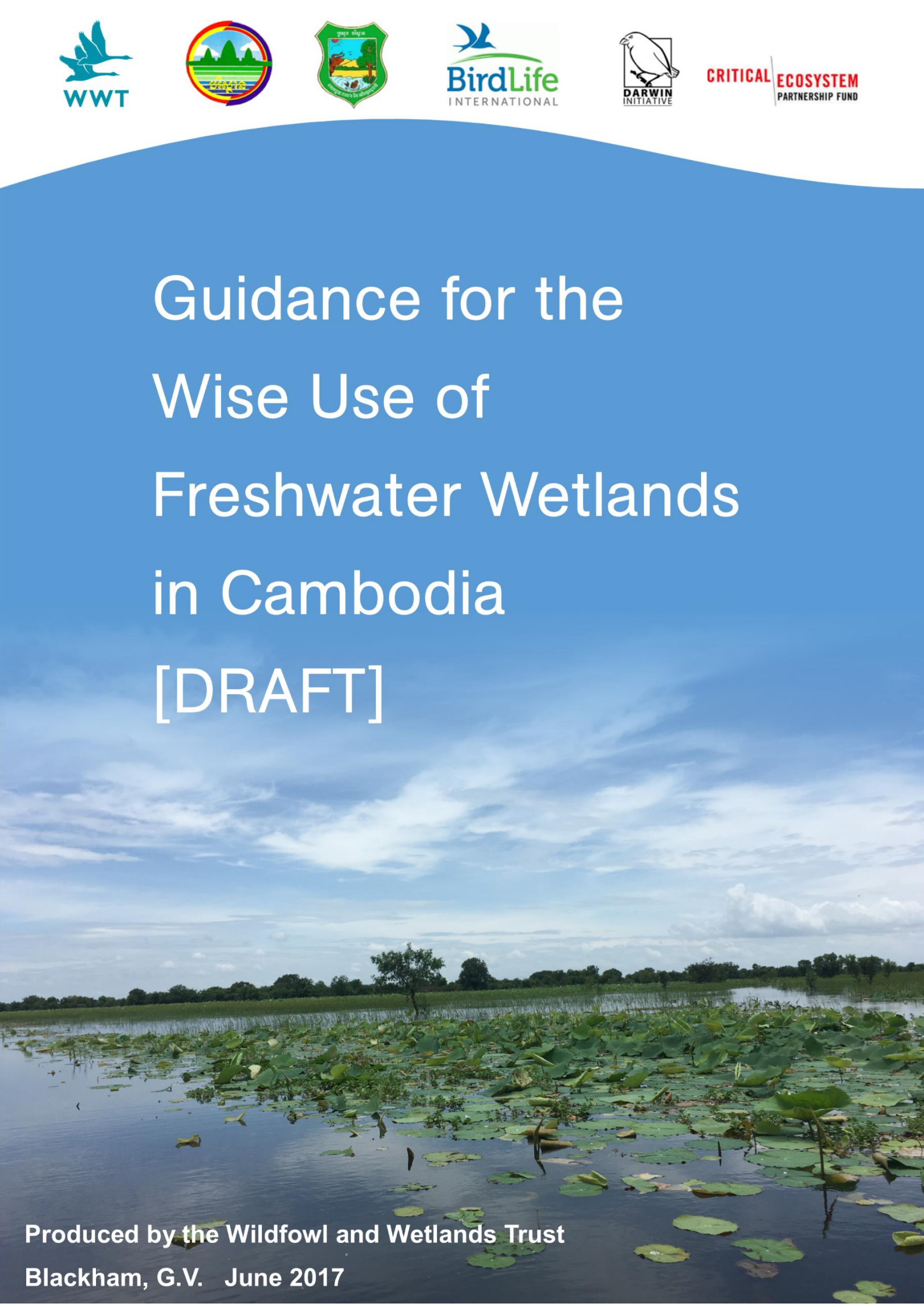
Guidance for the Wise Use of Freshwater Wetlands in Cambodia [DRAFT]



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Foreword

Contents

Acronyms and Abbreviations

CBET	Community-based ecotourism
CFi	Community Fisheries
cm	Centimetre
e.g.	for example
FA	Forestry Administration
FCA	Fish Conservation Area
FiA	Fisheries Administration
GDANCP	General Department of Administration for Nature Conservation and Protection
km	kilometre
m	metre
MoE	Ministry of Environment
MOWRAM	Ministry of Water Resources and Meteorology
NGO	Non-Governmental Organization
PA	Protected area
SRI	System of Rice Intensification
SRP	Sustainable Rice Platform
TSBR	Tonle Sap Biosphere Reserve
UNESCO	United Nations Educational, Scientific and Cultural Organization

Aim of the guidance

The aim of this guidance is to provide support for stakeholders living in and around wetlands to enhance their understanding of:

- the importance of wetlands and the services they provide for people and the environment;
- the considerations that need to be taken into account when managing wetlands; and
- methods that can be employed in the management of different features and activities within wetlands.

Designed for use by site managers, the guidance is also an important tool for stakeholders working on a range of projects in and around wetlands, including development and industry. The guidance helps to ensure the correct considerations are taken to support sustainable livelihoods for local communities and secure ecosystem services and nature conservation values.

While several legislative and policy instruments impact on wetland management, most of the current regulations are indirect and regulate wetlands through environmental protection, agriculture, aquaculture, fisheries and forestry. Similarly, many wetlands in Cambodia are already integrated into overarching management plans for larger areas which do not specifically focus on wetland management. Separate guidance for the wise use of freshwater wetlands is desirable in view of the specific threats these ecosystems face and their potential for sustainable management.

Although there are already many general publications on wetland management, these are not readily available to everyone working or living in and around wetlands in Cambodia, often contain complicated technical language, and are long documents where useful information is hidden amongst less relevant content. The present guidance attempts to provide concise information that is directly relevant to the management of Cambodia's wetlands in easy-to-understand language. The guidance also directs the reader to other sources of information where appropriate. We hope this guidance will be a useful and accessible reference document for Cambodian wetland stakeholders.

Structure of the guidance

Wise Use Guidance for Freshwater Wetlands in Cambodia is divided into three parts:

Part A: Background information. These sections contain information on freshwater wetlands in Cambodia and the authorities which govern them.

Part B: Wetland management planning and engaging with people. These sections contain information on developing a wetland management plan, engaging with stakeholders and using CEPA methods.

Part C: Managing wetlands: Information on key wetland features and activities. These sections provide information on key wetland features and activities that need to be considered when managing wetlands. Each section provides practical information on approaches and techniques which follow the wise use concept of maintaining wetland values and functions, while still meeting current and future human well-being needs.

Part A:

Background Information

The following sections provide information on freshwater wetlands in Cambodia and the authorities which govern them.

1. Introduction

1.1 What are wetlands?

Ramsar defines wetlands as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.”[1]

In the Cambodia Wetland Inventory, sites classified as wetlands must meet at least one of the following criteria: [2]

- Plants able to tolerate inundation by water for a period of greater than 6 weeks;
- Soils are classified as hydric soils;
- Area is inundated by water for a period on an annual and periodic basis (usually for a minimum of six weeks).

This guidance covers freshwater wetlands as found in Cambodia. Freshwater wetlands in Cambodia can be separated into the following categories: [3]

- Permanent Lakes;
- Permanent Rivers;
- Pools in Rivers;
- Permanent Ponds;
- Seasonally Inundated Flooded Forests;
- Pasture / Grass Marshes;
- Rice Fields.

1.2 Wetland values

Wetlands provide a diverse range of ecosystem services that are essential for human well-being and the environment. Some of these services are listed in Table 1.

[1] An Introduction to the Convention on Wetlands, Ramsar Convention Secretariat, Gland, Switzerland, 2016.
[2] Vathana, K. and Penh, P., 2003. Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.
[3] Vathana, K. and Penh, P., 2003. Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.

Table 1. Wetland ecosystem services.[4]

Services	
Provisioning	Wetlands provide the main source of drinking water for many households.
	Wetlands supply food through natural resources such as fish, and through agricultural practices in wetland areas.
	Wetlands supply other natural products including timber, construction materials, fibres, fuel, fodder and medicinal plants.
	Wetlands supply water for industrial development and energy production through sensitively designed hydropower schemes.
Regulating	Wetlands assist with the storage and retention of water which helps flow regulation and provides flood and drought protection.
	Wetland sediments and vegetation help to purify and filter harmful waste from water by absorbing pollutants.
	Wetlands play an important role in climate change resilience and carbon storage. They assist in the regulation of greenhouse gases, temperature, precipitation and other climatic processes.
Supporting	Wetlands provide important habitat for biodiversity.
	Wetlands assist in soil formation through sediment retention and accumulation of organic matter.
Cultural	Wetlands can have strong links to ancient traditions, cultures, spiritual values and religious values.
	Wetlands provide research, education recreation and tourism opportunities.

[4] Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-Being: Wetlands and Water Synthesis. World Resources Institute, Washington, DC.

1.3 Wise use of wetlands

The Ramsar Convention defines wise use of wetlands as:

"the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development."[5]

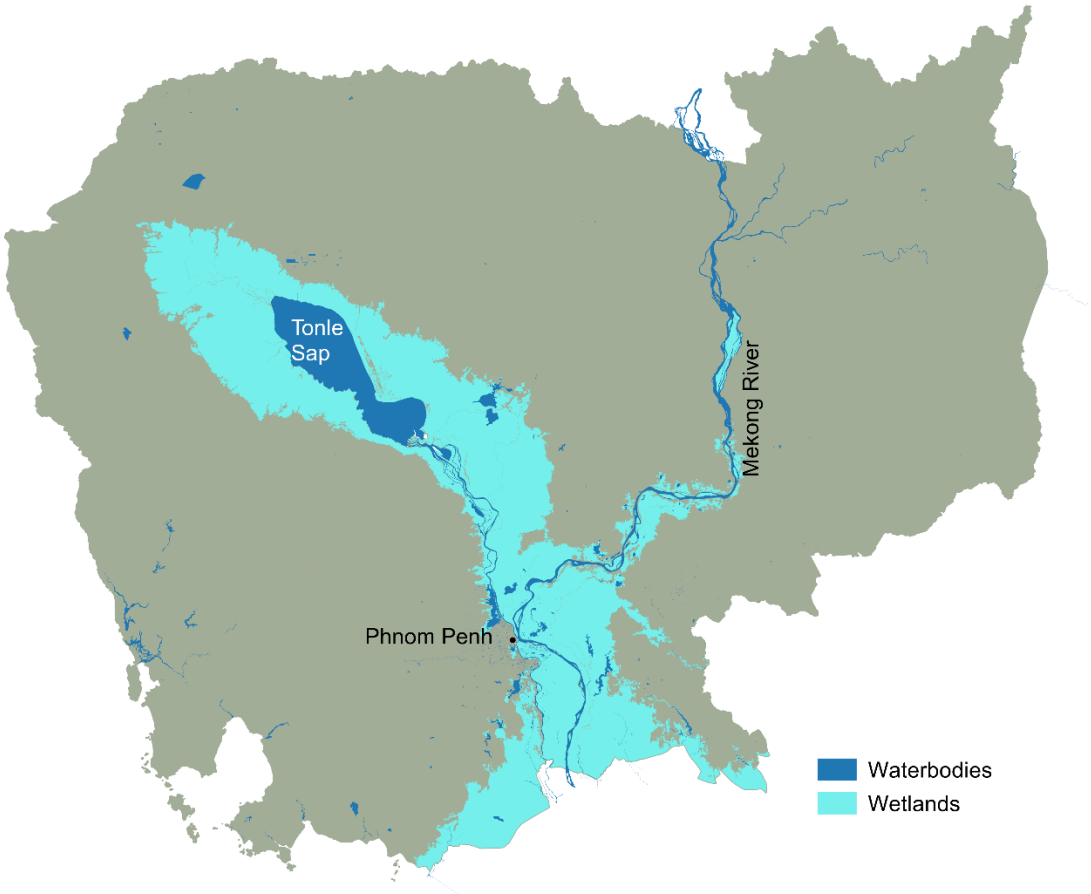
The concept of wise use means finding ways to maintain wetland values and functions, while still meeting current and future human well-being needs. Cambodia is a developing country with a large population aspiring to reduce poverty, which is highly dependent on natural resources.[6] Pursuing wise use management strategies, as discussed in this document, will help the country to achieve a balance of uses which will deliver ecosystem, economic and sociocultural benefits from wetlands now and in the future.

1.4 Cambodia's freshwater wetlands

Cambodia's freshwater wetlands cover more than 30% of the land area (see Figure 1).[7] The freshwater hydrology of Cambodia is dominated by the Mekong River and Tonle Sap River and Great Lake system.[8] Other important freshwater wetland areas include the seasonally inundated grassland of Boeung Prek Lapouv. In addition, numerous other smaller wetlands are found in the country in the form of streams, ponds, freshwater swamps and marshes.[9] Many of these wetlands make a significant contribution to human well-being and biodiversity but are not being actively managed and may be under threats which will lead to their degradation or loss.

[5] http://www.ramsar.org/about/the-wise-use-of-wetlands
[6] National Biodiversity Steering Committee (2014). The Royal Government of Cambodia: Fifth National Report to the Convention on Biological Diversity.
[7] Vathana, K. & Penh, P. (2003). Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.
[8] Kosal, M. (2004). Biodiversity of Cambodia's wetlands. Torrell, M. et al. (eds.), Wetlands Management in Cambodia: Socioeconomic, Ecological and Policy Perspectives, WorldFish Center Technical Report, 64.
[9] Vathana, K. & Penh, P. (2003). Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.

Figure 1. Map of Freshwater Wetlands in Cambodia.[10]



1.4.1 Mekong River and its tributaries

The Mekong River is the longest river in Southeast Asia. The river enters Cambodia from Lao PDR in the northeast and flows southwards towards Phnom Penh. The Mekong delta begins downstream of Kampong Cham and extends into Vietnam. Mekong delta is formed by both the Mekong and Bassac Rivers. Overall, a 468 km stretch of the river flows through Cambodia and around 86% of the country lies within the Mekong Basin.

The river has seasonal variation in flow. Water levels are at their lowest in April and May. Indeed, by the end of April, many water bodies are isolated and the smaller tributaries have dried out. The river starts to rise again with the monsoon rains in late May and reaches its highest water levels in September or October.[11]

[10] Data source: ASEAN Regional Centre for Biodiversity Conservation

[11] Vathana, K. and Penh, P., 2003. Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.

