of Biosphere Reserves). Reserves are nominated by national governments; each must meet a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the network. Each Biosphere Reserve is intended to fulfil three complementary functions: 1) a conservation function, to preserve genetic resources, species, ecosystems and landscapes; 2) a development function, to foster sustainable economic and human development; and, 3) a logistic support function, to support demonstration projects, environmental education and training, and research and monitoring related to local, national and global issues of conservation and sustainable development.

Physically, each Biosphere Reserve comprises three elements: one or more **core areas**, which are securely protected sites for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses (such as education); a clearly identified **buffer zone**, which usually surrounds or adjoins the core areas, and is used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism and applied and basic research; and a flexible **transition zone**, or area of cooperation, which may contain a variety of agricultural activities, settlements and other uses, and in which local communities, management agencies, scientists, non-governmental organizations, cultural groups, economic interests and other stakeholders work together to manage and sustainably develop the area's resources.

Cambodia's Tonle Sap Biosphere Reserve was established by Royal Decree dated 10 April 2001. It comprises the most important inland wetland in Southeast Asia. An outer Transition Zone of some 899,600 ha encircles a Buffer Zone of 541,482 ha of permanent and seasonal wetlands, including the lake itself, and managed for sustainable fisheries production and conservation of flooded forests and other wetlands. The Reserve has three Core Areas: Prek Toal (21,342 ha) in Battambang Province, and Boeung Chhmar (14,560 ha) and Stung Sen (6,355 ha) in Kampong Thom Province. The Royal Decree specifies that the Core Areas have the status of national park or wildlife sanctuary. The Ministry of Environment is responsible for the preparation of protection and conservation plans for the Core Areas, through the coordination of the Cambodia National Mekong Committee (Tonle Sap Biosphere Reserve Secretariat), and for subsequent implementation.


This plan addresses management needs in the Prek Toal Core Area for the period 2007-2011. In order to make the plan as familiar and "user-friendly" as possible to MoE officials and other stakeholders in Cambodia's protected areas system, it follows the format established in Cambodia's first protected area management plan, for Virachey National Park 2003-2007 (MoE 2003), and subsequent prescriptions and guidelines outlined in Ministry of Environment's manual "Participatory Development of Management Plans for Protected Areas in Cambodia" (MoE 2005). However, the management planning process and management plan content also have been adjusted as necessary to take into account the special circumstances and context of a Biosphere Reserve Core Area, both with regard to the international definition provided by UNESCO (above) and the functional definition of a Biosphere Reserve and constituent Core Areas in the Cambodian context.

I take pleasure in entrusting the Director of Prek Toal Core Area with the authority and the responsibility to implement this management plan.



Mr. Chay Samith
Director, Department of Nature Conservation and Protection
Ministry of Environment

This Management Plan has been reviewed by the Department of Nature Conservation and Protection of the Ministry of Environment and approved for implementation.



His Excellency Dr. Mok Mareth
Minister of Environment
June 2007

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The Plan was prepared by a planning team comprising members from the TSCP, Ministry of Environment, and Fisheries Administration. We thank the many individuals in these institutions, and in the Tonle Sap Biosphere Reserve Secretariat, Tonle Sap Environmental Management Project, Wildlife Conservation Society and other NGOs, Provincial Administrations, and Commune Offices who assisted in the preparation of this Plan through providing information and logistical support. We particularly wish to thank the dedicated staff of the Prek Toal Core Area, local officials and community members who shared their knowledge of the Core Area's ecology and management challenges with us during field visits and consultations. We sincerely hope that the management measures now contained in the Plan accurately and sufficiently reflect your concerns and good advice.

The cover illustration was selected from over 25 entries in a school drawing contest organized by Osmose and teachers of the Koh Chiveang Primary and Secondary Schools, located immediately adjacent to the Prek Toal Core Area. We thank the contest organizers and all of the entrants for their enthusiastic contributions, and congratulate the contest winner, Khoern Seng Chan Srey from Anlong Ta Oor village.

This Plan is dedicated to the children of the communities that are reliant on the natural resources of the TSBR Core Areas and the larger Tonle Sap ecosystem. These resources and the irreplaceable biodiversity of the Tonle Sap are their legacy, and the future will soon be in their hands. We hope that this Plan and its successors will assist current and future generations of Tonle Sap residents to use and conserve these resources wisely.

Acronyms, Abbreviations and Symbols

ADB	Asian Development Bank
B.Sc.	Bachelor of Science
BMS	Biodiversity Monitoring Subcontractor
CAMC	Core Area Management Centre
CFOs	Community Fisheries Organizations
CITES	Convention on International Trade in Endangered Species
CNMC	Cambodia National Mekong Committee
DoE	Department of Environment
<i>e.g.</i>	for example
<i>et al.</i>	and others
FA	Forestry Administration
FiA	Fisheries Administration
GEF	Global Environment Facility
GoC	Government of Cambodia
GPS	Global Positioning System
ha	hectare
IFREDI	Inland Fisheries Research and Development Institute
IUCN	International Union for Conservation of Nature and Natural Resources
km	kilometer
km ²	square kilometer
m	meter
m ²	square meter
MoE	Ministry of Environment
NGO	Non-Governmental Organization
No.	Number
<i>op. cit.</i>	previously cited
ref	reference
TSBR	Tonle Sap Biosphere Reserve
TSBRS	Tonle Sap Biosphere Reserve Secretariat
TSEMP	Tonle Sap Environmental Management Project
TSSLP	Tonle Sap Sustainable Livelihoods Project
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCS	Wildlife Conservation Society
%	per cent
~	approximately
>	greater than

Executive Summary

Introduction

The Prek Toal Core Area was created under the Royal Decree on the Establishment and Management of Tonle Sap Biosphere Reserve dated 10 April 2001. The Ministry of Environment was designated as the authority responsible for the preparation of protection and conservation plans for the Biosphere Reserve's Core Areas.

The TSBR comprises the most important inland wetland in Southeast Asia, both for biodiversity conservation and livelihoods based on harvesting of aquatic resources. The Prek Toal Core Area is considered to represent the most pristine habitat in the Reserve. The concentration, variety and numbers of nesting waterbirds, including many threatened species, makes the area unique and globally significant. Aquatic productivity also is very high, currently yielding the best fish harvests on the lake.

Mission Statement for Prek Toal Core Area

The mission of the Prek Toal Core Area is to conserve and sustainably manage the natural and cultural resources of the Core Area, in partnership with local communities and other stakeholders, for the benefit of the people from local communities and Cambodia as a nation, and, by so doing, to contribute to international efforts to reconcile the conservation of biodiversity with its sustainable use, as exemplified by the Biosphere Reserve concept.

Management Plan Purpose

This Plan is intended to be used as a guide for the management of Prek Toal Core Area during the five year period 2007-2011. Part One of the Management Plan describes the Core Area, and identifies its conservation values and significance. Part Two of the Plan describes management objectives, and identifies priority activities that need to be undertaken to achieve these objectives, including responsible parties and timing. The Plan is intended to be used as the primary resource in the preparation of annual operating plans and budgets, and also provides a basis for evaluating achievement of management objectives.

Management Programmes

The Management Plan is divided into seven Management Programmes, with the following goals and objectives:

1. Core Area Operations and Maintenance

with the **goal** of strengthening and routinely implementing Core Area operations and support services, and the **objectives** of ensuring operational effectiveness of Core Area staff; developing, operating and maintaining the infrastructure necessary for effective Core Area management; ensuring that adequate equipment is available for efficient operation and management of the Core Area; developing and implementing financial management systems that are both efficient and transparent; and improving coordination of Core Area activities with those of other government agencies, communes, communities, NGOs and other partners.

2. Resource Conservation and Management

with the **goal** of maintaining the integrity of the biological, cultural and physical features of the Prek Toal Core Area, and the **objectives** of ensuring effective and efficient protection and management of the fauna and flora, and of the biophysical elements of their habitats, within the Prek Toal Core Area; identifying and maintaining cultural values associated with the Core Area; and minimizing the occurrence of destructive fires and their related impacts within the Core Area.

3. Resource Inventory, Monitoring and Research

with the **goal** of providing accurate, relevant and timely information for resource management, and the **objectives** of carrying out baseline inventories and monitoring of Core Area ecological resources; undertaking effective, management-oriented research on these resources; and developing and maintaining a Resource Information Management System, and using this as an information sharing and decision-making tool for managing Core Area resources.

4. Ecotourism Development

with the **goal** of developing and sustainably managing ecotourism in the Prek Toal Core Area, in partnership with local communities and other stakeholders, and without negatively affecting the ecological integrity of the Core Area or the social and cultural integrity of adjacent communities, and the **objectives** of establishing ecotourism that is appropriate to the ecological setting and legal status of the Core Area, and to the social setting of surrounding communities; improving dissemination of information on ecotourism experiences that are available in the Core Area, and improving the marketing of these experiences; ensuring that visitors arriving at Prek Toal are provided with the best possible orientation and information services and facilities; ensuring that products and services delivered as part of the "Prek Toal experience" adhere to the highest possible quality standards; and establishing and implementing procedures and regulations regarding the management of ecotourism and ecotourist activities.

5. Community Development

with the **goal** of increasing community involvement and support for biodiversity conservation and the **objectives** of strengthening the operation of community institutions involved in conservation; ensuring that local communities share in the benefits of Core Area conservation and management; improving the living conditions of local communities that are impacted by Core Area management; creating understanding and awareness about biodiversity conservation among local residents through education and outreach activities; ensuring sustainable utilization of Core Area resources by local communities; and evaluating the impact and effectiveness of community awareness, conservation, livelihoods and other natural resource management programmes.

6. Buffer Zone and Transition Zone Management

with the **goal** of establishing and enhancing collaboration with authorities and other stakeholders in the Buffer Zone and Transition Zone adjacent to the Prek Toal Core Area, and the **objectives** of ensuring that prescriptions in the Prek Toal Management Plan are communicated to key stakeholders in the Buffer Zone and Transition Zone, that appropriate cooperative linkages are developed and maintained, and that impacts of land use and resource use activities adjacent to the Core Area are minimized.

7. International Cooperation

with the **goal** of contributing to collaboration and knowledge development within the global system of Biosphere Reserves, and the **objective** of ensuring that lessons learned in the development and implementation of the Prek Toal Core Area Management Plan are exchanged with others concerned with Biosphere Reserve Core Area management.

Budget

The budget summarized below combines funding from GoC (MoE, FiA), WCS and the UNDP/GEF-funded Tonle Sap Conservation Project. Details of budgets and periodic revisions are held by the individual agencies.

Budget Summary (all figures in US\$).¹

Description and Cost (US\$)	2007	2008	2009	2010	2011	Subtotal
Basic Operations						
Ranger salaries	48,500	48,500	48,500	48,500	48,500	242,500
Ranger equipment and supplies	3,200	3,200	3,200	3,200	3,200	16,000
Ranger boat operation and maintenance	4,100	4,100	4,100	4,100	4,100	20,500
Tourist boat operation and maintenance	4,800	4,800	4,800	4,800	4,800	24,000
CAMC/floating centre maintenance	1,000	1,000	1,000	1,000	1,000	5,000
Office supplies	2,500	2,500	2,500	2,500	2,500	12,500
Communications (telephone, internet)	200	200	200	200	200	1,000
Photocopying and report reproduction	1,500	1,500	1,500	1,500	1,500	7,500
Travel costs	20,600	20,600	20,600	20,600	20,600	103,000
Special Programmes						
Colony monitoring programme	6,700	6,700	6,700	6,700	6,700	33,500
Livelihoods support	23,400	17,800	17,800	4,400	4,400	67,800
Environmental education	6,500	3,500	500	500	500	11,500
Training	3,600	4,800	4,800	4,800	4,800	22,800
Boundary demarcation	1,000	6,000	0	0	0	7,000
Fisheries management	5,000	5,000	5,000	5,000	5,000	25,000
Total	132,600	130,200	121,200	107,800	107,800	599,600

¹ in addition to MoE, FiA, WCS and UNDP/GEF funding coordinated through GoC, Osmose currently expends US\$42,500/yr on environmental education and US\$46,000/yr on livelihoods support in villages immediately adjacent to the Core Area (Prek Toal, Piak Kantel and Kbal Toal)

Part One: Background Information on Prek Toal Core Area

A. Introduction

A basic principle of protected area management is that every protected area should have a management plan. The management plan "guides and controls the management of protected area resources, the uses of the area, and the development of facilities needed to support that management and use. It facilitates all development activities and all management activities to be implemented in an area" (MacKinnon et al. 1986).

This Management Plan is intended for use primarily by those charged with planning and implementation of the day to day management of the Prek Toal Core Area, and by other stakeholders such as resource users, resource managers, researchers, NGOs and government staff from district, provincial and national levels. The intent is to provide users of the Plan with an agreed guide to what they need to do, how and when they should do it, and what resources are required. It is intended that the Plan will also be of use to policy-makers, decision-makers and funding agencies in understanding why and how the Prek Toal Core Area is being managed.

The Plan focuses on assessments of biodiversity resources (what needs to be managed) and human use (why it needs to be managed), and on a description of administration, resource management and protection, visitor use and management, and development programmes. It provides sufficient detail on biophysical and socio-economic conditions for an understanding of key issues surrounding management of the Core Area, but purposely avoids presentation of excessive (and largely unnecessary) background information. This approach has been taken to facilitate preparation, discussion and understanding of the Plan, and to ensure that it remains focused and easy to use. Additional background on the regional biophysical and socioeconomic setting can be found in the documents listed under References Cited.

