

# STAKEHOLDERS OF ANGKOR WORLD HERITAGE SITE MANAGEMENT

## *Agentes de la gestión del sitio Patrimonio Mundial de Angkor*

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### 1. INTRODUCTION

Angkor is living World heritage Site that covers more than 40,000 hectares with 112 villages. In the inscription Angkor complex was recognized as architect buildings but also hydraulic engineering systems from the Khmer period with hydraulic structures like Baray (ancient reservoir), canals, dikes and basins that some of them still use up today. The hydraulic system is built not only for daily life or agriculture purpose but also to assure the stability of the temples that built on artificial sand layer which need ground water.

After inscription of Angkor in the World Heritage Site List in 1992, the Siem Reap/Angkor region has become the greatest tourism site in the country and a powerhouse of tourism development. Tourism has become one of the main pillars of economic growth and the majority of tourism is cultural. Nowadays the income from tourism is more than 16% of GDP for Cambodia. But it can also generate irreparable destructions of the tangible as well as intangible cultural heritage.

Due to the increasing number of tourists every year and the rapidly growing population of the whole region, the demand for water also increased dramatically. Water management for the Siem Reap-Angkor area is the most critical issue for safeguarding the monuments and for sustainable development, the challenge is to satisfy the needs of water for daily use, while assuring the stability of Angkor temples, which have a sand foundation and are linked to the groundwater. The government is developing approaches to assure the development of the region without spoiling the Culture heritage, and has been supported in this endeavor through UNESCO from donor countries. To assure this giant task, the government with the assistance of UNESCO has established a strategy and vision for Management of Angkor.

## 2. MANAGEMENT

Through the vision that approved during the Third Intergovernmental Conference for Angkor for third decade (2014-2023) of ICC-Angkor, the management plan of Angkor World Heritage site will be covered on the major visions like: Monuments, Water, Visitors and Population.

### 2.1. *Monuments*

The conservation and restoration works at Angkor is doing by many countries that needs a coordination for exchange of technical approach of difference teams. It's why the Intergovernmental Conference of Tokyo for Angkor (October 1993) established the International Coordinating Committee for the Safeguarding and Development of the Historic Site of Angkor (ICC) known as ICC-Angkor to assure the conservation and development of Angkor on the right way. The ICC-Angkor is a forum of exchange the experiences between architects, engineers, restorers, archaeologists, researchers, anthropologists, technical experts in various fields for the preservation and development of the Angkor Park.

The ICC-Angkor is chaired by France and Japan with UNESCO as secretariat and conducted in close cooperation with the APSARA National Authority (that is responsible for the management of the Angkor World Heritage Site), contributing to policy making related to conservations of monuments, forest, water system and cultural landscape as well as to sustainable development in the Angkor area.

The ICC-Angkor meetings are held twice a year, one a Plenary Session in December, the other Technical Session in June. Before the meetings, the Ad-hoc expert groups visit the site working by different teams (national and international) to discuss and provide advice, solutions or methodologies for specific issues. The Ad hoc experts also bring the questions, solutions and recommendations to the ICC meetings to have approval from Co-Chair of meetings. The Plenary Session is used to introduce new projects and budgets from state parties. Note that the decision of Ad hoc experts is independent and it has Ad hoc experts for conservation and Ad hoc experts for sustainable development.

Angkor World Heritage Site with the ICC-Angkor mechanism can attract 14 countries (Australia, China, France, Germany, Hungary, India, Indonesia, Italy, Japan, Korea, New Zealand, Singapore, Switzerland, United State of America) to work for conservation and sustainable development. The ICC strategically assists the APSARA National Authority to gain more from this support by coordinating activities and sharing lessons and findings across all of the partners. This international cooperation has also supported the capacity development (theoretical and practical) of many Cambodian staff.