1.4.2 Tonle Sap River and Great Lake system

The Tonle Sap Lake is one of the largest freshwater lakes in Southeast Asia. The Mekong River connects to the Tonle Sap Lake via the Tonle Sap River. During the wet season (May to October) the Mekong River swells and its waters flow into the Tonle Sap River and to the Tonle Sap Lake. This causes the lake to expand from 2,500 km² in the dry season to 13,000 km² in the wet season. In November, when the level of the Mekong River decreases, the Tonle Sap River reverses its flow and water flows back from the Tonle Sap Lake into the Mekong River.

The Tonle Sap Lake has eleven main tributaries. The Stung Sen River is the largest tributary and originates in the Dangrek Mountains on the border between Cambodia and Thailand. In Cambodia the river flows through Preah Vihear Province and Kampong Thom Province.[12]

The lake's resources are hugely important to the population of Cambodia: around one million people are dependent on the lake's fisheries for their livelihoods while are further 2.6 million are dependent on other lake-related resources.[13]

1.4.3 Internationally recognised wetland sites

1.4.3.1 Ramsar sites

As a Contracting Party to the Ramsar Convention (since 1999), Cambodia has designated four sites as Wetlands of International Importance, also known as Ramsar sites (see Table 2). Ramsar sites are sites which contain representative, rare or unique wetland types, and/or are important for conserving biological diversity. As a Contracting Party, Cambodia is expected to manage its Ramsar Sites so as to maintain their ecological character and retain their essential functions and values for future generations.[14]

[12] Nagumo, Naoko, Toshihiko Sugai, and Sumiko Kubo. "Late Quaternary floodplain development along the Stung Sen River in the Lower Mekong Basin, Cambodia." *Geomorphology* 198 (2013): 84-95.
[13] Chadwick, M. and Juntopas, M., 2008. Sustaining Tonle Sap: An assessment of development challenges facing the Great Lake. Sustainable Mekong Research Network
[14] http://www.ramsar.org/sites-countries/managing-ramsar-sites

Table 2. Ramsar Sites in Cambodia.[15]

Ramsar Site	Description
Boeng Chhmar and Associated River System and Floodplain **28,000 ha** **Designated in 1999**	The site is part of the Tonle Sap Biosphere Reserve and consists of a permanent lake surrounded by flooded forest in the northeast fringe of Tonle Sap lake. The site merges with Tonle Sap Lake in the wet season.
Koh Kapik and Associated Islets **12,000 ha** **Designated in 1999**	The site consists of alluvial islands immediately off the mainland of Koh Kong Province. The main wetland types at the site are estuarine waters, intertidal mud, sand or salt flats and mangroves.
Middle Stretches of Mekong River North of Stoeng Treng **14,600 ha** **Designated in 1999**	The site consists of a 40 km stretch of the Mekong River in the north of Cambodia. This river habitat is characterized by strong turbulent flow with numerous channels between rocky and sandy islands that are completely inundated during high water as well as higher alluvial islands that remain dry.
Prek Toal **21,342 ha** **Designated in 2015**	The site is located in the north-west upstream end of Tonle Sap Lake and is part of the Tonle Sap Biosphere Reserve. It is mostly covered by freshwater swamp forest which floods annually to depths of up to 8 m.

1.4.3.2 Tonle Sap UNESCO Biosphere Reserve

Tonle Sap was designated as a UNESCO Biosphere Reserve in 1997. Biosphere reserves are internationally recognized reserves in which management of the site aims to promote solutions reconciling the conservation of biodiversity with its sustainable use.[16]

[15] Boeng Chhmar information from: https://rsis.ramsar.org/ris/997; Koh Kapik and Associated Islets information from: https://rsis.ramsar.org/ris/998; Middle Stretches of Mekong River information from: https://rsis.ramsar.org/ris/999; Prek Toal information from: https://rsis.ramsar.org/ris/2245;
[16] http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/

1.4.4 Transboundary wetlands

The Mekong River is the longest river in Southeast Asia, flowing through three provinces of China, continuing into Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam and finally into the South China Sea. Since the river crosses international boundaries it is classed as a transboundary wetland.

In a river system, actions can be taken which extract, divert or hold water at specific points for human-related purposes. Through these actions, river water can be used to sustain fisheries, for flood mitigation, for irrigation, for urban and domestic water supplies and for hydropower.[17] However, any actions taken upstream can impact the wetland resources downstream, and can have large-scale and long-distance consequences. Therefore water resources should ideally be managed at a basin-level, with the aim of balancing trade-offs to both human well-being and ecosystem services at all points in the river system.[18] Where wetlands cross international boundaries, such as transboundary wetlands, cooperation between countries is needed to ensure actions in one country do not cause harmful effects across the border.

For the transboundary Mekong River, the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, known as the Mekong Agreement, was entered into by the four member countries (Cambodia, Lao PDR, Thailand and Viet Nam) in 1995. [19] The goals, objectives and underlying principles of the agreement are:

- To cooperate in all fields of sustainable development, utilisation, management and conservation of the water and related resources of the Mekong River Basin, in a manner to optimise multiple uses and mutual benefits in the water and related resources of the Mekong River Basin including, but not limited to irrigation, hydro-power, navigation, flood control, fisheries, timber floating, recreation and tourism;

- To promote the development of the full potential of sustainable benefits and to prevent wasteful use with an emphasis and preference on joint and/or basin-wide development projects and basin programs through the formulation of a basin development plan;

[17] Brels, S. et al. (2008). Transboundary water resources management: the role of international watercourse agreements in implementation of the CBD. CBD Technical Series no. 40, Secretariat of the Convention on Biological Diversity, Montreal, Canada.
[18] Millennium Ecosystem Assessment,(2005). Ecosystems and Human Well-Being: Wetlands and Water Synthesis. World Resources Institute, Washington, DC.
[19] http://www.mrcmekong.org/about-the-mrc

- To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects;

- To utilize the waters of the Mekong River system in a reasonable and equitable manner.[20]

1.4.5 Drivers of wetland loss in Cambodia

In Cambodia, population growth and economic development are putting increasing pressure on wetland resources.[21] Various sectors directly or indirectly impact on wetlands e.g. agriculture, fisheries, hydropower, industrial development etc. Some specific drivers of wetland loss and degradation are: loss of habitat through agricultural expansion; changes to water flow and fish migration patterns through hydropower schemes; a loss of fishery resources through overfishing and illegal fishing practices; pollution from agrochemicals; industrial development such as mining; and pollution from industry.[22]

Cambodia has also been identified as being highly vulnerable to the impacts of climate change. Since much of the country is low-lying, any rise in sea level caused by climate change would significantly affect the hydrology of wetlands in the country. Furthermore, extreme weather events caused by climate change, such as extreme flooding or severe droughts, also has a high potential to negatively impact Cambodia's wetlands.[23]

In addition, a lack of cross-sectoral coordination in laws and legislation for wetland-related activities also has the potential to negatively impact wetland ecosystems.

1.5 Government authorities and laws

1.5.1 Government authorities

No single government authority has overarching responsibility for the management of wetlands in Cambodia. Instead, governance is spread across a number of government

[20] Mekong River Commission (1995). Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin
[21] Tordoff, A.W. et al. (2011). Ecosystem Profile: Indo-Burma Biodiversity Hotspot 2011 Update. Critical Ecosystem Partnership Fund (CEPF).
[22] UNEP (2009).Cambodia environment outlook. Report published by Ministry of Environment, Kingdom of Cambodia.
[23] National Biodiversity Steering Committee (2014). The Royal Government of Cambodia: Fifth National Report to the Convention on Biological Diversity.

authorities, with different authorities responsible for different aspects of wetlands or the activities that impact on them. A full list of all the authorities involved in wetland management, and their respective responsibilities, can be found in Table 3.

1.5.2 Laws that relate to Cambodia's wetlands

Cambodia has many laws relating to wetlands and the activities that occur in, or have an impact on them. However, each government authority involved in wetland management has their own policies and laws specific to certain uses and activities, which generally do not take into account other uses of wetlands not under that sector's jurisdiction. Activities and uses of wetland areas include local community use, agriculture, fisheries, forestry, tourism, transport systems and energy production. Box 1 lists some of the laws relevant to wetland management.

Box 1. Laws relevant to the management of wetlands.

- Law on Environmental Protection and Natural Resource Management (1996).
- Law on Water Resources Management (2007).
- Protected Area Law (2008).
- Fisheries Law (2006).
- Sub-Decree on Water Pollution Control (1999).
- Sub-Decree on Community Fisheries Management (2005).
- Sub-Decree on the Mekong Dolphins' Managerial Protection Area 2012.

Table 3. Authorities involved in the management of wetlands in Cambodia.

Authority	Responsibility
Ministry of Environment (MoE)	Management jurisdiction for protected forests and landscapes, including all wetland habitats that fall into this category. The management of wetlands that are also protected areas must comply with the law on protected areas. Within the MoE is the General Department of Administration for Nature Conservation and Protection (GDANCP). The GDANCP is responsible for assisting the MoE to manage protected areas in Cambodia and develop and implement the Protected Areas Strategic Management Plan. Within the GDANCP lies the Department of Freshwater Wetlands Conservation which is specifically focussed on wetlands.
The Ministry of Agriculture, Forestry and Fisheries (MAFF)	Management jurisdiction for Fish Conservation Areas and Community Fisheries, which are managed by the Fisheries Administration (FiA), and Community Forests, which are managed by the Forestry Administration (FA).
Ministry of Water Resources and Meteorology (MOWRAM)	Jurisdiction over water resources policy and management. The ministry is responsible for management of fresh and marine water resources. Within the Ministry are two authorities specifically involved in the management of wetlands: - National Cambodia Mekong Committee: the national institution for coordinating the management, preservation, conservation and development of water and other related resources in the Mekong River Basin. - Tonle Sap Authority: coordinates the management, conservation and development of the Tonle Sap Lake region.
Ministry of Land Management, Urban Planning and Construction	Responsible for governing land use, urban planning, construction projects, and for the resolution of land use conflicts.
Ministry of Tourism	Responsible for managing and developing the tourism field of the Kingdom of Cambodia, including tourism activities within and around wetlands.
Ministry of Interior	Responsible for public administration throughout Cambodia's 24 provinces and 186 districts. The Ministry governs the Cambodian National Police and the administration of the law enforcement.
Ministry of Rural Development	Coordinates, cooperates, implements, monitors and evaluates rural development projects and programs in order to rehabilitate and help develop the country's rural areas by assisting the rural population.
Ministry of Mines and Energy	Responsible for the mining and energy sector, including oil, gas and electricity in the Kingdom of Cambodia.

This lack of a unified legal framework is not just wetland-specific, but is the case for laws and policies relating to environmental protection and natural resource management across Cambodia's different ecosystems. Therefore, to integrate laws created by the government institutions that share responsibility for environmental matters, the Natural Resource and Environment Code has been created. The code provides a unifying legal framework for all matters pertaining to environmental protection and natural resources conservation in Cambodia.

Two sections of the code are particularly important for wetland management:

- Sustainable Management of Natural Resources.

This outlines provisions covering:

- Sustainable Management of Natural Resources
- Biodiversity Conservation Corridors and Protected Areas
- Management of Biodiversity Conservation Corridors and Protected Areas
- Collaborative Management of Natural Resources
- Sustainable Forest Management
- Wildlife Protection, Conservation, and Management
- Protection of Threatened Plants and Ecosystems
- Coastal Zone Management
- Sustainable Water Resources Management
- Sustainable Fisheries

- Waste and Pollution Management and Sustainable Production.

This outlines provisions covering:

- Waste and Pollution Management
- General Obligations for Pollution Control
- Environmental Quality Standards and Effluent Standards
- Environmental Pollution Check and Inspection
- Management of Hazardous Substances
- Waste Management
- Water Pollution Control
- Restoration of Contaminated Sites
- National Pollutant Release and Transfer Register

1.5.3 International conventions and agreements

Cambodia has signed and ratified a number of international conventions and agreements which relate to wetlands and their management:

- Convention on Biological Diversity: since 1995
- Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin: signed in 1995.[24]
- United Nations Framework Convention on Climate Change (UNFCCC) since 1996.
- UNESCO Network of Biosphere Reserves: Tonle Sap was designated in 1997.[25]
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): ratified in 1997.
- Ramsar Convention on Wetlands: ratified in 1999.[26]
- The United Nations Sustainable Development Goals (SDGs): came into effect in 2016.

[24] http://www.mrcmekong.org/about-the-mrc
[25] http://www.unesco.org/new/en/phnompenh/natural-sciences/biosphere-reserves/tonle-sap-biosphere-reserve
[26] http://www.ramsar.org/cda/en/ramsar-documents-list-anno-cambodia/main/ramsar

Part B:
Wetland Management Planning and Engaging with People

The following sections provide information on freshwater wetlands in Cambodia and the authorities which govern them.

2. Wetland Management Planning

The wise use of wetlands means finding ways of ensuring wetlands support human needs, whilst also maintaining vital ecosystem functions. Achieving this balance requires cooperation between all stakeholder groups connected to the wetland. It requires decisions to be made about the uses of the wetland and its resources. This often involves identifying trade-offs between: specific human uses and the ecosystem; and between two or more competing human uses.

Management planning provides the process of making these decisions, based on evidence and existing knowledge, and creating a structured plan of action with clear objectives for how to manage the wetland.

Many wetlands in Cambodia are already integrated into overarching management plans for larger areas i.e. because the wetland is part of a protected area. But these plans may overlook the environmental and socio-economic issues that specifically relate to wetlands. Therefore, for sites with existing management plans, the information in this guidance can be used as a checklist to evaluate the current plan and ensure that full consideration is given to wetlands. With an extensive number of natural, small wetlands in Cambodia, many sites have no formal management structure. To prevent the degradation and loss of these wetlands it is vital that steps are taken to begin managing these sites.

In Cambodia the management of some wetland resources is already the responsibility of local communities through the establishment of community-based organizations. More details on community-based organizations for specific wetland resources are provided in the relevant sections.