This Management Plan provides a five year framework for management, within which the scope, timing and relative emphasis on specific activities can (and should) be modified by field managers on the basis of experience, success and progress achieved as the Plan is implemented. In order to ensure success in management implementation it is important that overall levels of inputs indicated under each programme be maintained to the extent possible, but it is even more important that there is sufficient flexibility to make needed modifications and adjustments to management activities within the limits set by overall goals and objectives.

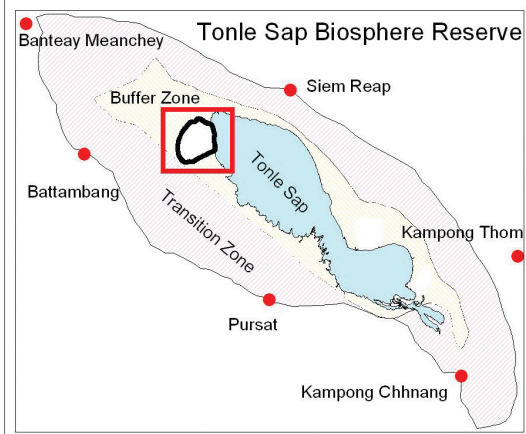
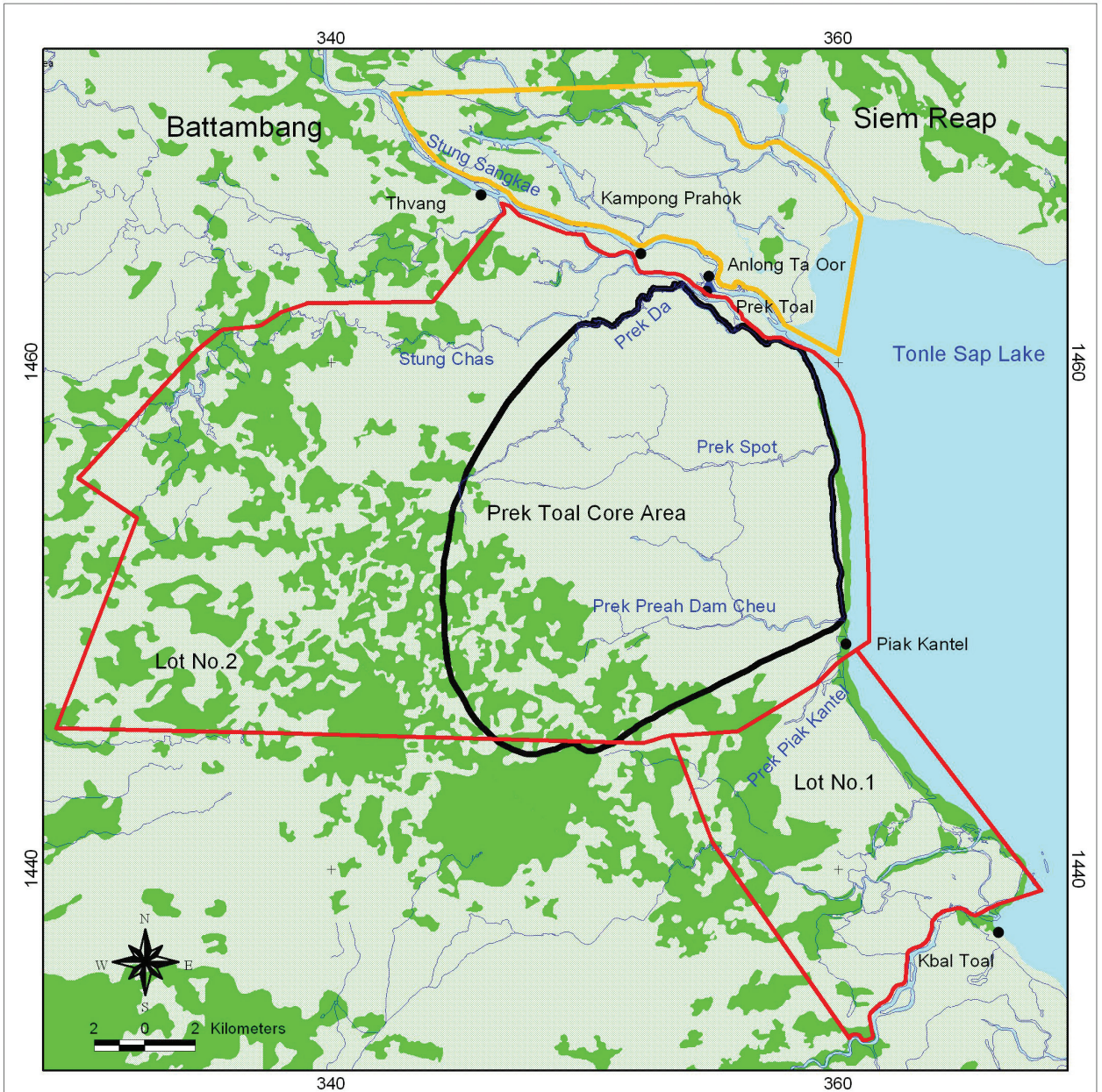
The role of the management plan is to guide the managers of a protected area towards a vision for the site in a structured way. The management plan, if properly structured and used, can be the most important document that a protected area possesses, and, together with its supporting documents, should form the basis for all management actions and decisions (MoE 2005).

B. Description of Prek Toal Core Area

B1. Biophysical Description

B1.1 Location and Physical Features

The Prek Toal Core Area is located at the northwestern end of Tonle Sap Lake, in Koh Chiveang Commune, Ek Phnom District, Battambang Province (Figure 1). Roughly circular in shape, it is located



LEGEND

● Village	■ Grassland
— Core Area Boundary	■ Flooded Forest
— Fishing Lot Boundary	■ Tonle Sap Lake
— Released Fishing Lot Area	

Figure 1. Location of Prek Toal Core Area

entirely within the TSBR's Buffer Zone, with its eastern boundary bordering the dry season (low water) edge of the lake. It is the largest of the TSBR's three Core Areas, with an extent of 21,342 ha.

Prek Toal is part of the unique Tonle Sap Lake ecosystem, the functioning of which determines the Core Area's biophysical features and biological importance. During most of the year (October to June-July) the lake drains into the Mekong through the Tonle Sap River, becoming incrementally shallower and smaller in area, to ~2500 km², and decreasing in depth to a maximum of ~1 m. However, when the Mekong floodwaters peak in mid-year, the Tonle Sap River reverses its flow and backfloods the lake, increasing its area to ~12,000 km² and maximum depths to ~10 m. The Prek Toal Core Area is largely dry during the low water season, with water remaining only in scattered pools and watercourses, and completely flooded during the high water season, only the tops of emergent trees remaining above water.

B1.2 Flora

The predominant vegetation cover in the Prek Toal Core Area is seasonally flooded freshwater swamp forest (also known as flooded or inundated forest). Composition and structure of the vegetation cover varies according to depth and duration of inundation, soil composition, and human influence, primarily cutting and fire (McDonald *et al.* 1997; CNMC NEDECO 1998; Rundel 2000).

Three main vegetation types can be distinguished on the basis of habitat structure and plant species composition:

- gallery forest, located along the dry season shoreline of the lake (eastern edge of Core Area) and in small patches elsewhere. Predominant species are *Barringtonia acutangula* and *Diospyros cambodiana*;
- short-tree shrublands, comprising dense stands of scrub and scattered emergent trees, and covering most (~80%) of the Core Area; and,
- grasslands/herbaceous vegetation, covering extensive areas primarily in the southwest of the Core Area, and subject to an annual cycle of flooding and dry season fires. A narrow strip of grassland/herbaceous vegetation also occurs along the dry season shoreline of the lake.

Approximately 200 vascular plant species have been documented as occurring on the Tonle Sap floodplain (review in Davidson 2006), but the number that occur within the Prek Toal Core Area, and their distribution, remains to be documented.

B1.3 Fauna

The annual cycle of flooding and drying in the Tonle Sap ecosystem limits faunal diversity to the most mobile or otherwise flood-adapted species. However, this cycle also results in very high levels of aquatic productivity which supports a unique faunal community, including one of the most productive freshwater fisheries in the world.

Although information is incomplete, the TSBR is considered to support >300 species of invertebrates, 210 species of birds (17 of conservation significance), >107 species of fish (4 of conservation significance), >30 species of reptiles (10 of conservation significance), 20 species of mammals (6 of conservation significance) and ~5 species of amphibians (Goes 2005). Given its size, location and habitat structure, the Prek Toal Core Area can be expected to support many of these species.

Birds

The TSBR is a globally important site for colony-nesting waterbirds, supporting "the largest remaining fragment of a bird megafauna that was once widespread across much of Southeast Asia" (Davidson *et al.* 2001). The Prek Toal Core Area is by far the single most important nesting site on the lake, supporting populations of five globally threatened, five globally near-threatened and four internationally significant waterbird species. An additional four waterbirds that are threatened as breeding species in adjacent Laos, Vietnam and Thailand also occur in substantial numbers in the Biosphere Reserve (Table 1).

Table 1. Waterbird Species of Conservation Concern Occurring in Prek Toal Core Area.¹

Species	International Status	Significance
Greater Adjutant <i>Leptoptilos dubius</i>	IUCN Endangered	second largest colony in the world (>10% of global population)
Spot-billed Pelican <i>Pelecanus philippensis</i>	IUCN Vulnerable	largest colony in the world (20% of global population)
Lesser Adjutant <i>Leptoptilos javanicus</i>	IUCN Vulnerable	largest colony in Southeast Asia (4% of global population)
Milky Stork <i>Mycteria leucura</i>	IUCN Vulnerable	only colony in mainland Southeast Asia
Masked Finfoot <i>Heliopais personata</i>	IUCN Vulnerable	likely of global significance
Oriental Darter <i>Anhinga melanogaster</i>	IUCN Near-threatened	largest colony in Southeast Asia (>10% of global population)
Black-headed Ibis <i>Threskiornis melanocephalus</i>	IUCN Near-threatened	largest colony in Southeast Asia (4-8% of global population)
Painted Stork <i>Mycteria leucocephala</i>	IUCN Near-threatened	largest colony in Southeast Asia (20% of global population)
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>	IUCN Near-threatened	breeds in Prek Toal
Grey-headed Fish-Eagle <i>Ichthyophaga ichthyaetus</i>	IUCN Near-threatened	breeding population likely of global significance
Little Cormorant <i>Phalacrocorax niger</i>	IUCN Least Concern (but Prek Toal population is internationally significant)	>1% of Asian biogeographic population
Indian Cormorant <i>Phalacrocorax fuscicollis</i>	IUCN Least Concern (but Prek Toal population is internationally significant)	>1% of Asian biogeographic population
Great Egret <i>Casmerodius albus</i>	IUCN Least Concern (but Prek Toal population is internationally significant)	>1% of Asian biogeographic population
Asian Openbill <i>Anastomus oscitans</i>	IUCN Least Concern (but Prek Toal population is internationally significant)	>1% of Asian biogeographic population
Woolly-necked Stork <i>Ciconia episcopus</i>	IUCN Least Concern (but Prek Toal population is regionally significant)	threatened as a breeding species in adjacent countries
Glossy Ibis <i>Plegadis falcinellus</i>	IUCN Least Concern (but Prek Toal population is regionally significant)	threatened as a breeding species in adjacent countries
Purple Heron <i>Ardea purpurea</i>	IUCN Least Concern (but Prek Toal population is regionally significant)	threatened as a breeding species in adjacent countries
Great Cormorant <i>Phalacrocorax carbo</i>	IUCN Least Concern (but Prek Toal population is regionally significant)	threatened as a breeding species in adjacent countries

¹ adapted from Goes (2005) , Davidson (2006), IUCN (2006) and Tingay *et al.* (2006)

Mammals

The mammalian fauna of the TSBR is not particularly diverse, but includes several species that are listed as globally threatened, and that may remain in internationally significant numbers (Davidson 2006). Globally threatened mammals occurring in Prek Toal Core Area are slow loris (either northern slow loris *Nycticebus bengalensis* or pygmy slow loris *N. pygmaeus*, both listed as Vulnerable), long-tailed macaque *Macaca fascicularis* (Near-threatened), Germain's silver leaf monkey *Trachypithecus villosus germaini* (Data Deficient), hairy-nosed otter *Lutra sumatrana* (Data Deficient), smooth otter *Lutrogale perspicillata* (Vulnerable), and fishing cat *Prionailurus viverrinus* (Vulnerable).

All large wild herbivores (Eld's deer *Cervus eldi*, hog deer *Axis porcinus*, wild water buffalo *Bubalus bubalis*, Asian elephant *Elephas maximus*) and Irrawaddy dolphin *Orcaella brevirostris* have now been extirpated from the TSBR.

Reptiles

The Tonle Sap is possibly the single most important wetland for reptile conservation in Southeast Asia (Goes 2005), supporting significant populations of several threatened species (Table 2). Relatively little survey work has been conducted, and many species are now difficult to observe in the field due to low population densities (Davidson 2006). Only a preliminary list of species can be derived for Prek Toal Core Area, based on limited records, known habitat affinities and recent studies of watersnake harvests.