## ICC-Angkor

### The ICC Meeting

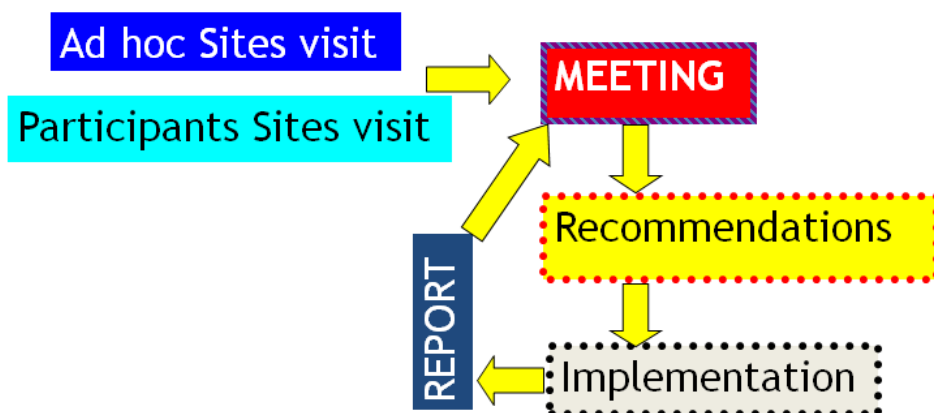


Figure 1: International Coordinating Committee for the Safeguarding and Development of the Historic Site of Angkor (ICC-Angkor)

#### 2.2. Population

Angkor is living site, we need to assure the villagers who is the key of conservation of Intangible heritage. The big part of original landscape of Angkor Park is the rice field that linked to the Ancient hydraulic system. So the villagers have a role very important to maintenance/safeguard this cultural landscape. To do so, it needs the sustainable development for those villages to educate and encourage them to continue the practice their tradition.

##### 2.2.1. Intangible heritage

Since 2000 the APSARA Authority has deployed tremendous effort in conducting research and establishing inventory of different forms of intangible heritage in the Angkor Park by founding a research group named “Social Studies Group”. Alongside these activities, on April 22, 2010, the APSARA Authority founded a research group called “Research on Intangible Heritage in the Angkor Park”. This group concentrated its effort in drafting the “Guidelines for Safeguarding Intangible Cultural Heritage within the Angkor World Heritage Site and other Sites under the Jurisdiction of APSARA Authority”.

### 2.2.2. Sustainable development

Sustainable development is a difficult task to achieve, finding ways to balance the compromises between conservation and development so as to promote a more sustainable future. With this in mind water has and continues to play a key role in the sustainable development of the entire Angkor Park.

The Royal Government of Cambodia has a long and collaborative relationship with New Zealand regarding the management of Angkor World Heritage site. The initial activities commenced in 1998 with support for forestry activities. The first major contribution came in 2005 with support for the research and design of the Angkor Management Plan, which was published in 2007 with the primary aim to: “bring together information on the Park’s resources, with clarification of issues and the opportunities for APSARA and the management needs, goals, objectives and action plans for sustainable development involving the park community in a partnership role with APSARA and the provincial government agencies.”

With links to implementation of the Angkor Management Plan, the Angkor Participatory Natural Resource and Livelihoods (APNRM&L) programme started as a 6-month pilot in 2009 to determine if there was capacity to effectively work on community development and natural resource management activities in the World Heritage site. Positive steps made in this pilot led to the design of a larger APNRM&L programme, with a budget of US\$1 million and was conducted from 2010 to 2013. Independent evaluation considered the APNRM&L programme a success and worthy of further support, with major accomplishments including; Aerial Mapping, Water Infrastructure, Community Liaison Team capacity, Heritage Education, Village Action Plans, Self Help Groups, Business Planning and Value Chain Training, Environmental Good Practices, Food Security, and Community Economic development enhanced through strategic training and support of heritage livelihood activities, including: agriculture, solar, handicrafts and community tourism.

Building on lessons learned from APNRM&L APSARA and the New Zealand Ministry of Foreign Affairs and Trade have continued their collaboration with the Angkor Community Heritage and Economic Advancement (ACHA) project. ACHA has a budget of US\$3,753,000 and is proposed to be delivered across the entire Angkor Park over five years (2014-2018). The goal of the Activity is “sustainable management of Angkor Park, protecting heritage while providing economic prosperity and food security for the people who live within the Park”. Due to the significant role of water in safeguarding the monuments and in promoting livelihoods and food security for local people, nearly a third of the project budget is allocated in support of water infrastructure.