2.1 Sources of information

There are already many excellent publications on how to develop wetland management plans. However, these are not readily available to everyone working or living in and around wetlands in Cambodia, do not specifically consider Cambodia's regulatory framework, and are often not available in Khmer. The present guidance therefore provides a reference document that is accessible to Cambodian wetland stakeholders.

Three good English language sources of information on wetland management planning are:

Ramsar Handbook 18: Managing Wetlands. This handbook provides a framework for managing Wetlands of International Importance (also known as Ramsar Sites) and other wetland sites. It includes tools for the development of a management plan. The handbook is available to download on the Ramsar website.[27] [Link]

Wetland Management Planning. A guide for site managers. Designed to complement the Ramsar Handbook, this site managers' guide has been developed by WWF in association with Ramsar's Scientific and Technical Review Panel. It can be downloaded from the internet.[28] [Link]

Ramsar Sites Management Toolkit. This section of the Ramsar website has a range of online resources which will help site managers with the key steps and components involved in managing a Ramsar Site.[29] [Link]

2.2 Developing a wetland management plan

One of the first steps in the management of a wetland is to form a broad-based 'management committee' who then take the lead in developing a management plan for the site. It is important that the committee **engages with all stakeholders** throughout the process to ensure their interests and views are taken into consideration in the development of the management plan. The committee then works through a number of management planning steps. These steps also form the sections of the management plan document. The major steps involved in wetland management planning are:

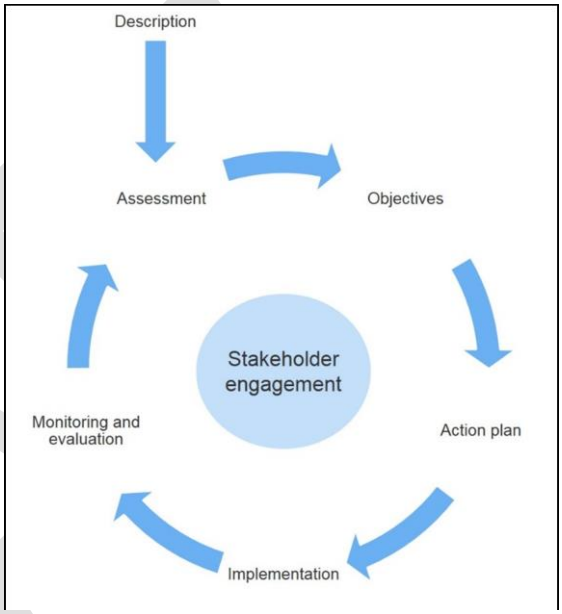
i) Description
ii) Assessment
iii) Objectives
iv) Action plan
v) Monitoring and evaluation

[27] http://www.ramsar.org/sites/default/files/documents/pdf/lib/hbk4-18.pdf
[28] http://assets.panda.org/downloads/wetlands_management_guide_2008.pdf
[29] http://www.ramsar.org/resources/ramsar-sites-management-toolkit

In a written management plan document there should also be a preamble at the beginning to explain the need for the plan, state who is responsible for its development and who is responsible for its implementation.

Wetland management planning should take an adaptive approach. This means that planning should involve element of learning by doing, and that monitoring and evaluation of any actions implemented should be used to adjust or refine management processes to maximise their effectiveness. Figure 2 provides a summary of the steps involved in wetland management planning.

Figure 2. Wetland management planning steps.



2.2.1 Description

Purpose: To understand the physical, ecological and socio-economic characteristics of the wetland.

Management decisions for the site will be based on the specific characteristics of the wetland. Therefore the first step in management planning is to gather existing information on the site. For Ramsar Sites, this information will have already been collated on the Information Sheet for Ramsar Wetlands (RIS), which needs to be updated every six years.[30] For other wetlands this information sheet can be used as a template for what information is needed for the description and how it could be organised.[31]

Some useful sources of information for wetlands in Cambodia are:

- **Directory of Important Bird Areas in Cambodia: Key sites for conservation** (available in Khmer and English).[32] Important Bird Areas (IBAs) have been identified and

[30] http://www.ramsar.org/document/ramsar-information-sheet
[31] http://assets.panda.org/downloads/wetlands_management_guide_2008.pdf
[32] Seng, K.H. et al. (2003). Directory of Important Bird Areas in Cambodia: key sites for conservation. Phnom Penh: Department of Forestry and Wildlife, Department of Nature Conservation and

documented by Birdlife as places on earth of greatest significance for the conservation of the world's birds. Forty IBAs have been identified in Cambodia.[33]

- **Indo Burma Hotspot Ecosystem Profile** produced by Conservation International and the Critical Ecosystem Partnership Fund (CEPF).[34]

- The **Mekong River Commission (MRC)** collects and manages a range of data and information with its Member Countries and other regional stakeholders. This data is available on the MRC website.[35] [Link]

2.2.2 Assessment

Purpose: To identify important characteristics and services provided by the wetland, understand its value, and identify any risks or threats.

The assessment should also establish whether the current situation is optimal, how the situation might change and any risks or threats (both on site and off site) that apply. The purpose of the assessment is to understand why the wetland is important to local people and also why it is important for biodiversity and at wider ecological scales.

Different methods of assessment include ecological assessments, ecosystem service assessments and participatory rural appraisals. Assessments usually focus on ecological, socio-cultural and economic features of wetlands and should attempt to give a value to the characteristics and services provided. Figure 3 lists some of the features that should be assessed for wetland sites

Sources of information: As well as the documents highlighted in Section 2.1, there is also a Ramsar Technical Report on valuing wetlands, which can be downloaded from the Ramsar website.[36] [Link

Protection, BirdLife International in Indochina, and the Wildlife Conservation Society Cambodia Program. http://datazone.birdlife.org/userfiles/file/IBAs/AsiaCntryPDFs/Cambodia.pdf

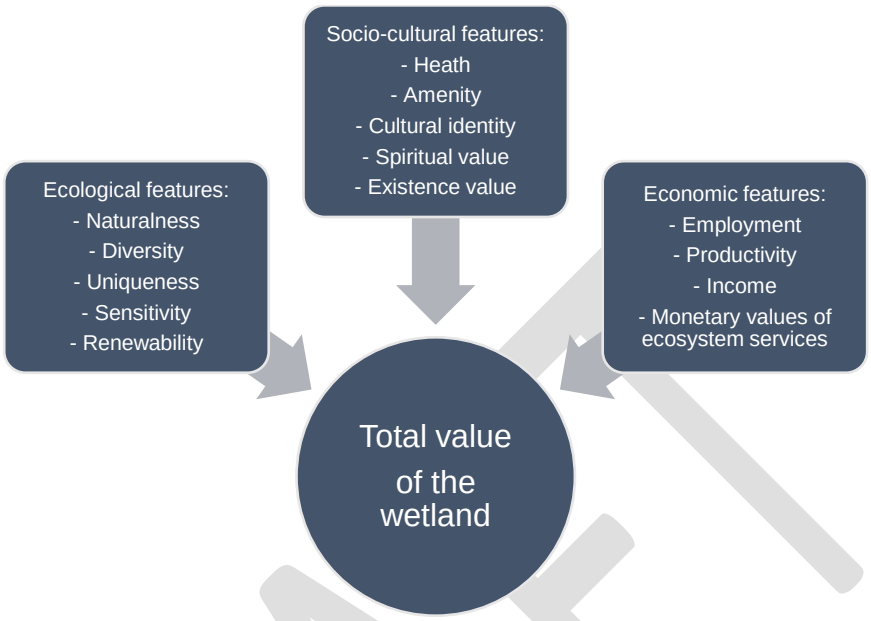
[33] http://www.birdlife.org/worldwide/programmes/sites-habitats-ibas

[34] Tordoff, A.W. et al. 2011. Ecosystem Profile: Indo-Burma Biodiversity Hotspot 2011 Update. Critical Ecosystem Partnership Fund (CEPF).

[35] http://portal.mrcmekong.org

[36] De Groot, R.S. et al. (2006). Valuing wetlands: guidance for valuing the benefits derived from wetland ecosystem services, Ramsar Technical Report No. 3/CBD Technical Series No. 27. Ramsar

Figure 3. Wetland features to be assessed during management planning.[37]



2.2.3 Objectives

Purpose: To express the 'desired state' that should be achieved for key features or services through wetland management.

The result of the evaluation will be a list of the important site features and services provided by the wetland. The next step is to prepare objectives for each of these features or services. Objectives are what should be achieved through management of the wetland. They must be measurable, achievable and they must define the condition required of a feature. Objectives are statements of 'outcomes' rather than how to achieve them.

Two examples of wetland management objectives are:

- Wetland resources that support human livelihoods are maintained and enhanced in the area.
- Wetland species will have increased their use of the wetland.

Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. ISBN 2-940073-31-7.

[37] De Groot, R.S. et al. (2006). Valuing wetlands: guidance for valuing the benefits derived from wetland ecosystem services, Ramsar Technical Report No. 3/CBD Technical Series No. 27. Ramsar Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. ISBN 2-940073-31-7.

2.2.4 Action plan

Purpose: To describe in detail the specific management approaches required to achieve the objectives. To describe in detail when, where, and who will carry out the management approaches.

The action plan lays out the approaches and strategies selected that will allow the objectives to be achieved. For each management approach described in the action plan details should be included on:

- when the activity or action will be carried out
- how long it will take
- where the activity or action will take place
- who will be involved and how much of their time will be required
- how much the activity or action will cost

This section should also prioritise the order and importance of management approaches.

2.2.5 Monitoring and evaluation

After the management approaches have been implemented it is important to monitor and evaluate the progress toward achieving the objectives. This provides feedback which can be used to decide whether a current management action is effective and efficient. This information can be used to adapt and adjust the approaches being taken to ensure that objectives are met. One of the tools that can be used is the Ramsar Management Effectiveness Tracking Tool (R-METT) which can be downloaded from the Ramsar website.[38] [Link].

2.2.6 Realistic timeframes

Management planning can be lengthy processes. A realistic timeframe should be set to proceed through the necessary steps and this should be explained to all stakeholders. There

[38] Ramsar Resolution XII.15 (2015). Evaluation of the management and conservation effectiveness of Ramsar Sites http://www.ramsar.org/sites/default/files/documents/library/cop12_res15_management_effectiveness_e.pdf

needs to be an understanding that it may take time for some of the actions in the management plan to be implemented or completed. Of course, measures should be taken to prioritise actions accordingly, and these conversations should be had with stakeholders during the planning stages. This will prevent stakeholder frustrations that nothing appears to be happening, which can have a detrimental impact on the overall uptake and success of management initiatives. Similarly, over-ambitious targets can be counterproductive.

2.3 Social safeguards

Social safeguards are tools used to ensure that any project or management approach has no negative effects on the living conditions of local communities and that their interests are safeguarded by compensatory measures or even improvement. The management planning process should include assessment of potential social risks and impacts (positive or negative) associated with any proposed management actions.[39]

Examples of social safeguarding questions that should be asked during the management planning process include:

- Will the proposed project support activities in an area that is frequented by local communities?
- Will any proposed impact from the management action negatively affect the livelihoods of local communities either in the area or elsewhere?
- Will the proposed project involve activities that are likely to have adverse impacts on the local community?
- Will the proposed project lead to a conflict of interest with spiritual beliefs or cultural areas?
- Will the proposed project result in the strengthened management of the area?
- Will the proposed project result in reduced or restricted access to the resources in the area?
- Will the proposed project result in removal or eviction of anyone from the area? [40]

[39] http://www.fao.org/investment-learning-platform/themes-and-tasks/environmental-social-safeguards/social-safeguards/en/
[40] Adapted from: http://www.cepf.net/grants/Pages/safeguard_policies.aspx

Alternative livelihood approaches can be used as a way to compensate for management actions that would negatively affect local livelihoods. The negative affect is counteracted through the provision of an alternative resource or an alternative occupation.

3. Engagement with stakeholders

Stakeholder involvement, and especially that of local communities, is a vital part of successful management. A stakeholder is defined as "any individual, group or community living within the influence of the site, and any individual, group or community likely to influence the management of the site."[41] There are important reasons why involving stakeholders in the management planning process is beneficial.

Box 2. Wetland stakeholders in Cambodia.

- Government authorities
- Local communities
- Non-government organizations (NGOs)
- Women
- Marginalized groups
- Donor organizations
- Business sector
- Religious groups, including monks

It is stakeholders whose actions are most likely to impact on a wetland site and in turn they are also the people most likely to feel the impact of any management interventions put in place. Therefore, it is essential that the views and needs of stakeholders are heard and considered from the very beginning of the planning process. Similarly, stakeholders may hold important knowledge about the wetland that will help in the development of a management plan. Finally, actively involving stakeholders will help them to feel part of the process which will help build commitment towards achieving the decided management objectives.[42] Management of a wetland will only succeed if all stakeholders either agree on the management goals or at least on a compromise.[43]

3.1 The participatory approach

The active involvement of stakeholders in management planning and decision-making is known as the participatory approach. Participation is a collective action aimed at achieving a common objective.[44] A successful participatory approach needs:

[41] Ramsar (2010). Managing wetlands. Ramsar handbooks for the wise use of wetlands, 4th edition, vol.18.
[42] Chatterjee, A. et al. (2008). Wetland management planning. A guide for site managers. WWF, Wetlands International, IUCN and Ramsar Convention. India.
[43] Gatteniohner, U. et al. (2004). Reviving Wetlands-Sustainable Management of Wetlands and Shallow Lakes.
[44] Chatty, D. et al. (2003). Participatory Processes towards Co-Management of Natural Resources in Pastoral Areas of the Middle East. http://www.fao.org/docrep/006/ad424e/ad424e03.htm

- Long term incentives for people to be involved
- Trust and transparency among stakeholders
- Flexibility and a learning by doing approach
- Knowledge exchange and capacity building
- Continuity of resources and effort[45]

3.1.1 Stakeholder analysis

A stakeholder analysis at the beginning of the management planning process will establish which communities, groups and individuals need to be involved and helps set out an approach for their participation.

The first step in the analysis is to identify all major stakeholder groups. It is important to identify stakeholders groups which are often overlooked or usually side-lined from decision-making processes e.g. women, the landless and more marginalised groups. Box 2 lists typical wetland stakeholders.