Table 2. Reptile Species of Conservation Concern Occurring in the TSBR.¹

Species	International Status	Significance
Siamese Crocodile <i>Crocodylus siamensis</i>	IUCN Critically Endangered	small numbers may persist in Prek Toal
River Terrapin <i>Batagur baska</i>	IUCN Critically Endangered	probably extinct in TSBR
Asian Giant Softshell Turtle <i>Pelochelys cantorii</i>	IUCN Endangered	reported from the Tonle Sap, but no confirmed specimens or photographs
Elongated Tortoise <i>Indotestudo elongata</i>	IUCN Endangered	reported from the Tonle Sap, but no confirmed specimens or photographs
Yellow-headed Temple Turtle <i>Hieremys annandalii</i>	IUCN Endangered	TSBR population may be the most important in Cambodia; known from Prek Toal Core Area
Burmese Python <i>Python molurus</i>	IUCN Near-threatened	occurs in Prek Toal
Asian Box Turtle <i>Cuora amboinensis</i>	IUCN Vulnerable	now uncommon in TSBR
Black Marsh Turtle <i>Siebenrockiella crassicollis</i>	IUCN Vulnerable	rare, but TSBR population may be the most important in the region
Giant Asian Pond Turtle <i>Heosemys grandis</i>	IUCN Vulnerable	considered to be scarce
Malayan Snail-eating Turtle <i>Malayemys subtrijuga</i>	IUCN Vulnerable	reportedly the most numerous turtle around the Tonle Sap, but declining across its range
Asiatic Softshell Turtle <i>Amyda cartilaginea</i>	IUCN Vulnerable	common to rare around the Tonle Sap; populations have recently declined

¹adapted from Davidson (2006) and IUCN (2006)

Amphibians

Very little information on amphibians is available for the TSBR, and none specifically for Prek Toal Core Area (Davidson 2006). Local fishermen interviewed in December 2005 described the presence of frogs and/or toads (perhaps several species) but no specimen collections have been made to date. The amphibian fauna is expected to show close affinities with that in adjacent lowlands, which includes at least 18 species (Davidson 2006, citing B. Stuart *in litt.* 2005).

Fish

Fish are the largest vertebrate group in the Tonle Sap ecosystem (Lamberts 2001), although the number of species is not precisely known. Approximately 500 fish species have been described for the Mekong River system in Cambodia; at minimum 143 of these have been recorded in the Tonle Sap Lake, the Tonle Sap River and the surrounding floodplain (Davidson 2006). Sixteen of these are known to be of international conservation concern (Table 3). Battambang Fishing Lot No. 2, which overlays the Prek Toal Core Area, is the most productive fishing lot on the Lake, and is considered to be a key area of conservation importance for fish.

Table 3. Fish Species of Conservation Concern Occurring in the TSBR.¹

Species	International Status	Significance
Mekong Giant Catfish <i>Pangasianodon gigas</i>	IUCN Critically Endangered; CITES Appendix I	Fishing Lot No. 2 may be an important nursery area
Leaping Barb <i>Chela caeruleostigmata</i>	IUCN Critically Endangered	not recorded from Tonle Sap Lake, but possibly occurs
Jullien's Golden Carp <i>Probarbus jullieni</i>	IUCN Endangered; CITES Appendix 2	recorded from Tonle Sap Lake
Laotian Shad <i>Tenualosa thibaudeaui</i>	IUCN Endangered	populations have recently drastically declined due to factors outside of the Tonle Sap
Tricolor Sharkminnow <i>Balantiocheilos melanopterus</i>	IUCN Endangered	depicted on FiA's Endangered Fishes of Cambodia
Asian Bonytongue/Asian Arowana <i>Scleropages formosus</i>	IUCN Endangered; CITES Appendix I	occurrence in TSBR not confirmed
Thicklip Barb <i>Probarbus labeamajor</i>	IUCN Data Deficient	recorded in Tonle Sap, but little known
Giant Pangasius <i>Pangasius sanitwongsei</i>	IUCN Data Deficient	becoming increasingly rare throughout its range
Giant Barb <i>Catlocarpio siamensis</i>	not listed, but requires urgent evaluation and immediate conservation attention	numbers have declined drastically
<i>Puntioplites bulu</i>	not listed	formerly common, but has recently become very rare. Depicted on FiA's Endangered Fishes of Cambodia. Occurrence in TSBR requires confirmation.
Sabretoothed Thryssa <i>Lycotryssa crocodilus</i>	not listed	depicted on FiA's Endangered Fishes of Cambodia
Four-barred Tigerfish <i>Datnioides quadrfasciatus</i>	not listed	occurrence in TSBR not confirmed. Depicted on FiA's Endangered Fishes of Cambodia

<i>Wallago leeri</i>	not listed	occurrence in TSBR not confirmed. Depicted on FiA's Endangered Fishes of Cambodia
<i>Albulichthys albuloides</i>	not listed	depicted on FiA's Endangered Fishes of Cambodia
Elephant-ear Gourami <i>Oxonedus exodon</i>	not listed	occurrence in TSBR not confirmed. Depicted on FiA's Endangered Fishes of Cambodia
<i>Botia</i> genus	not listed	several species recorded in first half of 20th Century, but no recent records

¹adapted from Davidson (2006) and IUCN (2006)

Invertebrates

The invertebrate fauna of Prek Toal is expected to include primarily aquatic and semi-aquatic species, and species richness may be relatively low (Constant and Grootaert 2003). However, only limited field surveys have been undertaken (Constant and Grootaert *op cit.*).

B2. Socio-economic Situation

"Permanent" settlements in the vicinity of the Core Area are limited to the adjacent villages of Prek Toal and Anlong Ta Oor along the Sangkae River immediately opposite the northern boundary, and to Kampong Prahok and Thvang, ~4 km and 10 km, respectively, upstream of Prek Toal/Anlong Ta Oor villages. All of these villages primarily consist of floating structures, and the population disperses during high water levels. Near the southern boundary, the floating village of Piak Kantel disperses seasonally up and down the Prek Piak Kantel; administratively this village is part of Prek Toal village. All of these villages are in Koh Chiveang Commune. The estimated populations are as follows: Prek Toal/Piak Kantel 2598 (497 families); Anlong Ta Oor 1964 (365 families); Kampong Prahok 988 (206 families); Thvang 1306 (244 families).

Village economies rely almost entirely on fishing and associated processing activities, using a wide variety of fishing gear (Goes 2005). Related activities include hunting turtles and snakes for food and trade. Harvesting of watersnakes (primarily as feed for crocodile farms) has been a major activity since the mid-1990s. Live capture of macaques (for international trade), and collection of waterbird eggs and chicks for food and trade, have been important livelihood activities in the recent past; these activities are illegal and are now much reduced through improved enforcement, although occasional incidents still occur. Capture of crocodiles (for sale to crocodile farms) was also an important activity in the past, but has now largely ceased due to effective extirpation of the wild population. Fish farming (primarily *Pangasius* sp.) and crocodile farming also are well-established, but the latter is currently economically unviable due to the collapse of external markets. Some animal husbandry (chickens, ducks, pigs) is carried out, but generally with poor results.

The Core Area is completely overlain by Battambang Fishing Lot No. 2, which is one of the most productive fishing concessions in Cambodia. The management of fishing activities in this Lot largely determines access to the Core Area, and has an over-riding influence on how the Core Area resources are managed, as follows (see also Goes 2005):

- the lot (and hence the Core Area) is open to unrestricted access only during July-September, the closed season for commercial-scale fishing. At the beginning of this season water levels are at their lowest (and hence access by water is restricted to wooden canoes and the major streams), but by end of September they are generally at their highest, and all areas can be reached by even the largest boats. Livelihoods activities during this period include subsistence fishing, hunting/capture of macaques and reptiles, and harvesting and transport of fuelwood;
- during July-December the predominant fishing activities are the operation of lop raw (arrow-shaped bamboo fence traps that may be several kilometers long) and dong fishing (family-scale fishing

requiring payment to the Fishing Lot owner). It is noteworthy here that lop raw fishing is not officially permitted inside the flooded forest, but this restriction is open to differing interpretation and is not enforced. Darters, pelicans and adjutants initiate nesting during this period, and are subject to egg collection (currently largely prevented by Core Area staff) and to disturbance from fishing and tourist boats and related activities. Waterbirds also are subject to subsistence hunting and trapping during this period by the lop raw operators and family fishermen;

- the lakeshore is closed off with bamboo fencing during January-June, and access by boat is closely controlled by means of guarded gates. Tourist access continues, by means of paddle boats and with permission of the Lot owner, during the early part of this period (which is also the peak nesting season for colonial waterbirds). Also during this period, large (but undocumented) numbers of migrants from upland areas move into the outer margins of the Core Area, following the receding shoreline. As the lake waters reach their lowest levels in April, streams are dammed and pumped out to maximize the fish catch, an illegal activity that is, however, largely uncontrolled. From March through June access is by foot only. Uncontrolled fires, many if not most of which are set by hunters, are widespread during this period, and may threaten colony sites still occupied by unfledged young.

B3. Conservation Values and Significance

B3.1 Biological Values

Although certainly impacted by a long history of human use, the Prek Toal Core Area is considered to represent the most pristine habitat in the TSBP. The concentration, variety and numbers of nesting waterbirds, including many threatened species, makes the area unique and globally significant. Aquatic productivity also is very high, yielding very large (although possibly declining) harvests of watersnakes and, notably, the best fish harvests on the lake.

At the ecosystem level, the Core Area represents a small but largely intact and important part of the globally unique seasonally inundated zone of the Tonle Sap Lake.

B3.2 Ecotourism Values

The Prek Toal Core Area is a globally significant ecotourism resource, providing relatively easy and comfortable access to a spectacular and unique concentration of nesting large waterbirds in scenic surroundings. Ecotourism value remains largely intact and has very likely increased with the successful protection and concomitant increased numbers and wider distribution of waterbirds. Protection and maintenance of the biological and ecotourism values of the bird colonies will, however, require a careful assessment of carrying capacity, and development and enforcement of rules regarding timing and number of visits, proximity of approach, and visitor behaviour.

The area's potential as an ecotourism resource is increased many-fold by its relatively easy access from Siem Reap Province, which currently (2005 figures) receives in excess of 675,000 visitors per year (MoT 2006). It is thought that most current visitors to Prek Toal make the trip as an adjunct to longer visits to Siem Reap/Angkor Wat, although specific or long-term figures are not available. The Prek Toal Core Area is an easy day trip from Siem Reap, approximately 20 km by road and an additional 15 km by boat to reach Prek Toal village. Although the great majority of visitors currently make the round-trip in a single day, there is some potential for longer visits, and basic overnight accommodations are now available.

B3.3 Cultural Values

The cultural and historic values of the Prek Toal Core Area remain to be fully assessed, although the area is certainly of immediate significance to the lifestyles of current residents in adjacent villages.

One of the aims of Biosphere Reserve management is to encourage the use of traditional knowledge in sustainable development. There is a wealth of such knowledge held by local residents, although this remains to be adequately documented.

B3.4 Educational Values

Another aim of Biosphere Reserve management is to promote environmental education and public awareness. The Prek Toal Core Area provides a unique, diverse and relatively easily accessible resource on which to focus environmental education and awareness activities. These have already been initiated on a modest scale, primarily involving structured visits to the Core Area by school children from Prek Toal and adjacent villages, and delivery of environmental education and awareness programming within the village. This programming will be continued and expanded during the Management Plan period, with delivery through the local school system, the Core Area Management Centre, and on site in the Core Area itself.

B3.5 Economic Values

The current economic value of the Prek Toal Core Area is based largely on commercial exploitation of the fishery resource, and on resource harvesting for subsistence-level livelihoods. There is also potential for local economic diversification, including employment as Rangers, boat drivers and CAMC staff, and provision of visitor support services (accommodation, transportation, food services, guiding).

Part Two: Management Plan 2007-2011

C. Purpose and Mission Statement

C1. Purpose of Prek Toal Core Area

The purpose of the Prek Toal Core Area is to conserve and protect:

- representative examples of Cambodia's biodiversity, including flooded forest and associated habitat types, and constituent floral and faunal species;
- an area of exceptional natural and scenic beauty;
- endangered, vulnerable, threatened, endemic and rare species, and species otherwise of special concern or of exceptional value, including unique, globally significant concentrations of colonial-nesting waterbirds;
- spawning grounds and nursery habitat for an economically important assemblage of fish species;
- the unique association and mosaic of habitats that give the Core Area its distinctive character;
- the scenic, aesthetic and cultural attributes that can support sustainable tourism development; and
- the cultural and natural ecological processes that support the Core Area's biodiversity, while safeguarding the interests of local communities.

C2. Mission Statement for Prek Toal Core Area

The mission of the Prek Toal Core Area is to conserve and sustainably manage the natural and cultural resources of the Core Area, in partnership with local communities and other stakeholders, for the benefit of the people from local communities and Cambodia as a nation, and, by so doing, to contribute to international efforts to reconcile the conservation of biodiversity with its sustainable use, as exemplified by the Biosphere Reserve concept.