In previous phases of this Activity a Community Liaison Team (CLT) was established within APSARA. The CLT has been successful in engaging with

village people, building their trust and capacity, and supporting them to initiate income-generating activities, food production and farming initiatives, which are complimentary to the tangible and intangible heritage values of the site. With trust and communication established, people have been supported with activities to protect the park, use resources sustainably and directly benefit through livelihoods.

This collaboration between APSARA and New Zealand has adapted over time and succeeded as the relationship has allowed for responsiveness to opportunities and needs. The development of enhanced capacity to better communicate with the communities living within the World Heritage site and understanding of the natural and social features of the site as significant living heritage (intangible heritage) has helped to make more positive relationships. This has also complimented the capacity of APSARA staff to more holistically approach heritage management as more of a collaborative activity that is best-achieved together.

### *2.3. Visitors*

Managing heritage at Angkor requires manage tourism - so as to assess risks and identify issues, conserve values, enhance visitor experiences and guide development in a way which respects and provides opportunities and benefits for the tourism industry and local people.

In 2010, the ICC-Angkor and the APSARA National Authority requested that a The Angkor Tourism Management Plan (TMP) be incorporated within the Heritage Management Framework project (HMF). TMP has been prepared through an experts from the APSARA National Authority, Australia (GML), UNESCO and ICC-Angkor.

The TMP provides a basis for managing tourism at Angkor through an assessment of values of the World Heritage Area, analysis of issues that pose a threat to those values, and development policy. The TMP identifies major initiatives for sustainable tourism, ranging from integrated temple management to a revised transport system, changes to ticketing, improved visitor orientation, re-training of tourist guides, development of local craft and better industry relationships and communication.

A “Tourism Industry Stakeholder Workshop” and “Community, Monks and NGO Workshop” were held in Siem Reap in March 2012. From the workshops, the team can have a clear guideline to establish a working group on the Tourism Management Plan team who is now in the implementation on the ground (since end of 2013).

### *2.4. Water*

The Khmer mastery of water engineering in ancient times is shown in a range of Angkor’s hydraulic structures such as Barays (ancient reservoirs), moats, laterite spillway, laterite bridges, ponds, canals and dykes. Angkor is recognized by Bernard-Phillip Groslier (of the École d’Extrême-Orient – EFEO) in 1950s and

1960s as ‘Hydraulic City’ because of this city is organized around an immense water management network (Groslier, 1979), the system has been re-mapped by Pottier (Pottier, 1999) and later on in Geographical Information System (GIS), but the functioning of this water network didn’t discovered in that time. It is only from 2004-2005 that the Khmer researcher found how it functions then rehabilitated it. (Water section extract from Hang Peou, 2015).

#### 2.4.1. Conception of temple construction

The soil in central plain of Cambodia cannot support heavy loads. In order to build stone temples like Angkor Wat, Bayon, Ta Prohm and Preah Khan, the best technique had to be found. Khmer engineers at the time discovered the physical properties of sand and water and realised that they could combine these two elements for building: sand once wet can support a heavy load. The discovery of this technique led them to locate the places where this theory could be applied. Studies have shown that the Angkor region is the best location, as underground water is close to the ground surface (Acker, 2005). They then used the immediate presence of underground water to completely fill the sand layer under the monument to ensure its stability. To assure the sustainable of ground water to support the temples, the Khmer ancestor introduces the water in its culture that we demonstrate only two main points (thousands of Lingas and Moat) without talking on the other ceremony practical by local people every day.

The ancient Khmers knew the vital role played by water resources in the safeguarding of the Angkor region and learned how to preserve water. This is why this vital resource is celebrated within the tradition, culture and spirit of the Khmer people. Some of these customs are still celebrated today.

