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COMITE INTERNATIONAL DE COORDINATION POUR LA SAUVEGARDE ET LE DEVELOPPEMENT DU SITE HISTORIQUE D'ANGKOR  
INTERNATIONAL COORDINATING COMMITTEE FOR THE SAFEGUARDING AND DEVELOPMENT OF THE HISTORIC SITE OF ANGKOR

**TECHNICAL COMMITTEE**

# Twenty Fourth Technical Committee

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**Siem Reap — June 4 & 5, 2015 — APSARA National Authority**

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## TABLE OF CONTENTS

<b>I- OPENING SESSION.....</b>	<b>6</b>
I.1 Statement by the Japanese Co-chairman, Mr. Takahisa Tsugawa, Minister/Deputy Chief of Mission, Embassy of Japan in Cambodia .....	6
I.2 Statement by the Representative of the Royal Government of Cambodia, His Excellency Dr. Sok An, Deputy Prime Minister, President of the APSARA National Authority .....	7
<b>II- ACTIVITY REPORTS .....</b>	<b>10</b>
II.1 ICC-Angkor Scientific Standing Secretariat Activity Report, by Professor Azedine Beschouch, Scientific Secretary .....	10
II.2 APSARA National Authority General Activity Report, by His Excellency Mr. Bun Narith, Director General .....	11
<b>II-A TECHNICAL TEAM ACTIVITY REPORTS: RESTORATION AND CONSERVATION .....</b>	<b>14</b>
II.A.1 Follow-up of the recommendations adopted in June and December 2014.....	14
a. Introduction by the Scientific Secretariat, Professor Azedine Beschouch .....	14
b. Western Prasat Top: Follow-up on recommendation 23TS.II.1, by Dr. Hiroshi Sugiyama, NARA Institute, Japan .....	14
c. Prasat Kravan: Follow-up on recommendation 23TS.II.2, by Dr. Ly Vanna, Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology.....	15
d. Angkor Wat Causeway: Follow-up on recommendation 23TS.II.3, by Mr. Satoru Miwa, Sophia University .....	17
e. Ta Prohm: Follow-up on recommendation 21PS2 by Dr. Rakesh Tiwari, Director General, ASI New Delhi, Dr. Jhanwij Sharma, director (Conservation, NCF & WH), and Mr. Devendar Singh Sood, Dy. S.A.E & project team leader, ASI (Archaeological Survey of India).....	18
f. Hydraulic work site to the north of Angkor: Follow-up on recommendation 23TS.II.7 by His Excellency Dr. Hang Peou, Deputy Director-General, Department of Water Management, APSARA National Authority.....	20
g. Western Baray and Western Mebon: Follow-up on recommendation 23TS.II.8, by H.E. Dr. Hang Peou and Ms. Marie-Catherine Beaufeist, APSARA-EFEO .....	21
h. Risk map, perimeter wall of Angkor Thom: Follow-up on recommendations 23TS.II.5 and 21 PS1, by His Excellency Dr. Hang Peou, Deputy Director-General, Water Management Department, APSARA National Authority .....	24
i. Banteay Srei: Follow-up on recommendation 21PS4, by Her Excellency Ms. Chau Sun Kérya, Project Leader, Counsellor and Spokesperson of the APSARA National Authority .....	26
j. Ta Keo conservation operations: Follow-up on recommendation 23TS.II.9, by Mr. Qiao Yunfei, Director of CACH and Project Leader of CSA, Chinese Government Team for Safeguarding Angkor .....	28
k. Statement from the Minister of the Environment Mr. Say Samal .....	29
l. Western embankment of Angkor Wat moat: Follow-up on recommendation 21PS5, by Professor Walter-Maria SANTORO, IGes.....	31
m. Lolei: Follow-up on recommendation 21PS7, by Mr. Tann Sophal, Deputy Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority .....	32
n. Bakong: Follow-up on recommendation 21PS8, by Mr. Tann Sophal, Deputy Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority.....	34

General discussion .....	34
<b>II.B TECHNICAL TEAMS ACTIVITY REPORTS: SUSTAINABLE DEVELOPMENT .....</b>	<b>40</b>
II.B.1 Follow-up on recommendations adopted at the 23 <sup>rd</sup> Technical Session in June and at the 21 <sup>st</sup> Plenary Session in December, 2014 .....	40
a. Introduction by the Scientific Secretariat, Professor Azedine Beschouch .....	40
b. Ta Prohm: Follow-up on recommendations 21PS9 and 23TS.II.6.1-6.2, by Mr. An Sopheap and Mr. Chhay Ratchna, Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority .....	40
c. Angkor Wat Parvis: Follow-up on recommendation 21PS10, by His Excellency Mr. Uk Someth, chairman of Angkor Wat Approach Area Implementation Committee, APSARA National Authority .....	42
d. Kampong Phluk: Follow-up on recommendation 21PS11, by Professor Tan Boun Suy, Deputy Director General, Project Leader, APSARA National Authority .....	43
e. Tourism Management Plan (TMP): Follow-up on recommendation 21PS12, by His Excellency Mr. Sok Sangvar, head of TMP Unit, APSARA National Authority .....	45
f. Rehabilitation of Ancient Canals: Follow-up on recommendation 23TS.IV.3 by His Excellency Dr. Hang Peou, Deputy Director General, Water Management Department, APSARA National Authority .....	47
General Discussion .....	48
<b>III-A New projects: Research and Conservation .....</b>	<b>51</b>
III.A.1 Banteay Thom conservation and restoration project, by Mr. Sébastien Appert, Chairman of l'Atelier Banteay Thom .....	51
III.A.2 Preah Pithu conservation and restauration project, by Mr. Kim Kwanghee, Director, International Cooperation Team, Korea Cultural Heritage Foundation, KOICA .....	54
III.A.3 Preliminary Excavation at Banteay site, Phnom Kulen, by Dr. David Kyle Latinis, ISEAS-NSC-AU, Singapore.....	56
III.A.4 Yaśodharāśrama, 2015 campaign: First results of archaeological excavations at <i>Prasat</i> Komnap South, by Mr. Chea Socheat, Archaeologist, APSARA-EFEO.....	57
III.A.5 LiDAR Programme on Archaeology in Cambodia: Siem Reap Region, Phnom Kulen, Preah Khan, Kampong Svay, Banteay Chhmar, post-Angkorian landscape, Longvek, Udong and Sambor Prei Kuk by Dr. Damian Evans on behalf of EFEO ...	59
III.A.6 Inventory of archaeological artifacts in Angkor, by Mr. Pheung Dara, archeologist, Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority.....	62
III.A.7 Black patina on Khmer temples: Banteay Srey and Neang Khmau at Koh Ker site—causes and chemical reactions, by Professor Tan Boun Suy, APSARA National Authority .....	62
General discussion .....	64
<b>III.B New projects: Sustainable development .....</b>	<b>67</b>
III.B.1 ACHA-Angkor Community Heritage and Economic Advancement, by His Excellency Mr. Khuon Khun Neay, Deputy Director General, Department of Land Planning and Habitat Management in Angkor Park, APSARA/NZAID .....	67
III.B.2 UNESCO (Paris)/Japanese Funds-in-Trust project: Linking World Heritage sites, museums and populations—Khmer Women in the past, present and future, by Mrs. Sam Thyda, Deputy Director of the National Museum of Phnom Penh and Ms. Chhom Kunthea, Director of Preah Norodom Sihanouk Angkor Museum,	

Department of Cultural Development, Museums and Heritage Standard, APSARA National Authority .....	69
III.B.3 Working Group on Water on the Angkor Site and in Siem Reap City, project funded by UNESCO Jakarta, by Mr. Philippe Delanghe, Culture Programme Specialist and Ms. Ai Sugiura, Coordinator and sustainability science specialist, UNESCO .....	71
III.B.4 Introduction of the Environmental Management System according to ISO 14001 standard by His Excellency Mr. Chhor Thanat, Deputy Managing Director in charge of the Department of Forest Management, Cultural Landscapes and the Environment, APSARA National Authority.....	73
III.B.5 Report on the international training on ceramic of Chong Samrong site to archaeologists from different Asian countries, by Dr. Ea Darith, Deputy Director of the Department of Conservation of Monuments Outside Angkor Park, APSARA National Authority .....	74
III.B.6 Report on activities of the Angkor Training Centre first six months of 2015, by Professor Azedine Beschouch, Chairman of the Center .....	76
General discussion .....	78
<b>IV.1 CONSERVATION, RESEARCH AND ARCHAEOLOGY: TECHNICAL TEAMS ACTIVITY REPORTS .....</b>	<b>79</b>
IV.1.1 Recent research by Mafkata (French-Khmer archaeological mission for the development of the Angkor territory) by Dr. Christophe Pottier, Senior Lecturer, EFEO .....	79
IV.1.2 New archaeological evidence of landscape transformations around <i>Prasat</i> Krachap, Koh Ker Site, by Dr. Karoly Belensy, leader of archaeological mission in Cambodia, HUNINCO-HSARI, Hungary .....	81
IV.1.3 Searching for past records of aerosol pollution in sandstone microstructure, by Dr. Karel Kranda, Institute for Nuclear Physics, AVCR.....	82
IV.1.4 Overview of restoration work from June 2014 to June 2015, by Dr. Takeshi Nakagawa, Dr. Kou Vet, Mr. Cheam Pross, JASA.....	84
IV.1.5 Results of restoration work on brick monuments, by the Department of Conservation of the Monuments in the Angkor Park and Rescue Archaeology, APSARA National Authority, by Mr. Tann Sophal .....	87
IV.1.6 Angkor Wat, archaeology of residence pattern identified by the Greater Angkor Project, by Dr. Alison Carter, Robert Christie Research Centre, Faculty of Arts, Sydney, Australia .....	89
IV.1.7 World Monuments Fund Projects: a) Phnom Bakheng: The ongoing restoration and stabilisation of central shrine and related stone and brick shrines on the terrace levels, b) Preah Khan Temple: The ongoing work to conserve the east gopura, selected garudas, and other elements of the monastic complex; c) Ceiling patterns in the Angkor Wat east gallery by Ms. Cheam Phally, architect, World Monuments Fund .....	92
IV.1.8 2014 activity report, by Mr. Thomas Bernecker and Mr. Tek Touch, GIZ/APSARA Stone Conservation Unit.....	94
IV.1.9 3D documentation of Ta Nei Temple, by Ms. Katsura Sato, National Research Institute for Cultural Properties, Tokyo .....	96
IV.1.10 Preliminary results from studies of the physicochemical properties of ceramics and dating, by Dr. Ea Darith, Deputy Director of the Department of Conservation of Monuments Outside of Angkor Park, APSARA National Authority.....	97
IV.1.11 Conservation of O'Paong temple, Phnom Kulen and Emergency shoring of the temples on Koh Ker Site, by Dr. Chhean Ratha, interim Director, Department of Conservation of Monuments Outside of Angkor Park, APSARA National Authority .	98

IV.1.12 Results of excavations of Angkor Wat’s western moat by Dr. Ly Vanna, Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority .....	101
IV.1.13 Report on activities in Angkor Wat and programme for 2015 by, Dr. Hans Leisen, Project Director, GACP .....	102
IV.1.14 Activity report from the Archaeology and Development Foundation (ADF) at Phnom Kulen, by Dr. Jean-Baptiste Chevance, ADF .....	104
IV.1.15 <i>Institut national de recherches archéologiques preventives</i> (INRAP): Cooperation with the APSARA National Authority and prospects for research and training at conclusion of first five-year phase, by Mr. Pierre Bâty, project manager, INRAP .....	107
General discussion .....	110
<b>V. NEW RECOMMENDATIONS .....</b>	<b>113</b>
V.1 Report from the <i>ad hoc</i> group of experts for conservation by Professors Giorgio Croci, Pierre-André Lablaude and Kenichiro Hidaka.....	113
V.2 Discussion on the new recommendations for conservation, research and archaeology .....	119
V.3 ICC Motion presented by Mr. Azedine Beschouch .....	120
V.4 Report from the <i>ad hoc</i> group of experts for sustainable development, by Professors Jean-Marie Furt and Shinji Tsukawaki .....	122
V.5 Discussion on the new Recommendations for Sustainable Development.....	126
<b>VI- GENERAL INTEREST DEBATE on Water Management.....</b>	<b>132</b>
VI.1 Introduction by Professor Azedine Beschouch, Standing Scientific Secretary of ICC-Angkor .....	132
VI.2 His Excellency Dr. Hang Peou, Deputy Director General, Department of Water Management, APSARA National Authority .....	133
VI.3. Presentation on water distribution in the Siem Reap region by Mr. Cheav Chany, Deputy Director General, Siem Reap Water Authority, and Mr. Paul Galzin, expert, AFD.....	139
VI.4 Mr. Philippe Delanghe, culture programme specialist, UNESCO.....	144
General Discussion .....	146
<b>VII- MISCELLANEOUS ITEMS .....</b>	<b>150</b>
VII.1 Points of information .....	150
<b>VIII- ICC RECOMMENDATIONS .....</b>	<b>152</b>
VIII.1 Presentation of the draft recommendations by the Standing Secretariat .....	152
<b>RECOMMENDATIONS.....</b>	<b>153</b>
VIII.2 Approval of the recommendations by the ICC-Angkor.....	157
VIII.3 Date of the next plenary session .....	158
<b>IX- CLOSING SESSION .....</b>	<b>159</b>
IX.1 Speech by Ms. Anne Lemaistre, representative in Cambodia of the UNESCO Director General .....	159
IX.2 Speech by the French Co-chairman, Mr. Romain Louvet, Counsellor for Cooperation and Cultural Affairs, Embassy of France in Cambodia .....	160

**List of Participants..... 163**

**NOTICE:** The languages used during the sessions of the ICC are English, French and Khmer. In the English language record of the discussions, all material spoken originally in French or Khmer is therefore a translation. Presentations and comments made originally in English are indicated by <sup>[OrigE]</sup> at the beginning of the contribution. The insertion <sup>[OrigK]</sup> shows that the original statement was in Khmer.

# RECORD OF THE DISCUSSIONS

## I- OPENING SESSION

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### **I.1 Statement by the Japanese Co-chairman, Mr. Takahisa Tsugawa, Minister/Deputy Chief of Mission, Embassy of Japan in Cambodia**

[OrigE] "On behalf of the co-chairmanship we have the pleasure to open this 24<sup>th</sup> technical Session of the ICC.

Your Excellency Mr. Sok An, Deputy Prime Minister, Chairman of the APSARA National Authority,  
Your Excellency Minister of Tourism,  
Your Excellency Minister of Culture and Fine Arts,  
Your Excellency Minister of the Environment,  
Your Excellency Governor of Siem Reap Province,  
Your Excellency Director General of the APSARA National Authority,  
Your Excellency High Representative of His Majesty King Norodom Sihamoni,  
Your Excellency Ms. Anne Lemaistre, UNESCO Representative in Cambodia,  
Excellencies,  
Distinguished guests,  
Ladies and Gentlemen,

It is a great honour for me to participate in this 24<sup>th</sup> Technical Session of the ICC-Angkor as co-chairperson. I would start by expressing my deepest appreciation to His Excellency Dr. Sok An, for his relentless commitment to the ICC-Angkor.

The APSARA National Authority celebrates its 20<sup>th</sup> anniversary this year and, on this important occasion, I would like to congratulate His Excellency Mr. Bun Narith for the APSARA Authority's remarkable development over the last 20 years.

I would also like to extend my sincere thanks to Ms. Anne Lemaistre and the ICC Secretariat of UNESCO for making all the arrangements for this Technical Session. In addition, I wish to express my profound respect to Professor Azedine Beschaouch, Scientific Secretary of the ICC, for his devotion to the protection of the Angkor historic site since the ICC's very inception.

My deepest gratitude also goes to Mr. Romain Louvet, Counsellor for Cooperation and Cultural Affairs at the Embassy of France in Cambodia, for being my co-chairperson. I am delighted to be presiding over this two-day Technical Session with him.

On my first ICC Technical Session, I also would like to extend my deep appreciation to all the *ad hoc* experts, Dr. Mounir Bouchenaki, Dr. Giorgio Croci, Dr. Pierre-André Lablaude, Dr. Kenichiro Hidaka, Dr. Jean-Marie Furt, Dr. Bernard Hubert and Dr. Shinji Tsukawaki. Their broad knowledge, experience and dedication to the Angkor site are crucial to the success of the ICC sessions.

I would also like to express my gratitude to, and respect for, the teams and individuals present here today; JASA, Sophia University, Nara National Research Institute for Cultural Properties, National Research Institute for Cultural Properties, Tokyo, and all the other national and international teams. They have contributed to the protection and development of the Angkor site for a very long time.



I hope our discussions over these next two days will be beneficial to the present and future of the Angkor site.

Thank you for your attention.”

Comment from the Co-chairman for Japan: “We now have the pleasure to invite His Excellency Dr. Sok An to take the floor.”

## **I.2 Statement by the Representative of the Royal Government of Cambodia, His Excellency Dr. Sok An, Deputy Prime Minister, President of the APSARA National Authority**

“Distinguished Co-chairs,  
Excellencies,  
Dear colleagues,  
Ladies and Gentlemen Professors and Experts,  
Ladies and Gentlemen

It is a pleasure for me once again to attend our International Co-ordinating Committee for Angkor, which 24<sup>th</sup> Technical Session demonstrates its vitality and continuous momentum through its history. The latter has attracted the envy of other numerous heritage bodies.

Following more than a quarter of a century of good and loyal services, our ICC is not shying away from a complete overhaul or resolute change. To this matter, Both French Ambassador, H.E. Jean-Claude Poimboeuf, and Japanese Ambassador H.E. Yuji Kumamaru took the initiative to put forth a changing process in the drafting of the agenda of our committee and in its *modus operandi*.

I have agreed to their proposals and I have particularly highlighted the need to improve the follow-up of the recommendations and to promote a more active role for the two groups of *ad hoc* experts bestowed upon the ICC. On this point, I would like to express my highest esteem to the experts and to ask them to note that they are forever distinguished guests in Cambodia. They in some way are to feel at home at the headquarters of the APSARA National Authority.

Excellencies, Ladies and Gentlemen,

Before dealing with topics on Angkor I would like to add a few things. First, I would like to mention the follow-up of recommendations and the extended sojourn of our experts. We discussed ways to increase their participation and to draw more from their experience. The best solution has been to extend their sojourn for more active contribution. To this end, there will be a need to appoint a coordinator. I will myself name that individual and he will be tasked with coordinating their stay with the APSARA National Authority established programme. The latter may include training courses or colloquia for them to attend. The coordinator to be appointed will help in furthering the ever so priceless contributions of our experts.

Before talking about Angkor, the World Heritage and this session’s topics, I would like to welcome a new colleague whose new functions are of interest to us. I am talking about the Japanese co-chair of this technical Session, Minister Takahisa Tsugawa. He has been recently appointed as Chief of Mission at the Japanese Embassy in Phnom Penh and it is his maiden co-chairmanship of the Angkor ICC. I would like to wish him a warm welcome among us and rapid success.

I have no doubt that his colleague and first co-worker, Mr. Romain Louvet, Counsellor for Cooperation and Cultural Affairs of the Embassy of France in Phnom Penh, will convey to him his wealth of experience and skills that we have all enjoyed. Best wishes to both of you. Let's hope for smooth proceedings during their chairmanship.

Distinguished Co-chairs,

It is true that any items dealing with Angkor also concern the Heritage of Humanity. For us, responsible for Angkor and its future, we have to remain vigilant regarding the development of the sites and monuments inscribed on the World Heritage List.

The ICC cannot remain idle faced with the unprecedented disasters that have struck the cultural heritage of Iraq and Syria, both cradles of human civilization. We all know that defenceless populations have been slaughtered whilst multitudes of others have been forced into exile. Antique monuments and even Islamic monuments have been demolished. Museums have been profaned and ransacked. Even worse, statues and bas-reliefs, archaeological artefacts of significant historical value, have been destroyed.