D. Issues and Long-term Vision

D1. Analysis of Issues and Problems

The mission statement for Prek Toal Core Area focuses on reconciling conservation of the area's unique biodiversity resources with its sustainable use. Much has already been accomplished toward this goal, but much remains to be done. Following the "discovery" of Prek Toal's globally-significant biodiversity by the outside world in the mid-1990s, scientifically-sound monitoring programmes have been initiated, effective protection measures have been put in place (albeit focussed almost exclusively on colonial-nesting birds), staff have been engaged and trained, basic equipment for monitoring and patrolling has been procured, community-based ecotourism has been established, and delivery of environmental education programming has been initiated. However, some basic issues remain unresolved and/or require management attention, including but not limited to:

- **the future of commercial fishing in the area.** Prek Toal is overlain by one of the most productive freshwater fishing lots in Cambodia, producing an estimated annual harvest of 2000 tonnes of fish (Gum 1998, citing other sources). Fishing is intensive and non-selective, taking all species and all size classes over an 8 month period each year.

The Royal Decree establishing the Biosphere Reserve specifically states that fishing lots within the Core Areas shall continue to function in accordance with the Fishery Law, while the fishing lot owners must be committed to long-term conservation objectives. The fishing lots are subject

to review every four years and to adequate reform in order to be consistent with long-term protection and conservation objectives of the Core Areas.

Policy currently being developed by the Tonle Sap Biosphere Reserve Secretariat calls for significant reduction of such large-scale exploitation of resources in the Core Areas in the interest of biodiversity conservation. Similarly, the Tonle Sap Sustainable Livelihoods Project aims at selecting the best way to maximize the conservation of natural resources in the Core Areas, specifically by controlling the extent and scale of commercial fishing pressure (ADB 2005). However, it needs to be recognized that by strictly limiting access, and thereby limiting opportunities for egg collection and hunting, the current fishing lot system coincidentally protects other elements of biodiversity (*e.g.*, the bird colonies) during much of the fishing season. The lot system also results in the maintenance of flooded forest, as this is recognized by the operators as essential fish habitat. Reform of fishing lot management, although necessary for the Prek Toal Core Area to be managed and promulgated as a legitimate biodiversity conservation unit, will need to proceed extremely cautiously and with very well-formulated (and funded) checks and balances, as it will otherwise involve an unacceptably high risk of the flooded forest, bird colonies and other elements of biodiversity being quickly and irretrievably lost to rapid, intensive and/or unregulated increases in access to the area, and concomitant harvest of both fisheries and non-fisheries resources.

In the interim prior to reform measures being implemented, significant attention will need to be paid to control and prevention of destructive (and illegal) fishing methods, such as pumping out of streams during the dry season. The primary issues to be addressed are as follows (based on Gum (1998), Goes (2005) and interviews conducted by the Core Area Planning Team 2005-2006):

- fish catches reportedly are declining
 - local villagers have insufficient fishing grounds
 - catches using family-scale gear are insufficient for subsistence
 - Community Fisheries Management adjacent to the Core Area is not yet effectively established, and early attempts at organization have failed
 - villagers depend on fishing in Battambang Fishing Lot No. 2 (when closed to commercial fishing), cutting of forest for fuelwood, and opportunistic harvesting of wildlife in order to make a living
 - the allocation and exploitation of flooded forest resources (fish, fuelwood) is non-transparent and closely linked to commercial interests and other elite groups
 - the Fishing Lot tenure system has no provision for scientific fisheries management
 - Lot subleasers openly use illegal fishing gear and practices in order to maximize profits
 - local authorities have little or no resources or incentive to perform their duties, and as a result do not enforce fisheries regulations
 - villagers do not trust local authorities.
- **local livelihoods.** Although there are no permanent villages in the Core Area, Prek Toal, Anlong Ta Oor, Kampong Prahok, Thvang and Piak Kantel are immediately adjacent, and residents of these villages fish and collect other resources in the area during June through September, when the Fishing Lot is not operational, or as otherwise permitted by the Fishing Lot owner and his subleasers. Also, during the dry season (February-May), migrants from upland areas access the Core Area from its outer edges, engaging in hunting, fishing (often using illegal methods, such as electro-fishing), and harvesting of other biodiversity resources on an opportunistic basis. Additional seasonal migrants appear during June-August to harvest large fish spawning in the rivers. The impacts of subsistence livelihoods on the biodiversity of the Core Area are largely unknown, but will need to be further assessed, controlled and replaced as appropriate.
 - **control of fires.** Frequent and occasionally extensive fires are associated with the dry season and the ingress of upland migrants into the area. This results in habitat modification (loss of tree cover and incremental conversion to grassland and scrubland) and mortality of wildlife species that cannot escape. Fires occasionally threaten bird colonies and could potentially have disastrous

consequences, both short-term (loss of nests and unfledged birds) and long-term (residual impacts at population level, loss of nesting trees).

- **ecotourism.** Controlled, well thought-out and operated ecotourism has already been established in the area. This is based primarily on day visits to the bird colonies, but also includes opportunities for visits to Prek Toal floating village, purchase of handicrafts, and overnight stays. Although ecotourism development has proceeded carefully, there are issues of carrying capacity, frequency and proximity of approach to the bird colonies, distribution of benefits, and control of unregistered and/or opportunistic operators, that need to be addressed.
- **management programming, implementation and funding.** Biodiversity conservation and management activities in the Prek Toal Core Area have to date been carried out primarily through NGO support, with Wildlife Conservation Society being the major source of both funding and technical advice to-date. Osmose has provided support for related aspects of livelihoods and environmental education. Additional support has been provided since 2005 through GEF and ADB funding (through the Tonle Sap Conservation Project and the Tonle Sap Environmental Management Project). The responsible government agencies are Ministry of Environment, Department of Nature Conservation and Protection (for resource conservation and environmental protection) and Ministry of Agriculture, Forestry and Fisheries, Fisheries Administration (for fishing lot management, including maintenance of flooded forest). Primary issues are: 1) securing and maintaining long-term, stable funding for routine management activities, preferably through central government; 2) agreeing on, and effectively implementing, the roles of MoE and FiA in future conservation management in the Core Area; and, 3) efficiently and effectively planning, managing, monitoring and coordinating the activities of all stakeholders in the conservation of the area's biodiversity resources.

D2. Vision Statement

Given the necessary funding and commitment by all stakeholders, in five years time the successful implementation of management measures detailed in this Management Plan will have:

1. **maintained and where necessary enhanced the biological, physical and cultural assets of the Core Area.** This will have been achieved through the effective and efficient protection of all faunal and floral diversity and physical elements of their habitats, restoration as necessary of degraded areas, control of fire and other destructive physical impacts, reform and effective management of commercial fishing operations, and protection and promotion of cultural values.
2. **strengthened Core Area management, operations and support services.** Coordination with national and provincial government agencies, commune and village level administrations, NGOs and other partners will be well-established, as will the operational capacity and effectiveness of Core Area staff. An infrastructure development and maintenance plan will have been implemented, and necessary equipment procured and maintained as required. A financial management system will be in place and the budget base for Core Area management will have been increased.
3. **increased community involvement in Core Area management, and improved support for conservation.** Community institutions will have been established and their operations strengthened, "conservation friendly" income-generating activities will be established, and unsustainable use of Core Area resources minimized. Basic living conditions of local communities will have been improved, and community members' understanding of biodiversity conservation will have been increased.

4. **provided accurate, relevant and timely information to all levels of the Core Area management team.** An information system based on routine and systematic data collection by Rangers, management-oriented research, and inventories of important Core Area ecological resources will have been established, and management decisions will routinely be based on this system. Management interventions will be routinely monitored and evaluated for effectiveness and adjusted as required.
5. **guided the development and management of ecotourism, in partnership with local communities and other stakeholders, and without negative ecological impacts on the Core Area or negative social impacts on surrounding communities.** High quality ecotourism experiences based on international best-practice standards will have been developed, and local communities will be meaningfully involved in their delivery. Ecotourism activities, products and facilities will have been diversified, and Core Area staff and community members trained in their delivery and management. Regulations and procedures guiding ecotourism activities will have been produced, routinely implemented, and periodically reviewed by Core Area management and community members for implementation effectiveness.
6. **contributed to the development and implementation of environmental education and awareness activities, aimed at visitors to the area and local residents, resource users and school children.** High quality information about the Core Area and surrounding TSBR will be routinely available to visitors at the CAMC, in both English and Khmer. Programming for delivery through the local school system, NGOs and community organizations will have been developed, routinely delivered on an as-required basis, and periodically reviewed for relevance and effectiveness.
7. **resulted in the establishment of cooperative linkages with organizations and initiatives aimed at improved management of the surrounding Buffer Zone.** Coordination with relevant government agencies and other organizations will be well-established. The boundary between the Core Area and Buffer Zone will be demarcated on the ground and/or on suitable maps, and its location understood by all stakeholders. Land use and livelihoods activities in the surrounding Buffer Zone will be well-documented, and initiatives underway towards both improving management of the Buffer Zone and preventing/mitigating impacts on the Core Area.

E. Zones

Biosphere Reserve Core Areas are intended to be **securely protected sites** for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses such as education. Given the over-riding requirement for secure protection throughout, the geographic division of the Prek Toal Core Area into different use zones does not readily apply. Instead, protection of key biodiversity elements that are sensitive to human presence (primarily colonial-nesting birds) will be based on development and application of regulations specifying permitted proximity of approach by season of year and type of transport. These regulations will be subject to public review during the development stage and will apply to all users of the area, from subsistence resource users to ecotourists. The regulations will be widely promulgated prior to and during the process of application, and may be revised (subject to appropriate public notification) on the basis of experience and public inputs. Penalties consistent with standing Government of Cambodia practice will be applied for non-conformance with these regulations.

In addition to regulating proximity of approach to key biodiversity elements, it may be necessary or desirable for area management purposes to limit certain types of transport and/or activities to specified areas. These limitations, if necessary, will be specified in more detailed plans and notifications produced during the Management Plan application period. Examples include but are not limited to: 1) bans on motorized transport in specified areas and/or specified seasons, and 2) limitation of ecotourism visits to specified bird colonies or colony groups (with no visits permitted to others).

F. Management Programmes

The Prek Toal Core Area Management Plan 2007-2011 is divided into six Management Programmes:

1. Core Area Operations and Maintenance
2. Resource Conservation and Management
3. Resource Monitoring and Research
4. Ecotourism Development
5. Community Development
6. Buffer Zone, Transition Zone and International Issues

Each Management Programme has a stated goal, and each is divided into Subprogrammes with specific objectives addressing issues identified during the planning process. Activities aimed at achieving Subprogramme objectives are listed in table form for ease of reference. Responsible parties, timing and priority levels are identified for each activity as a guide to MoE managers and Core Area field staff. It is expected that the Subprogramme activities tables will provide the basis for both annual planning and tracking of implementation progress.

F1. Core Area Operations and Maintenance

Goal: to strengthen and routinely implement Core Area operations and support services.

F1.1 Staffing

Objective: to ensure operational effectiveness of Core Area staff.

Issues and Rationale: the success of any organization in meeting its mission is dependent on the calibre of its staff and their operational effectiveness. In order to protect the critically important ecosystem elements within the Prek Toal Core Area, well-trained and motivated staff are required.

Initial staffing of the Core Area has evolved primarily in response to the need to protect and monitor colonial bird nesting sites. The present field staff complement is as follows:

Table 4. Core Area staff.

Position	Location	Number	Appointed
Core Area Director	MoE staff member based in Phnom Penh, with frequent travel to Prek Toal	1	2003
Core Area Deputy-Director	Battambang DoE staff member, based in Prek Toal	1	2003
Rangers	Prek Toal. Selected from local villagers and former bird collectors, with on the job training provided by WCS and TSCP	31	from 2001
Boat Driver	Drives boats for ecotourists, official visitors, and research, survey and Ranger teams, and maintains boats as required	1	1999
Cook/cleaner	Prek Toal (local resident). Supervision provided by Core Area Director and Deputy-Director	1	from 2005

The incumbent Core Area Director and Deputy-Director are Government of Cambodia employees. A designated local staff member of WCS has provided long-term (since 2002) training inputs and field supervision of the colony monitoring programme. The Rangers and Cook/cleaner have employment contracts (one year, renewable) limited to the Prek Toal Core Area, and are currently funded by MoE, WCS and TSCP.

Staffing-related operational issues to be addressed during the life of the Management Plan are as follows:

- **optimal staffing levels.** Current staffing levels represent a balance between minimal staffing levels required for effective protection of the bird colonies and funding availability. Continuous watches of the bird colonies are labour-intensive (requiring the 24 hour/day presence of two Rangers for each group of colonies), and expansion of the colonies resulting from effective protection will require additional staff. A recent review of waterbird conservation activities concluded that a pool of ~30 trained and operational villager Rangers is required for security and flexibility of the resource protection programme (Goes 2005).
- **staff turnover and replacement.** Staff turnover rates are relatively low, but an effective system of recruitment needs to be in place to deal with staff attrition when it occurs.
- **staff training and equipment.** Current Ranger staff have all been trained on the job (by WCS) and from 2006 have received additional classroom and field-based training provided through TSCP. Some have also been trained by Osmose in the facilitation of outdoor environmental education for school children. Training will need to continue as new staff are hired and as additional training needs become apparent.
- **staff payment.** The current system of paying or supplementing staff salaries from NGO and international donor sources is unsustainable. This is not currently an urgent problem, but funding availability needs to be forecast on the basis of a one year (preferably two years or longer) horizon, in order to ensure continuity of Ranger staffing.
- **staff deployment.** At present all Ranger staff are from villages immediately adjacent to the Core Area. Reasonably balanced representation from each village needs to continue to be maintained.