##### 2.4.1.1. The sacred water of the Mount Kulen

Khmer ancestors carved the Siem Reap River of Thousand Lingas in the river beds of Mount Kulen and Kbal Spean, where these rivers source, before they flow into Siem Reap and the Angkor site plain. At Banteay Srei they flow together to form the Siem Reap River. The water flowing from the “Thousand lingas” has become sacred and has been used in the major ceremonies (e.g. coronations, cremation ceremony) of the Khmer Kingdom since the 9th century. During coronation, the sacred water of Mount Kulen is used to bless the future King. This tradition is still practiced. The Khmer population believes in the power of this sacred water, using it to cure diseases or during blessings to bring luck. But the real goal of the sacred water from Mount Kulen is to underline to the population the need to protect water resources, the region’s life-blood, and to maintain the sustainability of this resource, which is essential for the conservation and development of the Siem Reap region. Therefore, the water source of Mount Kulen will be lost if deforestation continues and the environment is destroyed.





Figure 2: Thousand Lingas at Kbal Spean on the Kulen chain

#### 2.4.1.2. The moats

Before the construction of temple, the natural soil was removed and filled back with sand that needs water for its resistance. Of course this sand layer link to groundwater but to make the sustainable of temple in case of variation of underground water, the moat system was adopted. Thus, each temple in central plain of Cambodia, is surrounded with moats which play a pivotal role: they collect runoff water from the temple during the monsoon and recharge the sand layer underneath the temple (Hang, 2014).

The Khmers ancestors understood that if the safeguarding of water was conveyed as a message or ordered (law) by using technical reason, this would not be sustainable. So by including the water as both a form of life-blood and as the basis for a system of beliefs, the recommendations may have lasted. Then to assure the sustainable water in the moat to support the temple, the engineering approach was transformed into the religious. The moats are considered in the Khmer tradition as the Ocean and the temple as Mount Meru (the dwelling of the Gods).



Figure 3: Angkor Wat with its moats

#### 2.4.2. Water Management for development of Siem Reap region

After inscription of Angkor in the World Heritage Site List in 1992, the Siem Reap/Angkor region has become the greatest tourism site in the country and a powerhouse of tourism development. For Cambodia, tourism has become one of the main pillars of economic growth and the majority of tourism is cultural. Nowadays the income from tourism is more than 16% of GDP for Cambodia. It means the visitor in the regional will continue to increase every year.

Due to the number of tourism increase every year, and the needs of water supply for daily used of the whole region caused to the demand of water is increase in remarkable. The whole region use underground water that link to the stability of the monument as mentioned in previous chapter. In this regard, Water Management for Siem Reap-Angkor is the most sensitive issue for Sustainable Development and Safeguard monuments-to assure the stability of Angkor temples stand on the sand layer that link to the groundwater. The groundwater can recharge naturally and quickly with the present of forest, but in the upstream and on top of Kulen Mountain is deforested.

To assure the compromise between the development of tourism and the safeguarding of the temple, the government of Cambodia is setting the long term policy to stop increasing of pumping underground water and take water surface like West Baray (storage of 56 million cubic meters) in 2015 and Tonlé Sap Lake in 2019. Without waiting the long time solution and assure the development of the tourism, since 2004, APSARA National Authority has been adopted two solutions, the first is the reforestation in the whole region to increase the recharge of underground water (Hang, 2005), but this solution will take long time for those



tree grow up and play it role. The second solution is to rehabilitate the ancient reservoir like Baray, Moat and Basin to recharge underground water immediately.

Nowadays, we face not only the problem of water resources for the water supply in the region but also the flood that threat every year since 2009 to this tourism region. The best ways to protect the temples, airport and Siem Reap city from the floods, Department of Water Management of APSARA National Authority has conducted necessary project in analysing, field investigating with theoretical and practical research in order to rehabilitate ancient Angkorian Hydraulic System to permit restore Cultural Landscape, Environment and recover their essential role of safeguard monuments. This long and challenging program has been implemented with technical and financial resources within the APSARA National Authority and especially comparing of analysis and preliminary findings with exceptional data provided by the upheavals following the floods of 2009, 2010 and 2011 (Hang, 2013). This solution will descript in chapters below.