Throughout the world voices speak up to show their indignation and call for action, concurring with the firm stance of the UNESCO Director General, H.E. Ms. Irina Bokova. I would like to propose that our ICC endorses a special recommendation expressing our full support for the UNESCO initiatives and our solidarity with all of those who are committed to safeguarding the heritage of Iraq and Syria, a Heritage of Humanity.

Excellencies, Ladies and Gentlemen,

Let me now talk about Angkor. You are all aware that this site stands out from the World Heritage List due to its management complexities and the numerous challenges it is facing. It is quite a task to manage a site extending over 40,000 hectares adjacent to the town of Siem Reap, which within two decades has sprawled into an agglomeration of 250,000 people. This town not only hosts domestic visitors numbering to hundreds of thousands but also, in line with the boom of tourism, foreign visitors, who totalled 320,000 in 2003 to now reach 2 millions in 2014.

They were 320,000 in 2003 and up 450,000 in 2004, which was already a great leap in one year, that same year that Angkor was taken off the List of World heritage sites in danger. This is a rather important fact, as in 2004 a 30 per cent increase of foreign visitors was a remarkable feat.

There are also the people living in 112 villages scattered inside the site of the historical city of Angkor. These villages have their own authentic folk traditions which are part of the site inscribed on the World Heritage List. Modern life and tourism impacts have now turned these villagers into prospective city dwellers. They have become more demanding in terms of pressing housing developments.

This has rendered the APSARA National Authority's task even more arduous. The Authority faces criticism on the one hand and on the other must unremittingly continue to safeguard the integrity of Zone 2, a buffer zone which has been established to protect the temples and see to the safeguarding of the Angkorian civilization's legacy, whether monumental or cultural landscapes.

Honourable professors,  
Ladies and Gentlemen heads of heritage teams,  
Distinguish *ad hoc* experts,

I would like to address you directly because in the field you are the architects of the international fame of the Angkor-ICC. Your professionalism and abnegation are famous all

over the world and once again I would like to congratulate you. We know that in the key fields of monuments, water and tourism, there is ceaseless cooperation with the relevant departments of the ever-growing and diversifying APSARA National Authority. This has been noted with satisfaction.

One must think and prepare the future now. I would like you to cooperate with the Training Centre that we established and inaugurated last December. At any time and depending on your respective availabilities, the Centre will welcome you and the APSARA National Authority management will make available any material needed for ideal working conditions. May I add that professor Beschouch, the head of the Centre, is always available to organise any event.

I would also like to draw your attention to the importance of other aspects falling under the umbrella of the APSARA National Authority which are necessary to ensure the consistency of the body's activities while meeting the standard of good stewardship of the whole site. These aspects are forest and people. Once again, I call upon specialists among you to strengthen cooperation with your Cambodian colleagues and that together you may draw up training activities in these fields.

One last recommendation: The APSARA National Authority seat is now easily accessed thanks to the new road that we have built. This present conference room's equipment is constantly improving. The same goes for the cuisine of its restaurant. In a few months the seating capacity of this conference centre will reach one thousand participants to allow for the organisation of larger meetings.

The APSARA National Authority's management can also provide, when necessary, a very competent secretariat. This means that all conditions are gathered for the organisation of scientific and technical colloquia or any meetings related to Angkor or the Heritage of Humanity.

Subsequently, I would like to invite you to reflect on organising such events that would add to the luster of the Angkor-ICC and to our joint activities, for the benefit of the monument and sites inscribed on the World heritage List.

Distinguished Co-chairmen,

Finally, I will talk about today's agenda. As I said, the engaged reforms bring brighter prospects. I particularly would like to highlight the decision to commence our proceedings with the 'Follow-up of Recommendations'. It is vital for the *ad hoc* experts who established these adopted recommendations to be able to look back at the successful work completed. It is also helpful for the APSARA National Authority, which manages Angkor on a daily basis. The World heritage Centre, ICCROM and ICOMOS will also approve this remarkable example of successful monitoring. To this end the discussions and their minutes should be circulated worldwide.

This is the reason I have decided to earmark to the APSARA National Authority a budget for the printing of the brochure that twice a year reports on the proceedings of the ICC session. This was done in the past, but the budget restrictions that hit the ICC Secretariat this year stopped them from being able to print the brochure for this session. Many thought it was unfortunate and regrettable, and they asked us to remedy this matter.

Moving to another topic: I am delighted with the general interest debate topic, water. You are aware of the huge investments undertaken by the royal government over recent years to support the work carried out by the Department of Water Resources management, spearheaded skillfully and with dedication by H.E. Hang Peou. I hope that the debate will disseminate to all, and especially to Cambodian people, achievements and future prospects.

As we are on the topic of water, I would like to add that the management of Kulen Mountain is closely associated with this, as it is the Angkor region's water source. There are also at Kulen issues related to forest and heritage management. I believe that this session will leave some time for the presentation of H.E. Mr. Say Samal, Minister of the Environment, who has worked hard and will give us an update on the organisation of Kulen Mountain stewarded by his Ministry.

Co-chairs, Excellencies, Ladies and Gentlemen,

Despite a packed schedule and a just-completed assignment abroad, I wanted to attend this session and to testify to my interest in the Angkor-ICC proceedings.

With my minister colleague—note that the Minister for Tourism has left for Singapore, which is why he is represented by the Secretary of State—and members of the delegation of the presidency of the Council of Ministers, I will listen carefully to all presentations and especially the recommendations. I will note them down to facilitate their implementation.

I wish the 24<sup>th</sup> Technical Session of the ICC smooth proceedings and great success. May I present you my warm regards and thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you, your Excellency Deputy Prime Minister. We note with satisfaction your approval regarding the changing of the proceedings of this technical session, spurred by the co-chairmen, of course in association with the APSARA National Authority and UNESCO.

Let's now swiftly move on to our scientific exchange after this opening session. You will have noticed on the agenda, and it was also mentioned by the Deputy Prime Minister, that some of the reforms have appeared on this 24<sup>th</sup> Technical Session agenda with special focus on the recommendations with presentations of their follow-up and also an additional focus on new projects.

Let's move on to the first part of the session and I would like to immediately give the floor to professor Beschouch for the Standing Scientific Secretariat's report."

## II- ACTIVITY REPORTS

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### **II.1 ICC-Angkor Scientific Standing Secretariat Activity Report, by Professor Azedine Beschouch, Scientific Secretary**

"Your Excellency, Deputy Prime Minister Dr. Sok An,  
Your Excellency the Governor of Siem Reap,  
Distinguished Ministers,  
Your Excellency Minister of Culture,  
Dear colleagues,  
Ladies and Gentlemen,

I feel like I have first to apologise on behalf of our Secretariat, as for the past few months you may have had the feeling that we have not been as responsive as usual. Three reasons explain this failure. That first is that someone who, like the moth, has been attracted to light is back with us, and we are delighted with this: This is our dear friend, Bun Hok. He left us for thousands of reasons but could not be replaced due to the UNESCO procedure. Only recently has the Phnom Penh office managed to hire Mr. Nou Niran. The

consequences were that for three to four months only the director of the office and the head of the Culture Programme were doing all the work.

We had another calamity with the illness of Ms. Chau Sun Kérya, the representative of the APSARA National Authority within our Committee. I am sure she will allow me to state that she had a cataract operation that may seem trivial for many of you, but is actually a rather important surgery. Yours truly was also ill, although that has never happened in twenty years. I had to take a two months' sick leave. I apologised to the co-chairmen and to the UNESCO Secretariat. The doctors have now decided that I am fit to work and that I have enough energy to serve you again.

Once again we extend our apologies. We have tried to catch up with the loss of time. We have started work again and have rapidly made sure that the agenda and important dossiers were reviewed. The Secretariat and myself went in the field thanks to H.E. the APSARA National Authority's Director General. We visited several sites, such as that of Roluos. We respected the co-chairmen's recommendations so that the site visits are for the Secretariat a way to monitor the implementation of the recommendations.

During the follow-up of the recommendations, you will see that they have been implemented. This must be said. This small lapse in our duty was major, but I am sure that in twenty years it will be forgotten, as it is over. Work has restarted and we have accomplished our work along with the co-chairmen, the APSARA National Authority and H.E. the Deputy Prime Minister, who sees Angkor as part of his duty for the royal government, but also considers it as a personal interest. The Secretariat will make sure that we remain at your disposal. This is the course we wish to follow. Later on, twice, during the recommendations and the follow-up of the sustainable development recommendations, we will take the floor again.

Two additional observations regarding better efficiency of the technical session, as we vowed to the co-chairmen. This means that the recommendations are prepared from the onset of the meeting, to be distributed and reviewed by the participants. You have allocated us a whole morning and I can assure you that the recommendations are ready in French and English and that they will be circulated. From now on, they will be given in advance, so that you may judge of their relevance during the discussions.

I thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you Professor. I would now like to give the floor to H.E. Bun Narith for the presentation of the APSARA National Authority's General Activity report."

## **II.2 APSARA National Authority General Activity Report, by His Excellency Mr. Bun Narith, Director General**

"Your Excellency, Deputy Prime Minister, President of the APSARA National Authority,  
Co-chairs,  
Excellencies,  
Distinguished hosts,  
Ladies and Gentlemen,

At the onset of the ICC 24<sup>th</sup> Technical Session, I have the great honour to welcome all participants, guests of honour, international delegations, experts, contributors from all horizons and friends of Angkor.

This activity report starts on a high note, with a memorable event marking the success of the negotiations carried out by the royal government that peaked with the return of the magnificent statue of Hanuman, the six items from the Koh Ker site statuary group. An official ceremony was organised at the Presidency of the Council of Ministers on the 12<sup>th</sup> of May 2015, presided over by H.E. Sok An, Deputy Prime Minister, and attended by public servants, journalists and the president of the Cleveland Museum of Art. The latter is where this 10<sup>th</sup> century masterpiece of Khmer art had been exhibited for almost thirty years. This artefact is finally back home and will be restored and displayed at Phnom Penh's National Museum.

The Cultural and Tourism city, established by two sub-decrees in 1995 and 1999, extending over 1,007, hectares was changed. In order to solve land issues linked to land concessions, the royal government of Cambodia enacted two new decrees, numbers 51 and 52 on 17<sup>th</sup> of April 2015. They aim at scaling down the size of the Cultural and Tourism City with 226.90 hectares returned to the population.

Let me now begin with other activities of the APSARA National Authority: Restoration works on the Angkorian hydraulic structures have continued and in particular the upgrading of ancient canals located to the north and north-west of the West Baray—canals flowing through the rice paddy plains and to the north of Siem Reap. The goal is to divert the overflow of the Siem Reap River during the monsoon towards the Tonle Sap and to irrigate rice fields in the dry season.

The water management strategy set up by the relevant department at the West Baray has protected from water the Khmer-French working site for the restoration of the West Mebon. It has also met the needs of the locals for irrigation of thousands of hectares of rice paddies located to the south of the West Baray. The West Baray used to almost completely dry up during the dry season, whereas now it stores a significant amount of water. H.E. Hang Peou will present this in detail later on.

Regarding road infrastructure: a tarred road has been added to the road network. With a width of four metres, it stretches over 2,620 metres and connects the road of the Great Circuit to the Angkor Thom north gate to the west of the Korean road.

The APSARA National Authority has drawn up projects benefiting villagers living in the Angkor Park, but the related activities carried out are not always understood or well received by the locals. To familiarise the people with the activities of heritage safeguarding, awareness groups have been established to undertake information campaigns for villagers. Two additional groups have bolstered the five already existing.

A total of seven groups, made up of managers and staff of the APSARA National Authority, regularly visit the villages and organise meetings. In the latter the activities of the APSARA National Authority undertaken are explained to the villagers. Villagers can also contact the groups for questions to help them solve daily issues and listen to their complaints. By asking them to engage in heritage protection measures, villagers feel more responsible towards the preservation of natural resources and the cultural landscape. Dialogue has become easier through the realisation that their interests are protected through the activities undertaken.

Conservation, research and archaeological activities have been carried out in compliance with the experts' recommendations. Speakers working in these fields will give important presentations in their respective fields.

Professor Azedine Beschaouch, President of the Angkor Training Centre, inaugurated during the 21<sup>st</sup> Plenary Session in December 2014, will look back at the first six months of activities. I would nevertheless like to underscore the importance of training activities for young APSARA National Authority technicians.

With the help of stipends, some of them have been able to continue their studies abroad while others have trained at the Centre and in the field. Professor Pierre-André Lablaude taught techniques of restoration for two days in December 2014 at the Koh Ker site and a full day at Chau Srei Vibol and Phnom Krom, benefiting twenty young managers from different departments.

One of the highlights in the field of tourism was the joint World Tourism Organisation and UNESCO General Conference. Very important people attended the conference. *Samdech Moha Sena Deccho* Hun Sen opened the conference. Later, His Majesty, the King of Cambodia Norodom Sihamoni, offered a gala dinner at the Elephant Terrace.

As for Angkor, visitation figures have slightly increased year on year. International paying visitors for the first five months of 2015 have totalled 970,361, a 0.4 percent year on year increase. Growth revenue from ticketing has reached US\$27,621,720, a 1.84 percent year on year decrease.

Tourism officers of the APSARA National Authority have been equipped with new uniforms and gear in order to improve their working conditions and visibility to visitors. They can act more quickly and better budgeting has enabled improved efficiency when intervening. Their distribution in the monuments has been increased to manage visitor flow when necessary and to prevent any offences from being committed on heritage sites by ill-intentioned people.

The vigilance of these officers was key in stopping tourists caught in the act of disrespectful behaviours in the sacred places that the temples are. Some have been caught red-handed when being photographed naked in monuments. They were arrested and sent to the tribunal.

The Communication Department also upgraded its equipment to meet growing needs. It has published press releases for the media and filmed several clips to raise awareness among the public on events or incidents that took place in Angkor, using mass media and the Website of the APSARA National Authority and social networks (Facebook).

The last point to report is the Angkor *Sangkran* festival, organised by the Union of Khmer Youth and the APSARA National Authority during Khmer New Year on the 14<sup>th</sup>, 15<sup>th</sup>, and 16<sup>th</sup> of April, 2015. It is now recognised domestically and internationally. *Samdech Moha Sena Deccho* Hun Sen the Prime Minister inaugurated the event this year. It attracted almost half a million visitors, of whom many were domestic and mostly young. This event focused on traditional festivities such as folk games and sports along with dance and music for entertainment, while showcasing and reviving ancient culture.

Thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you Excellency. Let's move on to the follow-up of recommendations with the teams' technical reports and once more Mr. Beschaouch that will take the floor."

## II-A TECHNICAL TEAM ACTIVITY REPORTS: RESTORATION AND CONSERVATION

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### II.A.1 Follow-up of the recommendations adopted in June and December 2014

#### *a. Introduction by the Scientific Secretariat, Professor Azedine Beschaouch*

"Thank you Co-chair. I start with three observations. That first is mostly practical as 'TS' on your sheet means Technical Session and 'PS', Plenary Session. You can easily identify the references on the recommendations circulated. We have given all the recommendations with 'TS' and 'PS' mentioned depending on the sessions they were made in.

The second point is to recall the decision on follow-up of the recommendations taken by the co-chairmen. This was reported to the Deputy Prime Minister and it has now been adopted and was announced last year for the smooth implementation of the decision.

At the Secretariat we have also managed to inform each team and what is presented has been undertaken in coordination with the Secretariat and the teams. Finally, this report underlines how vital this follow-up exercise has proven to be.

It is now a definitive decision to carry out the follow-up of the recommendations to check that they have been implemented with later on in the agenda presentations of new projects. Based on this methodology, each team will present their report.

Thank you."

*Comment from the Co-chairman for France:* "Thank you Professor. I would like to ask each participant to take it upon themselves as the agenda is, sadly, probably too packed. Yesterday during our last preparation meeting we thought that the agenda should be lightened in order to clear up more time for each speaker. This session programme is sadly dense and I would like each speaker to stick to their imparted time, otherwise we will be delayed. You also know what always happens in the technical sessions: the coffee breaks and lunch are on the receiving end of the lateness.

Thank you. I now ask professor Sugiyama to present on Western Prasat Top,"

#### *b. Western Prasat Top: Follow-up on recommendation 23TS.II.1, by Dr. Hiroshi Sugiyama, NARA Institute, Japan*

[*OrigE*] "Your Excellency Dr Sok An,  
Ladies and Gentlemen,

My name is Hiroshi Sugiyama and I work for the Nara Institute for Cultural Properties. At first, I have prepared a slideshow that I will report on and after, the Secretariat will distribute a table.

[*slide*] Our Institute has started research work on Western Prasat Top, and here is a picture of the temple. Today the presentation is divided as follows: 1) New Archaeological Findings, 2) follow-up on Recommendations and 3) the work plan for the next 6 months.

[*slide*] On new findings there are two points. The first regards alignments of stone that we found after dismantlement of the sandstone pavers and digging the base. In this shrine are different types of pavers and below them we found the base that we excavated. We



found stone alignments in this dig. One lines up west to east and the other north to south. A total of three alignments were discovered.

[slide] Other findings included buried pottery. We found them in three places. To the south of the dig, potteries A B and C. The buried pottery A looked like that when it was found in the excavation. It has a wide-mouthed vase, although this latter broke.

[slide] As for pottery B it comprises of two earthenware items; one is a round-bottomed jar and the other a long-neck pot. [slide] Pottery C is spouted and is a Kendi. In this base we found three different types of pottery. One is stoneware and the other three are earthenware. [slide] They all have different shapes and styles. I think that these four items were buried at the same time as the construction of the southern sanctuary. We estimate the construction of this sanctuary to the middle of the 14<sup>th</sup> century. I suppose that these four items can be also dated to the middle of the 14<sup>th</sup> century.

[slide] The next item is the follow-up of the recommendations. The first point is the protection of the lower structure, the second the use of geotextile and the third on site exhibition.

[slide] The first point regards the protection of the lower structure. I have already showed you the stone alignments and the digging of the base. [slide] Of course we did not excavate the stone alignments of the base, and we consolidated the base by resetting the sandstone after having compacted the soil with sandstone chips and consolidated the lower structure.

[slide] The use of geotextile is point 2. This is the lower base and when we reset the sandstone and laterite blocks we used geotextile. [slide] It enables prevention of the backfill soil of the lower base from being washed away. We use the geotextile in this position.

[slide] The third point is guiding on-site visitors. We have installed eight panels on site, which tell the history of the site, new findings and recounts the restoration work. This is only temporary. [slide] Once works are completed, we would like to build a site museum to the north with an exhibition hut and to the west and south sides we would like to present carved stones.

[slide] The last part is on the next six-month work plan. The reconstruction of the Southern Sanctuary will be completed this year, in September or maybe earlier. After this work has been completed we will focus on the Northern Sanctuary. We are in the preparatory phase of this work. [slide] Here is a 3D reconstruction of the northern sanctuary. Based on these 3D measuring and drawings we will make a recording of all the stones of the sanctuary.

We would also like to organise a ceremony for the completion of the restoration work of the southern sanctuary next September. I hope to see you all for this event.

This ends my presentation. It is very short and thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you doctor for respecting the imparted time slot. I now invite Dr. Ly Vanna to present on *Prasat Kravan*."

***c. Prasat Kravan: Follow-up on recommendation 23TS.II.2, by Dr. Ly Vanna, Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology***

[OrigE] "Your Excellency Deputy Prime Minister Sok An,

Ministers,  
Co-chairs,  
Distinguished guests,

[*slide*] My presentation is on the follow up of the recommendation from the 23<sup>rd</sup> Technical Session. I will be brief. What is the most and important part of a temple is the carving... [the recording stopped for a few minutes].

[*slide*] (...) [the recording resumed] Regarding conservation issues at this temple, GACP has been conducting several surveys and preliminary emergency consolidation works since early 2009 and also emergency cleaning of the surface. Here you have the recommendations on the soiling and re-soiling of the surface of sandstone.

[*slide*] I would like to mention also the variety of decay observed at *Prasat Kravan*, notably decay of coated slips on the bas-reliefs surface. If you look closely to the *sampot* design you will see very well-preserved traces of stucco or white layers on the surface.