Law enforcement issues, and issues related to staff mandates regarding fisheries management, are dealt with under Section F2 below.

Management Actions:

Table 5. Management actions related to Core Area staff.

No.	Activity	Responsibility	Timing	Priority
F1.1.1	Provide uniforms and necessary personal equipment to all field staff	Core Area Director	Year 1-5	High
F1.1.2	Provide appropriate, safe and reliable transport, field equipment and accommodations	TSCP/WCS	Year 1-5	High
F1.1.3	Develop and periodically review job descriptions, and ensure that all levels of staff understand their job functions in relation to others	Core Area Director	Year 1-5	High
F1.1.4	Carry out annual staff performance appraisals and implement recommendations	Core Area Director	Year 1-5	High
F1.1.5	Update training needs assessment on an annual basis and carry out necessary training	TSCP/Core Area Director	Year 1-5	High
F1.1.6	Recruit Rangers and support staff primarily (preferably exclusively) from a standing roster of local residents	Core Area Director	Year 1-5	High
F1.1.7	Supplement permanent staff with seasonal staff members from local communities who have relevant skills and knowledge	Core Area Director	Year 1-5	Moderate

F1.2 Infrastructure

Objective: to develop, operate and maintain the infrastructure necessary for effective Core Area management

Issues and Rationale: the primary infrastructure needs for conservation management in Prek Toal Core Area are as follows:

- offices and other working space for staff;
- community outreach facilities;
- visitor reception and information facilities;
- visitor accommodation; and,
- colony observation platforms.

As the only access for most of the year is by water, there is no need for the development of roads or other ground-based facilities in the Core Area.

Infrastructure currently in place and used for conservation management in the Core Area is as follows:

- a Core Area Management Centre (CAMC) located in Prek Toal village, opened in late 2005 and providing an office/working area for staff, a large meeting room, six bedrooms, and toilet facilities. Total area is approximately 270 m². The CAMC is fixed in place above the highest water levels, on a substructure of concrete columns. The CAMC also features an elevated viewing area above roof level and providing a 360 degree view of the surrounding Prek Toal village and flooded forest;
- a floating Tourist Reception and Information Centre, providing access via an open, roofed veranda/boat docking point, a visitor registration area, a combined waiting/display/sales area, and toilet facilities. The Centre also provides staff bedrooms and kitchen and toilet facilities, separate from the areas open to public access. It is normally located adjacent to the CAMC, but like other floating structures on the lake is designed to be easily towed to other locations;
- a floating environmental education centre, constructed and operated by Osmose, and normally situated adjacent to the CAMC; and,
- a series of elevated platforms (currently 13) located adjacent to the main colony locations, and used by Ranger staff for full-time monitoring and protection of the colonies during the nesting season (all months except July, when only boat patrols are undertaken).

Other infrastructure in Prek Toal village relevant to support of Core Area operations and visitor management, but maintained and operated by other government organizations, NGOs or the private sector are as follows:

- fisheries station (1);
- military post (1);
- police posts (2: regular and water police);
- school (1: Grades 1-9);
- medical clinics (2: 1 public, 1 private);
- accommodation (1 homestay, supported by Osmose);
- restaurants (2);
- tourist shop (1, supported by Osmose);
- general shops (several);
- boat repair shops (several);
- generator service (2);
- petrol stations (3);
- transportation service: Prek Toal - Battambang (daily), Prek Toal - Chhong Khnies (daily);
- pagoda (1); and,
- church (1).

Operational issues related to infrastructure, and to be addressed during the life of the Management Plan, are as follows:

- **offices and other working space for staff.** Adequate working space for staff, including necessary equipment (see below) needs to be permanently established and maintained in the CAMC.
- **community outreach facilities.** Community outreach facilities need to be permanently established in the CAMC, centering on the office and large meeting room. Materials to be provided include reference books, identification manuals, self-learning materials, map sets, posters, flipcharts, a whiteboard and portable audio-visual equipment and programmes.
- **visitor reception and information facilities.** Visitor reception and information facilities need to be permanently established and maintained in the Tourist Reception and Information Centre.
- **visitor accommodation.** Visitor accommodation needs to be permanently established and maintained in the CAMC.
- **cleaning, maintenance and repairs.** A maintenance plan for all buildings needs to be established and routinely implemented, and forecasted costs reflected in annual budget allocations. Public access areas (offices, visitor reception and information facilities, accommodation) need to be clean, orderly and maintained to the highest possible standards. Public access areas also need to conform with international safety standards.
- **observation platforms.** Experience has shown that the tree platforms used for monitoring bird colonies need to be substantially rebuilt every year. The platforms are constructed by Ranger staff, but costs need to be reflected in annual budgets.

Management Actions:

Table 6. Management actions related to infrastructure.

No.	Activity	Responsibility	Timing	Priority
F1.2.1	Develop and maintain office facilities, staff quarters, community outreach and other day use visitor information facilities	TSCP/Core Area Director	Year 1-5	High
F1.2.2	Provide staff quarters and basic amenities (electricity, running water) to a sufficient standard to ensure a positive effect on staff morale and efficiency	TSCP/Core Area Director	Year 1-5	High
F1.2.3	Renovate and use existing buildings only if they will remain functional throughout the five year plan period	TSCP/Core Area Director	Year 1-5	High
F1.2.4	Ensure that all building renovations, and new building designs and locations, are functionally and aesthetically appropriate, and in line with international standards for protected areas facilities	TSCP/Core Area Director	Year 1-5	High
F1.2.5	Develop and implement a maintenance plan for all Core Area infrastructure, including cleaning, repair and safety protocols	Core Area Director	Year 1-5	High
F1.2.6	Inspect the CAMC for design and construction deficiencies and implement timely renovation and repair measures	Core Area Director	Year 1-5	High
F1.2.7	Prepare annual plans for observation platform location	Core Area Director	Year 1-5	High
F1.2.8	Include cost forecasts in annual budget planning and allocations	Core Area Director	Year 1-5	High

F1.3 Equipment

Objective: to ensure that adequate equipment is available for efficient operation and management of the Core Area.

Issues and Rationale: specialized equipment is required for the implementation of Core Area management activities, and needs to be maintained and replaced as necessary. The primary equipment needs for conservation management in Prek Toal Core Area are as follows (lists are indicative only):

- field equipment (Ranger uniforms and standard kit, spotting scopes and binoculars, compasses, GPS units, fire-fighting equipment);
- transport (paddle boats, motorboats, motorcycles for dry season transport);
- office equipment (furniture, computers and printers, generator); and,
- communications equipment (ICOMs, mobile telephones).

Basic equipment is already in place, but will need to be supplemented and replaced during the life of the Management Plan. Procurement of equipment has been and will continue to be funded by a variety of sources, including UNESCO, WCS, TSEMP and TSCP. In order to satisfy both GoC and donor requirements, careful inventory and tracking of all individual equipment items will be required.

Management Actions:

Table 7. Management actions related to equipment.

No.	Activity	Responsibility	Timing	Priority
F1.3.1	Develop and implement a rolling procurement and replacement plan for all equipment required for Core Area management	Core Area Director	Year 1	High
F1.3.2	Develop and implement a maintenance plan for all equipment	Core Area Director	Year 1-5	High
F1.3.3	Develop and maintain an equipment asset register with sufficient detail to track the procurement and maintenance history of individual equipment items	Core Area Director	Year 1-5	High
F1.3.4	Train staff in proper use and maintenance of equipment	Core Area Director	Year 1-5	High
F1.3.5	Include cost forecasts in annual budget planning and allocations	Core Area Director	Year 1-5	High

F1.4 Financial Management

Objective: to develop and implement financial management systems that are both efficient and transparent.

Issues and Rationale: to date, infrastructure, equipment and operational costs for Prek Toal Core Area have been covered by a variety of non-government sources. There is a need for a consolidated financial management and reporting system that includes all revenue sources and expenditures. Efficient and transparent financial management of conservation programming in Prek Toal Core Area will depend on:

- how funding from donors and other partners is managed and reported;
- how funding released by or through MoE is managed and reported; and,
- how revenue collected from tourists is managed and reported.

It is expected that donors and other supporting agencies will continue to respond positively to requests for support only if fund management is demonstrably conscientious and based on full disclosure to all parties. Recognizing that a strong and secure financial base is required for the effective operation of any protected area, the following management actions are required.

Management Actions:

Table 8. Management actions related to financial management.

No.	Activity	Responsibility	Timing	Priority
F1.4.1	Collect and manage revenues from ecotourism, research and other fees in an open and transparent manner, including development and implementation of a proper receipting and accounting system based on international best practice/accounting principles	Core Area Director	Year 1-5	High
F1.4.2	Develop and implement a financial management system that includes full disclosure to all parties	Core Area Director	Year 1	High
F1.4.3	Train accounts staff and personnel responsible for budget planning in implementation of the system	Core Area Director	Year 1	High
F1.4.4	Review current secured funding levels in relation to projected needs over the life of the Management Plan and beyond	Core Area Director	Year 1	High
F1.4.5	Develop standards regarding collection of fees from tourists, and develop appropriate receipting and accounting systems for tourism revenues	Core Area Director	Year 1	High
F1.4.6	Explore additional opportunities for fund-raising including donations	Core Area Director	Year 1-5	High
F1.4.7	Base activities planning on secured funding, and allocate revenues to priority conservation activities	Core Area Director	Year 1-5	High
F1.4.8	Provide annual reporting to all parties	Core Area Director	Year 1-5	High

F1.5 Cooperation with Partners

Objective: to improve coordination of Core Area activities with those of other government agencies, communes, communities, NGOs and other partners.

Issues and Rationale: a number of organizations and agencies are involved in activities related to natural resource management and conservation in and around Prek Toal, and their activities often overlap with or otherwise impinge on management of the Core Area. There is a need for coordination of initiatives, particularly with regard to resource management and environmental education, but also including related issues such as visitor management. Guidelines and effective action are needed to assist all partners to maximize collaboration and benefits. Particular attention needs to be paid to:

- **law enforcement issues.** At present neither the MoE Rangers nor the Fisheries Officers responsible for the Core Area have effective capability or authority to enforce the full range of standing regulations regarding fisheries and other natural resources. The MoE Rangers have the right to bear arms, understood to be primarily for self-defence, but their mandate is only broadly defined (preventing the destruction of natural resources) and confined to MoE laws and regulations. All animals that "breed" in the water (fish, amphibians, turtles, crocodiles, water snakes) come under the fisheries law and the mandate of Fisheries Officers, who, however, do not routinely enforce the specifics of the fisheries law that deal with wildlife, nor are they permitted to bear arms.

Aquatic mammals and birds are technically under the Forestry Administration, but the FA does not have a permanent field presence in the Prek Toal area. The right to routinely use arms in law enforcement is limited to police and military personnel. Given this situation, there is an urgent need to train, equip and mobilize "Conservation Teams" comprising Rangers, Fisheries Officers and (possibly) Commune Police, with full authority to enforce all rules and regulations concerning natural resources in the Core Area.

- **environmental education.** Environmental education is a broad subject covering all aspects of the physical and natural environment, and involving a wide cross-section of stakeholders, from school children to resource users to resource managers. The Environmental Awareness, Education and Outreach Programme being implemented with TSCP assistance in the Core Area focuses particularly on biodiversity conservation. However, there are other, well-established and ongoing initiatives (*e.g.*, as implemented through Osmose) that also need to continue to be supported. It is expected that development of appropriate cross-linkages among environmental education programmes will improve both efficiency and effectiveness of overall environmental awareness and education delivery.
- **visitor management.** Basic visitor management services (reception, orientation and information, limited accommodation) will be provided to visitors through the CAMC, but there is broad scope for provision of additional services (guiding, transportation, meals, accommodation, local crafts and cultural experiences) by other organizations and individuals. While the development of these additional services should be encouraged, there is also a need for quality control standards that can best be developed and implemented through a cooperative approach.

Management Actions:

Table 9. Management actions related to cooperation with partners.

No.	Activity	Responsibility	Timing	Priority
F1.5.1	Identify all stakeholders and establish routine liaison procedures	Core Area Director	Year 1	High
F1.5.2	Develop clear operational procedures for law enforcement in the Core Area, through consultation and agreement by all stakeholders	Core Area Director	Year 1	High
F1.5.3	Establish, equip and provide logistic support to Conservation Teams comprising Rangers, Fisheries Officers, and Commune Police, and charged with enforcement of all natural resource regulations in the Core Area	Core Area Director	Year 1-5	High
F1.5.4	Review all environmental education and awareness programming being delivered in the Core Area, and identify areas of potential synergy	TSCP/Core Area Director	Year 1	High
F1.5.5	Develop and operationalize cooperative linkages in the delivery and periodic review of environmental education and awareness	TSCP/Core Area Director	Year 1-5	High
F1.5.6	Review and catalogue all visitor services available in the communities adjacent to the Core Area	Core Area Director	Year 1	High
F1.5.7	Develop and operationalize cooperative linkages in delivery of visitor services including maintenance of quality standards	Core Area Director	Year 1-5	High
F1.5.8	Establish a structure/procedures for regular public inputs on management plan implementation	Core Area Director	Year 1-5	High

F2. Resource Conservation and Management

Goal: to maintain the integrity of the biological, cultural and physical features of the Prek Toal Core Area

F2.1 Protection and Management of Flora, Fauna and Ecological Values

Objective: to ensure effective and efficient protection and management of the fauna and flora, and of the biophysical elements of their habitats, within the Prek Toal Core Area.