The second step is to think about the interests of each stakeholder group. This will involve looking at the full range of values the wetland provides as a way of understanding what the area means for different stakeholders, economically and in other ways. For each stakeholder group the following information should be noted:

- the role of each stakeholder group in the management and use of the site
- their likely expectations of process
- any benefits they might gain
- any interests that may conflict with the process
- how the stakeholder regards others on the list

Once this information has been established it should be followed by an assessment of the influence and importance of each stakeholder. Influence refers to how powerful a stakeholder is. Importance refers to stakeholders whose needs and interests will be directly impacted by any management initiatives. It also refers to stakeholders whose actions will affect the wetland

[45] http://www.unepscs.org/Wetlands_Training/Wetland%20Management/15-Stakeholder-Participation-in-Wetland-Management-Presentation.pdf

(e.g. a hydropower company, an agricultural concession, the land use planning agency). "Important" stakeholders must be involved in the management planning process.

It is likely that local institutions (such as community-based organizations) will be necessary for carrying out the planning process and stakeholder engagement. These local institutions may already exist or can be created as a result of the participatory approaches. These groups take ownership over the decision making and therefore provide the structure for continued participatory planning, management implementation, monitoring and evaluation, and any adaptations to management necessary over time.

3.1.2 Levels of participation

Based on the results of the stakeholder analysis, a participatory process should be designed based on the level of involvement needed from each stakeholder and the best strategies for approaching and involving them in the management planning process. The overall level of participation of a stakeholder group in the planning process should be based on their "importance," as established during the stakeholder analysis.

It is important to understand the different types of participation that exist, which range from information provision with no opportunity for stakeholders to influence outcomes, to open dialogues which give stakeholders the ability to provide knowledge, share ideas and have their say in decision making.[46] Stakeholders who will be directly impacted by management actions must be active participants in the planning process. Figure 4 shows different levels of participation.

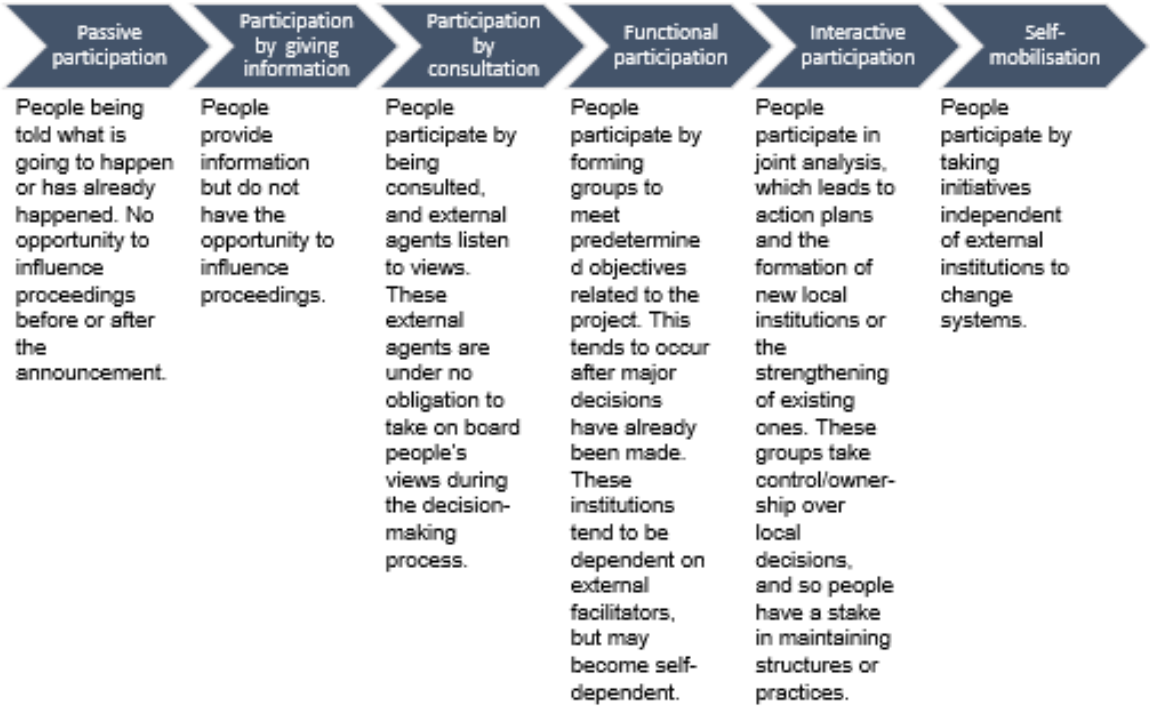
3.1.3 Participatory approach tools

There are a number of tools which can be used to involve stakeholders in management planning and decision-making. Tools should be chosen which are appropriate to the working and living context of each stakeholder group and different tools can be used with different groups. If a stakeholder already commonly uses a tool e.g. a local community holds regular meetings, this is likely to be the quickest and most efficient means of involving them in the planning process. A combination of tools is usually necessary to complete all stages of the planning process. The use of participation tools is particularly important during the evaluation

[46] Gatteniohner, U. et al (2004). Reviving Wetlands Sustainable Management of Wetlands and Shallow Lakes.

and objective setting stages, as well as to make decisions when constructing action plans, management projects and programmes, and in the monitoring and evaluation process. Common tools include can be found in Table 4.

Figure 4. Levels of participation.[47]



3.1.4 Sources of information

Good English language sources of information on participatory approaches to wetland management are:

Ramsar Handbook 7: Participatory Skills. This handbook provides information on establishing and strengthening local communities' and indigenous people's participation in the management of wetlands. The handbook is available to download on the Ramsar website.[48]

Collaborating for Resilience: A practitioner's guide. This manual provides a framework for understanding stakeholder interactions and organizing for social and institutional change. The manual is available to download online.[49]

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[47] Adapted from: Chatty, D. et al. (2003). Participatory Processes towards Co-Management of Natural Resources in Pastoral Areas of the Middle East.

[48] http://www.ramsar.org/sites/default/files/documents/pdf/lib/hbk4-07.pdf

[49] Ratner B.D. & Smith. W.E (2014). Collaborating for Resilience: A practitioner's guide. Manual. Collaborating for Resilience. http://coresilience.org/wp-content/uploads/Ratner.and.Smith.2014.Collaborating.for.resilience.practitioner.guide.pdf

Table 4. Common participatory approach tools.[50] [51]

Tool	Description
Meetings, workshops, focus groups	Gatherings with specific target groups, discuss a certain topic in detail as a group.
Interviews	A meeting at which information is obtained from a person, often by answering a series of questions.
Diagramming	Structuring information clearly in a visual way. Diagrams can be tables, 'trees', pie charts, flow diagrams and Venn diagrams. Venn diagrams use circles of various sizes to represent institutions or individuals. The bigger the circle, the more important is the institution or individual. Overlapping circles indicate interactions, and the extent of overlap can indicate the level of interaction.
Ranking	Placing a list in order, based on importance, personal preference or some other factor.
Exchange visits and community networking	Exchange visits involve organizing a meeting between a group of visitors and a host group. The aim is to exchange experiences and improve the knowledge and practices of the visitors and their organizations. Community networking connects people from different communities to share knowledge and information.
Transect walks and direct observation	Knowledgeable participants walk a route through an area describing and showing the location and distribution of resources, features, landscape, and main land uses.
Mapping	People work together to sketch maps to provide spatial information and assist discussions on spatial issues.
Seasonal calendars	Creation of a calendar which charts wetland activities e.g. local resource use, wildlife movement and migration, vegetation availability, local agriculture.
Activity profiles	A chart or table showing how people allocate their time between different activities over a specific time period e.g. a day, a week, a year etc.
Historical profiles and timelines	A historical profile is an interview with several of the people who are most knowledgeable about the history of the area. Information in a historical profile can include the settlement history of the community (who came when), periods of abundance and scarcity, landmark events (e.g. building of roads) and notable conflicts (especially those related to resource use). A timeline is a list that puts this information in date order.

[50] http://www.unepscs.org/Wetlands_Training/Wetland%20Management/15-Stakeholder-Participation-in-Wetland-Management-Presentation.pdf
[51] Chatty, D. et al. (2003). Participatory Processes towards Co-Management of Natural Resources in Pastoral Areas of the Middle East. http://www.fao.org/docrep/006/ad424e/ad424e03.htm#bm3.4

3.2 Communication, Education, Participation and Awareness (CEPA)

It is absolutely essential that local people and other stakeholders are actively involved in the decision-making process for the management of wetlands and therefore, successful wetland management requires tools that enable this participation. Equally, in order to be able to participate, stakeholders must be kept informed about activities, including any progress or set-backs. They should also be aware of, and understand the concept of, wise use and the value of wetlands. The main methods of doing all these things are commonly summarised as the acronym CEPA, which stands for communication, education, participation and awareness. Through CEPA methods people become motivated and enabled to be actively involved in the wise use of wetlands.[52]

A brief outline of the four main CEPA components is given below:

Communication is an exchange of information. It establishes a dialogue which leads to a shared and mutual understanding of an issue. It can be used to gain the involvement of stakeholders and is a means to encourage cooperation between groups.

Education is a process that develops understanding, motivates and empowers people to act or change their behaviour. It may take place in both formal and informal settings and in the broadest sense is a life-long process.

Box 3. Target groups for CEPA activities.

- Local communities
- Private landowners
- Females
- Children
- NGOs
- Media
- Community leaders and prominent people
- Business sector
- Government and local government
- Learning institutions
- Religious groups, including monks

Participation is the active involvement of stakeholders in the process of developing, implementing and evaluating strategies and actions for the wise use of wetlands. More information on participatory approaches can be found in Section.

[52] Ramsar (2010). Wetland CEPA: The Convention's Programme on communication, education, participation and awareness (CEPA) 2009-2015. Ramsar handbooks for the wise use of wetlands, 4th edition, vol. 6.

Awareness is about bringing an issue or message to the attention of individuals or key groups of people. There will be a purpose behind the act of informing people, with a targeted outcome to be achieved.[53]

Box 4. Religious links to conservation.

Religious links to conservation can also be used to encourage the wise use of wetlands. The majority of Cambodia's population are Buddhist. A number of successful conservation projects in Cambodia have been built on explicit links between nature conservation and the life of the Buddha, and to Buddhist principles such as karma. In general, Buddhist teachings can be used to give resonance to species protection and conservation concepts.

3.2.1 CEPA strategies

A range of strategies can be used to engage with stakeholders, motivate and inform people, build support for and increase awareness of wetland values. Strategies should be chosen based on the objective to be achieved. It is also important to establish how people usually engage with others and communicate information. If the target community already has a preferred method then this is likely to be the quickest and most efficient means of engaging with them. It is also important to examine how accessible different channels of communication are before using them. Table 5 outlines CEPA strategies used in wetland management.

[53] Ramsar (2010). Wetland CEPA: The Convention's Programme on communication, education, participation and awareness (CEPA) 2009-2015. Ramsar handbooks for the wise use of wetlands, 4th edition, vol. 6.

Table 5. CEPA strategies for use in wetland management.[54]

CEPA Strategy	Explanation	Example
Awareness messages	Simple messages can be used to raise awareness about specific issues in and around wetlands.	Signboards highlight the danger of pesticide use to human health.
Local communication tools	Media can be used to spread information to a broad range of people.	Newspapers, newsletters, radio, websites, notice boards. In areas where less technology is available word of mouth is often the best carrier of information.
Information products	These are hardcopy ways of sharing information. They need to be designed so that the level of content is suitable for the target audience.	Brochures, fact sheets, posters.
Meetings and Dialogs	Gatherings with specific target groups, including key actors of influence outside of the wetland site (e.g. sectoral agencies, provincial government/local departments).	Community meeting, focus group, consultation.
Access to the wetland	Personal experiences are a valuable way of building understanding of wetland issues.	Tourists, visitors, higher-level decision makers.
Interpretation for visitors	Signs, guides and facilities all help to enhance visitors' experiences.	Signboards, guidebooks.
Special events, celebrations, community awareness days	These can be used to build awareness and motivate people to become involved.	World Wetland Day, a community celebration for a wetland species or a festival to celebrate a sustainable rice harvest.
Education programme	A course of information designed to inform the audience about wetland management and encourage behaviour change towards sustainable use of natural resources.	Eco school.
Facilities	Facilities assist and enhance visitor access to wetlands.	Observation deck, bird hide, visitor centre.
Participatory approaches to management planning	A way of enabling stakeholders, including the local community, to be actively involved in the management of resources.	Management planning meetings, focus groups, community meetings, workshops. More information on participatory approaches can be found in Section 3.1.

[54] Based on information from: CEPA for wetland site managers: Brief guidance to assist site managers in using CEPA tools to assist in effective site management, accessed at http://wli.wwt.org.uk/wp-content/uploads/2012/04/CEPA_Panel_CEPA_For_SiteManagers_Final.pdf

Part C: Managing Wetlands: Information on Key Wetland Features and Activities

The following sections provide information on key wetland features and activities that need to be considered when managing wetlands. Each section provides practical information on approaches and techniques which follow the wise use concept of maintaining wetland values and functions, while still meeting current and future human well-being needs.

4. Agriculture

Wetland Wise Use Principle: Agricultural practices should focus on methods which provide adequate provisions for people while having a minimal negative impact on wetlands.

Cambodia's agricultural resources consist of 3.7 million hectares of cultivated land and employ just over two-thirds of the country's workforce.[55] Most farmers are smallholders with less than two hectares of land per household. The main form of agriculture in the country is rice farming, accounting for 3.05 million hectares of cultivated land and producing 9.38 million tons of rice in 2013.[56] The majority of rice grown is rain-fed, but the amount of irrigated rice being grown is increasing.

Following through on an objective of the Royal Government of Cambodia's Rectangular Strategy, the country has seen an increase the growth of other crops such as corn, sugarcane, cashew nut, rubber and cassava.[57] The land area of non-paddy crops grew from 210,000 ha in 2008 to 770,000 ha in 2012.[58] This diversification is a positive trend because non-paddy crops like vegetables, cassava and maize are more profitable which helps to secure farm livelihoods and generate income.[59]

Agriculture and wetlands are very closely linked in Cambodia. Agriculture has a direct impact of wetlands through the conversion of wetland habitats into agricultural land. Furthermore, agricultural activities upstream, downstream or around wetlands can impact indirectly on the wetland and its ecosystem services.