[*slide*] Other recommendations were on the polychrome and brick surface. [*slide*] This is the recommendation we had to follow. This is the work carried out by the GACP team and I received these slides courtesy of GACP yesterday. This is the proposal on how to protect the inscriptions on the central and laterite towers, as proposed by GACP during the last technical session.

[*slide*] This is the upper part of the bas-relief story. It is related to Vishnu and the lower part tells of Lakshmi. In order to reduce and protect the damage on these inscriptions, my department has proposed a method to protect the erosion of the surface. The entrance door will still remain visible with well-preserved doorframes built during former interventions by the EFEO. We would like to use this kind of protective device with stainless steel bars. You can see in detail the existing frame and where we put stainless steel bars at the top and bottom using two brackets fixed to the bars here and holding the Plexiglas set on the outside.

[*slide*] This is cross section with the iron bars fixed with the existing doorframe and these are the brackets. Between the inscription and the iron bar here, we would use a rubber pad to reduce the friction, and this is the Plexiglas.

[*slide*] Another issue was water penetration from the central tower roof. It still remains open like this but there is still a very well preserved structure on the top, onto which we could put a roof-like structure to prevent any infiltration of rainwater from the top. At each corner we have sorts of existing channels that are still operational and we plan to divert rainwater through those channels.

[*slide*] This is a detail of the roof installation. We use stainless steel material and rods here indicating clearly the size of the material put on top. We can change obviously, as this is a proposal. Water runs off from the top or from this direction and the rest flows into the existing channels.

This is what we would like to propose to the *ad hoc* experts, so that they can consider whether we could adopt this type of system or whether we would have to find an alternative. If we prohibit entrance to the central shrine we have to think about the presentation of the content on panels, including a brief history of the temple and of conservation and preservation activities. Professor Hans Leisen will contribute to this part and we have to present clearly the interior attributes of the temple, including the interior bas-reliefs. Professor Maxwell will help in explaining the epigraphy. This is what we have been thinking about and we would like to complete this work in the next six months.

Thank you very much for your attention."

Comment from the Co-chairman for France: "Thank you very much. You have read on the agenda a planned thirty minutes for discussion after the presentations which will allow us, and notably the *ad hoc* experts, to make observations on the presentations. I now hand over the floor to Mr. Satoru Miwa on the Angkor Wat entrance causeway dike."

***d. Angkor Wat Causeway: Follow-up on recommendation 23TS.II.3, by Mr. Satoru Miwa, Sophia University***

[OrigE] "Ladies and Gentlemen,

My name is Satoru Miwa and I am the Field Director of the University of Sophia Asia Centre here in Siem Reap. I will give a presentation on Phase II of the Conservation and Restoration Project of the Western causeway of Angkor Wat.

[slide] In cooperation with the APSARA National Authority, the Sophia University Angkor International Mission prepares the restoration work on the not yet repaired area of the western causeway of Angkor Wat. In March 2015, experts from Cambodia and Japan went on a mutual study tour to their respective countries. The people in charge for each country held meetings to discuss technical issues and studies.

[slide] From the 11<sup>th</sup> until the 15<sup>th</sup> of March, seven Japanese specialists studied several restoration sites in Siem Reap, exchanging opinions with the APSARA National Authority's technical team. The study focused in detail on the current state of the Western Causeway. [slide] In addition, the team and management visited the site of Angkor Thom, where the APSARA National Authority has restored a collapsed wall. They also went to the West Mebon, restored by the EFEO in cooperation with the APSARA National Authority.

The Japanese technical team studied several issues, including, masonry, soil and ground conditions, as well as equipment and material being used for restoration, new materials in use and consolidation methods.

[slide] From the 22<sup>nd</sup> until the 27<sup>th</sup> of March, several experts from the Department of Conservation of the APSARA National Authority, including the Director General, went to Japan. The Ministry of Foreign Affairs of Japan, the Japan Foundation, Sophia University and other organisations extended the invitation. They exchanged views with different experts to discuss current issues.

In order to inspect major ongoing restoration works on cultural properties in Japan, they visited three temples in Kyoto, where they listened to the explanations of the staff in charge of the restoration of these cultural properties. They studied various issues including approaches to the protection of architectural and cultural property, methods to guide tourists around sites and safety measures for construction sites.

[slide] Equipment to be provided by the Japanese Official Development Aid (ODA): After the recommendations of the ICC Plenary Session of the 6<sup>th</sup> of December, 2012, Sophia University and the APSARA National Authority were requested to deal with the yet to be restored areas of the Western Causeway, areas II and III. On the 15<sup>th</sup> of December, 2013, the Japanese government signed an exchange of notes setting the upper limit to 94.7 million Yen, nearly one million US dollars at that time, regarding the project for the improvement of the equipment for the restoration of the western causeway of Angkor Wat. His Excellency, Ambassador Kumamaru, signed the documents on behalf of Japan. The goal is to return Angkor Wat to visitor satisfaction while securing the site.

[slide] The actual equipment to be donated by the Japanese government to the APSARA National Authority will be: one tower crane, one wheel crane, two small cranes, two gener-

ators, two cranes mounted on trucks and various stone processing tools. This equipment is expected to arrive on the site of Angkor Wat in November of this year.

[slide] Preparation for the restoration of areas II and III: Looking back, it was in 1993 that Sophia University received a request from the Cambodian government to participate in the restoration of the Western causeway of Angkor Wat. Sophia University and the APSARA National Authority believed in an approach of the restoration of Angkor Wat by Cambodians for Cambodians. Between 1996 and 2007, the restoration work of phase I was carried out with the aim of training staff. The scientific data collected from the restoration project is practical and effective and proves useful when implementing the second phase.

[slide] Area II is a causeway section of approximately 90 metres in length and area III is located along the restoration work, which will take about six years to complete. Currently the technical team is studying various issues.

[slide] Sophia University carried out a ground level survey on approximately one thousand points on the stone pavement along the entire two hundred meters' length of the Western Causeway before starting work of the first phase in 2006. After completion of Phase I in 2007 and 2012, no major changes have been observed with regard to phase II, where restoration work is to be carried out.

[slide] Regarding recommendation A: a boring survey was conducted in August 2014, in three locations along the causeway. As for recommendations B, D and C, they are currently under discussion by experts.

Recommendation E to ensure the safety of visitors in Angkor Wat: Sophia University considers the construction of a temporary detour and the APSARA National Authority is looking into a one-way tourist flow. Recommendation F on archaeological investigations will take place after dismantling work.

[slide] The plan for the next six months: The required equipment is expected to arrive from Japan in November this year; the supporting base and other preparations for installing the cranes will be made in advance. After the arrival of the equipment, training sessions on equipment usage will be held; training for stonemasons will begin; discussions will continue with regard to the technical issues; a report on this matter will be presented at the next ICC meeting.

Thank you for your attention."

Comment from the Co-chairman for France: "Thank you very much. Let us move on to Ta Prohm. The agenda mentions three speakers but I believe only one will take the floor."

***e. Ta Prohm: Follow-up on recommendation 21PS2 by Dr. Rakesh Tiwari, Director General, ASI New Delhi, Dr. Jhanwij Sharma, director (Conservation, NCF & WH), and Mr. Devendar Singh Sood, Dy. S.A.E & project team leader, ASI (Archaeological Survey of India)***

**Mr. Sood:**

[OrigE] "Ladies and Gentlemen,

[slide] The Ta Prohm restoration project was launched in 2004 by the government of India. Since then, ASI and the APSARA National Authority have been working closely under the guidelines of the ICC and *ad hoc* experts. [slide] The areas: five locations with nine for

restoration and intervention and out of them four locations with nine critical locations which have already been completed and the last site on-going is that of the Hall of Dancers.

[slide] This is the condition of the Hall of Dancers, which *ad hoc* experts gave us partly for restoration and partly for keeping under the present conditions. [slide] We restored this eastern gallery, [slide] the causeway, [slide] the gopura of the fourth enclosure, [slide] the laterite wall of the fifth enclosure, [slide] also with intervention on the central axis and on [slide] the fifth gopura of the west side. [slide] We also gave support to tree roots for stability.

[slide] Let's move on to the ongoing conservation of the Hall of Dancers. [slide] This was its condition when we started the work. The proposal at the time was to restore part of it and keep the other part in its present, ruined condition. [slide] At first all stones were documented and given a number. [slide] After documentation, the area was divided into small portions, then all the stones were lifted from the Hall of Dancers and kept in storage for use and repair. A plan was prepared to reset the structures where they used to stand.

[slide] All documentation was carried out before dismantling the wall. You can see it and [slide] here again. All stones were removed after that and stacked in the backyard. [slide] After dismantlement, three test-pits were conducted to understand the resistivity of the soil and to know if it was ok or not to bear the load. It was tested in India and they sent us a report. [slide] After the soil was tested, stones were repaired and mended using epoxy and steel rods. [slide] The plinths and the laterite pavement were exposed to reinitiate them. [slide] The foundations were consolidated with slaked lime and mortar and the plinths were reset.

[slide] The floor was also consolidated to bear the load of the structure. [slide] Consolidation was carried out using a mechanical vibrator and laterite and sandstone blocks re-laid on the floor and on the plinths. [slide] Before erection of the wall, a floor plan was carried out to know the exact position of the collapsed stones: after ascertaining each and everything, then erection started after trial assembly. [slide] Already completed are the erection of 48 pillars and the northern side walls.

[slide] This is the position of the west side and inside the Hall of Dancers, [slide] here too, [slide] the plinths and northwest corner. [slide] This is the northeast corner after restoration and before. [slide] All the wall stones were reinforced with stainless steel bars and the wall has already been completed. [slide] Last time the ICC asked for the identification of the place of the Buddha statues that were recovered in 2011 from the shrine where they were removed and kept in the backyard. [slide] This is the position on this plan. [slide] This is the pedestal of the statues.

[slide] Monitoring of the structure is done using tilt meters and crack metres to understand the behaviour. Crack metres were fixed on four locations. [slide] A trenchless technology system has been provided inside the temple complex on 28 locations and a first excavation was carried out for the sink and drilling machine brought in for boring. Then the pipe is inserted without excavating any open trench. [slide] After the ICC, this sink was prepared with chambers. [slide] This is the position of the sink and the pipe. This is the profile. During the excavation of the sink we discovered a tiled floor that we will care for in future investigations.

[slide] Future conservation work will be undertaken in two places. To the east gate, already properly documented, from both east and west façades. [slide] This is the conjectural view of when it will be completed. [slide] This is the south gate, which we have documented and where we will start very soon.

[slide] Finally, a picture of the ASI team working at Ta Prohm. Thank you very much for your attention."

Comment from the Co-chairman for France: "Thank you very much. The hydraulic work, north of the Angkor site. H.E. Dr. Hang Peou has now the floor."

***f. Hydraulic work site to the north of Angkor: Follow-up on recommendation 23TS.II.7 by His Excellency Dr. Hang Peou, Deputy Director-General, Department of Water Management, APSARA National Authority***

"Your Excellency Deputy Prime Minister,  
Excellencies Co-chair,  
Ladies and Gentlemen,

I would like to present the outcomes of hydraulic works carried out to the north of the Angkor Park. I have several times already introduced the whole water flow system of the Siem Reap Angkor region.

[slide] This map recalls the three existing watersheds in Angkor: Puork, Roluos and Siem Reap. The water sources from Phnom Kulen to the northeast and flows downstream until the Tonle Sap, through Siem Reap. The most important areas are the monumental site and the sprawling city of Siem Reap. Flooding has plagued the city since 2009. In order to protect the temples and the flooded areas, we have developed a hydraulic system to protect the Angkor temples and Siem Reap town.

[slide] You are familiar with this presentation and you know the connections between the Siem Reap River and the canals. This is the Siem Reap River, Angkor Wat and Angkor Thom, the West Baray, North Baray and East Baray which connect with two when not three rivers. I'll talk about this later in the afternoon. Further to the east is Roluos and to the west the connection with the Puork River and Stung Preah Souk.

We identified the connection between the Siem Reap River and the ancient canal located to the northeast of Ta Som Temple. This has enabled us to understand the water flow and consequently to protect the temples and the city from flooding by using the existing water flow system with the overflow sent to the Angkor Wat and Angkor Thom moats and to the Roluos River, located just to the east of our offices.

[slide] Another possibility is to flow water using these structures in the pictures with at least five million cubic metres to be stored in the North Baray and 56 million cubic metres in the West Baray. This is the overflow from these storages that caused chaos for villagers living in this area. Since 2012, the temple and Siem Reap have not been affected by floods, but the people living here were.

[slide] To remedy this situation, we undertook research and noticed that on the archaeological map some ancient canals could be connected with the whole upstream system. Here in detail, the Preah Khan and Tonle Snout. We connected with the north, clearly visible canal on the radar imagery and O'Klot, a small river. We went on site to locate these traces, which proved easy to find.

[slide] We dredged this canal and built a car park for sellers. Water has been diverted in this direction using the canal. Last year, people living in this area have not been affected by flooding, but it is obvious that this water flow would have caused some problems as you are aware that water does not like 90 degree curves, as was the case here with this ancient canal.

We enlarged the 20 metre wide canal and flowed the water back towards Preah Khan. We decided not to divert too much water in this direction and to better control upstream. [slide] To this matter, a small structure has been built here to solve the problem. The field team has solved flooding for people living upstream of the Angkor Park using the ancient

system. Our philosophy is to use, as much as we can, the ancient systems to protect the temples and Siem Reap town.

I thank you for your attention.”

*Comment from the Co-chairman for France:* “Dr. Hang Peou should remain at the podium for the next item and I also invite Mrs. Marie-Catherine Beaufeist to join him.”

***g. Western Baray and Western Mebon: Follow-up on recommendation 23TS.II.8, by H.E. Dr. Hang Peou and Ms. Marie-Catherine Beaufeist, APSARA-EFEO***

1. Hydraulic works

**Dr. Hang Peou:**

[slide] “Let me move on to the Mebon. I just would like to recall some facts while my colleague will report on progress. This year has been outstanding, with the West Baray becoming one of the most important components of water management, especially during floods. It is a long-standing reservoir, built in the 11<sup>th</sup> century for irrigation and use by the people living downstream.

[slide] We are at the start of a new phase that we have waited to start for a long time. The Siem Reap Water Authority agreed to draw water from the West Baray to supply Siem Reap Town. This has turned this Baray into the largest potable water storage area.

In July 2014, the Cambodian government entrusted the APSARA National Authority with managing water at the outlet of the West Baray. This has enabled us to measure the need for irrigation and drinkable water for local people. Tourists use more water; this is something I will explain this afternoon and tomorrow.

[slide] An automatic system has been fitted. I showed you earlier the water flow which rises until late October/early November. The water is then redistributed to the locals until roughly the end of April. The collected data has enabled us to know the quantity of water used for irrigation and the quantity that can be set aside for the Siem Reap Water Authority to process drinkable water. In the Baray we have started restoring part of the West dike over 500 metres as it was damaged in 2007, and work has continued gradually as this is the most important dike.

My colleague will now present the activities at the Mebon.”

2. Consolidation work

**Ms. Marie Catherine Beaufeist:**

“Distinguished Co-chairmen,  
Dear colleagues,

[slide] The Mebon restoration programme started in April 2012, within the framework of the Angkorian and non-Angkorian Heritage, Development and Capacity Training priority solidarity funds. The French Ministries of Foreign Affairs, of Culture, Communication and Higher Education and Research, the École française d’Extrême Orient, the APSARA National Authority and the Total Foundation support this programme.

[slide] With the view to respect the new proceedings of the ICC, I will begin by introducing the report on consolidation works following the last technical session’s recommendations.

[slide] The reinforced earth technique presented as a test trial to the *ad hoc* experts last year has been applied to the so-called trial area of the work site. [slide] The defined method to consolidate the foundations had to be adapted during works, depending on the quality of the soils and the topography.

The characteristics of the eastern embankment forced the teams to modify the overall profile of the foundation massif formed by the reinforced soil blankets. This modification did not impact on the bearing capacity of the final scheme.

[slide] The blankets were consolidated with geogrids fitted at the rear of each of the re-laid courses. A thick layer of compacted gravels was laid between the blankets and the sandstone blocks. The decision, approved by the *ad hoc* experts, to use gravels was taken, as it is not as soft as sand and sets more easily than laterite.

[slide] A geotextile buttresses the compacted soils inside each of the blankets to prevent washing away of the compacted soils in likely changes of level of water [slide] as shown in this picture. The area has been restored up to the third step [slide] and some seriously degraded sandstone blocks have been replaced by new.

[slide] The methodology was once again tailored for the north and south facades to adapt to the topography. Two solutions are presently being assessed, heeding technical and cost-saving factors.

[slide] Earthworks prior to the consolidation work of the complete east façade started in November 2014. Similar to what was done in the trial area, backfills were dug in trenches to clear vertical berms and the related stratigraphy recorded. The backfill sands have been carefully preserved so that they maybe reset in the new foundation system.

[slide] Conversely to what was deemed impossible, the first three cranes have been set up on site and will allow for sizeable gains of time. [slide] During clearing work of the east façade and similar to the first phase, a brick paving was unearthed at the bottom of the excavations. Orthophotography has been used to survey the paving. It presents the same boundaries as the paving discovered outside, which suggests that it may have been part of an architectural structure prior to that of the studied Mebon.

[slide] I move to the last recommendation on archaeological studies. A one-month excavation campaign was completed ten days ago. Two French archaeologists who previously worked with Pascal Royère in 2012 and 2013 on the Mebon supervised it. It resulted in the survey of several areas of the temple and the unearthing of several elements that provided new data on the architectural history of the Mebon.

[slide] These surveys were followed by the dismantlement of the tiers of the east façade and part of the central causeway, made up of a soil dike faced with laterite.

[slide] Several elements were discovered during these dismantlements:

- [slide] First, an ancient Khmer inscription has been located on a block on the sixth course of the tiers. Close to the causeway soil it bears a very thin script that could explain why it was never noticed. Dominique Soutif of the EFEO is analysing this inscription.

- [slide] A series of postholes located in the sandstone steps recently taken down, located below the causeway, have been discovered. [slide] The outer brick paving also found below the causeway was bored to fit in wooden poles of which two spans have been discovered and six wooden members still fitted, as you can see in this picture. These spans are located perpendicular to the holes bored in the tiers and concur to the suggestion that the central causeway was built at a later stage.



[slide] It is thereby possible to assert that a wooden structure was built prior to the construction of the soil causeway. Either a bridge or a jetty: This is yet to be evidenced.

[slide] This test-pit also unearthed the laterite glacis that dives into the pond previously mentioned. Similar to the brick paving it is connected to, this feature continues below the central causeway. Its boundaries have been identified and topographic measurements carried out all around the temple. The only remaining question is the depth of it, as with water flooding this area even in the driest period of the year, the excavation cannot go further than one metre. [slide] It is suggested that this glacis may relate to the saddleback of the laterite-moulded wall discovered in 2013, during excavations in the central islet. According to its moulding, this base is probably half-buried, which would mean that it would be about two metres high.

[slide] It is highly likely that this fits with the depth of the pond. All these suggestions need to be verified using coring, among other techniques.

[slide] The remaining questions are: Did the rows of wooden poles extend to the west [slide] and form a platform reaching the central sanctuary? [slide] If this was the case, how deep were they? [slide] Or, was the pond already filled when the Mebon was built in its present form?

[slide] Answers to these key questions for future architectural restoration will only be known after the next archaeological investigations.

[slide] I make a transition to another great question: the cylindrical stones found scattered in several areas of the temple. In March several techniques were used to study this cylindrical sandstone block, hollowed in its core. Mr. Phy Sokhoeun from the restoration workshop of the Phnom Penh National Museum was assigned for a two-week restoration work on this member. This was also the opportunity for a team of the Mebon's skilled workers to be trained in restoration techniques for statues.