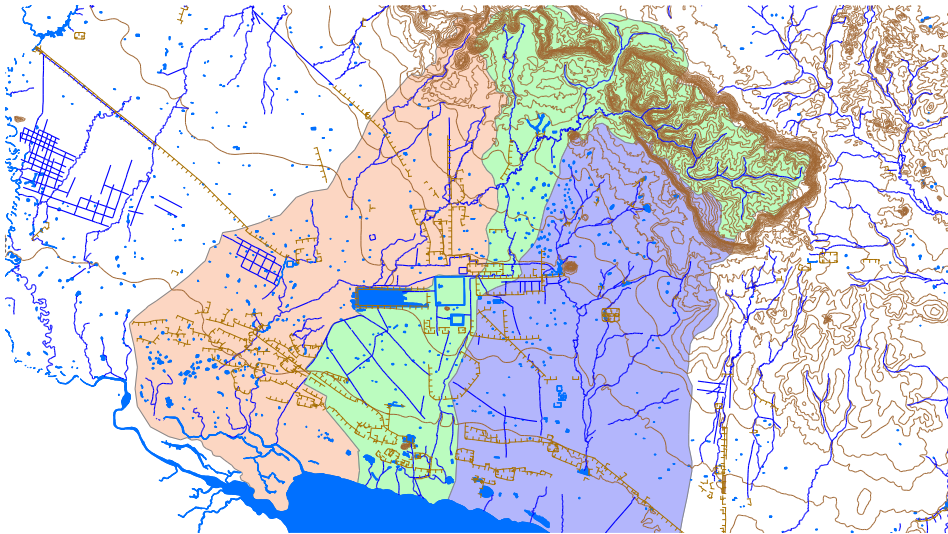


Figure 4: Watersheds of Angkor region

#### 2.4.3. Rehabilitation of ancient hydraulic structures

The main task to be archived before the rehabilitation of ancient hydraulic structures is analyzed the flow from upstream limit of watershed to the outlet of the Kulen plateau until they spill into the Tonlé Sap Great Lake, by three watersheds: Stung Pourk in the West, the Stung Siem Reap at Center and Stung Roluos at East. It appeared that the Pourk and Stung Roluos are natural waterways; while the Stung Siem Reap is an ARTIFICIAL waterway from Bampenh Reach (it's a laterite Spillways- the connection between Pourk river and actual Siem Reap river).

More than ten years of applied research on the ancient hydraulic system of Department of Water Management of APSARA, the department achieved the restoration of some structures that built during the Khmer Empire of Greatness Angkor by hydraulics engineers as Srah Srang, Banteay Srei, Angkor Thom moats, Angkor Wat moats, Jayatataka or North Baray, Neak Pean temple, Preah Khan moats and West Baray.

#### 2.4.4. Rehabilitation of 12<sup>th</sup> century Hydraulic System

Since 2009 the whole region is facing to flood in rainy season that has impact on the temples/monuments, villages, Siem Reap city (tourism and local resident). APSARA Authority is able to manage the flow to protect the temples/monuments and some villages, but not the Siem Reap city. In 2011, Siem Reap city was flooded 5 times, some part like Old Market (center of Siem Reap city) can't access even the Pick-Up car. It needs some million dollars to repair the infrastructure for Siem Reap province. In 2012, the government requested to APSARA Authority to find out the solution to protect not only Angkor Park and upstream but also this city from flood. As showing in this article, the concept of APSARA Authority is to reuse the ancient hydraulic system.

It needs to go back to the history by looking on the record of the Angkor city in ancient time, how they can face to this challenge with their complex hydraulic system. After our research, no inscription in Khmer Empire territory mentioned about the flood neither the drought in the Angkor region. Otherwise the Khmer people should have a memory of disaster and transfer that information to next generation or use like a legend. If those problems never happened in the past, it means that the water management system in ancient time is the best system to optimize water resources. Because of the ancient system unfunctioning for long time, that's why in 2004 it has drought- the Angkor Wat moats and Srah Srang dry up, and then it has floods in 2009, 2010 and 2011.