Issues and Rationale: a Biosphere Reserve Core Area is intended to be a securely protected site for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses. The protection and management of flora, fauna and ecological values in the TSBR needs to be consistent with the definition and function of a Biosphere Reserve as defined by UNESCO, the provisions of the Royal Decree establishing the Biosphere Reserve, and resource use and protection policies of GoC. Fisheries management is currently an area of active discussion, and adjustments will need to be made to reflect any major changes in GoC fisheries policy or management direction during the Plan period (see also Section B1).

All resource conservation and management activities currently scheduled under the Plan (below) are consistent with current GoC policies, legislation and regulations, and to the extent possible with international best practice in protected area management. These activities will need to be adjusted during implementation to reflect any changes in the national regulatory framework, again consistent with the overarching goal of effective conservation of the Core Area's biodiversity resources. The focus will be on safeguarding and managing biodiversity resources in the best possible way.

Commercial fishing activities will continue within the boundaries of the Prek Toal Core Area during the Management Plan period, pending GoC formulation and implementation of fisheries reform measures. The entire Core Area will continue to be protected as fisheries habitat (see also Section D1). Given the number of people living adjacent to the Core Area, and their reliance on the area for subsistence fishing and fuelwood collection, a controlled level of subsistence livelihoods (seasonal fishing and fuelwood harvesting only) also will need to continue to be permitted. However, subsistence fishing techniques will be limited to those that do not alter or destroy terrestrial or aquatic habitat, or result in a bycatch of birds or other species. No other commercial or subsistence harvesting of any biodiversity resources will be permitted. Large waterbird colonies will continue to be protected, and protective measures expanded in accord with any expansion or other changes in colony distribution.

Operational issues related to the protection and management of flora, fauna and ecological values are as follows:

- removal or spatial restriction of commercial fishing activities could also reduce the very effective control of access, protection of flooded forest habitat, and control of fishing methods and offtake, currently wielded by the Fishing Lot owner. This will need to be replaced, as necessary, by an armed and otherwise well-equipped, well-trained and demonstrably effective Conservation Team mandated to enforce all laws and regulations regarding natural resource use, including regulations and restrictions specific to the Prek Toal Core Area;
- the boundaries of the Core Area and permitted location of fishing activities will need to be demarcated on maps that are available to the public (*e.g.*, at the Commune Office, the CAMC and other public buildings), marked on the ground at strategic points, and regularly patrolled by the Conservation Team; and,
- benefits of Core Area conservation will need to flow back to adjacent communities. These benefits will include but not necessarily be limited to access to subsistence fishing, controlled seasonal/subsistence level harvest of fuelwood resources, and priority access to participation in conservation and ecotourism-support services (*e.g.*, employment as Rangers, provision of transportation and guiding services *etc.*).

Management Actions:

Table 10. Management actions related to protection and management of flora, fauna and ecological values.

No.	Activity	Responsibility	Timing	Priority
	Access Management			
F2.1.1	Identify major (seasonal) water and land access points and develop an access management plan	TSCP/Core Area Director	Year 1	High
F2.1.2	Monitor type, location and intensity of boat, foot, motorcycle and other motorized traffic as part of routine patrolling activity	Senior Ranger/Rangers	Year 1-5	High
F2.1.3	Develop policy and operational guidelines for entry of community members into the Core Area, and for resource use activities that are permitted	TSCP/Core Area Director	Year 1	High
F2.1.4	Organize and deploy armed Conservation Teams to ensure a continuous and effective monitoring and regulatory presence	Core Area Director/Senior Ranger/Rangers	Year 1-5	High
F2.1.5	Include access management in awareness programming and delivery	TSCP/Core Area Director	Year 1-5	High
	Boundary Marking			
F2.1.6	Develop and implement a boundary maintenance plan, including development of public awareness of boundary location, and boundary marking at major entry points and other strategic locations	TSCP/Core Area Director	Year 1	High
F2.1.7	Design boundary marking system to be as tamper-proof as possible, to prevent removal or shifting of boundary markers	TSCP/Core Area Director	Year 1	High
F2.1.8	Develop, install and maintain functionally and aesthetically appropriate signboards at main access points	TSCP/Core Area Director/Senior Ranger	Year 1	High
F2.1.9	Conduct periodic inspections to ensure that boundary delineation remains intact	Senior Ranger/Rangers	Year 1-5	High
	Captive Animal Management			
F2.1.10	Develop and implement a rehabilitation/release protocol (including penalties for repeat offenders) and associated facilities for the humane treatment and rehabilitation of confiscated wildlife	Core Area Director	Year 1	High
F2.1.11	Confiscate illegally held wildlife	Senior Ranger/Rangers	Year 1-5	High
F2.1.12	Develop and deliver appropriate staff training	TSCP/Core Area Director	Year 1-5	High
F2.1.13	Include captive wildlife issues in environmental education and awareness programming	TSCP/Core Area Director	Year 1-5	High
	Colony Protection			
F2.1.14	Continue and expand the existing colony monitoring and protection programme as required	BMS/Core Area Director/Senior Rangers	Year 1-5	High

F2.1.15	Develop, promulgate and enforce guidelines for proximity and speed of approach to bird colonies and/or other sensitive biodiversity resources	BMS/Core Area Director/Senior Ranger/Rangers	Year 1-5	High
F2.1.16	Ensure prosecution of violators	Core Area Director/Senior Ranger/Rangers	Year 1-5	High
F2.1.17	Conduct regular reviews of Conservation Team effectiveness and adjust staff numbers and activities as necessary	BMS/Core Area Director/Senior Ranger	Year 1-5	High
	Fishing (large and medium-scale)			
F2.1.18	Cooperate with FiA regarding control of illegal fishing activities	TSCP/Core Area Director	Year 1-5	High
F2.1.19	Coordinate with FiA and all relevant stakeholders regarding fisheries reform (e.g., as proposed under TSSLP, but potentially including other initiatives), advocating for the best possible balance between protection and maintenance of flooded forest and other natural habitats, and protection and maintenance of all elements of biodiversity (with a primary focus on protection of bird colonies), and fisheries viability	TSCP/Core Area Director	Year 1-5	High
F2.1.20	Establish and test monitoring, enforcement and review mechanisms prior to comprehensive implementation to ensure that fisheries and flooded forest do not become unregulated, open access resources	Core Area Director/Senior Ranger/Rangers	Year 1-5	High
F2.1.21	Establish monitoring, communications and enforcement mechanisms to ensure that large and medium-scale fishing adjacent to the Core Area does not negatively impact Core Area fish populations, water, vegetation or other biodiversity resources	Core Area Director/Senior Ranger	Year 1-5	High
	Fishing (small-scale)			
F2.1.22	Develop and implement an equitable system, agreed by all stakeholders, and consistent with prevailing legislation, regulations and effective resource conservation, that regulates small-scale fishing within the Core Area	Core Area Director/Senior Ranger/Rangers	Year 1-5	High
	Fuelwood and Other NTFP Harvest			
F2.1.23	Develop and implement an equitable system, agreed by all stakeholders, and consistent with prevailing legislation, regulations and effective resource conservation, that regulates fuelwood and other NTFP harvest within the Core Area	Core Area Director/Senior Ranger/Rangers	Year 1-5	High
	Habitat Management			
F2.1.24	Develop and implement appropriate habitat management prescriptions, including in surrounding Buffer Zone, specifically aimed at prevention of forest clearing and other encroachment	TSCP/Core Area Director	Year 1	High
F2.1.25	Manage entire Core Area as one ecological unit	Core Area Director	Year 1-5	High
F2.1.26	Ensure that habitat needs of specialist wildlife species (e.g., species dependent on standing dead trees) also are met	Core Area Director	Year 1-5	High

F2.1.27	Regain, protect and rehabilitate any encroached areas	Core Area Director	Year 1-5	High
	Hunting			
F2.1.28	Develop and apply enforcement tools and programmes	Core Area Director/ Senior Ranger	Year 1	High
F2.1.29	Prohibit unauthorized carrying of firearms or other weapons in or through the Core Area	Senior Ranger/ Rangers	Year 1-5	High
F2.1.30	Prohibit hunting, collection or destruction of any type of wildlife	Senior Ranger/ Rangers	Year 1-5	High
F2.1.31	Develop and deliver awareness programming, targeting both residents and seasonal migrants	TSCP/Core Area Director	Year 1-5	High
	Land Use			
F2.1.32	Develop and implement a monitoring and surveillance programme in coordination with the Commune Council, including the following activities not to be permitted within the Core Area at any scale: agriculture, livestock grazing, permanent or seasonal settlements, timber harvest	Core Area Director/ Senior Ranger/ Rangers	Year 1-5	High
	Law Enforcement			
F2.1.33	Develop clear operational procedures for warnings, arrests and confiscations, and develop and deliver training specific to these measures	Core Area Director/TSCP	Year 1	High
F2.1.34	Provide and maintain equipment (boats, motorcycles, communications) and ensure availability of operational costs to permit mobile law enforcement teams to efficiently reach all parts of the Core Area	TSCP/Core Area Director	Year 1-5	High
F2.1.35	Develop and implement a regular patrolling system and necessary support infrastructure, including seasonally or permanently manned guard posts	Core Area Director/ Senior Ranger/ Rangers	Year 1-5	High
F2.1.36	Involve local communities and Community Fisheries Organizations in reporting of illegal use of natural resources	Core Area Director/ Senior Ranger/ Rangers	Year 1-5	High
F2.1.37	Involve Commune Councils as an oversight agency with regard to law enforcement	Core Area Director/ Senior Ranger	Year 1-5	High
	Training			
F2.1.38	Ensure that all staff are trained in conservation area management and that refresher/specialized training is provided as required	Core Area Director/ TSCP	Year 1-5	High

F2.2 Maintenance of Cultural Values

Objective: to identify and maintain cultural values associated with the Core Area.

Issues and Rationale: traditional users of natural resources often feel a strong cultural affinity with these resources, and places, times or methodologies associated with their use. To our knowledge this aspect of resource use has not yet been investigated in or around the Prek Toal Core Area, apart from observations on the very wide variety of family fishing techniques and gear that have been developed (Loeung *et al.* 2003).

Management Actions:

Table 11. Management actions related to maintenance of cultural values.

No.	Activity	Responsibility	Timing	Priority
F2.2.1	Identify, evaluate and document cultural values associated with the Core Area	TSCP/Core Area Director	Year 1	High
F2.2.2	Identify opportunities for maintaining cultural values and incorporate in Core Area management programming	Core Area Director/TSCP	Year 1-5	High

F2.3 Fire Management

Objective: to minimize the occurrence of destructive fires and their related impacts within the Core Area.

Issues and Rationale: uncontrolled fires, many if not most set by humans (others are caused by lightning), occur regularly within the Prek Toal Core Area, and particularly around the seasonally dry periphery. Fires may be deliberately set to drive and capture wildlife (*e.g.*, turtles, primates), or to clear land for grazing/agricultural use. Casual disposal of smoking materials is widespread and is thought to be a primary cause of fire in otherwise sparsely inhabited areas. Apart from impacts on forest cover and vegetation succession, fire kills wildlife species that cannot escape. In 2003, a large fire threatened the bird colonies in the southern part of the Core Area, and in the absence of a fire management plan *ad hoc* measures needed to be devised and implemented.

Management Actions:

Table 12. Management actions related to fire management.

No.	Activity	Responsibility	Timing	Priority
F2.3.1	Compile and map available information on fire location and frequency in and around the Core Area	BMS/Core Area Director	Year 1	High
F2.3.2	Assess past and potential future impacts of fire on biodiversity in the Core Area	BMS/Core Area Director	Year 1	High
F2.3.3	Develop a fire management plan for the Core Area, including detection/early warning mechanisms; response options and response-selection and mobilization processes; and manpower, training and equipment and funding requirements	Core Area Director/BMS	Year 1	High
F2.3.4	Train Core Area staff and local community members in fire response and management techniques	Core Area Director/Senior Ranger/TSCP	Year 1	High
F2.3.5	Contain and extinguish fires as promptly as possible	Senior Ranger/Rangers	Year 1-5	High

F2.3.6	Monitor vegetation regrowth and wildlife use in areas affected by fire	Core Area Director/ Senior Ranger	Year 1-5	High
F2.3.7	Implement and periodically review and revise the fire management plan	Core Area Director/ Senior Ranger	Year 1-5	High
F1.4.8	Include fire impacts in environmental education and awareness programming	TSCP/Core Area Director	Year 1	High

F3. Resource Inventory, Monitoring and Research

Goal: to provide accurate, relevant and timely information for resource management.

F3.1 Resource Inventory and Monitoring

Objective: to carry out baseline inventories and monitoring of Core Area ecological resources.