A section of 1.85 metres in height has been partially reassembled and the other fragments could form at least four more sections. [slide] Christian Fisher from California University also analysed the composition of the sandstone and its surface. The outcomes showed that these blocks have been carved into Triassic sandstone, usually used for statuary and traces of metals, in particular lead, were found on the surface tin, and also gold in some grooves. [slide] Researches have yet to determine its purpose and location.

[slide] Finally, the level of water prevented the excavations of the remains of a wooden structure close to the south embankment of the Baray. Documentation has been compiled and the posts have recently been photographed.

[slide] I will conclude by presenting the detailed schedule of forthcoming works with a focus on the next six months. [slide] Weather and hydrography play a major role in the start of each phase of restoration of these tiers. The restoration of the trial area helped us in finding out that compacting the lowest level of soil is only possible when the Baray is dry.

[slide] The schedule was then accordingly changed, and in 2015 the east facade should be fully restored, as will part of the tiers of the north and south facades.

[slide] Finally, based on the inventory of the stones and the remaining timetable, the restoration project was drawn up. [slide] The restoration of the tiers can only be partial, whereas the elevations will be reset entirely. It has been planned to completely restore the east facade and to gradually reach a more or less restored condition of the west façade.

I thank you for your attention."

Comment from the Co-chairman for France: "Thank you. Let me recall to the podium Dr. Hang Peou for the next item on the Angkor Thom Wall Risk Map. He will share his presentation with two technicians in the dedicated time."

***h. Risk map, perimeter wall of Angkor Thom: Follow-up on recommendations 23TS.II.5 and 21 PS1, by His Excellency Dr. Hang Peou, Deputy Director-General, Water Management Department, APSARA National Authority***

**Dr Hang Peou:**

"Your Excellency Deputy Prime Minister,  
Co-chairmen,

[slide] We would like to present the progress of the Risk Map on the temples. Within the framework of the Heritage Management Framework (HMF) project, the Risk Map includes three components: monuments, the environment and the locals' social life.

Following the ICC recommendations, we will only focus on the monument Risk Map that will be presented by our colleagues, who for the past four years have been trained throughout the HMF project. They will expound on the applied methodologies and this year's outcomes."

**Mr. Chourn Bunnath:**

[OrigK] "Your Excellency Deputy Prime Minister,  
Professors,  
Ladies and Gentlemen,

I have the honour today to present our works on the Risk Map. The first phase of the programme focused on the Angkor Thom surrounding wall. The wall is 12 kilometres long and includes four *Prasat* Chrung and five gates.

[slide] This is an example of our condition survey index cards. They are the same for all the studied areas. 54 risk areas have been surveyed and listed within three categories. [slide] The red colour indicates high risks, orange is for medium risks and yellow for low risks. [slide] Another example of a condition survey index card. [slide] These are the cards for the four gates of Angkor Thom. [slide] In this picture you can see all the cards which are based on a more than one thousand page documentation that can be found at the EFEO. It includes ancient pictures that have enabled us to compare the condition of the monuments at different periods of time.

[slide] This is the card of the Death Gate, where you can notice the changes before and now. [slide] This is a card for the southeast *Prasat* Chrung, where consolidation works have been started. We also carried out archaeological excavations there and on one of the spans of the surrounding wall near the Death Gate. This location is that of the foundation of the wall, measuring 2.5 metres in depth for 4 metres in width. This has helped us better understand how the wall was built. On the flat area, works started by digging the outer moat and the wall's inner canal. This is a compacted backfill made up of sand and stone chips, atop of which was laid the outer course of the external wall with a paving at the foot. Stairs were also built to connect with the moat paving. The paving is currently buried and the steps of the stairs are weathered.

[slide] With regard to the different phases of the construction of the wall: they built atop a flat surface, as this picture shows, then dug the moat and the inner canal and laid the paving and the surrounding wall supported by a compacted backfill made up of sand

and stone chips.

[slide] This is the overview of the risks that the wall is threatened by with, in yellow, the low risks, medium in orange and high in red.

[slide] This is a picture of the south *Prasat* Chrung, and when comparing the 1925 pictures of the monument with those now, there is clear collapse of some inscriptions. [slide] In 1925, there were no trees, whereas now they have grown exactly here. [slide] This is a picture of the excavations that were conducted to better understand the foundation of the structure of the temple. Around the temple we found one paving of laterite of 10 centimetres' depth and cross-sections were sketched to understand the relationship between the surrounding wall and the temple.

[slide] As said, the construction process of this temple did not differ much from that used to build the Angkor Thom wall. Once the wall was built, the temple was built atop its upper area. The same materials were used to build the entire Angkor Thom wall.

I now hand over the floor to my colleague. Thank you."

### **Mr. Sok Soseila:**

[OrigK] "Your Excellency, Deputy Prime Minister,  
Excellencies Co-chairs,

My name is Sok Soseila and I am an architect. Once our archaeologist colleagues collected the data, they reported it on the index cards, where are located the exact locations and the diagnosis of each pathology at each location. The risks are categorised into low, medium and high. The low are coloured in yellow, medium in orange and high in red.

The low risks do not present any meaningful pathology, whereas those medium may flag stagnating water in upper areas and decay of lower parts of the wall. As for high risks, they mean water stagnation or infiltration in the upper areas and decay of the lower parts of the wall and stone collapses.

[slide] This picture shows a high risk, as there is a huge water puddle on the upper part and some parts of the wall have collapsed, with trees growing on top. [slide] Angkor Thom includes five gates and four corner temples (*Prasat* Chrung) for a 12 kilometre long surrounding wall. We have worked on the wall, gates and *Prasat* Chrung. Work started at the gates where risks were deemed greater. [slide] The upper part of this gate has cracks similar to a lotus flower's opening shape. The weakening of the lower part of the structure caused the cracks. In the case that no emergency measures had been taken, the lotus flower would have completely opened and would have collapsed. This is why this area of the monument was categorised as being high risk.

[slide] Here is a *Prasat* Chrung, where the problems are similar to those of the Death Gate. There are also cracks of the upper parts that could collapse the entire monument. You know that these temples were built on the corners of the surrounding wall. We noticed that both sides of the corners are cracked and in the case this corner collapses, so will the temple.

[slide] These are the results of the pathological analyses of the temple: water stagnating at the corner of the surrounding wall, and the upper area supporting the temple has subsidised in places. The red colour is the mound. The water flows to the mound and partly towards the temple and the surrounding wall. The big trees growing on the structure are represented in green.

[slide] Large and medium-sized water puddles have also been noticed on the monu-

ment. They pose great risks for the temple. [slide] All the collapsed stones hinder the water drainage flow and cause stability issues at the surrounding wall corners. The main causes of the subsidence of the temple are rain, the trees and water stagnating. The water stagnates on the upper areas of the temple and flows into the structures through tree roots. The digs revealed a layer of sand in the foundation, which means that the subsidence of the structure is caused by water washing away the backfill sand.

When studying pure static and not dynamic or mechanical static, it appears that the monument is built with stones without any iron or concrete and that this must be protected. [slide] This means that when there is thrust from the upper areas and the foundation is weak it causes cracks like these in this picture.

[slide] The corner of the surrounding wall and the Death Gate suffer the same problems. Once this was noted we could assess and determine the prioritisation of the works. First, the water flow needs to be redirected towards the inner part of the surrounding wall and not towards the wall to prevent water flowing in the structure. [slide] Secondly, once there are infiltrations like these the solution is to compact the different layers with different levels (stairs like). In case the infiltration is too strong, then the underlying structure must be consolidated and followed the judo precepts.

[slide] When facing major risks, emergency consolidation measures must be carried out, propping with wooden members and belting to prevent bursting of the tower and concrete props may be used later, as wood cannot withstand the Cambodian climate for long.

These measures are the same when consolidating monumental structures such as the corner temples or the gates: the use of wooden props, cutting of trees growing on the monuments, draining stagnating water and seeing to mid-term consolidation by using concrete shoring.

An index card needs to be filled in to monitor the works implemented. [slide] This box includes information on the causes. In this second box are recommendations with the types of measure to be taken, which are divided into four phases. These monitoring index cards should be drawn up for all working sites and are highly important. Thank you."

Comment from the Co-chairman for France: "Thank you. I now invite Her Excellency Ms. Chaun Sun Kérya to take the floor on Banteay Srei. I give you two minutes. Just kidding, you have ten minutes."

***i. Banteay Srei: Follow-up on recommendation 21PS4, by Her Excellency Ms. Chau Sun Kérya, Project Leader, Counsellor and Spokesperson of the APSARA National Authority***

"Your Excellency Deputy Prime Minister,  
Distinguished Co-chairs,  
Excellencies,  
Ladies and Gentlemen,

[slide] As I was only allocated two minutes, I will be brief. As project manager, I will present on the recommendation follow-up at Banteay Srei.

This recommendation included ten items, of which nine dealt with the monument and one on the *parvis*' [approach area] management. I recall briefly that the construction of the *parvis* was a bilateral project between Cambodia and Switzerland in 2007 and 2008. [slide] This was the signature of the Memorandum of Understanding. The *parvis* opened to the public in 2009 and this is a picture of the inauguration ceremony.

[slide] I present this report, not as a technician, but as project manager. The experts assess the works of the different technical departments.

[slide] This is just a recall of the recommendations, but I guess that you have them already. I will start with the work on the monument regarding nine items. On the 11<sup>th</sup> of December, 2014, following the ICC meeting, the Director General handed over the recommendations of the Plenary Session to the APSARA National Authority's staff. In January 2015, a service order was issued for each department to apply these recommendations. I move on straight to the works on the monument *per se*.

[slide] The first recommendation was to 'Deal immediately with the water stagnation problems in the east causeway along with carrying out an expanded archaeological survey prior to putting in any such drainage system'. This is the entrance causeway, and as soon as it rains it floods. The Department of Water Management implemented the work with the Department of Conservation of Angkor Monuments. Dr. Hang Peou put forth two proposals for a drainage system and the Department of Conservation will undertake the excavations prior to the start of the works. The *ad hoc* experts went on site with us to assess the proposals. This is proposal number two; the relevant departments will carry out the work.

[slide] This is a picture depicting visitors rubbing against highly valuable inscriptions. The experts decided that this could not go on and now visitors walk through a small side door, with the central area now closed to the public. Many have protested against this, but when dealing with site management, and I worked extensively on this matter, it is a way to force people to take a detour and it also facilitates flow management. Professor Pierre-André Lablaude has given me an example of a site in Israel where visitors have practically to bend in two to access it. It prevents them from running everywhere. The closure has been criticised as people cannot walk through, but our first task is to safeguard heritage so that these same people can enjoy it, so do not hesitate to do the same.

In order to protect the inscriptions, the use of Plexiglas was not recommended by the professors. It is not aesthetical when protecting the inscriptions and it is deemed better to cordon off the area. The latter was implemented in cooperation with the Departments of Monuments and that of Tourism and Cultural Affairs of the APSARA National Authority.

[slide] I will not talk about the study on biofilms as Professor Tan Boun Suy took the initiative to carry out researches that will be later presented. The experts have deeply questioned the state of conservation of the surface of the sandstone. This is the biofilm studied by Professor Tan Boun Suy.

You probably know that Henri Marchal and the Swiss team researched Banteay Srei, but the latter only worked on the central gopura, which means that many valuable pieces are scattered and trodden on by visitors. [slide] I would like to thank the Department of Conservation of Monuments, as they collected very precious lintels and cleaned the site. For example, this huge lintel, trodden on by everyone, although it bears priceless carvings. It is being cleaned and will be reset on location.

[slide] Now, management work which deals with the monument. The entire monument was studied to determine the place where a lapidarium could be located. Part of it would be indoors to install items that may eventually be set back on the monument after research and another section would be outdoors, but properly ordered and not scattered as is the case now. When the *parvis* was being built, the department of Technical Support and Intersectoral Projects drew a sketch. Specialists only need to analyse it and plan the construction of this lapidarium. I thank the Deputy Prime-Minister, who has already agreed to this project.

[slide] The Department of Forests analysed the health of the vegetation and their report is available for specialists. These are the two plans they drew. I supervised the implemen-

tation of the recommendation. The report is yet to be translated but this could be done for your reading.

[slide] These are pictures showing the building constructed by the Swiss before 2007, when they restored the drainage system. It is now collapsed and members are scattered everywhere. The experts have asked for the dismantlement of what was done by the Department of Conservation and the securing of the most precious artefacts in a safe location.

[slide] Moving on to the management of the *parvis*: This is the national road which at the time continued opposite the temple and which is now closed. A *parvis* has been built and vegetation planted, but old habits are hard to get done with and people continue driving through although a small canal has been dug. Motorbikes can be found driving inside the *parvis* next to the tourists. The Department of Intersectorial Projects helped by building a canal but people drive through from the other side. The Department of Water Management has vowed to deepen the canal as motorbikes still enter the *parvis* and present a threat to tourists.

I thank you for your attention."

Comment from the Co-chairman for France: "Thank you very much. I now invite Mr. Qiao Yunfei to speak on the conservation work at Ta Keo."

***j. Ta Keo conservation operations: Follow-up on recommendation 23TS.II.9, by Mr. Qiao Yunfei, Director of CACH and Project Leader of CSA, Chinese Government Team for Safeguarding Angkor***

[OrigE] "Ladies and Gentlemen,

Good morning. I am from the Chinese team and will present the report on Ta Keo, from January until June, 2015. [slide] This report is divided into four parts: 1) Conservation work on site; 2) monitoring and evaluation; 3) progress of archaeological studies; 4) stone carving conservation.

[slide] With regard to conservation work on site: This year you can see that in red we have completed 19 projects already and in blue are on-going projects in three locations. [slide] This is the interior of the southern long hall, where we found several pediments and [slide] this is the interior of the northern long hall before and after repair; [slide] the exterior of both long halls.

[slide] These are detailed carvings of the new sandstone from their original condition until completed work. [slide] Here is the reinforcement work of the lintel. Fixing five U-shaped anchor bars consolidated the bottom of the lintel. [slide] The components of the reinforcement and protection system include turnbuckles, plate holding clamps and steel wire ropes. All these components can be adjusted for length or tension. [slide] This is on the top of the entrance where it was reinforced and the [slide] north and south libraries.

Part 2: Monitoring and evaluation of the structure. Monitoring on site, placing and quantities: On the four corners of the second platform, a total of 40 monitoring spots. The monitoring points of the lintel of the gate and window were cancelled because of further reinforcement repair works.

[slide] This is the position of the monitoring support of the northeast corner of the second platform. It includes 13 points. So far, the monitoring has lasted 46 months, from April 2013 until June 2015. The structure of the architectural sites is currently in a stable condition.

[slide] Part 3: Progress of the archaeological studies. As you can see in the picture, the excavation units, which are coloured in pink, have been backfilled in the early period, in red they have been backfilled from March to April in 2015 and in blue they will be excavated in July of 2015. [slide] This picture shows you the excavations backfilled.

[slide] Part 4: Work summary of Ta Keo sandstone carving conservation. The recent progress and plan of sandstone carving conservation are to: 1) Continue to collect dynamic meteorological data, and to further study the influencing mechanisms of temperature, humidity, rainfall, ultraviolet radiation and other factors on rock carvings; 2) carry out the complete condition investigation and statistics of decorative carvings; 3) conduct intensive research of the conservation materials' prescription and construction technology and evaluate practicable and effective adaptability of the materials; 4) plan the undertaking of a complete safeguarding reinforcement and protection for all the decorative carvings of Ta Keo. [slide] This is grouting reinforcement of hollows on stone inscriptions and bonding and re-pasting of exfoliation of stone inscriptions.

Thank you for your attention."

Comment from the Co-chairman for France: "Thank you very much. We still have one hour before the rather long two-hour lunch break. It is vital to keep some time for the discussion at the end of this first half-day. Besides, we would like to give the floor to H.E. the Minister of the Environment before lunch, as he must leave due to other commitments.

What I would suggest, although I know that it will not be popular, is to scrap the coffee break. If you would like one do help yourself and come back into the room to listen to the discussions. I will now hand over the floor to the next speaker. Excellency Minister, you will take the floor after the general discussion before the lunch break.

I would like to invite the next speaker, Mr. Valter Maria Santoro, who will present on Angkor Wat's West dike. Actually, as H.E. the Minister of the Environment has to leave at 11:30 a.m., I invite him to take the floor immediately."

***k. Statement from the Minister of the Environment Mr. Say Samal***

[OrigE] "Your Excellency Deputy Prime Minister Mr Sok An,  
Excellencies,  
Senior Ministers,  
Co-chairs,  
Ladies and Gentlemen,

Please allow me to report on Phnom Kulen. We have conducted a complete review and restructuring of the institutional arrangement of the Ministry of the Environment. It consisted in revising and restructuring our public functions with the aim of changing them. Our functions are for the moment mainly the preservation of biodiversity, but many of our wildlife sanctuaries and national parks have cultural heritage in their boundaries. The review process is now over. We are still revising our financial reform and our strategic plans as well.

We try to position ourselves in such a way that we can use the national budget to preserve our cultural heritage in sites like Kulen Mountain or the northern forest. Secondly, with regard to Kulen, we have requested the government to redeploy the army. Previously, the army was stationed on the Mountain. The government has now agreed in principle to redeploy the soldiers away from the Mountain. The government also gave us the go-ahead for mine clearance operations, because in certain areas of the mountain there are still sites

that have been mined. We requested starting the mine clearance operation on the mountain and it was agreed that this would happen.

The third point is that the Ministry of the Environment is negotiating with the company which has the investment rights to the mountain. We have been looking at a number of options right now. We hope to have a *win-win* solution for the Ministry of the Environment and the company that has the investment rights. The bottom line is that we are trying to pull off the investment. This is just an idea; we are negotiating the terms and conditions on this point, as it has to be a *win-win* solution. This is part of the effort of the government to reduce land concessions in the country. This is one of the topics that we are currently negotiating and I hope that in our next meeting we will have progress on this issue. Once again, I would like to stress that this has to be a *win-win* solution.

Another point concerns the green light given by the government to the redrawing of the boundaries of the protected areas. This is very important. What we are trying to do is establish a biological corridor linking Thailand to Cambodia. In Cambodia, we have Preah Vihear, Kulen Promtep, Prey Lang and others and we try to link them to Kulen Mountain. From the Kulen we would like to link this biological corridor to the Tonle Sap as well.

This is quite a unique landscape for Cambodia because we want to link biological corridors throughout the region, also linking Heritage Parks through the northern part of Cambodia, which in turn link to the biosphere reserve. The key aspect of our effort is to link what we call biological corridors. We have the green light from the government but it will take some time to do this. Hopefully, at the next meeting I will have some good results to report to you.

Having put all these points together, I would like the ICC to consider and to draw up a comprehensive development plan for Kulen Mountain and to link these three points and especially the last I mentioned on re-demarcating the boundaries of our protected areas. At Kulen, we all agree that we need a proper management plan on the mountain if we want to ensure the preservation of our cultural heritage on the mountain and at the same time our biological resources. The latter includes the water resources for Siem Reap and to have a functioning link from Preah Vihear to the Kulen and then to the biosphere reserve of the Tonle Sap.

Today, I would like to ask the ICC to consider this request, which is urgent. I am sure everyone is waiting to get results from the Ministry of the Environment.

Thank you for your attention."

Comment from the Co-chairman for France: "H.E. the Deputy Prime Minister would like to take the floor."

Comment from the Deputy Prime Minister: "Thank you Co-chair. I would like to intervene because we have just heard a very important statement from H.E. the Minister of the Environment and I would like to congratulate him for his good results following his effort to do something important at Kulen.

I noticed his appeal to the ICC. We are thinking of contributing to the very special point of H.E. the Minister on the management plan for Kulen Mountain. He appealed to us at the ICC to establish, devise and set up a management plan for Kulen. We used to have huge problems with the management of Kulen, and now we are trying to provide a solution for proper management.

I think this is a very good opportunity. Our young minister has strived to improve and renew the management plan. I appeal to our ICC, to the experts and Excellencies to think about it. How to produce, jointly with the Ministry of the Environment and the provincial



authorities, to set up a very good management plan, as this is closely linked to the management of Angkor. It is also related with the Tonle Sap and the temple of Preah Vihear and it is most important to heed this and that the ICC takes it into consideration.