Agriculture, and especially rice production, is very important for local livelihoods but these communities also depend on wetlands for many essential ecosystem services. Therefore, the overall aim of the agricultural sector should be to achieve a balance between agricultural development and the maintenance of wetland ecosystem services.

[55] FAO. (2014) FAPDA country fact sheet on food and agriculture policy trends for Cambodia.
[56] Royal Government of Cambodia (2015). Agricultural Sector Strategic Development Plan 2014-2018
[57] Royal Government of Cambodia (2013). Rectangular Strategy Phase III
[58] Royal Government of Cambodia (2014). National Strategic Development Plan 2014–2018.
[59] Eliste, P. & Zorya, S. (2015). Cambodian agriculture in transition: opportunities and risks. Washington, D.C.: World Bank Group.

Box 5. Man-made wetlands.

Cambodia's wetland inventory does classify ricefields as wetlands. However, these human-made wetlands have the potential to negatively impact natural wetlands, e.g. through increased conversion of natural wetlands into ricefields. Therefore it is essential that man-made wetlands are managed in ways that maintain wider wetland ecosystem services.

Box 6. Agriculture in protected areas.

Protected areas are divided into four types of management zone: core zones, conservation zones, sustainable use zones and community zones. The Protected Area Law (2008) states that agriculture is prohibited in core zones and conservation zone. Therefore no agricultural land should encroach into these areas. Boundary markers should be used where appropriate so that local communities and other stakeholders have a clear idea of where the different land use zones are.

4.1 Approaches

At a local level, most farming located in or around wetlands is for subsistence purposes, but many people struggle to produce enough food for their family's consumption.[60] Therefore wetland wise use management approaches aimed at benefiting people and biodiversity should encourage the uptake of farming methods which can secure farm livelihoods and generate income, while still maintaining essential ecosystem services.

Such approaches incorporate some or all of the following methods:

- Techniques which increase crop yields on existing land
- Diversification of crops grown
- Efficient and fair use of water resources
- Alternative livelihoods
- Efficient use of agrochemicals

[60] CEDAC (2012). Development of System of Rice Intensification in Cambodia http://www.cedac.org.kh/imgs/file/SRI/Development%20of%20System%20of%20Rice%20Intensification%20in%20Cambodia.pdf

These match the vision of the General Directorate of Agriculture (GDA) within the Ministry of Agriculture, Forestry and Fisheries (MAFF) which is to boost agricultural productivity through agricultural diversification and reduce poverty by increasing the income of farmers.[61]

Two over-arching programmes in Cambodia, which use combinations of these methods are System of Rice Intensification (SRI), which is explained in Box 7, and the Sustainable Rice Platform (SRP), which is explained in Box 8.

4.1.1 Techniques which increase crop yields on existing land

Improving agriculture on under-used cropland is a good way to benefit people while helping to conserve habitats and biodiversity. Programmes such as SRI ((see Box 7 for more details) and SRP (see Box 8 for more details) have developed sets of principles and ideas to be adapted by farmers to help them to increase the productivity of irrigated rice.

4.1.2 Diversification of crops

An objective of the Royal Government of Cambodia's Rectangular Strategy is for diversification away from rice into other crops such as corn, sugarcane, cashew nut, rubber and cassava.[62] In 2013, many of these groups had an average farm gross margin higher than rice.[63] Therefore growing crops other than rice, or growing other crops alongside rice, can help farmers to increase their income. It is important to note that training and access to seeds may be required to teach farmers the techniques necessary to grow different crops.

4.1.3 Efficient and fair use of water resources

Farmers require water to provision crops and wetlands require adequate water in order to sustain ecosystem functions. Therefore, agricultural practices should use approaches which ensure a balance between these water requirements. In addition, the Law on Water Resources Management (2007)[64] states that all citizens have the right to use water resources for vital needs and domestic irrigation. This means that agricultural practices should ensure that water allocation is equitable.

[61] http://www.gda.maff.gov.kh/en/vision-mission.html
[62] Royal Government of Cambodia (2013). Rectangular Strategy Phase III
[63] Eliste, P. & Zorya, S. (2015). Cambodian agriculture in transition: opportunities and risks. Washington, D.C.: World Bank Group.
[64] Royal Government of Cambodia (2007). Law on Water Resources Management

Box 7. System of Rice Intensification.

One approach for increasing yields in rice farming is known as System of Rice Intensification (SRI). SRI is a set of principles and ideas to be adapted by farmers to help them to increase the productivity of irrigated rice. SRI was officially endorsed by the Government in its National Strategic Development Plan. Improving agriculture on under-used cropland is a good way to benefit people while helping to conserve habitats and biodiversity. The Cambodian Center for Study and Development in Agriculture (CEDAC) provide training on SRI techniques to farmers, community members, NGO staff, and private farmers.

SRI methodology is based on four main principles that interact with each other:

- Early, quick and healthy plant establishment
- Reduced plant density
- Improved soil conditions through enrichment with organic matter
- Reduced and controlled water application

More information on SRI can be found at http://www.cedac.org.kh

Box 8. Sustainable Rice Platform.

The Sustainable Rice Platform (SRP) is a multi-stakeholder partnership which promotes resource efficiency and sustainability both on the farm and throughout the value chain. It was launched by the United Nations Environmental Programme (UNEP) and the International Rice Research Institute in 2011. SRP encourages farmers to use sustainable farming practices which also help to protect the environment by boosting the use efficiency of resources such as water and agrochemicals.

The SRP guiding principles are:

- Improve livelihoods of current and future generations of rice growers
- Meet consumer needs for food security, food safety and quality of rice and rice products
- Manage natural resources efficiently
- Protect the natural environment from disruptive effects
- Protect neighboring communities from disruptive effects and to contribute to their development
- Mitigate greenhouse gas emissions and adapt rice production systems to a changing climate
- Respect labor rights and to promote the well-being of workers
- Conduct business with integrity and transparency.

More information on SRP can be found at http://www.sustainablerice.org

4.1.4 Alternative livelihoods

In areas where limiting agricultural land expansion will have detrimental effects on local livelihoods, alternative livelihood options for local communities should be explored. Alternative livelihoods offer communities a way to conserve wetlands and their resources through the provision of an alternative resource or an alternative occupation.[65]

4.1.5 Efficient use of agrochemicals

Agrochemicals, such as fertilizers and pesticides, are used by farmers to improve their crop yield and quality. But incorrect or excessive application of these chemicals can have a detrimental impact on wetland ecology, biodiversity, local livelihoods and human health.

Overuse of chemical fertilizers can lead to nitrate contamination of water resources and acidification of the soil which leads to lower productivity. Additionally, the toxic nature of pesticides means that they are potentially hazardous to humans, non-target wildlife and the environment. Incorrect use of pesticides can:

- poison non-target biodiversity including birds, mammals, fish, aquatic invertebrates, insect pollinators and plants;
- contaminate water resources through run-off and seepage;
- increase the resistance of pest populations to pesticides;
- alter bacterial diversity in the soil which can have a negative effect on soil fertility;
- impair human health through direct or indirect exposure to the hazardous chemicals found in pesticides.[66]

Finally, the use of chemical fertilizer and pesticide has a monetary cost for farmers. Reduced chemical fertilizer and pesticide use will provide farmers with the added benefit of cost savings.

Many farming practices involve ‘preventative’ or indiscriminate pesticide use with calendar-based applications. For example, farmers apply pesticides a certain number of days after

[65] Roe, D, et al. (2015). Are alternative livelihood projects effective at reducing local threats to specified elements of biodiversity and/or improving or maintaining the conservation status of those elements? Environmental Evidence 4.1

[66] Pingali, P.L. (1995). Impact of pesticides on farmer health and the rice environment: an overview of results from a multidisciplinary study in the Philippines. *Impact of pesticides on farmer health and the rice environment*, pp.3-21.

transplanting or at a certain stage of plant development regardless of the presence or absence of pest / level of infestation.

However, reducing chemical inputs without implementing alternative management practices can lead to lower crop yields. Therefore, to encourage local stakeholders to reduce pesticide use, integrated pest management practices should be introduced.

4.1.5.1 Integrated pest management

The FAO definition of integrated pest management is:

"the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. Integrated pest management emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms."[67]

Integrated pest management approaches reduce pesticide use through a combination of measures:[68] [69]

1) The main aim of integrated pest management is to prevent pests from becoming a problem in the first place. This involve growing healthy crops which are more resilient to pests (SRI methods can help do this, see Box 7), encouraging the growth / presence of the natural enemies of pests e.g. predators, parasites, pathogens and competitors, and changing cultural or traditional practices to reduce pest establishment, reproduction, dispersal, and survival e.g. removal of infected plants, change irrigation practices. Physical barriers can also be used to prevent pests coming to or establishing in an area.
2) Fields and crops should be regularly monitored for signs of pests so that any pest outbreaks are caught early.
3) If a pest is found it is important that it is identified correctly. Decisions about control methods must be based on the specific pest found and the level of outbreak.

[67] http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/more-ipm/en/
[68] http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/more-ipm/en/
[69] http://www2.ipm.ucanr.edu/WhatIsIPM/

4) Once a pest has been found and identified, non-chemical control methods should be prioritized over pesticide use. For example many insects can be removed by hand, pest killing lamps can be deployed, rat traps can be used, ducks eat many pests and so releasing them into paddy fields can reduce rice pests. It may be necessary to work through a series of non-chemical control options, sequentially or concurrently, to reduce pest numbers.
5) Pesticides should only be applied as a last resort when there are no adequate non-chemical alternatives. Any pesticide use should follow the practices outlined in the next section.
6) Monitor the success of the applied pest management measures. This will help improve the prevention or control of future pest outbreaks.

Integrated pest management will require training both for methods to employ to create conditions unfavourable to pests and/or conditions favourable to predators of pests; and for non-pesticide methods of pest control.

4.1.5.1.1 Pesticides

As part of an integrated pest management approach, pesticides should only be used as a last resort, with minimal and correct application and necessary precautions taken. However, some aspects of current pesticide use make this difficult. While Cambodia does have a list of banned or restricted pesticides, many pesticides are still imported unofficially and illegally through Thailand and Vietnam.[70] These generally do not have labels or instructions in Khmer which makes correct application difficult. In addition, many farmers are unaware of the dangers of pesticide use. The following practices should be applied to any pesticide use in and around wetlands:

- Pesticides should only be used as a last resort, and as part of an integrated pest management approach
- Pesticides should be bought from registered pesticide retailers.
- Pesticides should have labels and instructions in Khmer.
- A pesticide should be chosen that effectively kills the target pest. Indiscriminate pesticide use should be avoided, as should cocktails of pesticides.
- Pesticides should be applied as per the proper dosage and method of application.

[70] Preap, V. & Sareth, K., Current Use of Pesticides in the Agricultural Products of Cambodia. http://ap.fftc.agnet.org/files/ap_policy/554/554_1.pdf

- Pesticides should not be mixed or prepared in drinking water containers.
- Pesticides should only be applied at times in the growing season when they will be effective (know the life cycle of the pest).
- Personal protective equipment should be worn during application including a face mask, cap, gloves, long-sleeved shirt and long trousers.

Awareness raising through signboards, leaflets and training should be used to inform farmers and agricultural communities of the hazards of pesticides, the correct ways to use them and the precautions that should be taken. This should also include information on how to manage waste, such as empty containers, accumulated from pesticide use.

4.1.4.5.2 Chemical fertilizers

Chemical fertilizers are used by farmers to provide nutrients for crops. These nutrients are also found in organic fertilizers such as animal manure and compost. Farmers should be encouraged to use organic fertilizers instead of chemical fertilizers as much as possible.

Compost can be made from house waste, straw, dead plant materials, animal manure and urine, water hyacinth, crop residue, plant stalks, fruit skin, poultry litter and fish waste. However, the raw materials required to make compost may not always be available in sufficient quantities. Therefore, if there is no alternative but to use chemical fertilizers, training should be provided to teach farmers how to use the right type of fertilizer at the right time in the plant-growth cycle. This will stop indiscriminate over-use of fertilizer, reducing fertilizer use to specific, measured applications at times when it will most benefit the crop.

5. Fisheries

> ***Wetland Wise Use Principle: Fisheries resources in wetlands are managed sustainably and equitably.***

Cambodia's freshwater wetlands are vital habitat for the country's fish resource. More than 80% of the national animal-protein intake comes from fish. Correspondingly, it has been estimated the fisheries sector provides various levels of work to around 2 million people in the country.[71] The management of fish resources changed in 2012 when all Fishing Lots (areas leased to commercial fishing industries) were cancelled. In order to safeguard some fish populations after Fishing Lots were abolished, the Fisheries Administration (FiA) established some state-controlled Fish Conservation Zones / Areas. These include eight Tonle Sap fisheries conservation areas totalling 22,500 ha. In all other areas, fishing rights were given to local resource users to manage through the participatory approach of community fisheries.[72] The principle behind Community Fisheries (CFi) is that it give a community the opportunity to ensure fish stocks are used sustainably and managed in a way that allows for equal distribution of fishing benefits within the community, while also respecting the wetland ecosystem and other wetland biodiversity. Some of the challenges facing Community Fisheries management are addressed in Box 11.

Box 9. Freshwater fish in Cambodia.

Freshwater fish in Cambodia can be generally be categorised into two types: Whitefish and Blackfish. Whitefish are long distance transboundary migrant species (shorter distance migrant species are sometimes called Greyfish). These are species which leave flooded areas as the floodplains drain at the end of the wet season and return to rivers. In contrast, blackfish are floodplain resident fish species which remain on the floodplain after waters recede, living in deep pools and ponds that retain water during the dry season.

[71] Chap, S. et al. (2016). Fisheries reforms and right-based fisheries: insights from community fisheries across Cambodia, Phnom Penh: The Learning Institute.
[72] Kim, S. et al. (2013). Fishery reforms on the Tonle Sap Lake: Risks and opportunities for innovation. Cambodia Development Review (2), 1-4.

5.1 Community fisheries

With the cancellation of all Fishing Lots in 2012, fishing rights were given to all Khmer citizens to manage fish resources through the establishment of community fisheries (see Box 10 for definition of community fisheries[73]).

Box 10. Community fisheries definition from the Sub-Decree on Community Fisheries Management (2005).