Issues and Rationale: resource inventories and monitoring carried out to date in the Core Area have been very much focussed on colonies of large waterbirds. Information also is available on other species groups, but this is based primarily on unsystematic observational data. Additional inventory and monitoring data will be required for sound management of the area. Inventory and monitoring priorities are:

- continued monitoring (and expansion of monitoring as required) of the waterbird colonies;
- continuation of lakeshore counts for waterbirds not satisfactorily monitored by colony counts (e.g., black-headed ibis, milky stork and greater adjutant);
- baseline assessments and monitoring of all other species groups;
- baseline assessment of habitat (vegetation) types and monitoring of area and condition; and,
- monitoring of fire distribution and impacts.

Management Actions:

Table 13. Management actions related to resource inventory and monitoring.

No.	Activity	Responsibility	Timing	Priority
F3.1.1	Review resource inventories carried out to date and determine what additional inventories are required	BMS/Core Area Director	Year 1	High
F3.1.2	Continue existing monitoring programme including timely data analysis and reporting	BMS/Core Area Director/Rangers	Year 1-5	High
F3.1.3	Periodically review monitoring programme, and modify as necessitated by data requirements for sound scientific management of the Core Area	BMS/Core Area Director	Year 1-5	High
F3.1.4	Develop a current habitat map of the Core Area, delineating flooded forest (by height class and tree density), scrubland, grassland and permanent wetlands, and regularly update on the basis of observational and remotely sensed data	BMS/Core Area Director	Year 1-5	High
F3.1.5	Analyze and report on inventory and monitoring data on a regular basis	BMS/Core Area Director	Year 1-5	High
F3.1.6	Use inventory and monitoring data to guide management actions	Core Area Director/ Senior Ranger	Year 1-5	High

F3.2 Research

Objective: to undertake effective, management-oriented research on Core Area ecological resources.

Issues and Rationale: in addition to inventory and monitoring data, the results of sound research into species biology, ecological relationships, and impacts of human behaviour and habitat change can be used to improve management decisions. While valid research needs to be encouraged and supported in the Prek Toal Core Area, there is a need to identify research priorities, competent institutions, ethical guidelines, and guidelines on ownership and dissemination of research results.

Management Actions:

Table 14. Management actions related to research.

No.	Activity	Responsibility	Timing	Priority
F3.2.1	Develop a research policy and guidelines in coordination with MoE	Core Area Director	Year 1	High
F3.2.2	Develop list of research priorities and actively seek institutional/researcher support	Core Area Director	Year 1	High
F3.2.3	Liaise with research institutions to mobilize resources	Core Area Director	Year 1-5	High
F3.2.4	Encourage and support non-destructive, management-oriented research by qualified institutions-based individuals	Core Area Director	Year 1-5	High
F3.2.5	Implement relevant research-based recommendations	Core Area Director/ Senior Ranger	Year 1-5	High

F3.3 Resource Information Management System

Objective: to develop and maintain a Resource Information Management System, and to use this as an information sharing and decision-making tool for managing Core Area resources.

Issues and Rationale: management of the Core Area and its resources will require accurate, up-to-date and easily accessible information for planning, transparent decision-making and evaluation of effectiveness of actions taken. A computer-based, user-friendly Resource Information Management System needs to be developed and maintained for the storage and utilization of a broad spectrum of information on:

- types and distribution of biodiversity resources in the Core Area (*e.g.*, all data from resource inventory and monitoring programmes, other observations);
- location and timing of local use of these resources (*e.g.*, from patrols, reports, resource use agreements);
- location, timing and results of management actions taken (*e.g.*, use agreements, patrols [timing, route, personnel], warnings, arrests, fines and penalties imposed); and
- visitor use (*e.g.*, visitor registrations at CAMC, registered trips to bird colonies, visitor participation in other activities, visitor comments and feedback).

Management Actions:

Table 15. Management actions related to resource information management system.

No.	Activity	Responsibility	Timing	Priority
F3.3.1	Prepare an assessment of the types of information that are/can be available and the utility of this information in managing Core Area resources	Core Area Director/ MoE staff	Year 1	High
F3.3.2	Develop a Resource Information Management System to facilitate routine access to, manipulation and use of information to facilitate effective management of the Core Area	Core Area Director/ MoE staff	Year 1	High
F3.3.3	Train staff in data input and use of the system	Core Area Director/ MoE staff	Year 1	High
F3.3.4	Input resource inventory and monitoring, resource use, visitor use and other defined data on a regular and routine basis	Core Area and MoE staff	Year 1-5	High
F3.3.5	Monitor operation and use of the system to ensure optimal functionality and utility	Core Area Director/ MoE staff	Year 1-5	High

F4. Ecotourism Development

Goal: to develop and sustainably manage ecotourism in the Prek Toal Core Area, in partnership with local communities and other stakeholders, and without negatively affecting the ecological integrity of the Core Area or the social and cultural integrity of adjacent communities.

F4.1 Needs and Priorities for Ecotourism Development

Objective: to establish ecotourism that is appropriate to the ecological setting and legal status of the Core Area, and to the social setting of surrounding communities.

Issues and Rationale: the Prek Toal Core Area is a world-class destination for bird-watching and related aspects of ecotourism. However, given that the Core Area is intended to comprise "a securely protected site for conserving biodiversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low impact uses", ecotourism activities will need to be carefully developed and implemented to ensure that negative impacts on biodiversity resources are avoided or minimized. Similarly, visitor management programming and guidelines will need to be carefully developed to ensure that benefits to local communities are maximized, and that negative social impacts are avoided.

Management Actions:

Table 16. Management actions related to needs and priorities for ecotourism development.

No.	Activity	Responsibility	Timing	Priority
F4.1.1	Develop comprehensive review of all existing ecotourism resources and activities, focussing on opportunities, strengths and weaknesses	Core Area Director/TSCP	Year 1	High
F4.1.2	Develop ecotourism master plan/implementation plan based on "safe" carrying capacity relative to visits to bird colonies and other sensitive biodiversity resources	Core Area Director/TSCP	Year 1	High

F4.1.3	Develop regulations and guidelines specifying frequency of visits to specified areas, number of visitors/group, proximity and method of approach, visitor behaviour standards <i>etc.</i>	Core Area Director/TSCP	Year 1	High
F4.1.4	Develop and implement permitting, monitoring and enforcement methodologies	Core Area Director/ Senior Ranger	Year 1-5	High
F4.1.5	Periodically review implementation and enforcement experience and adjust to ensure minimal impact of ecotourism on sensitive resources	Core Area Director/ Senior Ranger	Year 1-5	High
F4.1.6	Ensure community involvement in ecotourism development and delivery, and equitable benefits-sharing	Core Area Director/ Senior Ranger	Year 1-5	High

F4.2 Ecotourism Information and Marketing

Objective: to improve dissemination of information on ecotourism experiences that are available in the Core Area, and to improve the marketing of these experiences.

Issues and Rationale: at present, very little information is available to potential visitors on the type, timing or cost of ecotourism experiences that can be had in the Prek Toal Core Area. Osmose (a not-for-profit conservation, education and tourism association) pioneered guided day trips to the bird colonies in 2003, and similar experiences are currently available from other tour agents based in Siem Reap. A few agencies provide basic but limited information and booking via websites. Boats can also be hired through individual operators at Chhong Khnies. No information is currently available to potential visitors to the area through GoC agencies.

Management Actions:

Table 17. Management actions related to ecotourism information and marketing.

No.	Activity	Responsibility	Timing	Priority
F4.2.1	Develop and distribute information about the unique biodiversity resources of the area, and viewing opportunities, using all available and feasible media (print, television, internet)	Core Area Director/ MoE staff	Year 1	High
F4.2.2	Identify and register reputable tour agents interested in or currently providing ecotours to the Prek Toal area	Core Area Director/ MoE staff	Year 1-5	High
F4.2.3	Provide all registered agents with up to date information on opportunities, regulations and guidelines regarding ecotourism management (see also F4.1.2 and F4.1.3 above)	Core Area Director/ MoE staff	Year 1-5	High
F4.2.4	Provide contact details of registered tour agents in information materials produced and distributed by the Core Area management authority	Core Area Director/ MoE staff	Year 1-5	High
F4.2.5	Encourage feedback and suggestions from registered agents towards improving information and marketing	Core Area Director/ MoE staff	Year 1-5	High

F4.3 Visitor Orientation and Information

Objective: to ensure that visitors arriving at Prek Toal are provided with the best possible orientation and information services and facilities.

Issues and Rationale: the easy availability of adequate, clear and relevant information immediately on arrival will positively impact visitor experience. Visitors will want to know where they are, they need to know what facilities are available, and they will want to learn about the environmental and social aspects of the area they are visiting.

Visitors arriving at Prek Toal are required to stop and register at the Tourist Reception and Information Centre, providing an opportunity for initial orientation and delivery of information about the Core Area and its surroundings. This will require development of appropriate signage and written materials, and, as appropriate, interpretive materials and audio-visual programming.

Management Actions:

Table 18. Management actions related to visitor orientation and information.

No.	Activity	Responsibility	Timing	Priority
F4.3.1	Develop visible, welcoming signage identifying the entrance to the Tourist Reception and Information Centre	TSCP/Core Area Director	Year 1	High
F4.3.2	Develop simple handout materials (including a user-friendly map) for distribution at the registration area, providing background information on the biological, ecological and social resources of the area, and how these can be experienced by the visitor, and on available support facilities (lodging, restaurants, shops, transportation <i>etc.</i>)	TSCP/Core Area Director	Year 1-5	High
F4.3.3	Develop and deliver additional interpretive and audio-visual programming at the Tourist Reception and Information Centre, as determined by an initial needs assessment and visitor demand	TSCP/Core Area Director	Year 1-5	High
F4.3.4	Develop mechanism for visitor feedback and suggestions and incorporate as appropriate in information delivery	TSCP/Core Area Director	Year 1-5	High

F4.4 Quality of Products and Services

Objective: to ensure that products and services delivered as part of the "Prek Toal experience" adhere to the highest possible quality standards.

Issues and Rationale: visitors to Prek Toal will have made a special effort to arrange travel and support services, and are likely to have high expectations of their experience. These will include safe transportation, high quality guiding services, provision of basic but accurate information about the environmental and social features of the area, safe food and water, and clean and comfortable accommodations.

Management Actions:

Table 19. Management actions related to quality of products and services.

No.	Activity	Responsibility	Timing	Priority
F4.4.1	Develop safety and service standards regarding transportation of visitors to and within the Core Area, distribute to registered service providers, and monitor service standards through visitor feedback and other mechanisms	Core Area Director/ TSCP	Year 1-5	High
F4.4.2	Develop standards for registered guiding services, and distribute and monitor as above	Core Area Director/ TSCP	Year 1-5	High
F4.4.3	Develop standards for other registered visitor services (accommodation, dining, souvenir and craft sales), and distribute and monitor as above	Core Area Director/ TSCP	Year 1-5	High
F4.4.4	Periodically review standards with registered service providers and modify service delivery as required	Core Area Director/ TSCP	Year 1-5	High
F4.4.5	Periodically review programming and services delivered through the CAMC and ensure that they comply with or exceed prevailing standards	Core Area Director/ TSCP	Year 1-5	High

F4.5 Ecotourism Regulations

Objective: to establish and implement procedures and regulations regarding the management of ecotourism and ecotourist activities.

Issues and Rationale: the key resources (nesting waterbirds) that attract ecotourists to the Prek Toal Core Area are sensitive to disturbance, and carelessly developed or poorly regulated ecotourism could have serious negative impacts on nesting success, on continued use of the area by species of conservation importance, and ultimately on population size and viability of these species. Regulations regarding frequency of visits to nest sites, type and size of transport, proximity of approach, and visitor behaviour will need to be carefully formulated and enforced in order to ensure long-term viability of the resource, continuing high-quality ecotourism experiences, and flow of benefits to local communities.

In addition, increased visitor levels can have negative social impacts in adjacent communities if not carefully managed and regulated.

Management Actions:

Table 20. Management actions related to ecotourism regulations.

No.	Activity	Responsibility	Timing	Priority
F4.5.1	Develop, implement and enforce science-based regulations and guidelines specifying frequency of visits to specified areas, number of visitors/group, proximity and method of approach to nesting trees, and visitor behaviour standards	Core Area Director/ TSCP	Year 1-5	High
F4.5.2	Develop and disseminate a code of conduct for tourist behaviour in local communities and toward community members	Core Area Director/ TSCP	Year 1-5	High
F4.5.3	Train staff and Core Area residents in visitor management	Core Area Director/ TSCP	Year 1-5	High

F5. Community Development

Goal: to increase community involvement and support for biodiversity conservation.

F5.1 Involvement of Community-based Institutions

Objective: to strengthen the operation of community institutions involved in conservation.

Issues and Rationale: implementation of the biodiversity conservation and management measures specified in this Management Plan will require the direct involvement and cooperation of the Koh Chiveang Commune Council, possibly a Community Fisheries Organization(s) encompassing the Core Area, and other community-based organizations involved in livelihoods activities, environmental education and delivery of visitor support services. It is anticipated that the Commune Council will be directly involved in enforcement of resource use and access restrictions in the Core Area (jointly with Ranger and FiA staff), and that the CFO(s) will play a key role in management of subsistence-level fisheries (see also Section F5.5).

Management Actions:

Table 21. Management actions related to involvement of community-based institutions.