Thank you very much."

Comment from the Co-chairman for France: "Thank you, Excellency. I think that the ICC has heard your appeal jointly with that of the Minister of the Environment. It will endeavour to meet your expectations. The Ambassador for India, the floor is yours."

Comment from the Ambassador for India: "I think it is a very good idea. The reason I am taking the floor is because at present India is doing a water management plan in this area with the Ministry of Water Resources. We are actually working on a water management plan for the entire Siem Reap water basin and this can fit within the overall management plan. If the ICC is doing something we can work with it because it is not only the APSARA National Authority, but also the River basin management plan we are working on with the Ministry.

This can have an input to the overall water management plan of Phnom Kulen. Thank you very much."

Comment from the Co-chairman for France: "Thank you for this intervention Ambassador. It is noted. I would now like to once again invite Professor Valter Maria Santoro to present on the Angkor Wat West dike."

#### ***I. Western embankment of Angkor Wat moat: Follow-up on recommendation 21PS5, by Professor Walter-Maria SANTORO, I Ges***

[OrigE] "Excellencies,  
Ladies and Gentlemen,

[slide] I would like to present on the follow-up on the recommendations of the last ICC on the Italian team's project for the restoration of the northern half of the west moat embankment on the northern steps. The project started in 2008 and finished in 2011 for the first span. [slide] The on-going project started in 2012 and is expected to end in 2015. It is close to the next project funded by the APSARA National Authority where there is a mutual exchange of technical assistance between the Italian team and the APSARA National Authority. There is also co-funding of this project, as the Italian funds were not sufficient to complete the project.

[slide] The project is the reconstruction and restoration of the embankment based on geotextile. According to our interpretation, the situation of the embankment is now stable. It is only during the flooding phase that the thrust due to the back pore pressure can induce instability of the steps. The use of geotextile, thanks to the effect of drainage, assures shear strength to the earth embankment and allows us not to take into account the back thrust of water pressure during the flooding phase of the moat. The wrapping allows this effect and has been used in previous projects funded by the Italian government.

[slide] A summary of the activities between the periods of December 2014 until May 2015: After heavy rainfalls in November 2014, there were very important floods that damaged the site due to the failure of the provisional dam first on the east then north and south corners. [slide] After the water receded, the reconstruction started by placing laterite stone courses and [slide] constructing the wrapping soil by placing geotextile sheets and compacting the soil, the construction of a slurry trench and the first phase of resetting the steps in January 2015. [slide] These are the first two steps made of laterite blocks. [slide] The

refining of the laterite blocks: they came from the quarry and presented irregularity and differences in size.

[slide] Resetting more steps in February 2015, [slide] moving of laterite blocks, [slide] more resetting in February. [slide] Infiltrated rainfall water was pumped out. [slide] This is the ending of the north side, which is the closest to the APSARA National Authority site. In April, we completed the north boundary of the work site. [slide] This is the completion with laying the four courses of steps. [slide] You can see the slurry trench with more drainage elements in order to ensure the equilibrium of the water level between uphill and downhill. [slide] This is the protection of the excavation waiting for the material supply and this is the current state of the worksite.

[slide] During the 21<sup>st</sup> Plenary Session in December 2014, the group of *ad hoc* experts delivered three recommendations. The first: To extend the project for at least one year in order to properly complete the present intervention. This is the follow up: UNESCO and the National APSARA Authority approved the extension up to December 2015.

The second: To realise the operation of compacting and installation of the laterite blocks during the dry season, as was successfully done in the first part of the embankment during the Italian project of 2008 until 2011. The follow up is the formation of the wrapped earth mass which will be performed during the dry season. It started in December and will go forward according to the availability of the geotextile sheets to be supplied by the National APSARA Authority

The third recommendation was to guarantee the proper purchase of equipment, especially geotextile, that is necessary in order to complete the process of reconstruction of this part of the embankment. The follow up: As this is a National APSARA Authority duty, IGeS Team has worked with UNESCO in order to ease up the process of procuring the supply from the selected vendor.

[slide] The work plan for the next six months is to: follow up with the wrapping of reinforced earth backfill; reconstruct the laterite block steps; replace the top restored sandstone block steps—they were restored in the first phase of the project; complete the general arrangement of the top ground surface—drainage, refining and green cover.

[slide] We hope to complete the project during the Plenary Session of the next ICC for the celebration of the 20<sup>th</sup> anniversary of the IGeS Italian team in Angkor 1995-2015: 20 Years for Angkor Conservation. All the distinguished guests will be invited to this celebration."

Comment from the Co-chairman for France: "Thank you Professor. I now ask Mr. Tann Sophal for two presentations on Lolei and Bakong before we end this morning's session."

***m. Lolei: Follow-up on recommendation 21PS7, by Mr. Tann Sophal, Deputy Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority***

[OrigK] "Excellencies,  
Ladies and Gentlemen members of the Angkor-ICC,

I work for the Department of Conservation of Monuments and Rescue Archaeology. Today, I have the pleasure to present our works in the Angkor Park. The presentations made until now have mostly dealt with stone monument restoration works. I will differ as I deal with the restoration works of brick monuments supervised by the APSARA National Authority. It includes Bakong and Lolei temples. I will present on the works implemented to

meet the ICC recommendations taken since 2001.

[slide] King Yaçovarman I built Lolei temple in the late 9<sup>th</sup> century in the middle of a baray. The EFEO restored it in 1951. It presents a rather decayed structure nowadays, as this slide shows, notably four very damaged brick towers. This is Lolei, but the condition of the other temples in the Angkor region is similar. The major causes of the collapses of the brick temples are trees growing on the structures and the lack of conservation and restoration works for years.

[slide] The southeast tower was in good condition but is now partly collapsed and the same goes for the southwest tower, and this has been on going for several years. Our efforts focus on the restoration of these towers.

[slide] The base platforms are extremely damaged, bricks are rotten and porosity has increased. In 2006, part of the southeast tower collapsed [slide] and these are the brick debris of the collapsed tower. The same decay can be seen on other towers. [slide] There is a large crack on the lintel and the small columns are broken. [slide] This tower is the focus of our works as there is a small sandstone shrine in bad condition capping the tower and it threatens to collapse.

I now move on to the ICC recommendations since 2001. In 2011 the ICC recommended to: a) consolidate the tower by belting it and restoration work to prevent water infiltration in the structure; b) to restore the cracked lintel that could fall as I presented and not to remove the concrete props put up by the EFEO to consolidate the door and to restore the two small columns.

To meet these recommendations, the Department set up a plan in two phases. The first was the restoration of the southeast, northeast and northwest towers. The bases of the southeast and northeast towers have been mostly restored. To meet the ICC recommendations, lime was used to fill in small holes in the tower in order to prevent water infiltration and tree growth.

[slide] In this picture, our first interventions to restore the northeast tower, where works started in April and still continue. The ICC asked us to strengthen the upper lintel. We cannot consolidate it directly and immediately, as its structure is connected to the entire monument. We started consolidating the southeast and northeast bases, as I showed you, and will continue the consolidation of the two small columns. After these works we will be able to begin consolidating and restoring the lintel.

[slide] This is another lintel on the southeast side presenting similar pathologies. In case measures fail to be taken it will also collapse. In 1960, the EFEO belted the tower with steel ropes and shored it using concrete props. In 2012, the ICC recommended the removal of some of the cement items used in the previous restoration and to replace them with bricks respecting the ancient technique.

[slide] This is the fully restored north side and you can see that part of the structure no longer exists. We did not restore it, only consolidated it, so that the still-standing structure would not collapse. [slide] These are the outcomes of our works on the southeast and northeast sides and [slide] two pictures show the condition before and after restoration. During the first phase we also restored the bases of the west tower. [slide] These two pictures show the state before and after restoration.

The next phase, phase II, will continue the restoration works for the lintels and the small columns of the east and northeast doors. The consolidation of the lintels will be carried out on site. The restoration works of the bases of the northeast tower will continue, as will those on the very damaged upper brick structure.

[slide] The emergency restoration of the northwest tower will begin with the sandstone

shrine, a unique work of art that can still be seen atop this brick tower here in the Angkor region.

[slide] Completed works are represented in blue and the red is for works to be undertaken, in particular here with the restoration of the two small columns and the restoration of the lintel atop.

[slide] I show you this picture to get the recommendations of the ICC experts on potential solutions. Our Department is suggesting to insert two stainless steel bars inside the lintel and to fix them to the left and right sides. They will be connected to the stones and bricks. For the next six months we will treat the main gaps in the bricks that pigeons use for nesting. Another site is the restoration of the northwest tower which lost most of its base and threatens to collapse. Emergency works concern the strengthening of the base by working on the original still-existing brick courses and extending them."

***n. Bakong: Follow-up on recommendation 21PS8, by Mr. Tann Sophal, Deputy Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority***

[OrigK] "Bakong is located close to Lolei, in the Roluos region. [slide] The ICC also took recommendations on several brick monuments in the Bakong enclosure and it recommends, as is the case for Lolei, to consolidate the towers by belting and to begin the necessary restorations to prevent any water infiltration into the structure.

[slide] Areas coloured in blue mean that the works are completed and in red the working site of the GACP team, in collaboration with the APSARA National Authority. This tower is heavily damaged. Two cables have been used to belt it. GACP, using lime to fill the gaps in the brick walls, consolidated towers 4 and 5. [slide] The APSARA National Authority restored the brick structures of tower 6 and the GACP team is dealing with the material surface using lime.

[slide] This picture shows the restoration works of the upper part of brick tower 6. [slide] These are the restoration works on the small columns of tower 7 of Bakong. Tower 8 partly collapsed several years ago and the ICC asked us to restore the lintel and if possible to reset it in its original position. The GACP team has carried out the restoration and we will study the possibility of resetting it to its original place.

[slide] This is another brick tower located outside the Bakong enclosure. Belting has already been done. [slide] For the next six months it is planned to intervene in three locations on towers 6 and 8 and at the southeast library. [slide] This is the library that is in the restoration schedule [slide] and this is the damaged structure to be restored. [slide] This is the partly collapsed tower and the small columns to be restored and on top of which the lintel will be reset, as mentioned earlier. [slide] Finally, we will restore the upper part of the tower to stop water infiltration. Thank you."

*Comment from the Co-chairman for France* "Thank you very much. Let's start with the observation and question time session. I invite you all to raise your hands and express yourselves. Any observations? I think that Professor Hidaka and Professor Beschouch have some. Who would like to take the floor first? Professor Beschouch, please take the floor."

## **General discussion**

Comment from Professor Azedine Beschaouch: "Thank you Co-chair. We exchanged during the presentations, and some observations are not made on a personal level. We first have to take note of some things. We are delighted to find out that there are more and more young Cambodian experts among the APSARA National Authority that apply methods and follow the recommendations of the experts and we would like to publicly express our satisfaction. Of importance is also the fact that now the Department of Monuments and Archaeology rises to the challenge, thanks to the training it has received. Young technicians, especially regarding brick restoration, have been experimenting, although these are complex fields. These are reasons for satisfaction and to congratulate them.

We have the following questions to ask and I do this on behalf of all my colleagues. What we would like is that when people talk about forthcoming works in the next six months, notably at the Western Prasat Top, where they said they would do such and such, they send a report as soon as possible. We would know what will be done before the next technical session linked to the plenary—this will be explained at the end of this session—so that we have some technical arguments during question time. This recommendation goes for all teams. When you announce future works, could you add some documentation so that the experts can assess them. I mentioned Western Prasat Top, but this is valid for other sites: Ta Prohm, Prasat Kravan and etc.

Two other questions: The first on Prasat Kravan and I would like, if you will allow me Co-chair, to ask Mr. Ly Vanna to answer. You said that you would affix Plexiglas to protect inscriptions. The problem is that as soon as you put up this protection it has a damaging effect; this is true in the whole world. Decay is appearing with fungi and a microclimate which within five to ten years rapidly worsen. I am not here just restricting to the Mediterranean basin that I am sort of familiar with, but this impact has been observed everywhere.

It is better to cordon off the area, so that tourists cannot touch or draw graffiti. If you want I can show you pictures of the condition before and after Plexiglas was mounted. Thank you to have taken the steps but conservation is unlike mathematics, not an exact science. You have tried which is good but now let's turn back and implement something different. This does not mean any changes in the doctrine, these are simply trials and they benefit the protection of monuments. Could you please give us some reassurance, as everyone was rather concerned? »

Comment from the Co-chairman for France: "Dr. Ly Vanna, would you like to answer?"

Answer from Mr. Ly Vanna: <sup>[OrigE]</sup> "Thank you. We tried to answer the previous recommendation telling us to install a kind of glass partition or lattice to protect the inscription from erosion. If we decide not to use the Plexiglas, we still have other options, one of them lattice. We can use a scheme that will prevent visitors from touching the inscriptions. We will be working with my technical staff and even after the ICC we can send you documents to confirm or get more suggestions from the *ad hoc* experts. I proposed in my presentation the Plexiglas be fitted 20 centimetres away from the surface to keep a ventilation system to prevent bad conditions inside the inscription. Thank you."

Comment from Professor Azedine Beschaouch: "Thank you. Co-chairmen, we adopt the proposals from Mr. Ly Vanna, who will send an alternative project and will continue to exchange and improve the situation. Professor Hidaka who would like to intervene on a key item: the use of cement. I just have one observation first.

This is an important item concerning the Mebon. I here take the opportunity of the attendance of Dr. Sok An, who represents the Royal Government, but who is also personally interested in this work. If I am right, this project should have been completed this year. To continue, it needs a financial stocktaking exercise with you Mr. Co-chairman or with Ms. d'Orgeval, so that the Cambodian government is aware of the amount that it needs to be earmarked to continue the project so that it does not stop, which would be a disaster.

Wonderful discoveries occurred, notably that of a monument prior to the Mebon. This is very positive for future presentation to tourists and we do not have the right to stop this project. To continue an agreement needs to be reached between France and the APSARA National Authority on additional funding. This is what I would like to comment on, as this project is very interesting. Ms. d'Orgeval will allow me to state that she warned me that, sadly, after the passing of Pascal Royère and the difficulties in drawing up a document, the project should stop at the end of the year.

We do not wear our politicians' hats here, but those of archaeologists and people working in the heritage field. It is not possible to stop this project. I beg you to do something, so that France may rather quickly submit to the APSARA National Authority a state of play and then we will weep, implore, do anything we can so that the APSARA National Authority and H.E. Sok An manage to fork out the additional contribution. This is what we are going to do."

Comment from the Co-chairman for France: "Allow me, Professor, to answer wearing my hat as Counsellor for cooperation and Cultural Affairs to the French Embassy and not as Co-chairman. The closure of the project at the end of this year has not been in the pipeline: I can reassure you on this point; it will have a one-year extension—this is agreed on and cannot be undone.

You are actually right to underscore that as for any other projects, it may meet some additional funding difficulties and we are looking into this issue. Recently, a steering committee between the co-chairmanship and Mr. Bun Narith was held, highlighting our partnership with the APSARA National Authority on this project. The APSARA National Authority is actually a natural partner when it comes to any project in Angkor. We will do everything possible to find relevant solutions."

Comment from Professor Azedine Beschaouch: "Can Mr. Hidaka take the floor?"

Comment from the Co-chairman for France: "Of course. As I said, my intervention was wearing my other hat than that of Co-chair, and I give the floor to Mr. Hidaka."

Comment from professor Hidaka: <sup>[OrigE]</sup> "Thank you. As this is the technical session of the ICC, I would like to deal with two points of our recommendations regarding risk mapping intervention. In December 2014, we recommended point 1, item d: 'The importance of associating ancient and modern techniques of conservation; if necessary, taking into account the overall aesthetic integration of the different elements'. This is particularly needed for the treatment of concrete props set on the façade of *Prasat* Chrung. I would like to make a technical comment on this point.

The second comment is from the same recommendation, item E: 'The necessity of carefully monitoring the structural intervention in order to ensure the quality of the works'. Last December the *ad hoc* experts saw the treatment of wide gaps found on the surface of the Death Gate of Angkor Thom. The treatment was done using brick and clay filling gaps. This was a bit new and a strange treatment to fill the gaps. Therefore, I would like an explanation or comment from the team. Please, excuse my poor English."

Comment from the Co-chairman for France: "Could the team answer if it can? Dr. Hang Peou the floor is yours."

Answer from Dr. Hang Peou: <sup>[OrigE]</sup> "Thank you, Professor. First, I would like to clarify the question on the use of concrete at *Prasat* Chrung temple. In reality, we used precast concrete on this temple. <sup>[slide]</sup> It is not a concrete that we do on site. We make it before and we bring it on site. Even to connect it with the stone we did not use cement, but just clay mixed with lime. We tried to avoid any contact between cement and the structure.

[slide] You can see it here; this concrete is not made *in situ*. You can also notice that between this outside concrete and the structure the connection does not use any cement, to avoid the issue of migrating salt to the stone from the precast concrete. What we did was first analyse the load as this [slide] drawing is showing, and how it can be best supported. I would be happy to go more into detail about the methodology, not the mechanics. We can talk in detail about that, because all of you know that Khmer temples are made of block assembly, so we use a certain methodology to analyse the temple. By then we know exactly where the load is going to and we try to stop it.

I now come to your second question. [slide] Why did we use clay? When we analysed the problem of the wall close to the edge, we found that inside the gaps water infiltrated and created pore pressure, pushing on the wall. We tried to stop the water coming from inside, to stop increasing the water pressure water on the wall. I think you remember that when we went on site last year the middle of the structure was leaning towards the outside. We put clay on top to stop water penetrating and we also tried to clean the vegetation.

Water is important, as it can push the load onto the wall. We had many gaps and tried to close them to prevent water infiltration. This is the solution we considered on this point. I am not sure you understood what I meant, exactly. This is the solution we took last year. We used a mixture of clay and lime that we applied there to prevent water from permeating the wall. [slide] In this picture, you see the top of the wall and if the water goes down then it creates pressure on this part. This is what we try to do instead of restoring completely by using cement; we used local material that cannot have a negative impact on stone conservation."

Question from professor Hidaka: [OrigE] "If I understand, all these solutions are temporary or final?"

Reply from Dr Hang Peou: [OrigE] "Of course they are temporary, and when we have the time to study in detail we will restore them for good. The meaning of the Risk Map is that we have these different colours; red, yellow and orange. We identify that if a point is at risk it may collapse and we need to use a quick fix that can prevent the evolution of the damage. It is not a final restoration but the best way we can stop the movement immediately."

Reply from professor Hidaka: [OrigE] "Of course I understand very well, the difference between Risk Map and risk evaluation and the permanent conservation work. Therefore, further cooperation with archaeological research and conservation is strongly encouraged."

Observation from Dr Hang Peou: [OrigE] "We are trying to show you the procedure we follow. We have the archaeological team which checks old documentation and then we can assess the evolution of the temple. The team firstly makes a survey because we cannot do that without any archaeological survey. This work is not permanent because we would need much longer studies, but it stops worsening the damage. We will eventually implement final restoration, but to immediately stop further damage to the temple we have done this."

Comment from the Co-chairman for France: "Thank you Dr. Hang Peou. I would invite Dr. Hidaka and Hang Peou to continue their talks outside of the meeting room. Professor Lablaude would like to ask a question."

Question from Mr. Pierre-André Lablaude: "The question is on the use of clay. This was employed recently at the Elephant Terrace. At first, it may seem surprising, but it is interesting to secure water tightness, although I would like to ask Professor Leisen whether clay is really a neutral material. Are they really no risks for stone conservation; will clay not bring any salt? Is it really a passive material?"

Reply from Mr. Hans Leisen: [OrigE] "It is not that easy to answer the question. I would like to start by saying that I was really concerned when I saw these interventions. I do not know much about the recipes used. Have they been tested before and especially in compat-

ibility with the material supplied, in this case the sandstone? I only heard it was done four months ago, so we cannot yet assess the impact of rainfall. The question is to know whether these repairs will survive the first or the second rainy season.