"A community fishery (CFI) is a group of physical persons holding Khmer citizenship who live in or near the fishing area, voluntarily established and taking the initiative to improve their own standard of living by using and processing fisheries resources sustainably to contribute to economic and social improvement and poverty alleviation."

The 2005 sub-decree on community fisheries management lays out the rules and legislative procedures for establishing and managing community fisheries.[74] A Community Fishery (CFi) is composed of a group of Cambodian citizens who live in or near the fishing area and freely decide to establish the group to use and process fisheries resources sustainably. Group members must be 18 years or above and people can only belong to one CFi. The main duties and rights of a CFI are outlined below:

The duties of a CFi:

- participate in managing and conserving resources;
- respect instructions from the Fisheries Administration (FiA) and the Ministry of Agriculture, Forestry and Fisheries;
- participate in establishment of conservation areas within CFi area;
- guarantee equal rights in sustainable use of resources;
- implement by-laws and formulate a management plan;
- enter into CFi area agreement with FiA to manage resources; and keep all documents related to CFi.

[73] Royal Government of Cambodia (2005). Sub-Decree on community fisheries management.
[74] Royal Government of Cambodia (2005). Sub-Decree on community fisheries management.

The rights of a CFi:

- organize all fishing activities;
- can fish, undertake aquaculture, sell, use and manage all fisheries resources in accordance with CFi agreement and management plan
- cooperate with local authorities to enforce regulations;
- request to seize evidence of any violations of regulations, detain offenders and send them to the local Fishery Officer.[75]

Box 11. Challenges facing Community Fisheries management

CFi have the potential to empower people by providing rights to access resources, and in turn help reduce poverty and improve wetland and resource conservation. But it is important to recognise that there are a number of challenges involved in achieving a functioning CFi.

Firstly, a CFi requires the committee and members to have sufficient capacity to carry out effective and efficient management practices. In many CFi this is currently lacking. Across Cambodia, the need for capacity building has been raised as one the key elements required by CFi, with a focus on practical livelihood skills, community organization functions, and resolving fisheries resource conflict.[76]

Secondly, a CFi needs to be able to finance its activities. These include operating expenses such as fuel costs associated with patrolling, administrative costs etc. One way to generate revenue is to charge CFi members fees, but this has had limited success so far. Recently, NGO partners assisting CFI have been exploring a number of other funding mechanisms e.g. tapping into commune development budgets[77] and using the interest generated by a trust fund.

It is important to note that non-CFi members are actually entitled to access the fishing area, provided they respect the prevailing rules of the CFi.[78] This means that the benefits accruing

[75] Kurien, J. (2012). On developing guidelines for securing sustainable small-scale fisheries: Sharing processes, results And lessons learnt from Cambodia.
[76] Kurien, J. (2012). On developing guidelines for securing sustainable small-scale fisheries: Sharing processes, results And lessons learnt from Cambodia.
[77] Milne, S. (2015). Strengthening capacity of fishing communities in the Tonle Sap to manage their natural resources sustainably. Mid-term review: EU Non-State Actors Project. Thailand: IUCN.
[78] Chap, S., et al. (2016). Fisheries reforms and right-based fisheries: insights from community fisheries across Cambodia, Phnom Penh: The Learning Institute

Box 11 continued.

to fishers need to outweigh any membership costs in the short, medium and long term, otherwise there will be little incentive for fishers to remain CFi members and pay their fees.

Thirdly, a CFi needs to provide an equal distribution of fishing resources. Unless fish catch quotas are implemented and enforced, it is very difficult to ensure that fishing resources are equally distributed amongst all CFi members. This is because some individuals may have access to better or larger fishing gear,[79] may be better geographically situated i.e. live closer to more productive fishing grounds,[80] or have power and influence with the community which allows them to monopolise the more productive fishing grounds.

Finally, a CFi does not have power in its own right to enforce its regulations.[81] This means that for a CFi to function effectively there must be a good relationship between the CFi and local authorities so that authorities can intervene when illegal fishing practices are observed.

5.1.1 Approaches

The CFi is responsible for preparing by-laws and fishing area management plans which outline the rules and regulations for fishing activities carried out by group members. Generally, the overarching aim of the CFi should be to operate fishing practices that minimize harm to the aquatic environment and associated species and support the sustainability of the resource so that there are sufficient quantities for present and future generations.[82] [83]

The following information is provided to assist CFi with the management of fishing activities carried out by group members and protection of fishing habitat within the fishing area.

[79] Oeur, I.I. et al. (2014). Innovations to strengthen aquatic resource governance on Cambodia's Tonle Sap Lake. Program Report. Collaborating for Resilience.
[80] Milne, S. (2015). Strengthening capacity of fishing communities in the Tonle Sap to manage their natural resources sustainably. Mid-term review: EU Non-State Actors Project. Thailand: IUCN.
[81] Chap, S., et al. (2016). Fisheries reforms and right-based fisheries: insights from community fisheries across Cambodia, Phnom Penh: The Learning Institute
[82] Kurien, J., (2015). Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication: summary.
[83] FAO (1995). Code of Conduct for Responsible Fisheries

5.1.1.1 Fishing gear

More than 150 types of fishing gear have been identified in Cambodia.[84] The largest fishing gear used includes barrage traps, fish bag nets, shrimp bag nets, and arrow shaped bamboo fence traps. Medium-sized fishing gear includes seine nets, river pelagic trawls, deep bag nets (dragged), v-shaped boat mounted nets, big cone shaped nets and raft mounted lift nets. Small fishing gear includes gill nets, cast nets, oblong traps, drum traps, slit traps, scooping baskets, folded cone traps, vertical vase traps and hooked long lines. In addition, electrocuting devices, poison and explosives are also used to capture fish.[85]

Not all of the fishing gear used in the country is legal. The Fisheries Law (2006) lists the fishing gear which is prohibited to use in Cambodia (see Box 13). CFi should regulate the fishing gear being used by fishers in the fishing area to ensure only legal types of fishing gear are being used.

Box 12. The Sub-Decree on the Mekong Dolphins' Managerial Protection Area (2012)

This sub-decree bans on gill nets, fish cages and floating houses within a 180 km safe zone along the Mekong River between Kratie town and the Laos border to prevent the accidental catching of dolphins.

The Fisheries Law also states the size of mesh that can be used for fishing nets. The size of mesh used for fishing nets has a major impact on the sustainability of fish resources. Seine net mesh size of less than 1.5 centimetres is prohibited in Cambodia. This reduces the number of juvenile fish caught, thereby ensuring fish stock remains to grow to catchable sizes and to reach breeding age. CFi should also regulate the size of mesh being used by fishers in the fishing area.

Ideally, CFi should manage fishing gear regulation at two levels. Firstly, there should be enforcement of fishing gear rules at an internal level. This means that CFi members must agree to abide by fishing gear regulations when they join the CFi. In addition, the CFi should carry out awareness raising activities to educate fishers to stop using illegal fishing gear. Secondly, there should be enforcement of fishing gear laws at the external level. A CFi should have a protocol in place for monitoring the fishing gear being used and have the cooperation of local authorities to enforce regulations and punish offenders where necessary.

[84] Deap, L. et al. (2003). Fishing gears of the Cambodian Mekong, Inland Fisheries Research and Development Institute
[85] FAO. (2011). National Fishery Sector Overview Cambodia

Box 13. Prohibited fishing gear, from the 2006 Fisheries Law.

Article 20.

All kinds of fishing activities in the fishery domain by using the following gears shall be absolutely prohibited:

1) Electrocuting devices, explosive materials, or any kind of poison.
2) All means of pumping, bailing or drying any part of fishery domain, which has a disastrous impact on the fishery resources.
3) Brush park, Samras or other devices used to attract fish and other aquatic animals.
4) Spear fishing gears, Chhbok, Sang, Snor with projected lamp.
5) Fixed net or any kind of boa nets.
6) Net or any kind of seine with mesh size of less than 1.5 cm in inland fishery domain.
7) Any kind of net with mesh size bigger than 15 cm in inland fishery domain.
8) Pair trawler or encircling net with attractive illuminated lamp to concentrate fish in the area.
9) Fishing gears made of mosquito net in inland fisheries.
10) Any kind of trawling in the freshwater, and mechanized push net (Chhip Yun).
11) Any kind of bamboo fence with mesh size of less than 1.5 cm.
12) Any kind of transversal string and any measure which make fish escape.
13) Dam with any kind of fishing gear.
14) Any kind of modern fishing gear; newly invented fishing gear or fishing practices leading to the destruction of fish, fishery resources and fishery ecosystem, or which are not listed in the proclamation of the Minister of Agriculture, Forestry and Fisheries

Article 21.

Producing, buying, selling, transporting and storing any electrocuting devices, all types of mosquito net fishing gear, mechanized motor pushed nets, inland trawler that are used for fishing purpose shall be prohibited.

5.1.1.2 Protecting and restoring fish habitat

Part of the role of CFi is to establish Fish Conservation Areas within the community fishing area.[86] These are areas where it is prohibited to fish. They may be areas where breeding or spawning takes place or simply a section of the fishing area that is not fished in order to

[86] Royal Government of Cambodia (2005) Sub-Decree on Community Fisheries Management.

safeguard fish populations more generally. Any Fish Conservation Areas should be defensible within the CFi's means and capabilities.[87] It is important that the Fish Conservation Area is clearly demarcated and has adequate signage to inform people about prohibited activities. Additionally, regular patrolling is vital to monitor the area for illegal activities. It may also be wise to designate a buffer zone around the boundary of the Fish Conservation Area. If the concentration of fish is higher in the Fish Conservation Area than in unrestricted areas, then fishing at the boundary line will have the benefit of catching fish that stray over the line. A buffer zone will prevent individuals from monopolising this highly lucrative fishing site.[88]

An important habitat for fish are the seasonally inundated flooded forests which are breeding and spawning grounds for many species. Protecting and prohibiting fishing in these areas will ensure that there are adequate fish resources in the future. In areas where seasonally inundated flood forest habitat has been degraded, CFi may want to want to restore some of this habitat. More information on seasonally inundated flooded forests can be found in Section 6.

5.2. Fisheries management across a wider landscape

The movement of fish, either over long migrations or the shorter movements of floodplain resident species,[89] means that the sustainable management of fisheries resources in Cambodia requires measures at a wider landscape-scale than can be achieved by individual CFi alone. Indeed, a CFi may exist as part of a wider wetland area, which in turn has a number of different wetland activities and features that need to be considered in the overall management of the site.

A number of considerations can be made during more general wetland management planning, and during management planning for other wetland activities, to ensure that adequate provisions are made for all parts of the fish life cycle. [90] In this way, wider wetland management can help Cambodia maintain and safeguard its fish populations for present and future use.

These considerations include ensuring that:

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[87] https://www.iucn.org/content/fish-conservation-areas-tonle-sap-results-mid-term-review
[88] Milne, S. (2015). Strengthening capacity of fishing communities in the Tonle Sap to manage their natural resources sustainably. Mid-term review: EU Non-State Actors Project. Thailand: IUCN. http://cmsdata.iucn.org/downloads/nsa_cambodia_mtr_june_2015_final_23_6_15.pdf
[89] Hortle, K.G., et al. (2004). An introduction to Cambodia's inland fisheries. Mekong Development Series No. 4. Mekong River Commission, Phnom Penh, Cambodia. 41 pages. ISSN 1680-4023
[90] https://www.iucn.org/content/fish-conservation-areas-tonle-sap-results-mid-term-review

- waterways remain accessible and connected
- wetlands retain connectivity to the rest of the watershed during flooding periods, where this occurs naturally
- there is good connectivity between protected areas important for fish populations
- there is adequate provision of fish breeding habitat
- there are dry season refuges for floodplain species
- water quality remains good.

6. Seasonally Inundated Flooded Forest

Wetland Wise Use Principle: Seasonally inundated flooded forest should be protected, managed and where necessary restored.

An important habitat found in many of Cambodia's wetlands is seasonally inundated flooded forest. Seasonally inundated flooded forest is a forest area that is submerged or partially submerged seasonally. Seasonal inundated forest occur naturally around Tonle Sap, along the edge of the Mekong and Tonle Sap Rivers, and at other wetland sites. In general, seasonally inundated flooded forests are dominated by small and medium-sized trees and many shrubs.[91]

Seasonally inundated flooded forests is very important fish habitat. It is used as shelter, spawning and nursing grounds by many fish species. The forests are also important for other biodiversity including dolphins, otters, fishing cats, freshwater turtles, tortoises, crocodiles and many species of waterbirds. But seasonally inundated flooded forests are threatened by land clearance for agriculture, aquaculture, fuelwood, and by fires set by fishers and hunters. Additionally, a cycle of degradation is emerging in the destruction of seasonally inundated flooded forests. Clearing seasonally inundated flooded forest for agriculture decreases the spawning and nursing ground for fish, which has a negative impact on fisheries, reducing productivity of fisher livelihoods which in turn causes people to clear more seasonally inundated flooded forest to expand their agricultural area.[92]

In order to sustain fish diversity and numbers, as well as providing habitat for other biodiversity, it is vital that wetland management includes the conservation of seasonally inundated flooded forest areas.

[91] Vathana, K. and Penh, P. (2003). Review of Wetland and Aquatic Ecosystem in the Lower Mekong River Basin of Cambodia. Phnom Penh: Cambodia National Mekong Committee.
[92] Milne, S. (2015). Strengthening capacity of fishing communities in the Tonle Sap to manage their natural resources sustainably. Mid-term review: EU Non-State Actors Project. Thailand: IUCN.

6.1 Approaches

6.1.1 Conserve and protect seasonally inundated flooded forest

Efforts should be made to conserve and protect all remaining areas of seasonally inundated flooded forest. The Fisheries Administration (FiA), part of the Ministry of Agriculture, Forestry, and Fisheries (MAFF) has jurisdictional management and regulatory authority over seasonally inundated flooded forests outside of the Protected Area network (with the exception of fisheries resources within Protected Areas for which FiA is also responsible). Seasonally inundated flooded forests within the Protected Area network are under the management jurisdiction of the Ministry of Environment (MoE).

Prohibited activities within seasonally inundated flooded forests include conversion for agriculture and any cutting, clearing or burning of seasonally inundated flooded forest areas. Box 14 outlines all activities that are prohibited by law. To ensure no prohibited activities occur, seasonally inundated flooded forest areas should be monitored through regular patrols. Signboards explaining allowed and prohibited activities, placed in suitable locations, are an additional method of raising awareness of the law.