Understand the overall organization of the Angkorian Hydraulic System: rivers, Barays, Moats, canals, pounds and dikes, it can be identified on the field how it was ensured water flow and thereby highlight channels and their connections. This discovery led to understand that the level of the North Baray, at North-East, it has a canals and dikes East-West and an **ancient laterite bridge** (on Siem Reap river) of multiple arc form which could use to control the flow and discharge. With this distribution node, and through the channels, we managed to distribute water in three flow direction instead of sending all through Siem Reap river: one part to the South (Moat of Angkor Thom– 2 million cubic meters, Angkor Wat – 1.5 million cubic meters and to Siem Reap river), second part to the East (Stung Roluos river) and third part to the West that can be storage in North Baray – 5 million cubic meter, West Baray – 56 million cubic of meter, the Stung Pourk river and Stung Preah Srok river).

In 2012, the main part of this system has been rehabilitated; it's why the Angkor and Siem Reap city can avoid the flood during rainy season of 2012 and 2013, without this work Siem Reap city will face to flood at less four times. Until 2014, APSARA Authority rehabilitated more than 37.87 kilometers of 52 kilometers of system. It's why in the rainy season of 2014 Siem Reap region doesn't have any flood. This result is confirmed that the Millennium Hydraulic System not only can optimization of Water Resources Management but also flood control.

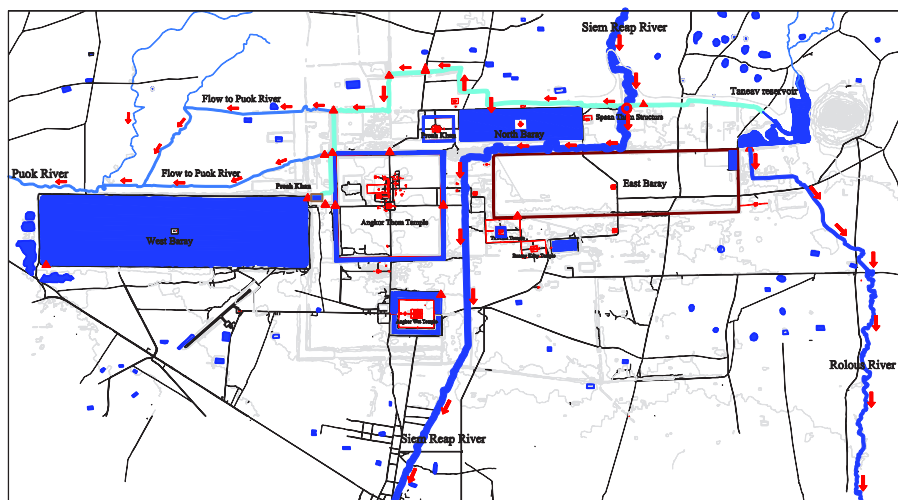


Figure 5: The distribution of flow through the 12<sup>th</sup> century of Angkor Hydraulic Network

### 3. CONCLUSION

Angkor is inscribed as Eco historic site with people who live inside. It means Angkor is the living site that is necessary to manage with all stakeholders (government agency, international agency, private sector and local authorities), this can help local people lives in prosperity with the increasing of the tourism in the region. The management for the monument conservation, the tourism and the development projects are complement to assure the intangible and tangible preservation/conservation and sustainable development of Angkor World Heritage Site.

While there have been significant challenges ICC-Angkor with UNESCO and partners can show many successes for the management of the Angkor World Heritage Site. ICC-Angkor is a very good model for Cultural sector not only for conservation but also for the sustainable development of the Angkor region and the country. A focus on water, by rehabilitating the ancient hydraulic systems

and promoting benefits to the monuments and the local community shows sustainable development in practice. Through this ICC-Angkor system, more and more Cambodian people are training to assure the tasks in the future and become experts for other sites in Cambodia.

In Cambodia the best way to assure the compromise between conservation and development of Angkor World Heritage Site is by promoting the role of collaborative stakeholders such as through cooperative mechanisms like the ICC-Angkor. Based on this success the Government of Cambodia requested UNESCO to setup the ICC-Preah Vihear for Preah Vihear temple that was inscribed in World Heritage Site list in 2008. The first ICC-Preah Vihear meeting held in December 2014.

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