I made a very simple test. I found samples on top of the roof: I put them in water; after one hour there were already sediments on the bottom of the glass. I am concerned that rain will remove this material very quickly. I observe that there are many cracks, most probably depending on the recipe, as clay shrinks when it dries. On all these layers we can see that there are cracks on top. If you take a sample, we do not see any connection between the reinforcement inside the straw fibres. In my opinion they are much too big, much too thick. There is no connection between clay and fibre; they separate by themselves. If you observe there are many breakages already; with clay you cannot work with zero, so you have a very thick layer. On every edge you will see breakages and loose parts of clay lying on the stone because there is no connection between the clay and the stone.

Before applying, we should question the long-term behaviour and the compatibility of the material where we apply it with the general sustainability. We know that sometimes some interventions have lasted so long that they cannot be removed properly. I think we should discuss and do some research on the material, such as water absorption. Something we do with all the materials before we apply them to the site and then we should test the material and test errors and then we can justify whether it works or not. This is my comment. Thank you very much."

Comment from the Co-chairman for France: "Dr Hang Peou, would you like to reply?"

Reply from Dr Hang Peou: <sup>[OrigE]</sup> "You know, as I said, it is just a test. In the last part of the presentation there was a table with timelines to monitor the situation. We check all the time, not only the temple but also the soil. We did this work because instead of having the entire wall fall down, we, at least, stopped the water infiltrating. This type of material is easy to remove. I think that natural material has less impact on the stone than chemicals and it is easy to remove. It is not cement, but clay mixed with vegetation. What we try to do is to stop the progress of the deterioration, but it is not a definitive solution."

Comment from the Co-chairman for France: "Thank you. May I suggest continuing this discussion later, as this topic deserves it. The floor is now to Mrs. Anne Lemaistre."

Comment from Ms. Anne Lemaistre: "Thank you very much, Co-chair. UNESCO is very pleased with the remarkable progress and with the proposals made this morning by H.E. the Minister of the Environment. I recall them: corridors, showcasing of the archaeological heritage located in these areas and above all a management plan for Kulen from the Royal government of Cambodia. UNESCO supports all these initiatives, including the management plan and I guess that we will work on this with the group of *ad hoc* experts on sustainable development.

Earlier on, H.E. Sok An recalled the strong relationship between Kulen and Angkor, and it is within this spirit that UNESCO always fosters the Cambodian authorities to consider in the middle or long term the extension of the World Heritage boundaries to include Kulen Mountain. Now that the situation is more conducive, and I am sure you will agree with me, the historical and symbolical source of the Angkor site should be included. Thank you."

Comment from the Co-chairman for France: "Thank you. A hand is up. Please, you have the floor."

Comment from Mr. Ros Borath: "Thank you Co-chair. To rebound on what was said by Ms. Anne Lemaistre. I believe that the project to inscribe Kulen in the extension of Angkor is in the pipeline. I was wondering whether what I heard this morning on the biological corridors could be including straight away. This would prevent starting with Kulen, then to extend



further to the biological corridors. This would be a mixed inscription of nature and culture. Thank you."

Comment from the Co-chairman for France: "Thank you for this proposal Mr. Ros Borath. Are there any more interventions?"

Comment from Mr. Pierre-André Lablaude: "I would like to talk about the causeway dike project presented earlier and implementing the ICC recommendations. Knowing that the working site in the coming years will occupy most of the space of the causeway dike and that visitors will not be able to access this way, it was proposed to add a side access platform. One of the items that is on the presented drawing and is included in the recommendations is for this platform to operate one way. This means that the entrance to Angkor Wat will be from the east. We indicated in the recommendations that we would exit to the east and this is what has been planned by the University of Sophia project.

The question I would like to ask the APSARA National Authority is to know whether it has planned all the developments for visitor flow so that this exit to the east is facilitated, as there will be a lot of disruption. Some of us are already convinced that this one-way operation at Angkor Wat would be positive. The entrance would be from the west and the exit at the south or north, although it would be better to the east. This raises the question on how to channel tourism flow (buses and etc.) What need to be set up very quickly are supporting activities towards these flows."

Comment from Professor Azedine Beschaouch: "I am intervening so that this question is not answered now. We went on site with the sustainable development experts and H.E. Sok Sangvar, head of the TMP. We mentioned this issue and this will be reflected in the recommendations with a general study on traffic, not only of the site of Angkor Wat but also of all sites. The goal is for this not to be a one-off operation but to give us an overall understanding. Professor Lablaude is absolutely right, but the recommendations will show you that the TMP will carry this out.

Comment from the Co-chairman for France: "That's grand. Thank you. Professor Croci, please take the floor."

Comment of Professor Giorgio Croci: <sup>[OrigE]</sup> "As we are talking of tourists, I think that the problems of the staircases should be taken into account and that we should consider it as a delicate problem."

Comment from the Co-chairman for France: "It is noted. Would anyone like to add something on this point? No additional questions? Apparently no; I gaze around 360 degrees. I have already deprived you of the coffee break this morning; I will not stop you from enjoying lunch. This morning's session, the first half-day of the session, is over. Enjoy your lunch."

Comment from Professor Azedine Beschaouch: "Congratulations to the co-chairmen and to all of you as we are only ten minutes late, which is outstanding."

Comment from the Co-chairman for France: "Yesterday, you said that we are the masters of time and we understood that this was our duty. I invite all of you to be back on time, at 2 p.m."

Comment from the Co-chairman for Japan: "We all had a delicious lunch and continued to exchange in a friendly manner. We congratulate the APSARA National Authority, which offered us this opportunity.

Let's resume this afternoon's proceedings and move to item B, the follow-up on the recommendations on sustainable development, followed by the recommendations adopted

at the 23<sup>rd</sup> Technical Session in June and at the 20<sup>th</sup> Plenary Session in December of 2014. Mr. Beschaouch, the floor is yours.”

## **II.B TECHNICAL TEAMS ACTIVITY REPORTS: SUSTAINABLE DEVELOPMENT**

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### **II.B.1 Follow-up on recommendations adopted at the 23<sup>rd</sup> Technical Session in June and at the 21<sup>st</sup> Plenary Session in December, 2014**

#### ***a. Introduction by the Scientific Secretariat, Professor Azedine Beschaouch***

“Thank you, Co-chair. Obviously, I will not repeat what I said earlier, but I confirm that ‘TS’ is for Technical Session and ‘PS’ for Plenary Session. This helps you better understand. The interventions will deal with two key items. The first is tourism (Kampong Phluk, TMP) with also included issues on developments and the west entrance gate of Ta Prohm. These are sometimes complex questions that require a common reflection.

The other key item is water. For this session, you agreed to put it on the agenda. There will be a two-hour session dedicated to this point.

The last matter, and we will not talk further about it today, is a special recommendation on Kulen. You heard the presentation on the Kulen Mountains and their key role. We have two main topics: Water and Kulen Mountain. These issues will be monitored by us and the two professors, Jean Marie Furt and Shinji Tsukawaki. Thank you.”

*Comment from the Japanese Co-chairman:* <sup>[OrigE]</sup> “I thank you very much for this opening remark. Now, I invite the team to present on Ta Prohm: Follow-up on recommendations 21PS9 and 23TS.II.6.1-6.2, by Mr. An Sopheap and Mr. Chhay Ratchna, Department of Conservation of Monuments in the Angkor Park and Rescue Archaeology, APSARA National Authority.”

#### ***b. Ta Prohm: Follow-up on recommendations 21PS9 and 23TS.II.6.1-6.2, by Mr. An Sopheap and Mr. Chhay Ratchna, Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority***

##### **1. Arrangements in front of the west gate (APSARA)**

###### **Mr. An Sopheap:**

<sup>[OrigK]</sup> “Distinguished Co-chairs,  
Your Excellency Mr. Sok An Deputy Prime Minister and President of the APSARA National Authority,  
Excellencies,  
Ladies and Gentlemen,

I will present on the follow up of the *ad hoc* experts’ recommendations of the 23<sup>rd</sup> Technical Session and the development project of the east, west and south gates at Ta

Prohm.

Let me start with the east gate. [slide] These were the observations of the experts on the construction of the bypass road at the west gate of Ta Prohm. These works may have disturbed archaeological remains and the experts asked to carry out and widen archaeological investigations before any other developments take place in this area. Once the recommendations had been adopted, the Department of Conservation of Monuments and Rescue Archaeology submitted an archaeological investigation project where the bypass road is located to answer the request of the experts, on the fact that this road may have been built atop major archaeological remains, as LiDAR pictures hinted at.

[slide] This is LiDAR imaging of Ta Prohm and surrounding areas. We can see a grid pattern. In yellow is a dike and in light blue the road below with present soil level. [slide] This is the development area at the west gate of Ta Prohm and [slide] the detailed plan of the area to be developed. [slide] This is the plan of the area compared with LiDAR images. Note that the west gate bypass road superimposes traces highlighted by the LiDAR pictures.

Four 2 x 2 metre trenches were dug in order to understand the structure of these traces and the relationship with the dike located in the western area. According to the analyses of the found ceramics and to the stratigraphy of the trenches, the following conclusions can be made: This is the natural soil layer before any traces of human settlements are found from the pre-Angkorian period until the 11<sup>th</sup> century [slide] in the form of the construction of a dike to the west with huge amount of soil piled here. In the early 12<sup>th</sup> century, during the construction of the Ta Prohm temple, further construction of ancient roads took place. Until the 13<sup>th</sup> the dike was probably raised while people continued using and maintaining this ancient road in the post-Angkorian period.

The APSARA National Authority built a new road to bypass the west gate of Ta Prohm in 2014. Based on the outcomes of our research, this new road follows the layout of that ancient one. The upper layer was levelled and the new road raised, which had limited impacts on the archaeological remains.

The Archaeology Unit of the Department of Conservation of Monuments and Rescue Archaeology began rescue excavations in the planned locations before the construction of the bathrooms. This location does not seem with any potentially valuable archaeological items. According to the excavations, they are banal soil layers.

Now I would like to present the developments opposite Ta Prohm's south gate. [slide] These are the experts' recommendations, asking for the immediate start of archaeological digs in order to locate the best place for the development project, either to the west or south of the gate. [slide] These are the LiDAR pictures: opposite the south gate of Ta Prohm there are some particular grid patterns. Based on this data, already flagging abounding archaeology in this area, our Department decided not to excavate further.

## **2. Treatment of the eastern gate and its vicinity (APSARA)**

The last and third point concerns the project to develop the area opposite the temple's east gate. In 2008, the Department of Conservation of Monuments and Rescue Archaeology commenced designing development works for the area opposite Ta Prohm's east gate. A location, 70 x 80 metres, was identified to the south of the temple access axis. A mound has been identified and two trenches dug with a mechanical digger.

[slide] The first trench was opened from the mound until the limit of the south area. Traces of a 1 to 1.5 metre deep pond were found. [slide] The second test-pit was opened to the west of that first. Traces of an ancient canal of the same depth and of about 1.5 metres' width were found. We believe that this pond and canal were built prior to the construction of Ta Prohm. They could have been backfilled during the temple's construction.

We have cordoned off the area of an ancient mound located north of this location. The bathrooms have been built to the south and temporary stalls located in the eastern and northern areas. The central area is reserved for parking cars and two wheelers. The business of the stalls located to the eastern area did not flourish; the sellers then took it upon themselves to move and provisionally settle in the central area. <sup>[slide]</sup> This is the reason for the parking space issue, as cars and two-wheelers are parked anywhere along the roads, sometimes right beside the laterite enclosure wall, as this picture shows. Thank you.”

Comment from the Japanese Co-chairman: <sup>[OrigE]</sup> “Thank you. Let's proceed to the next item, the Angkor Wat Parvis [approach area]: Follow-up on recommendation 21PS10, by H.E. Mr. UK Someth, chairman of **the** Angkor Wat Approach Area Implementation Committee, APSARA National Authority.”

***c. Angkor Wat Parvis: Follow-up on recommendation 21PS10, by His Excellency Mr. Uk Someth, chairman of Angkor Wat Approach Area Implementation Committee, APSARA National Authority***

“Your Excellency Mr. Sok An, Deputy Prime Minister, President of the APSARA National Authority,  
Distinguished Co-chairs,  
Ladies and Gentlemen,

<sup>[slide]</sup> In the footsteps of the December 2014 ICC, I would like to present on the evolution of the *parvis* [approach area] opposite Angkor Wat. Seizing this opportunity, I will first begin to recall the main objectives of the *parvis*: Thanks to its design, the *parvis* will not be used for any commercial purposes. It will not be turned into a shopping centre or a restaurant hub. To the contrary, it will be a visitor centre for domestic and foreign tourists. In this centre, visitors will find an information desk and rest areas, enjoy basic services and find shelter from the weather (rain, wind, sun). Sadly, this *parvis* is yet to be built.

Modest in its aesthetic, it will not compete with the monument it presents because of the outstanding value of the said monument. On a human scale, it will meet the need of the relentlessly increasing—as you all know—number of visitors.

The APSARA National Authority has not overlooked the fact that in socio-economic terms, any activity should be inclusive of the locals. The latter should be fully engaged with tourism development and in particular be at the receiving end of the accrued benefits. Although modest, it will serve as one of the means to decrease poverty. This is why the Deputy Prime Minister and President of the APSARA National Authority decided to review the architectural design of the *parvis*.

<sup>[slide]</sup> In a first instance, the total built area shrank from 15,000 m<sup>2</sup> to 5,000 m<sup>2</sup>. According to a comprehensive study, this area should have sufficient capacity to receive growing numbers of tourists in the coming years. <sup>[slide]</sup> The height of the monument was lowered from 12 to 7.75 metres. This will hide the construction discreetly below the green canopy and will not dwarf the Angkor Wat temple, whichever angle you looked at it from. The *parvis* will not be seen from the air or from the ground to preserve its discreet features. Around the *parvis* a vegetal screen including a park and trees will showcase the site across the temple.

<sup>[slide]</sup> Complying with the recommendations on architecture, the materials used will mostly be locally sourced, in line with a traditional, sober and open to nature architecture, so that the space inside the building exudes fluidity and permeates its vegetal environment.

[slide] The APSARA National Authority stopped the works as per the last December ICC recommendations. A Coordinating Committee for the implementation of the works has since been established to improve project management. The experts were also informed of the final design of the *parvis*. I can guarantee that the APSARA National Authority will not commence the second part of the project as long as the ICC does not give the green light. The first part of the project aimed at improving traffic opposite Angkor Wat. This part is operational and went seamlessly. A second car park has been included to meet the growing demand of vehicles and the TMP team will be responsible for this project.

I have the honour to inform you that in relation to the construction of the *parvis*, an overall study of visitor flows and of vehicle traffic is being thought out by the TMP. It aims at drawing up a balanced project in order to improve the quality of the visit to the temple and to optimize the space surrounding it in the short and long terms.

[slide] We have in the meantime carried out an awareness-raising campaign for the locals explaining the fundamentals of the construction of the *parvis* and subsequent impacts, both cultural and economic. The *parvis* should generate major inferred impacts to local stallholders that have a right to equally sharing the benefits of tourism development in Angkor. We got the green light and strong support on this matter. The APSARA National Authority is strongly committed to this policy and is actively engaged in all projects and efforts, along with the government's strategy in fighting poverty.

Before concluding, I take it upon myself to reassure the ICC that this project will respect the advice given by the ICC and that it is not only a project of the APSARA National Authority, but a joint endeavour of the APSARA National Authority and the ICC, in full compliance with World Heritage procedures and regulations.

Finally, I apologise to the members of this committee for not having been able to personally present this project to the ICC members. I am now available to answer your questions. I thank you for your attention."

Comment from the Co-chairman for Japan: [OrigE] "Thank you Excellency. If I understood correctly, this *parvis* was the subject of a long debate in the last session. Recommendations were made; more will come out of this session. I would now like to move on to the next item: Kampong Phluk: Follow-up on the 21SP recommendations, presented by H.E. Professor Tan Boun Suy, Deputy Director General and project manager at the APSARA National Authority."

***d. Kampong Phluk: Follow-up on recommendation 21PS11, by Professor Tan Boun Suy, Deputy Director General, Project Leader, APSARA National Authority***

"Distinguished Co-chair,  
Your Excellency, Deputy Prime Minister,  
Ladies and Gentlemen,  
Dear friends,

My presentation is on Kampong Phluk and the follow-up on the recommendations of the *ad hoc* experts. [slide] I recall the location of Kampong Phluk, southeast of Siem Reap, 30 kilometres away. This is the group of monuments of Roluos, the Tonle Sap and Kampong Phluk village, located right by the lakeside.

[slide] The commune is part of *Prasat Bakong* district and is populated by 54 families, mostly living from fishing and tourist transportation. It counts *circa* 450 stilt houses. [slide] One of the features of Kampong Phluk is its biodiversity, including a real haven for fish. [slide] This cultural landscape must be protected. It is also the largest inundated forest site in

Cambodia. It is obviously an ecotourism destination. [slide] A picture of this famous inundated forest, the only one still well-preserved in Cambodia.

[slide] Locals eke out a living from fishing and visitor transportation. Fish quantities have sadly been dwindling in the Tonle Sap and the locals can no longer survive on fishing; they have had to turn to the transportation of visitors.

[slide] The December 2014 recommendation underlined the need to establish talks and find mutual agreements between the exploiting companies and the locals. The second item was to upgrade the condition of the road and of the canal. The project that is presented has taken into account the discussions between the investors and the locals.

[slide] The main project is based on ecotourism supported by NGOs, community-based projects and Sea Pac investments. Regarding the projects supported by different partners, they aim at protecting the inundated forest, the fish reserve and ecotourism. 27 hectares of inundated forest have been planted, contributing to the preservation of 5,480 hectares of inundated forest, of which 18 hectares have been set aside for a fish sanctuary.

[slide] The projects supported by the commune funds are: Construction of schools, upgrading of roads and the replanting of the inundated forest. This is a picture of a school built with commune funds. The commune has maintained the road leading to the village. [slide] This is the Sea pac project, which includes the construction of bungalows and kiosks on the Tonle Sap's shores. A total of 80 bungalows, three supermarkets and one restaurant have been planned.

Up to now, only one of the three restaurants has been completed. [slide] Here it is in this picture, built by Sea Pac with [slide] an impressive bridge built in the woods and the skeleton of a bungalow. They have recently upgraded the road and deepened the canal in short sections. Overall, Sea Pac has built a restaurant, a wooden bridge in the middle of the forest and the frames of future bungalows, and they have upgraded a small stretch of the road and canal.

[slide] Sea Pac has yet to respect many legal obligations. Before implementing this project, it is important that public property turned private complies with provisions that have not been applied. Recently, in mid-2014, the Sou Ching Company, which operates at Chong Kneas, extended its activities to Kampong Phluk. It started operating there without prior discussion or the agreement of the villagers. They sold boat tickets and levied a tax per person. Even locals had to pay US\$3 to enter Kampong Phluk, although the Angkor Park is free for them.

[slide] Mr. Ning Ny, the village chief, reacted. According to him, since these companies have started operating in the village, activities have decreased by 65 per cent and the income of boat drivers has largely diminished. [slide] This brought on a reaction from the government, which, in a letter dated on 17<sup>th</sup> of April 2015, the Prime Minister demanded that both companies, Sou Ching and Sea Pac, stop selling entry tickets to Kampong Phluk. H.E. Mr. Khim Bhun Song, the Governor, simply stated that the locals should establish self-managed, community-based tourism.

[slide] I recall the ICC recommendations: 'To discuss and find an agreement with the investors and upgrade the conditions of the road and canal'. NGOs, the commune and Sea Pac Company implemented the first part of the recommendations whereas Sou Ching Company did not. The second recommendation has been carried out by the commune authorities and partially by Sea Pac.

[slide] In the future, the APSARA National Authority would like to improve the dialogue with the provincial authorities to further the development of Kampong Phluk village.

I thank you for your attention."