Box 14. Prohibited Activities within seasonally inundated flooded forest from the Fisheries Law (2006).

- Expanding agriculture lands or using lands which are protected by the provision of this law for other purposes other than development of fisheries in the inundated areas.
- Issuance of land title in the protected inundated areas.
- Cutting, reclaiming, digging out, clearing, burning or occupying flooded forests and mangroves.
- Destroying, cutting down of inundated forest and mangrove forest or rooting up to collect trunks of inundated and mangrove forests.
- Commercial collection, transportation, and stocking of woods, firewood or charcoals of inundated and mangrove forest species.
- Construction of kilns, handicraft places, processing places and all type of plants using raw materials of woods of inundated and mangrove forest species.

6.1.2 Prevention and preparedness

As Recommendation 4.1 of the Ramsar Convention rightly notes "the maintenance and conservation of existing wetlands is always preferable and more economical than their subsequent restoration."[93] One of the main drivers of seasonally inundated flooded forest loss is fire.[94] Therefore, management approaches should include actions which help prevent fires and allow for a rapid response to any fire outbreaks. These actions may include: regular patrols during dry periods to allow for early detection of fire outbreaks; establishing a fire-fighting team and response protocol to fight any fires that do occur; providing fire-fighting equipment and relevant training; and securing funding for fire prevention schemes and fire-fighting team wages.[95]

6.1.3 Strategies to reduce community dependency on fuelwood

Some local communities rely on flooded forests for fuelwood collection. While collection of wood from living trees is prohibited, a controlled level of dead wood harvesting may be acceptable in flooded forest areas. However, if this practice occurs it needs to be regulated so that it abides by any current legislation and upholds effective resource conservation.

To reduce wetland communities' dependency on fuelwood, efforts should be made to encourage the uptake of alternative fuel sources and more efficient cooking equipment which use less fuelwood such as sustainable economic stoves. An additional benefit of more efficient cooking equipment is that less time needs to be spent collecting fuelwood.

For communities that traditionally smoke fish, uptake of fuel efficient smoke stoves should also be encouraged. Any initiatives which encourage uptake of these types of stoves must explore long-term access to supply of stoves to ensure that people are able to continue buying these items after the initial initiative has ended.

[93] Ramsar Resolution VIII (2002). 16 Principles and guidelines for wetland restoration. http://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_viii_16_e.pdf
[94] Milne, S. (2015). Strengthening capacity of fishing communities in the Tonle Sap to manage their natural resources sustainably. Mid-term review: EU Non-State Actors Project. Thailand: IUCN.
[95] Tonle Sap Conservation Project (2007). Prek Toal Core Area Tonle Sap Biosphere Reserve Management Plan, 2007-2011.

6.1.4 Seasonally inundated flooded forest restoration

It is recommended that cleared or degraded areas of seasonally inundated flooded forest should be restored with native tree species. This will help to restore the ecosystem services that seasonally inundated flooded forests provide. It will also help contribute to the sustainability of fish resources by providing fish breeding and spawning grounds.

If the area has been degraded through changes to the natural hydrology, then hydrological restoration will also be required. Native seasonally inundated flooded forest species may not grow if the hydrological regime has been altered.

Before forest restoration takes place a restoration management plan should be created with input from the local community and other stakeholders. This will ensure that that long-term goals of forest restoration are understood and allow stakeholders to be involved in the selection of a suitable site. Involving local communities in the restoration planning and planting process will help encourage feelings of ownership of the restored area. Box 15[96] contains guidance on producing seedlings and points to consider before and during replanting efforts. In addition, successful restoration does not end with replanting an area: replanted areas should be monitored and maintained to ensure successful tree-growth.[97]

6.1.5 Sources of information

Two useful sources of information for seasonally inundated flooded forest restoration are:

Ramsar Resolution VIII.16 Principles and Guidelines for Wetland Restoration which provides useful information to guide restoration activities. [99] [Link]

The **FAO Sustainable Forest Management Toolbox** which contains guidance on successful tree planting.[100] [Link

[96] FAO. Sustainable Forest Management Toolbox. http://www.fao.org/sustainable-forest-management/toolbox
[97] FAO. Sustainable Forest Management Toolbox. http://www.fao.org/sustainable-forest-management/toolbox
[98] FAO. Sustainable Forest Management Toolbox. http://www.fao.org/sustainable-forest-management/toolbox/
[99] Ramsar Resolution VIII (2002). 16 Principles and guidelines for wetland restoration http://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_viii_16_e.pdf
[100] FAO. Sustainable Forest Management Toolbox. http://www.fao.org/sustainable-forest-management/toolbox

Box 15. Guidance for successful tree planting.

- Planting density: 400–1000 stems per ha is usually sufficient (this number includes any naturally regenerated seedlings or trees already found in the area).
- Seedlings: These should generally be in the range of 25 to 50 cm in height. If there is existing vegetation in the area to be restored, taller seedlings (50-75cm) should be used.
- Planting: Deforested or degraded sites require sturdy plants that have been hardened off in the nursery and watered prior to planting.
- Nurse crops: In bare areas it may be necessary to establish nurse crops of fast-growing species prior to planting or to maintain secondary vegetation for site protection.
- Timing: The best time to plant trees is early in the rainy season to ensure that newly planted seedlings receive adequate moisture in their first months as they develop their root systems.

7. Wetland fauna

> ***Wetland Wise Use Principle: Methods should be used to help conserve wetland fauna.***

Cambodia's wetlands provide important habitat for freshwater fish, waterbirds and other fauna. Out of Cambodia's 512 bird species, a quarter are waterbirds (113 species).[101] 500 of the 1,200 fish species found in the Mekong River occur in Cambodia. Wetland mammals found in Cambodia include the smooth-coated otter (*Lutrogale perspicillata*), the fishing cat (*Prionailurus viverrinus*) and the critically endangered Irrawaddy dolphin (*Orcaella brevirostris*).[102] Many other terrestrial mammal species also depend on wetlands, particularly in the dry season.

There are a number of threats to Cambodia's wetland fauna including habitat loss, over-harvesting (through hunting and collection) and the introduction of invasive species (more information on invasive species can be found in Section 8). The following sections outline approaches which should be used to conserve Cambodia's important wetland fauna.

7.1 Approaches

Some threatened wetland species have their own species action plan, with specific initiatives in place to work towards their conservation. Therefore this section outlines more general approaches which can be used for biodiversity conservation in wetlands.

7.1.1 Habitat protection

Adequate amounts of wetland habitats that are essential for specific species and/or general biodiversity should be protected. Similarly, habitats which are unique or provide vital ecosystem services should be protected. For example, flooded forests provide fish breeding grounds.

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[101] BirdLife International (2017). Country profile: Cambodia. http://www.birdlife.org/datazone/countrycambodia

[102] Kosal, M. (2004). Biodiversity of Cambodia's wetlands. Torrell, M. et al (eds.), Wetlands Management in Cambodia: Socioeconomic, Ecological and Policy Perspectives, WorldFish Center Technical Report 64.

Cambodia's Protected Area Law 2008 states that the four management zones of natural protected areas are: core zones, conservation zones, sustainable use zones and community zones.[103] For wetland sites in protected areas, the core zone or conservation zone should include habitats which are integral to the conservation of biodiversity and vital ecosystem services. The identification of zone boundaries should be carried out with full participation of all stakeholders. Similarly, community-based organizations such as Community Fisheries should place habitats which are integral to the conservation of biodiversity within no-take zones (see Section 5.1 for more information on Community Fisheries). All zones should be clearly demarcated with boundary markers and signboards to inform local communities and outsiders of the prohibited activities.

7.1.2 Patrols and law implementation

Monitoring of the wetland area and related activities through patrols is necessary in areas where illegal hunting of species, collection of species, or habitat clearance occurs. It is important to work closely alongside all relevant stakeholders, including law enforcement agencies, to develop a manageable strategy to carry out patrols. It is vital that there is strong law enforcement, with swift and effective prosecutions for any illegal activity.

It is a good idea to develop a patrolling protocol to ensure that patrolling takes place at times when it is most needed and that the areas to be patrolled are defined. There also needs to be clear operational procedures for warnings, arrests and confiscations for any illegal activity observed. Detailed records of patrols and any actions carried out should be kept, both as evidence to assist with any prosecutions and to ensure transparency. It may be necessary to carry out training with members of the patrol team to build their capacity. Where possible, local communities and community organizations should also be encouraged to report illegal use of natural resources.

7.1.3 Monitoring and research

Alongside patrols, it is important to monitor the demographics of populations of key species. This monitoring will detect changes in population numbers and allow any management plans that may be impacting upon this to be adapted accordingly. Wetland sites can also benefit

[103] Royal Government of Cambodia (2008). Protected Areas Law

from collaborations with research institutions to carry out research and gain greater insight into the behaviour and ecology of key wetland species.

7.1.4 Habitat restoration

At wetland sites where a species' habitat has been destroyed through burning, conversion to agriculture or some other form of land conversion, it is recommended that efforts are made to restore the degraded or destroyed habitat. Many types of wetland habitat are able to be relatively rapidly and effectively restored provided that certain fundamental conditions (e.g. favourable hydrology) can be ensured. **Ramsar Resolution VIII.16 Principles and Guidelines for wetland restoration** [link] provides useful information on the necessary steps to achieve successful restoration.[104]

7.1.5 Temporal restrictions to protect important life cycle stages or events

Human activities occurring during specific species life cycle stages or events can have a detrimental impact on the future number of individuals. Restricting human activity or resource use during these times helps reduce these impacts. In addition, depending on human density or the sensitivity of a species, restricting access to certain parts of a wetland during mating, breeding, egg-laying or brooding periods of target species may also be sensible.

7.1.6 Pesticides and accidental poisoning

Pesticides may be used be farmers on agricultural land in close proximity to important biodiversity habitats. The toxic and often persistent nature of pesticides means that they are potentially hazardous to non-target wildlife including birds, mammals, fish, aquatic invertebrates, insect pollinators and plants.[105] To prevent the poisoning of non-target biodiversity, pesticide use should be avoided where possible. If pesticides are used the practices outlined in Section 4.1.5.1.1 should be followed.

[104] Ramsar Resolution VIII.16 (2002). Principles and guidelines for wetland restoration.. http://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_viii_16_e.pdf

[105] Pingali, P.L. (1995). Impact of pesticides on farmer health and the rice environment: an overview of results from a multidisciplinary study in the Philippines. *Impact of pesticides on farmer health and the rice environment*, pp.3-21.

8. Invasive species

Wetland Wise Use Principle: Steps should be taken to avoid or minimise the damage caused by invasive species to wetlands.

There are a number of different definitions of invasive species. Two definitions which are relevant to Cambodia are:

"*Species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity*."[106]

"*A plant or animal species that is not native to a specific location or ecosystem, and which has the ability and/or tendency to spread to a degree that can cause damage to the environment, economy or human health*."[107]

Invasive species may have been introduced deliberately or unintentionally (although not usually maliciously). One of their main characteristics is the ability to establish themselves outside of their natural habitats. Once established they are then able to out-compete native species and take over an area.

Invasive species are a major threat to wetlands in Cambodia, negatively impacting biodiversity and local livelihoods. For example, Giant Mimosa (*Mimosa pigra*), an invasive thorny shrub that colonizes areas and turns them into a single species blanket,[108] now covers around 20% of the maximum flooding zone on the floodplains of Cambodia.[109] The main invasive species found in wetlands in Cambodia are listed in Table 6.

Due to the damage invasive species can cause to habitats and community livelihoods, management approaches which limit their spread in Cambodia's wetlands are required.

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[106] https://www.cbd.int/invasive/WhatareIAS.shtml
[107] Natural Resource and Environment Code, Draft 7, December 2016.
[108] Braithwaite, R.W. et al. (1989). Alien Vegetation and Native Biota in Tropical Australia: the Impact of Mimosa pigra. Biological Conservation 48, 189- 210.
[109] Samouth, C., et al. (2004). Mimosa pigra infestations and the current threat to wetlands and floodplains in Cambodia. Research and management of Mimosa pigra: papers presented at the 3rd International Symposium on the Management of Mimosa pigra, Darwin, Australia, 2002.

Table 6. Invasive species found in wetlands in Cambodia.[110]

Common Name	Scientific Name	Type	Distribution
Water hyacinth	*Eichhornia crassipes*	Plant	Slow flowing rivers and stagnant water bodies
Giant Mimosa	*Mimosa pigra*	Plant	Mekong Delta and floodplain
Tilapia	*Oreochromis sp.*	Fish	Mekong River and tributaries
Golden Apple Snail	*Pomacea canaliculata*	Molluscs	Paddy fields and ponds
Bighead carp	*Hypophthalmichthys nobilis*	Fish	Mekong River
Common carp	*Cyprinus carpio*	Fish	Mekong River

8.1 Approaches

8.1.1 General strategies for invasive species

Ideally, the best way to manage invasive species is to not introduce them in the first place. Therefore it is important that no more potentially invasive non-native species should be introduced into wetlands in Cambodia.

Where invasive species already persist, methods should be taken to eradicate or contain and control them to limit their impact on livelihoods and biodiversity.

Eradication. This is the complete removal of an invasive species from an area. Complete eradication is often costly and may be difficult to achieve. That said, while it may be costly in the short term, complete eradication at the early stages of invasion, when populations are small and localised, will avoid the higher costs involved in eradicating a widespread invasion later on.

[110] Adapted from: MWBP/RSCP (2006). Invasive Alien Species in the Lower Mekong Basin: Current State of Play. Mekong Wetland Biodiversity Programme and Regional Species Conservation Programme, IUCN Asia.

Control. This involves limiting the spread of invasive species by reducing the number of individuals or area they cover, with a focus on reducing the level of damage caused.[111] This may be a more realistic option when the cost of eradication is unfeasible.

In many cases the same removal methods are used to eradicate an invasive species as for controlling it. The difference is usually in the scale of the approach: eradication will use the method of removal over the entire invaded area, while control will target specific areas where removal will have maximum benefit for reducing damage and/or limiting further spread.

Methods of control include mechanical control, chemical control, biological control and habitat management.

Box 16. Safety and ethics.