No.	Activity	Responsibility	Timing	Priority
F5.1.1	Clearly define and periodically review roles of all community partners in Core Area management implementation	Core Area Director	Year 1	High
F5.1.2	Regularly disseminate information and solicit feedback on Core Area operations from all partners	Core Area Director/ Senior Ranger	Year 1-5	High
F5.1.3	Provide relevant training to community institution members	Core Area Director/ Senior Ranger	Year 1-5	High
F5.1.4	Formulate and adopt a common community development strategy with all partners that is compliant with sustainable management and protection of Prek Toal Core Area	Core Area Director/ Senior Ranger	Year 1-5	High

F5.2 Benefits Sharing

Objective: to ensure that local communities share in the benefits of Core Area conservation and management.

Issues and Rationale: successful conservation management of the Core Area, and successful implementation of restrictions on natural resource use, will be driven in part by how well and how profitably community members and organizations are able to participate in the benefits of ecotourism and associated activities. Also, as increased visitor levels can have negative social impacts if not carefully managed, communities adjacent to the Core Area will need to have a voice in all aspects of visitor management and related facilities development.

Management Actions:

Table 22. Management actions related to benefits sharing.

No.	Activity	Responsibility	Timing	Priority
F5.2.1	Establish mechanisms to identify opportunities for early and where feasible priority participation in development of visitor services, and in provision of other Core Area support services by community members	Core Area Director/ Senior Ranger	Year 1	High
F5.2.2	Establish mechanisms to identify and avoid negative impacts of increased visitor levels and related activities on local communities	Core Area Director/ Senior Ranger	Year 1	High
F5.2.3	Provide technical and management assistance for the development of community-based ecotourism initiatives and support services, and training for their implementation	Core Area Director/ Senior Ranger	Year 1-5	High
F5.2.4	Continue to hire Ranger and CAMC support staff from local communities	Core Area Director/ Senior Ranger	Year 1-5	High

F5.3 Access to Livelihoods and Income Generation Support

Objective: to improve the living conditions of local communities that are impacted by Core Area management.

Issues and Rationale: the provisions of this Management Plan restrict use of the Core Area by local residents to subsistence-level fishing and harvest of subsistence levels of fuelwood. While this will be offset to some extent by opportunities for sharing in the benefits of ecotourism and related activities, additional support will be needed to ensure that restricted access to Core Area resources does not negatively impact local living standards. To achieve this, technical and financial support will be provided for the development of alternative sustainable livelihoods activities selected in conjunction with local residents.

Promotion and support of livelihoods activities will be based on the following priorities:

- activities that have no or easily managed environmental impacts;
- activities that can be carried out at or near the home;
- activities that benefit women, poor families or those with otherwise limited access to natural resources;
- activities that produce goods and services that will substitute for those currently obtained from the Core Area; and,
- activities that require low initial investment costs and that produce early and consistent returns.

Management Actions:

Table 23. Management actions related to access to livelihoods and income generation support.

No.	Activity	Responsibility	Timing	Priority
F5.3.1	Identify and document livelihoods activities that currently impact Core Area biodiversity resources	TSCP/Core Area Director	Year 1	High
F5.3.2	Consult with local resource users to select preferred alternative or replacement livelihoods for trial implementation, and provide technical and financial support	TSCP/Core Area Director	Year 1	High
F5.3.3	Promote environmentally friendly technologies that will potentially reduce pressures on limited natural resources used by communities	TSCP/Core Area Director	Year 1	High

F5.3.4	Include clean water, family planning and other health-related issues in livelihoods support and community outreach	TSCP/Core Area Director	Year 1	High
F5.3.5	Provide technical support for replication of successful alternative/replacement livelihoods	TSCP/Core Area Director	Year 1-5	High

F5.4 Community Education and Awareness Raising

Objective: to create understanding and awareness about biodiversity conservation among local residents.

Issues and Rationale: in order for conservation action to be successful, local residents and resource users need to understand how it benefits them and their families in both the short and long-term. They also need to understand how and why resource use and access restrictions, and associated laws and regulations, are applied. This will require a broadly-based, sustained environmental education and awareness programme utilizing a variety of techniques. Delivery will be through schools, through outreach programming aimed at specific communities and resource users, and through media programming. The CAMC will be a key delivery point for residents of Prek Toal and adjacent communities, for two reasons: 1) it provides a large space that is ideal for group meetings and interaction; and, 2) the view from the roof tower provides an ideal vantage point from which to identify familiar sites of interest, and facilitate discussion that draws on the experience and knowledge of community members. Selected Ranger staff will be trained to assist in programme delivery, and other local human resources (school teachers, local NGO staff, community volunteers) will also be used in order to promote a sense of community ownership of the programme.

Management Actions:

Table 24. Management actions related to community education and awareness raising.

No.	Activity	Responsibility	Timing	Priority
F5.4.1	Ensure that all persons and organizations relevant to environmental education and awareness are included in Core Area management planning and implementation	TSCP/Core Area Director	Year 1	High
F5.4.2	Design and develop appropriate environmental education programming and materials, and deliver through local schools and outreach programming aimed at outlying (including seasonal) communities	TSCP	Year 1-5	High
F5.4.3	Design and develop appropriate information/interpretive programming and materials and deliver through Core Area Management Centre and guided tours, including a programme of free tours for community members	TSCP/Core Area Director	Year 1-5	High
F5.4.4	Develop and deliver appropriate <i>ex situ</i> awareness campaign (using newspapers, radio, television, other media)	TSCP/Core Area Director	Year 1-5	High
F5.4.5	Train staff in delivery of environmental education/interpretive programmes, and in public and media relations	TSCP/Core Area Director	Year 1-5	High
F5.4.6	Involve specialist NGOs and other organizations in environmental education development and delivery, and in public and media relations	TSCP/Core Area Director	Year 1-5	High
F5.4.7	Encourage and support relevant and compatible environmental education and awareness activities developed by other organizations	TSCP/Core Area Director	Year 1-5	High

F5.5 Resource Access and Utilization

Objective: to ensure sustainable utilization of Core Area resources by local communities.

Issues and Rationale: extractive use of Core Area resources will be limited to subsistence fishing using controlled gear, and to seasonal harvest of fuelwood for family use. These activities will be limited to *bona fide* residents of the five communities (Prek Toal, Anlong Ta Oor, Kampong Prahok, Thvang, and Piak Kantel) adjacent to the Core Area. Levels and locations of resource harvest will be monitored and reviewed on a regular basis to ensure that impacts on biodiversity resources and the environment are minimal. Community members and organizations (e.g., Community Fisheries Association) will be encouraged to participate in these reviews in order to ensure that their concerns are understood and fairly dealt with, within the over-riding priority of long-term conservation of all biodiversity resources in the Core Areas.

Management Actions:

Table 25. Management actions related to resource access and utilization.

No.	Activity	Responsibility	Timing	Priority
	Subsistence Fishing			
F5.5.1	Quantify numbers, origin and socio-economic background of small-scale fishers	Core Area Director/ Commune Council	Year 1-5	High
F5.5.2	Strictly limit and enforce the type of fishing gear permitted, to eliminate all methods that are non-selective, that result in damage to or destruction of habitat, and/or that result in a bycatch of waterbirds or other biodiversity	Core Area Director/ Senior Ranger/FiA	Year 1-5	High
F5.5.3	Develop working relationships among FiA, Core Area and Commune Council staff in order to efficiently regulate small-scale fishing	Core Area Director	Year 1-5	High
F5.5.4	Include small-scale fishing issues in environmental education and awareness programming	Core Area Director/ TSCP	Year 1-5	High
F5.5.5	Involve Commune Councils as a cooperating agency with regard to small-scale fisheries management	Core Area Director/ Senior Ranger	Year 1-5	High
F5.5.6	At appropriate intervals, assess the feasibility of converting specified areas to Community Fisheries co-management (with the Core Area Management Authority), contingent on there being no or low (and controllable) impact on other biodiversity resources, and an adequate regulatory and enforcement structure in place	TSCP/Core Area Director/FiA	Year 1-5	High
	Fuelwood and other NTFP harvest			
F5.5.7	Quantify numbers, origin and socio-economic background of harvesters	TSCP/Core Area Director	Year 1	High
F5.5.8	Permit resource harvest only at subsistence scale by legitimate users of the Core Area	Core Area Director/ Senior Ranger	Year 1-5	High
F5.5.9	Provide replacement income sources as required, including employment as Core Area labourers	TSCP/Core Area Director	Year 1-5	High
F5.5.10	Provide replacement fuelwood/NTFP resources as appropriate	TSCP/Core Area Director	Year 1-5	High
F5.5.11	Encourage use of fuel-efficient stoves and alternative energy sources	TSCP/Core Area Director	Year 1-5	High
F5.5.12	Emphasize equitable representation of women in income replacement/participatory programmes	TSCP/Core Area Director	Year 1-5	High

F5.5.13	Improve awareness and enforcement	TSCP/Core Area Director	Year 1-5	High
F5.5.14	Identify and take appropriate action against middlemen	Core Area Director/ Senior Ranger	Year 1-5	High

F5.6 Impact of Integrated Conservation and Development Programming

Objective: to evaluate the impact and effectiveness of community awareness, conservation, livelihoods and other natural resource management programmes.

Issues and Rationale: effective protection and conservation of the unique, globally significant biodiversity resources of the Prek Toal Core Area is a critically important issue. Impacts and effectiveness of the management programmes need to be evaluated on a regular basis, and adjusted as required to ensure that the objectives of both biodiversity conservation and community-based initiatives are being met.

Management Actions:

Table 26. Management actions related to impact of integrated conservation and development programming.

No.	Activity	Responsibility	Timing	Priority
F5.6.1	Develop appropriate biological and socio-economic indicators and document baseline conditions	Core Area Director	Year 1	High
F5.6.2	Remeasure indicators at specified intervals and make necessary management adjustments	Core Area Director/ Independent Evaluator (at mid-term)	Year 2-5	High
F5.6.3	Review and update the management plan at five year intervals	Core Area Director	Year 5	High
F5.6.4	Integrate lessons learned into second five year management plan	Core Area Director	Year 5	High

F6. Buffer Zone and Transition Zone Management

Goal: to establish and enhance collaboration with authorities and other stakeholders in the Buffer Zone and Transition Zone adjacent to the Prek Toal Core Area.

F6.1 Issues Related to Management of the Buffer Zone and Transition Zone

Objective: to ensure that prescriptions in the Prek Toal Management Plan are communicated to key stakeholders in the Buffer Zone and Transition Zone, that appropriate cooperative linkages are developed and maintained, and that impacts of land use and resource use activities adjacent to the Core Area are minimized.

Issues and Rationale: the Prek Toal Core Area is a small part (1.4%) of the 1,483,339 ha Tonle Sap Biosphere Reserve. It is completely surrounded by the Buffer Zone, ~10.5 km of its perimeter comprising permanent lakefront, and the remaining 47.0 km seasonally flooded forest, shrubland and grassland. An essential feature of the Biosphere Reserve concept is that the Buffer Zone is intended to be used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism and applied and basic research.

Activities in the Buffer Zone are meant to be managed to be consistent with the conservation and protection plans of the Core Areas. Fisheries activities and other development plans are intended to be managed based on existing law and regulations in a coordinated and cooperative manner. The Buffer Zone is also subject to experimental research and discovery of methods for the management of flooded forest, fisheries, agriculture, housing and settlement, land use, water resources, navigation and tourism, in order to ensure their sustainability and increased production while preserving environmental quality and fisheries resources.

The concerned line ministries are responsible for the management of the Buffer Zone and Transition Zone, through the coordination of the Cambodia National Mekong Committee. The Tonle Sap Biosphere Reserve Secretariat established under the CNMC is responsible for coordinating and strengthening cooperation between ministries, agencies, local authorities and communities for the protection and sustainable management of the TSBR.

Management Actions:

Table 27. Management actions related to management of the Buffer Zone and Transition Zone.

No.	Activity	Responsibility	Timing	Priority
F6.6.1	Communicate key provisions of the Core Area Management Plan to stakeholders in the Buffer Zone and Transition Zone	Core Area Director	Year 1	High
F6.6.2	Monitor land and resource uses outside of the Core Area, and communicate concerns regarding downstream impacts to the relevant agencies (through CNMC and TSBRS) for action	Core Area Director/ TSBRS Director	Year 1-5	High

F7. International Cooperation

Goal: to contribute to collaboration and knowledge development within the global system of Biosphere Reserves.

F7.1 Issues Related to the Global System of Biosphere Reserves

Objective: to ensure that lessons learned in the development and implementation of the Prek Toal Core Area Management Plan are exchanged with others concerned with Biosphere Reserve Core Area management.

Issues and Rationale: Biosphere Reserves are intended to be a practical means of achieving a sustainable balance between the often conflicting goals of conserving biological diversity, and promoting human development while maintaining associated cultural values. Biosphere Reserves are sites where this objective is tested, refined, demonstrated and implemented. As a member of the international Biosphere Reserve network, Cambodia has an obligation to communicate lessons learned to other members of the network, for consideration, modification and application in other areas of the world.

Management Actions:

Table 28. Management actions related to the global system of Biosphere Reserves.

No.	Activity	Responsibility	Timing	Priority
F7.7.1	On completion and review of Management Plan implementation (see Management Action 5.6.3 above) share lessons learned with other members of the International Biosphere Reserve network	TSBRS Director	Year 5	High

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Management Plan 2007-2011