Comment from the Japanese Co-chairman: "Thank you. Let's proceed to the next item, the Tourism Management Plan (TMP): Follow-up on recommendation 21PS12, by H.E. Mr. Sok Sangvar, head of TMP Unit, APSARA National Authority."

***e. Tourism Management Plan (TMP): Follow-up on recommendation 21PS12, by His Excellency Mr. Sok Sangvar, head of TMP Unit, APSARA National Authority***

[OrigE] "Excellencies Co-chairs,  
Your Excellency Deputy Prime Minister,  
Ministers,  
Ambassadors,  
Colleagues,

[slide] Today, I have the pleasure to present the progress report of the Angkor Tourism Management Plan (TMP) and an update on the recommendations. Since December, the TMP and the Tourism Department of the APSARA National Authority have been under the same roof and follow the same direction. This has enabled the TMP to strengthen internal management. One example is that the management of the department and the TMP team now meet everyday at 4 p.m. to update and talk about issues and any solutions that can be found.

[slide] Moreover, we have created a new Unit called the Tourism Service Quality Control Unit. It is comprised of 12 members, with the purpose of going daily to each temple and supervising tourism facilities (road conditions, information panels, the presence of guards), basically controlling the way we are performing in the Park.

The TMP has implemented the visitor flow at Ta Prohm. It was discussed last December and put into effect this March. We actually informed the stakeholders (guides, the private sector) before implementation. So far, we have had good feedback from visitors, although we might revise some parts of the itinerary.

[slide] Regarding Bakheng and Bakan queue management: We now print passes to control the number of visitors that are able to access these two places. We have also put up new signs; for example, here a sign that is telling them how long they will have to wait to climb to the top of these temples.

[slide] We have upgraded the uniforms of the guards and provided them with all the necessary gear for work. This has helped the guards to take pride in the completion of their task. [slide] Professors Beschaouch, Bouchenaki and Tsukawaki came to visit our project of a cycle lane from Angkor Wat to the Bayon. The report from the experts is very good and the request has been sent to the Director General, and we hope to be able to start the project very soon.

[slide] Grass has been planted at Angkor Wat, on this corner, and we have been working on flow management in front of the temple. As you can see, nowadays, traffic still passes in front of the temple, which is a hazard for visitors and we are looking into closing this road.

[slide] Regarding national cooperation: we have organised a third meeting with the private sector. The APSARA National Authority has established a private sector consultative group. We met last month to talk about tourism issues in Angkor and for us to present our solutions to the private sector. We also cooperated with the Union of Youth Federation of Cambodia, which organised the 2015 Angkor *Sangkran*.

At the international level, the APSARA National Authority signed a Memorandum of Understanding (MoU) with the United Nations World Tourism Organisation (UNWTO) during the UNWTO/UNESCO World Conference on Tourism and Culture. The MoU focused on the implementation of the TMP. We are also working on signing another MoU with an NGO, Life Beyond Tourism, which is based in Italy, and we have participated in international conferences, such as the PATA annual Conference in China on Tourism and Culture.

[slide] In terms of Human resources development, we had the opportunity to welcome Professor Hervé Barré, a former employee of UNESCO in charge of the culture department. He stayed at the APSARA National Authority for one week and trained us on culture and tourism. We also received students from Miami University and Charles Sturt University, Australia, who visited Siem Reap to learn about heritage management. We also now have our second international trainee from France, Camille; she has been with us for two months already and will stay three more months.

[slide] Regarding complying with the recommendations: It was recommended last December that the TMP quickly finalize the Angkor Visitor Code of Conduct. It is done in terms of design and content. It has been translated into four languages (Khmer, English, Chinese and Korean). The code has been consulted with stakeholders, primarily the APSARA National Authority and being discussed with the private sector and the guide association. They all expressed their eagerness for the code to be implemented to better educate visitors during their stay.

We believe that before implementing the code, it is important to know the present situation, so we did a survey. We undertook a benchmark and counted the number of people dressed inappropriately, the number of hands touching the carvings, and the number of smokers, so that we can assess, after six months or one year, whether the code has helped improve this kind of situation.

[slide] On this matter I would like to share a story with you. The Code of Conduct was unofficially publicised a few weeks ago. It was not the whole code, but just a hint on what we wanted to do. A newspaper got excited, and the *Phnom Penh Post* contacted me. They asked me when the code would be implemented. I replied that it needed first to be discussed with the ICC experts before approval. The next day I read the news: 'By early June the code should be ready for a draft to be sent to expert at the International Criminal Court (ICC)'. They basically confused our ICC with another one. I have told them already, but I do not think we are going to send any tourists to The Hague if they do anything wrong.

In addition to this, we have prepared a small advertising spot to promote the code. We have been working with the Public Service Announcement (PSA) and today I would like to show, for the first time, a version which will be sent to the mass media in the forthcoming weeks. [a video clip is played] I hope you liked it.

[slide] The next steps of the TMP for the next six months are to work comprehensively for the Code of Conduct to have a more detailed plan for its implementation. We will also be focusing on the Angkor Wat *parvis* and on flow management. We are also hoping to start and implement the cycle lane project.

That was our report. Thank you very much for your attention."

Comment from the Japanese Co-chairman: [OrigE] "Since this part of the project concerns sustainability, it also relates very much to the Environment. The Minister of the Environment was to make a speech now, which he did this morning, so we may proceed to the next item, Rehabilitation of Ancient Canals: Follow-up on recommendation 23TS.IV.3 by H.E. Dr. Hang Peou, Deputy Director General, Water Management Department, APSARA National Authority."



***f. Rehabilitation of Ancient Canals: Follow-up on recommendation 23TS.IV.3 by His Excellency Dr. Hang Peou, Deputy Director General, Water Management Department, APSARA National Authority***

Your Excellency Deputy Prime Minister,  
Distinguished Co-chairmen,  
Excellencies,  
Ladies and Gentlemen,

[slide] May I introduce another aspect of water, this time the upgrading of ancient canals. This morning I presented on water flow. I will skip this point. I also mentioned flooding issues for villagers that we managed to solve by using existing ancient canals. Storage capacities remain, nevertheless, limited. The West Baray can store up to 54 million cubic metres and be used as a water reservoir during the flooding season. In case of upstream overflow, the water can also be released, as we have the capacity to know almost in real time the water flow upstream from Phnom Kulen until Banteay Srei and the main water distribution point at Ta Som.

[slide] We are able to store up to 100 million cubic metres in the archaeological area, although there exists a limitation, as the West Baray outlet is limited by the canal for the locals living along these areas and for irrigation. As capacity is limited, water can be further diverted to the natural River of Puork or to that of Roluos using these two ancient canals. On this map, this canal goes in this direction and part of it flows in Puork River and on Google earth you can see: Angkor Thom, Angkor Wat, the West Baray and both canals. Upgrading took place in 2012 up to this stretch, which has enabled us to divert water towards the West Baray and the two main moats of Angkor Wat and Angkor Thom.

We are also able to better control most of the water flow. We just need to protect the locals that live in this area that may be impacted by the West Baray and those who live southeast of the West Baray. We can also use the ancient canals and notice that at the northwest corner of the West Baray there is a connection with the Puork River and that of *Stung Preah Srok* which is wide enough to take in this overflow in this eastern section.

I showed you this morning this LiDAR picture where we connect and link to the previous pictures. Have a look on Google Earth and you will see the canal before the dredging works of the ancient canal. The canal is clearly seen and, keeping in mind the previous map, you will remember a bent area down to the southwest where there is the junction with the ancient course of the Puork River.

[slide] A section is then connecting with the Puork River and a new recently dug canal and another built up section of Puork River. This means that instead of 60 metres' width, as was the case previously, the width was reduced to three or six metres, with locals living in this area. The solution has been to divert as much water as possible towards *Stung Preah Srok* pending the resolution of the Puork River issues.

[slide] A section of the ancient route of the canal flows through the golf course and here is the *Stung Preah Srok*. Works carried out over the past two years have been continued to reach this final river. I will show you a picture later on. There is also a trench flowing into Angkor Thom's moats and the canal to fill the West Baray. The O' Damrei Slab canal has been dredged; it flows right to the north of the West Baray and until the former route that I mentioned earlier. It connects a section to the south and the other to the west.

Thanks to the enlargement of these canals, more water runoff can be collected and also upstream, from this watershed towards the Tonle Sap through the *Stung Preah Srok*, to let some water flow into the Puork River as the locals live very close on the banks of the river. It looks like it was before along the Siem Reap River, before it was cleared of dwellers.

[slide] Upgrading works have been carried out in this area; here is the canal before and after works. There are some houses on the banks, as well as temporary wooden bridges that have been replaced by dike bridges. The canal is wider than twenty metres, but the original stretched over 120 metres in width. This area is partly covered with rice paddies; it has barely been changed as not to disturb the locals.

[slide] The locals can use the canal during floods and if the water spills over the 20 metres' width that we dug, the canal may overflow but the locals can still drive through as it is shallow and not dangerous and two wheelers can pass. Simultaneously, this canal is used to store water for irrigating plots of land. Until this year, the locals who live in this area could not farm their lands during the dry season. We hope that not only will this system prevent flooding, but also entice the locals to use water in the dry season, by sharing the irrigation system in this area. Another area will also be upgraded so that locals can use the water for the paddies.

[slide] These were the works on all the canals. 32 kilometres have already been upgraded, out of 51 kilometres. The sections that are left do not concern large canals but ancient and less important canals although they remain essential to helping the locals in the long term.

I thank you for your attention."

## General Discussion

Comment from the Japanese Co-chairman: [OrigE] "Thank you Excellency. Before we open the floor for discussion, I would like to make a point on the agenda. As we did not have a break this morning, the session tends to feel rather long. Let me propose to begin the general discussion and then move on to the next session on New Projects and then have a break in the middle of it, probably at around 4.45 p.m. The floor is open and the experts maybe would like to take the floor. Mr. Beschaouch, please."

Comment from Mr. Azedine Beschaouch: "Thank you, Co-chair. We have understood that you propose to start the discussion now on the reports presented. I would like to state, on behalf of my colleagues and experts and I guess of the whole ICC, that we now better understand the overall economy of this great project, the Angkor Wat *parvis*. It will be a novelty close to the major temple of the site and one of the largest temples of the world. This novelty must comply with World Heritage standards and above all be in harmony with the landscape.

We now feel reassured and would like to congratulate His Excellency Uk Someth. The area dwindled from 15,000 m<sup>2</sup> to 5,000 m<sup>2</sup>, the height from 12 metres to 7.75 metres and the goal is not commercial but to facilitate the visit for tourists and forget the present mess. This is maybe the word that was missing, Excellency. I believe that it is very important to add that presently it is a mess and that pictures can prove it.

If one day we were to send to the World Heritage Committee a file on this project, we would have to show that presently it is chaos (people, vehicles). When you arrive on site, I am sorry to use this word, but I am from a region where this word takes its full meaning: it is a souk, in the negative meaning of that word. Let's stop this chaos: The presentation has comforted us. You will see that our recommendations allow for headway in good conditions.

My second observation is on Kampong Phluk. Once again, thank you to Professor Tan Boun Suy, as we had some worrisome information. We have been interested in this place for many years and some of us, including me, have visited the site. I was sent by His Excel-

lency to the site twice to reassure the locals, as there were fanciful projects of hotel constructions and etc.

Today, following the Prime Minister's decision, we come back to what you showed us. This means not only a beautiful place but also one that is unique in Cambodia. This may be the largest inundated forest in the country. We asked you to continue looking after this site, to apply the recommendations and to report to this Committee and to the president of the APSARA National Authority, as this is an added value for tourism. Once again we feel comforted.

If the Co-chairman allows me, I would like to ask a question. You mentioned upgrading of the roads. What are those roads made of, as this is a natural landscape with the forest and the lake, it would be better that these roads do not look too urban? Professor, please, tell us?"

Comment from the Japanese Co-chairman: <sup>[OrigE]</sup> "Are there, maybe, any other questions concerning this point?"

Answer from Mr. Tan Boun Suy: "Mr. Beschouch, I can tell you that the upgrading of the road enables access to the village. I was there recently and the road was in good condition apart from a few short stretches that need improvement, but it is still mostly acceptable for tourism."

Question from Mr. Azedine Beschouch: "Is it in harmony with the landscape? It is of the utmost importance that it fits with this valuable cultural landscape."

Answer from Mr. Tan Boun Suy: "Yes. I believe that the Sea Pac project that planned on building kiosks and bungalows has ceased its activities. The restaurant is there and also the bridge built in the trees; the rest has been postponed."

Comment from Mr. Azedine Beschouch: "Co-chairman, my last observation is important. Mr. Sok Sangvar presented as head of the TMP. Between December and now, the plenary session and today's technical, something happened that is good news. I am talking about his promotion as Deputy Director General of the APSARA National Authority. He now has under his umbrella the Department of Tourism Management and the TMP. This is very important and we are making it public so that we can express our warm congratulations and give him a round of applause. This was my last observation, but it is important to publicise this."

Comment from the Japanese Co-chairman: <sup>[OrigE]</sup> "Any other comments? Mr. Tsukawaki, please."

Question from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "Thank you very much for all the presentations on sustainable development. Most of the explanations for the follow-up of the recommendations are satisfactory. With regard to Kampong Phluk, I could not still understand something. We recommended a careful exploitation of the ecosystem and after discussion a mutual agreement among the committee members. I could not find any counter-measures on these parts. This is my first comment."

I went to the village last month and we had pointed out the very bad condition of the road already in December, and last month it was worse. Strangely, I bought a ticket there. So I was a bit confused. Maybe you could explain on both comment and question? Thank you."

Answer from Mr. Tan Boun Suy: "I am sorry I did not understand, nor hear very well. Could you please repeat? Earlier on in one of my slides I recalled the recommendations."

Question from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "We recommended careful exploitation of the ecosystem and mutual agreement among the community members, but I could not recognize any of these on the slides. Could you please explain what the follow-up was of these recommendations? This is my first question, comment or request, I must say."

Comment from the Japanese Co-chairman: "I believe that he means the issue of mutual agreement with the locals."

Answer from Mr. Tan Boun Suy: "I apologise, but what is your question on these recommendations? The projects that I mentioned have been discussed and agreed between the population and the investment companies."

Comment from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "We mentioned with community members not with stakeholders. We do not mean such information on development, like floating bungalows or restaurants. Here in red it is mentioned. We recommended with all community members."

Answer from Mr. Tan Boun Suy: "There was a discussion with the members of the community before Sea Pac started building. The population welcomed the work of Sea Pac."

Comment from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "I do not want to repeat. Mr. Beschaouch just mentioned that Kampong Phluk is very important for Cambodia, for nature, the environment and so on. Please, take into account and understand carefully our recommendations. For the second recommendation, you showed us the upgrading of the road, but the condition of it was worse when I went there last month. I also had to buy a ticket to get there. That is all for me."

Comment from the Japanese Co-chairman: <sup>[OrigE]</sup> "Did you notice any upgrading works of the road to answer this recommendation?"

Answer from Mr. Tan Boun Suy: "I went there four days ago and maybe you went before me. Last time I saw Sea Pac working on the upgrading of the road and dredging the canal."

Question from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "When did you go there?"

Answer from Mr. Tan Boun Suy: "Four days ago."

Comment from Mr. Shinji Tsukawaki: <sup>[OrigE]</sup> "I went there two weeks ago and most of the road was in bad condition. Ok, let's go there early next week."

Questions from Mr. Jean-Marie Furt: "Thank you Co-chair. I have two quick questions. The first is on the Angkor Wat *parvis*. We have well understood and seen and note with satisfaction the reduction of the area compared to the December session, as Mr Beschaouch said. My question is rather accurate and may be a bit technical. On the document that was handed over to us, we noticed two art galleries, covering a total area of 1,200 m<sup>2</sup> (I skip the details) that would represent a fifth of the planned area. I would like to know whether these art galleries are commercial areas, display areas or what are they exactly?"

Answer from Mr. Uk Someth: "Thank you for this question. The plan is not too detailed. As I said earlier, the 5,000 m<sup>2</sup> space will not be a shopping centre. This means that most of this area will be dedicated to hosting visitors. It includes a rest area, information desk, and a gallery to display the latest findings of the APSARA National Authority's excavations. Drawing competitions will also be organised to stimulate Cambodian artists, it could be a cultural centre to offer a space for artistic activities of local craftsmen and not only on Angkor. This will enable craftsmen living in the villages of Angkor to exhibit their work. We thought of setting up stalls where Cambodian artisans could display their sculptures or other work. There may be two or three restaurants and a couple of coffee shops. This is what has been planned."

*Questions from Mr. Jean-Marie Furt:* "Thank you for having detailed this point. My second question is on Ta Prohm's development. We noticed that between the December session and this one no changes have occurred, although at the last session we insisted once more on the need of coordinating the teams. As nothing has changed we would like to know whether future developments of the west or east gates will mean a mandatory tour direction. For example, the entrance would be from the West Gate and the exit at the East gate. This would change the dimensions of the developments."

*Answer from Mr. Uk Someth:* "We have taken note of your questions and I believe that you are right. For the moment, the traffic has not been too jammy, but this could happen with the 15 to 20 per cent increase of visitors per year. Simultaneously, and in collaboration with the TMP, we are trying to plan an overall traffic plan for the mid and long terms so that the traffic remains smooth in and out of the temples and also to facilitate tourism flows. This could give us an idea of the overall development of these flows in the mid and long terms. When this will be on the table, we will certainly organise with you at the next session a general discussion on this general matter."

*Suggestion from Mr. Azedine Beschaouch:* "Just to rebound on this observation from our colleague Professor Furt. Excellency, allow me to say that the words 'art gallery' are confusing. This is a generic wording and tomorrow we could see hyper-contemporary art—which I have nothing against, but in Angkor may seem weird—or the sale of products. If you agree, maybe you should say 'Thematic exhibition area'. You mentioned archaeology and the Minister of Culture is attending this conference and she could decide to exhibit on Khmer culture, as this is the ideal place for it. Please, call it a 'Thematic exhibition area' and not an 'Art gallery' to prevent any misunderstanding."

*Answer from Mr. Uk Someth:* "Thank you, Mr. Beschaouch. I was using the wrong wording. It is not an art gallery but an exhibition space. I could even add that in the last slide we showed you the view, which is the true aim of this project. What you will be able to see is the top of the temple and the vegetation. I do not believe that it is just a dream. We have the chance that visitors could relive the temple as it was in the old days, when it was hardly visited. This is a personal feeling, but I think that each visitor will enjoy visiting Angkor and this is my goal."

### **III-A NEW PROJECTS: RESEARCH AND CONSERVATION**

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*Comment from the Co-chairman for France:* "They seem to be no more questions or observations from the floor. I would suggest we move on to the second part of our session on new projects. The recommendations are now over and we will deal with the Temple of Banteay Thom. The speaker is ready, please go ahead."

#### **III.A.1 Banteay Thom conservation and restoration project, by Mr. Sébastien Appert, Chairman of l'Atelier Banteay Thom**

"Your Excellency Mr. Sok an Deputy Prime Minister and President of the APSARA National Authority,  
Your Excellency, Mr. Bun Narith, Director General of the APSARA National Authority,  
Distinguished Co-chairs,

Excellency Professor Beschaouch, Standing Scientific Secretary,  
Ladies and Gentlemen,

[slide] The Banteay Thom safeguarding programme includes the preservation and development of the site. Its goal is to study its monumental archaeology, architecture and history and also its environmental and cultural surroundings. The neighbouring southern village of Angkor Krao could be the recipient of tourism benefits when the temple, once secured and developed, is integrated into new so-called 'alternative' tourism tours.

[slide] Set aside from the main tourism tours, Banteay Thom is located two kilometres to the northwest of Angkor Thom, or around 12 kilometres from Siem Reap. [slide] Olivier Cunin's studies on the Bayon temple style evidenced that the temple and annexed structures were completed when Preah Khan was consecrated around 1191. [slide] As you will see on these slides, the temple is in a concerning state of preservation.