- Any measures used to eradicate, contain or control invasive species should be safe to humans, the environment and agriculture.
- Any methods used should be ethically acceptable to the wetland stakeholders. This will require consultation with stakeholders to discuss management of invasive species.

Mechanical control involves directly removing individuals of the invasive species by hand, using tools or using machinery. Disadvantages of this method are that it is very labour intensive and the costs of buying or hiring machinery can make it expensive.

Chemical control is the use of chemicals such as pesticides to kill invasive species. However, the toxic nature of the chemicals used means that they have the potential to be hazardous to humans, non-target organisms and the environment.

Biological control is the intentional use or release of the invasive species' natural enemies or naturally synthesised substances to reduce the invasive population. This approach can be highly cost-effective but caution should be taken to ensure that the 'natural enemies' do not become invasive species themselves or cause harm to non-target species.[112]

Another management technique for controlling plant invasive species is habitat management. This may be used on its own or alongside removal methods. The general idea is that by

[111] Convention on Biodiversity. COP 5 Decision V/8 Alien species that threaten ecosystems, habitats or species. https://www.cbd.int/doc/decisions/cop-06-dec-23-en.pdf

[112] Wittenberg, R. & Cock, M.J.W. (eds.) (2001). Invasive Alien Species: A Toolkit of Best Prevention and Management Practices. CAB International

encouraging the growth of native species you can increase vegetation cover and prevent invasion or re-infestation.[113]

Any efforts to eradicate or control invasive species must include regular monitoring and provisions for quick action to remove any new outbreaks.

A number of approaches have been used to try to eradicate or limit the spread of two of the common plant invasive species in wetlands in Cambodia. The following section provides more information on the control methods used.

8.1.2 Species-specific information

Name: ***Mimosa pigra*** **/ Giant Mimosa**
Description: A thorny shrub which reproduces via buoyant seed pods that can spread long distances in flood waters and has the potential to spread through grasslands, floodplain ecosystems and pastures, converting them into unproductive scrubland.
Management approach: Mechanical removal is recommended. Seedlings: Weeding of seedlings will reduce the number of mature plants in the future. Mature plants: Remove all seed pods from plants. Cut the main stem at the base of the plant. Timing: as water levels are rising, before the period of deep flooding. Return to the area immediately after the flooding period and re-cut any surviving plants. Burning of areas should be avoided. Adult plants are fire resistant and can regrow parts damaged by fire. Fire will also remove any native plant cover, clearing space for new Mimosa to invade. Habitat restoration: Encouraging growth or planting native species will provide natural vegetation cover that will help prevent re-infestation.[114]

[113] MWBP/RSCP (2006). Invasive Alien Species in the Lower Mekong Basin: Current State of Play. Mekong Wetland Biodiversity Programme and Regional Species Conservation Programme, IUCN Asia

[114] MWBP/RSCP (2006). Invasive Alien Species in the Lower Mekong Basin: Current State of Play. Mekong Wetland Biodiversity Programme and Regional Species Conservation Programme, IUCN Asia

Name: Eichhornia crassipes / Water Hyacinth
Description: Water hyacinth is a free-floating perennial aquatic plant which reproduces primarily by way of runners that eventually form daughter plants. Daughter plants can break off and float away to colonise new areas. The species also produces long-lived, viable seeds: Water hyacinth has many negative effects. If not controlled it will cover the entire surface of lakes and ponds. This surface cover starves the water of oxygen which can cause the death of fish (and other aquatic animals). This mat of water hyacinth also blocks sunlight from reaching other aquatic plants, impacts water flow and can impede boat transport in waterways.[115]
Management approach: Mechanical removal is conducted through hand-pulling of the water hyacinth from the water surface using simple tools such as a pitch fork or rake. Repeat efforts will be needed to keep an area clear. After the initial clearing it is best to wait until 20% of the water surface becomes covered again. At that point a new removal session should take place. Hand-pulling to remove plants in deep water will require the use of rafts or boats and carries an increased risk of drowning therefore safety precautions such as life jackets are necessary. Hand-pulling is labour-intensive hard work. It has been estimated that clearing 1 ha of 100% density water hyacinth infestation takes around 125 person-days.[116] For this reason, hand-pulling is only practical for small lakes, narrow streams or canals and for removing small infestations on large water bodies. [117] Machines like weed harvesters or boats with mesh rakes attached can also be used to remove water hyacinth. Due to the high costs of obtaining suitable machinery this is unlikely to be a feasible method of removal in most wetlands in Cambodia. Water hyacinth can be used as a resource for alternative livelihoods e.g. it can be used to make woven handicrafts such as baskets and mats, charcoal briquettes, compost or biogas. However, it is unlikely that any of these activities will lead to water hyacinth harvesting at levels that will significantly reduce local infestations of the species.

[115] Global Invasive Species Database (2016). Species profile: *Eichhornia crassipes*. http://www.iucngisd.org/gisd/speciesname/Eichhornia+crassipes

[116] eThekwini Municipality: Environmental Planning & Climate Protection Department (2013). Water Hyacinth Control: A Guideline Document.

[117] Charudattan, R., et al. (1995). Strategies for Water Hyacinth Control.

9. Ecotourism

Wetland Wise Use Principle: Ecotourism should be considered with caution as an alternative or additional livelihood option in wetlands.

Tourism has been recognised as one of the priority sectors for sustainable development in Cambodia.[118] Indeed, Cambodia's wetlands have features which may be attractive, or of interest, to visitors such as wetland scenery, wetland wildlife and the cultures and cultural heritage of the communities that live in and around them. Tourism to relatively undisturbed natural areas to appreciate nature is known as ecotourism (see Box 17 for definitions). Community-based ecotourism (CBET) is where tourism activities are managed and run by community members, decisions are made in consultation with the community and profits benefit the community. This type of tourism has the potential to generate income for communities living in and around wetlands and in doing so reduce pressure on wetland resources.

Box 17. Tourism definitions from the Natural Resource and Environmental Code.

"Ecotourism: sustainable, responsible tourism to relatively undisturbed natural areas, in order to enjoy, study and appreciate nature (and any accompanying cultural features — both past and present), that promotes conservation, has low visitor impact, provides for beneficially active socioeconomic involvement of local populations and involves interpretation and education of both visitors and hosts. (Based on an official definition adopted by the IUCN in 1996 with a contribution from The International Ecotourism Society in 2015)."

"Community-based ecotourism (CBET): tourism in which the infrastructure including accommodation, food service, transportation or other services are primarily owned and managed by community members and are operated on a basis of directly sharing profits and other benefits with the community while also contributing to conservation, creating low impact and providing education of visitors and local community members."

[118] Royal Government of Cambodia (2004). Rectangular Strategy

Best practice CBET projects involve villagers cooperating with one another to ensure that all members of the community, even those not directly involved in tourism activities, benefit from the project and understand that it is linked to conservation of the wetland. These benefits act as incentives which help encourage people to protect the wetland and its biodiversity.

But CBET has a number of requirements that mean it is not suitable for all wetland sites. Similarly, there is no one-size-fits-all approach and so any project must be carefully designed, taking into account the characteristics of the local community, its traditional and current relationship with the wetland and the prospective wetland feature to be the focal point of ecotourism activities.

9.1 Approaches

9.1.1 Evaluating the potential for CBET

The first step in any potential CBET activity is to consider whether it is a viable and appropriate option. There are economic, environmental and social requirements that must be considered before a community-based ecotourism project is started. Box 18 outlines some basic pre-conditions that need to be met before any development takes place.[119] If these pre-conditions are not met then it is unlikely that ecotourism is a viable option for the wetland site in question. While many wetland sites in Cambodia have landscapes, flora or fauna which have inherent attractiveness or degree of interest to appeal to visitors, they also have characteristics that can hinder ecotourism initiatives. For example, changing water levels may mean that sites of interest can only be accessed at certain times of the year. Similarly, wildlife migration patterns may mean that a species of interest only frequents a site at certain times of the year. Successful wildlife ecotourism is contingent on a guaranteed sightings of target species.

9.1.2 Taking a cautionary approach

Even if the basic pre-conditions in Box 9 are met there is no guarantee that any ecotourism scheme will be successful. It is important not to over-sell community-based ecotourism to local people. Of course, the concept of community-based ecotourism is that it provides a community with alternative income and so encourages the community to protect its natural resources. But

[119] WWF International (2001). Guidelines for community-based ecotourism development.

this this income should largely be considered supplementary and not assumed to completely replace other livelihoods.

Box 18. Basic preconditions for CBET.

- Landscapes or flora/fauna which have inherent attractiveness or degree of interest to appeal either to specialists or more general visitors;
- ecosystems that are at least able to absorb a managed level of visitation without damage;
- a local community that is aware of the potential opportunities, risks and changes involved, and is interested in receiving visitors;
- existing or potential structures for effective community decision-making;
- no obvious threats to indigenous culture and traditions; and
- an initial market assessment suggesting a potential demand and an effective means of accessing it, and that the area is not over supplied with ecotourism offers.

9.1.3 Planning and implementation

Generally, community-based ecotourism activities are managed by community members through a democratically elected committee. If a community decides to start an ecotourism activity there should be a planning phase, involving all stakeholders, to develop a clear management structure for the scheme. This should contain information on the agreed roles and responsibilities of members. Any relevant national and provincial rules and regulations (including local by-laws) that need to be followed by those directly involved in the tourism activities should also be included. The planning phase can also be used to decide which specific tourist activities will be offered, along with Standard Operation Procedures for each element of the activities.

9.1.4 Benefit sharing

It is vitally important that any community-based ecotourism scheme has a fair and transparent benefit sharing mechanism. All community-based ecotourism schemes should have:

- A clear system for benefit sharing that has been agreed by community members;
- A process for equal opportunities in income generating activities;

- An agreement that a portion or percentage of income from all tourism activities is deposited into a community development that is used for initiatives benefiting the whole Community.[120]

9.1.5 Monitoring

Any ecotourism schemes which do go ahead should include a monitoring process to measure the long-term success of the project. A monitoring process helps with early identification of potential problems which can lead to an adjustment in activities if needed. This would also help ensure the permanence of the initiative independently to external factors (i.e. short-term funding). For community-based ecotourism initiatives, training and involving local participants in the monitoring process is essential. Monitoring parameters should include (at least) financial performance; local community perception; environmental changes; and visitor feedback.

9.1.6 Codes of conduct

Any ecotourism activity in wetlands should have a code of visitor behaviour. The purpose of this code is to inform visitors of appropriate behaviour while interacting with local communities, at wetland sites and in proximity of wetland wildlife.

9.1.7 Sources of information

The Association of Southeast Asian Nations (ASEAN) has produced a Community-Based Tourism Standard to help initiatives throughout ASEAN countries to provide enjoyable and meaningful experiences while also benefiting local communities and protecting natural resources. A copy of the tourism standard can be downloaded from the Mekong Tourism website.[121] [Link]

[120] http://www.mekongtourism.org/wp-content/uploads/ASEAN-Community-Based-Tourism-Standard.pdf
[121] http://www.mekongtourism.org/wp-content/uploads/ASEAN-Community-Based-Tourism-Standard.pdf

10. Pollution from industry

> ***Wetland Wise Use Principle: Industry must abide by the legislation laid out in the Sub-Decree on Water Pollution Control to ensure they do not cause pollution to wetlands.***

Pollution of the water which feeds into wetlands can lead to significant changes in wetland ecological processes. These changes to the physical and chemical nature of wetlands can result in dangers to human health and detrimental impacts on biodiversity.[122] In Cambodia, economic development, urbanization and population growth are putting increasing pressure on wetland resources,[123] with concern that this growth and development is leading to the pollution of wetlands from point and non-point sources (industrial sector, agriculture, mining, households, navigation, and erosion).[124] One particular area of concern is where effluents from the industrial sector are being discharged into Cambodia's inland waters.[125]

Management of water pollution and waste is the responsibility of the Ministry of Environment. The law on this matter is laid out in a Sub-Decree on Water Pollution Control (1999).[126] The purpose of the sub-decree is to "regulate the water pollution control in order to prevent and reduce the water pollution of the public water areas so that the protection of human health and the conservation of biodiversity should be ensured."[127] The sub-decree contains a list of sixty types of pollution sources. Owners of these types of pollution source must gain permission from the Ministry of Environment before they can discharge or transport their wastewater.[128]

10.1 Approaches

It is vitally important that the legislation laid out in the Sub-Decree on Water Pollution Control is upheld. The following four measures will assist with this:

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[122] http://www.ramsar.org/sites/default/files/documents/pdf/lib/hbk4-08.pdf
[123] National Biodiversity Steering Committee (2014). The Royal Government of Cambodia: Fifth National Report to the Convention on Biological Diversity.
[124] Mekong River Commission (2012). Carriage, handling and storing of dangerous goods along the Mekong River.
[125] Phet P. 2008. The implication of Environmental Legal Tools to Water Environment in Cambodia. The 3rd WEPA International Forum on Water Environmental Governance in Asia. Putrajaya, Malaysia; 2008. http://www.wepa-db.net/pdf/0810forum/paper21.pdf
[126] Royal Government of Cambodia (1999). Sub-Decree On Water Pollution Control
[127] Royal Government of Cambodia (1999). Sub-Decree On Water Pollution Control
[128] Royal Government of Cambodia (1999). Sub-Decree On Water Pollution Control

1. Water quality monitoring of both of ambient and effluent water is important to measure any changes in water quality, which will allow swift action to be taken if negative changes are found, and if necessary the implementation of measures to restore water quality. Both the Ministry of Environment (MoE) and Ministry of Water Resources and Meteorology (MOWRAM) carry out regular water quality sampling.[129] An increase in technical capacity, both at the national and local levels, in water quality monitoring would assist in water pollution control.

2. Support for the local authorities, such as the provincial and municipal environmental departments which are in charge of water environmental management, to carry out water quality monitoring. This will help ensure water quality standards are met and any violations of standards are dealt with swiftly and punished appropriately.

3. Awareness raising within industry of the dangers of pollution to wetlands will help to instill a responsibility to protect wetlands and maintain and improve water quality in Cambodia.

[129] Phet P. (2008). The implication of Environmental Legal Tools to Water Environment in Cambodia. The 3rd WEPA International Forum on Water Environmental Governance in Asia. Putrajaya, Malaysia; 2008. Available: http://www.wepa-db.net/pdf/0810forum/paper21.pdf


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