[slide] The condition of the shrines, of the northern library and of the East Gopura has reached a critical level. [slide] Emergency propping must be undertaken in order to stop the damage and ruination processes. [slide] All the carved décors have been plundered and only some fragments remain.

[slide] We are currently studying documentation on the monument and its surroundings with a view to determining the study scope and research avenues. Our main objective is nevertheless to reset Banteay Thom within the territory it was part of and not to re-search it as a stand-alone architectural item. Its relationship with neighbouring temples will also be studied, as will be changes to the surroundings to comprehensively understand rural life in the Angkorian era.

The temple, already in ruins, has hardly been subjected to any studies or excavations. Built-up archaeological methods, along with the outcomes of the architectural study of the temple and archaeological test-pits, will lead to the drawing up of the building's typo-chronology, highlighting the different stages of construction, occupation then abandonment.

We posit that the complex was built in the late 12<sup>th</sup> century, a time when new religious beliefs appeared at the Khmer court. Our research will strive to date and name the emperor that founded the temple and which emperor consecrated the shrines.

[slide] In Cambodia, the protection, management and development of heritage is a cultural and socio-economical challenge of importance for the development of regions and the fight against poverty. The environment of the temple is very interesting, as it is not included in the tours followed by visitors to the Angkor Park. Subsequently, the approach areas and surrounding landscapes have remained unspoilt by tourism development infrastructures. The safeguarding plan is a unique opportunity to preserve the temple in its original case and to develop it while respecting its environment.

[slide] Regarding tourism: The location of the temple, away from the traditional tours, its preserved environment and proximity with the traditional village of Angkor Krao are assets that should be highlighted in the face of mass tourism development. This site is an alternative to traditional tours and may meet the increasing demand of tourists yearning for authenticity and cultural exchange.

The main objective of the project remains the safeguarding and study of the monument, but these activities also aim at opening the site and the neighbouring village to tourism, or rather ecotourism, that is aware of sustainable development of cultural sites in danger and of the economic benefits for the locals and care for the environment.

This sustainable tourism fits within a momentum combining eco-transportation, production and consumption, while bringing closely together the population that lives and works in the area at hand, in order to fight poverty, similar to what has been set out in the Phnom Kulen Programme.

[slide] The primary goal is stopping the decay and ruin of the temple. Emergency propping must be carried out before parts of the temple collapse, which would make them unreachable to researchers. Along with structural stabilising measures, a complete topographical survey of the temple and approach areas should be undertaken.

[slide] Based on these surveys and in collaboration with architects and engineers from the APSARA National Authority, a condition survey will be drawn up. This stocktaking exercise will help identify the pathologies and their location on plans and elevations.

[slide] Based on this condition survey, a risk map will be drawn in order to prioritise and study the feasibility of the activities to be undertaken. [slide] For each of the risk areas we will complete measured drawings of each stone and establish an inventory of the blocks.

The analysis of these detailed measured drawings, associated with the archaeological study of the structures and the archaeological diagnosis of each area, will result in an accurate study of the temple and complete restoration. Archaeological test-pits will also help in understanding some of the pathologies found on the buildings.

[slide] These restorations will be first sent to the relevant authorities for their validation process, before any publication. Adding to our annual activity report, the Atelier Banteay Thom vows to publish its findings in different periodicals. Finally, we aim to edit a comprehensive architectural and archaeological study of the temple.

[slide] Archaeological excavations aim at studying and safeguarding material evidence left during the several occupations of the site. Similar to what will be done with the safeguarding and surveying activities, the excavations will be mostly undertaken by APSARA National Authority archaeologists.

[slide] Depending on need, a series of diagnoses will be undertaken, helping us to understand some of the damage to the structures. A cross trench will be dug in order to get the entire site's stratigraphy and better understand the organisation and function of the spaces bordered by the enclosures.

[slide] Investigation and mapping of the site and surroundings will be carried out. Once the potential remains have been located, they will have to be recorded and an identification programme, based on the existing documentation (LiDAR imagery, aerial photography, ancient excavations and traditional field investigations or even geophysical work) will be put forth. All data will be integrated to a GIS.

Later, a diagnosis will be necessary to understand the organisation of the landscape components, based on the investigation's outcomes. The diagnosis of these types of trenches aims at cross-referencing and relating the site main stratigraphic facts. They will connect the temple with peripheral structures in the surrounding landscape and also assess the archaeological potential of the temple approach area by drawing a risk map. Extensions of the excavation programme may be planned, depending on the results of the diagnosis.

[slide] Too often overlooked in the past, ceramic studies are included in our pro-

gramme. I recall that the combination of ceramic studies during excavation seasons enable huge progress in the establishment of a first, benchmark typo-chronology. Paleoenvironmental studies could also be undertaken in the many ponds and moats with a view to studying the site's vegetation.

The items excavated will be jointly analysed by APSARA National Authority archaeologists and available to international teams that take an interest in the development of these studies. All the artefacts will be recorded, measure-drawn and integrated with a database to facilitate research and exchange with other academics.

[slide] At the end of each excavation campaign, a scientific report will be drafted, informing the authorities and partner institutions of the research progress. To summarise the complete excavation season and building study, the Atelier Banteay Thom plans to, as mentioned earlier, edit a comprehensive architectural and archaeological study of the temple.

[slide] We would like to recall that this project is also part of a training programme, which core objective is to propose field work for skills transfer in a two-pronged approach: technical and scientific training. We plan to include the contribution of archaeologists, architects and engineers from the APSARA National Authority, of stone carvers and workers from the neighbouring village for manpower and site maintenance.

[slide] This several year long project will be regularly reported on at the ICC, which will first decide on and assess the necessity of setting up the scientific and heritage relevance of the programme and its continuity. This project cannot be started without the approval and sponsorship of the APSARA National Authority.

[slide] Once agreed on by the APSARA National Authority and the ICC, Atelier Banteay Thom will endeavour to raise the necessary funds for its programme. We have already made contact with potential partners through corporation foundations. These partners are targeted depending on the type of activities carried out and the budgeted amount.

Some study and survey phases may require less funding and could be covered by grants from some institutions. Other resources may be found with Cambodian or foreign smallholders/private partners and also using the numerous crowdfunding opportunities presently available.

[slide] Thank you to the APSARA National Authority and to the ICC for having given us the opportunity to present this Banteay Thom Temple Project.

I thank you for your attention."

Comment from the Co-chairman for France: "Thank you. Mr. Kim Kwanghee will now expound on the Preah Pithu project."

### **III.A.2 Preah Pithu conservation and restoration project, by Mr. Kim Kwanghee, Director, International Cooperation Team, Korea Cultural Heritage Foundation, KOICA**

[OrigE] " Excellencies,  
Distinguished co-chairs,

[slide] My name is Kim Kwanghee from the Korea Heritage Foundation. It is a great honour to present our paper on the restoration and conservation project of the Preah Pithu



temple group in the Angkor complex. I will be presenting and, in the case you have any questions, my technical team will be able to answer.

[slide] First, I will introduce our project. The first objective is to improve the condition of the Preah Pithu area and develop human resources. The first phase will last three years. Our objective can be divided into several categories: Conduct preliminary research; carry out the conservation of the Terrace area in the west of temple T; promote capacity development of local experts, engineers, workers.

[slide] Preah Pithu is located inside Angkor Thom, on the northern side of Angkor Wat. Take a closer look at the site: it is 600 x 300 metres long. [slide] There are five temples T, U, V, X, and Y on the southwest part of the site. The terrace area which will be preserved is to the west of temple T.

[slide] This is the work scope of the project. It includes: 1) Preliminary research; 2) conservation of the terrace area; 3) capacity development and equipment support.

[slide] I would like to give you a brief report on our preliminary research. The actual survey will be using scanning devices and drawing topographic maps of the area.

[slide] A soil and ground water survey will be carried out to research the soil condition of the site. These are some example of the works done back in Korea. [slide] Some example of research in the middle of this site, located in Korea.

[slide] Geological and lithological research to analyse stone condition will be carried out. [slide] Digging small test-pits for levelling the site area for unexplored ground and buildings is also planned. Historical research for architectural history, religion, art and landscape will be studied to understand more about the site and the temple, including Khmer culture and history.

[slide] *In situ* diagnosis for stone conservation: There are various ways to examine the condition of the stone using the portable XRFY ultrasonic survey. [slide] Structural stability research could be divided into two methods. We are currently monitoring some temple structures and we are planning to carry out structural analysis using computer tools. [slide] The establishment of the restoration and site management plans for future development.

[slide] Let me now speak about the conservation of the terrace area, which is on the west side of Temple K. This is a picture of the site where we will be inventorying the terrace members. [slide] An actual survey of the terrace will be conducted, including scattered stones.

[slide] An archaeological survey and partial dismantlement will be carried out and it will be comprehensively documented. A restoration plan will be drawn up. [slide] Conservation treatment will be applied to the materials that require it. It could be cleaning, consolidation or binding. The terrace members will be reassembled after treatment. [slide] A trial assembly will be done before reassembly on site: This is an example taken from Nang Sida temple in Laos.

[slide] Our third plan is capacity development. It is divided into three stages: 1) Local training; 2) invitational training; 3) equipment support. [slide] This is a tentative work plan schedule. It stretches over 36 months, from April 2015 until 2018.

[slide] Our conservation strategy is to maintain good contacts with the APSARA National Authority and other country teams within the principle of preserving the heritage value of Preah Pithu. [slide] The Angkor ICC recommendations and also the Angkor Charter will be taken into account during the conservation project.

Thank you for your attention.”

Comment from the Co-chairman for France: "Thank you. Moving on to Banteay Temple in Phnom Kulen, presented by Dr. Kyle Latinis."

### **III.A.3 Preliminary Excavation at Banteay site, Phnom Kulen, by Dr. David Kyle Latinis, ISEAS-NSC-AU, Singapore**

[OrigE] "Excellencies,  
Ladies and Gentlemen,

I will try to be brief. I will discuss the Banteay excavations from last year with the Singapore ISEAS team and the APSARA National Authority.

[slide] The goals were to survey, map and conduct excavations; also to examine sub-surface remains for evidence of site engineering/design, activity areas, and habitation. Research questions were geared towards urbanisation, settlement and site-use, things which are relatively unknown in the area. Research design and field training with APSARA-ISEAS partners and students were important, as were building capacity and strengthening partnerships, especially regionally.

[slide] Overall, the project excavated six Units of 104 m<sup>2</sup> ; they were not screened due to conditions and the research questions geared towards understanding the site's engineering and architecture. The Primary remains we identified were the central platform (50 x 30 metres, we will see that on the LiDAR image) on the uppermost terrace with brick pavements and roof tiles at the edges. It was probably a wooden structure with a tiled roof.

[slide] Terrace 1, the uppermost, had soil and sand filled. Three terraces were identified in total and supported that central platform structure. The upper terrace measured 125 x 125 metres and was composed of layers of sand and compacted soil. It was more formally built, but not at the scale of formality we see in later Angkorean periods. One might say that this site may have been the residence of Jayavarman II on Phnom Kulen. It is a speculation and is unknown at present, but it probably dates from the 9<sup>th</sup> century. One of the things we were testing is to see whether it was a royal residence.

[slide] Moving along we saw sandstone, laterite and soil buttressing at the perimeter of the upper terrace. We also noted vertical brick alignment features on the upper terrace. Supporting the upper terrace was an earthen embankment, with walls and ramparts. We saw several ditches, one leading from the central platform to a pond. These were very evident in the LiDAR imaging, so we went through many of these. In the central axis from what is presumed to have been the gate to the main residence, we unearthed a brick-paved walkway with stairs and postholes. This is what you see in the upper right image and the postholes (50 cm diameter) on the lower right image. We also found some burned earth features and brick remains, but very limited pottery.

[slide] Not a lot of activity areas: We noted possibly some brick manufacturing; certainly not habitation or long-term habitation remains. On the upper left, this displays where the six units were placed. You can see on the LiDAR image the outline of many of the rectilinear features. The areas to the right, in the red squares, were the areas tested by ADF in former campaigns. We will hear more about their discoveries later. To the lower left, again, the unit and right here to the lower right, this is a topographic map. You can see the drainage that comes from the high point down to here. A lot of these rectilinear features, where the pointer is, were ditches that probably channelled the water into these ponds area right here. Water management was important to a degree.

[slide] These are some field excavations shot by our Singapore team. Opening some units they found brick and burned features. They conducted a burn to see if the soil conditions change after a test burning to match the condition of the features in here. And they did. Here, you have the team mapping the brick pavement and stairs. Here, the team is auguring a test unit to test for anthropogenic subsurface deposits that may exist beneath this subsurface. Nothing was identified. Here are the postholes once again, and there would have been a matching set on the other side.

[slide] Here is the diagram mapping the excavation test units where the staircase comes down here. The plan view over here, and we have all the profiles and soil samples tested. An interesting thing about the soil samples is that we would like to further test them and do a lot more coring, because the geological and soil information is vitally important for agricultural and drainage potential and geological knowledge. We need to test it further and explore it farther to understand the substrates. It is not only important for the archaeologist, it is also important for the geologist and for the farmers.

[slide] Lastly, we just took some simple line diagrams here with the LiDAR imaging; translate this into a total distance and this is a very rough estimate. If you do the calculations, you come up with 20 to 40,000 cubic metres of excavated and moved piles of earth. The upper terrace is 125 x 125 metres, that is, 30,000 cubic metres of buttress fill, what we come up with is significant labour input. Compared to Angkor Wat or Angkor Thom this is very small scale. But the intention is to break up this small project and this is a very organised project.

We can translate this virtually into labour; what was moved in energy, and this enables us to find a proxy for the level of organisation, management and input needed. If we can break a lot of these larger sites into constituent parts we can learn a lot about the magnitude of management and of energy. This information feeds into a lot of ecological, economical and environmental information we would like to understand as well. I will not go into detail, but you are more than welcome to ask me any questions later.

Thank you very much for your attention, I appreciated it."

*Comment from the Co-chairman for France:* "Thank you. Yaśodharāśrama, 2015 campaign: First results of archaeological excavations at *Prasat Komnap South*, by Mr. Chea Socheat"

### **III.A.4 Yaśodharāśrama, 2015 campaign: First results of archaeological excavations at *Prasat Komnap South*, by Mr. Chea Socheat, Archaeologist, APSARA-EFEO**

"Excellencies,  
Co-chairs,  
Dear colleagues,

[slide] Today, I have the honour to present the Yaśodharāśrama research programme. It is the outcome of an international collaboration which for the past five years has brought together researchers of different specialties from different countries. Researchers from four different institutions have been involved in the 2015 excavation season: The EFEO, Mahidol University, Toronto University and, of course, the APSARA National Authority. This programme is also supported by the Commission des fouilles of the French Ministry of Foreign Affairs.

[slide] This year's works focused on *Prasat Komnap South*, the Vishnuite âçrama of Angkor, which is the best-preserved of the monasteries founded by Yaçovarman I in his

capital in the late 9<sup>th</sup> century. The excavation season extended from the 5<sup>th</sup> of March until the 10<sup>th</sup> of April, 2015. [slide] We only focused on researching the eastern platform of this site, which may have been potentially dedicated to the âçrama ritual activities and more surely to teaching. Previous works have suggested that the central and eastern areas were most likely habitat and market crop areas.

The sacred areas of the Angkor âçrama are characterised by the presence of two buildings constructed with sustainable material: [slide] A stele aedicule, here that of *Prasat Ong Mong* and a 25 metre long hall in laterite covered with tiles, [slide] here in *Prei Prasat* during George Trouvé's excavations in 1932

Since the 2011-started works, we have been able to evidence that in *Ong Mong* and [slide] *Prasat Komnap* [slide] a long hall was erected close to the stele aedicule. [slide] This is a highly satisfying finding, as it evidences that whichever the obedience of the site, these monasteries had similar infrastructures. Yet, knowing that this eastern platform measured 150 metres in length it would be surprising that it only included two buildings.

[slide] A georadar study initially revealed the linear structures [slide] south of the long hall. These laterite block alignments seemed early on to be difficult to understand [slide]. They seemed to have demarcated wide, open buildings with areas for postholes supporting a tiled roof.

The initial assumption was that these belonged to a surrounding gallery. But test-pits carried out after a renewed analysis of the georadar data [slide] contradicted this assumption. The end part of a building has actually been unearthed [slide] and other parallel alignments suggesting the presence of numerous buildings have also been discovered.

[slide] The first objective of the 2015 season was to excavate half of this northern structure, up to its eastern end. [slide] It is now asserted that this 4 metre wide building was 25 metres long. Similar to what was found to the south, the irregular alignments of blocks and the areas for the wooden postholes suggest that this area was an open gallery. Monks probably used it so that they could congregate, sheltered from the weather. As in the south, it was covered with a tiled roof. [slide] Some rare blocks lying in the field: Hollow excavations on these blocks suggest that these buildings may have been lined up with a small laterite guardrail on top of the alignments.

We also checked the existence of similar structures to the east and west of the two sustainable buildings. In both cases, the presence of two parallel buildings has been revealed. [slide] First to the west, with here the north end of a building which structure is similar to that we have just shown. Further west, we did not find any block alignments but a heap of tiles [slide] of which many are not fragmented, which suggests the collapse of a second gallery. Two circular areas where no potsherds were found may be interpreted as postholes and suggest that this gallery was three metres wide.

Similar parallel buildings have also been unearthed to the east. [slide] The closest to the sustainable structures has shown once again similar characteristics. Of interest is that another structure, a type of paving, was built on top of it and suggests a second phase of occupation. This is something that we had already noticed in other areas of the âçrama, although, until this year, they had not been as clearly identified to the eastern area. [slide] Further east, a succession of two buildings can be seen, thanks to two levels of tiles suggesting two periods of neglect.

[slide] A test pit excavated in the extension of the first north and east buildings unearthed a wall made up of three courses of laterite blocks [slide]. It will be necessary to extend the excavation in order to detail the plan of this structure, though it seems to be a surrounding structure with breaks constituted of open galleries and corner buildings. This is a key discovery, not only for the Yaçovarman I monasteries, but more generally, because it

is a new form of Angkorean architecture. This was prior to the proto-galleries that developed during Râjendravarman's reign, particularly at Pre Rup.

[slide] As is often the case in ritual places, the unearthed material is sadly rather scarce. Still, some areas with a lot of potsherds, possibly associated with neglect periods, that have been discovered will be further researched thanks to the ceramography study and will help us refine the phasing of the excavation of this monastery.

[slide] Finally, the last trenches dug up this year were almost 80 metres long. It aimed at connecting all these buildings to the âçrama's north dike, in order to widen the diagnosis of this eastern platform and to establish a stratigraphic connection between the different structures found. Apart from the block alignments, hardly any activity material was recovered. This suggests that this area seems to have been rather bare.

These findings are consistent with similar trenches excavated in the core area of the âçrama in 2011 and clearly evidence that the rectangular surrounding enclosure of the monastery was built during the first phase of occupation and the original foundation of Yaçovarman I.

An ultimate excavation season will be necessary to complete the study of the âçrama built by this King of Angkor. It will include checking that galleries equivalent to that of *Prasat* Komnap South (a site which is part of my PhD thesis) and those that I have identified at *Prasat* Ong Mong were also built in other âçrama known in Angkor. These works should be completed in 2016.

[slide] I thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you. Let's move on to the LiDAR Programme on Archaeology in Cambodia, and Dr. Damian Evans is presenting."

### **III.A.5 LiDAR Programme on Archaeology in Cambodia: Siem Reap Region, Phnom Kulen, Preah Khan, Kampong Svay, Banteay Chhmar, post-Angkorian landscape, Longvek, Udong and Sambor Prei Kuk by Dr. Damian Evans on behalf of EFEO**

[OrigE] "Excellencies,  
Colleagues,  
Ladies and Gentlemen,

[slide] This afternoon I would like to report on the completion of the first phase of a new project funded by the European Union, which is a collaboration between the EFEO, APSARA and the Ministry of Culture and Fine Arts, authorised by His Excellency the Deputy Prime Minister Dr. Sok An.

The name of the project is the Cambodian Archaeological LiDAR Initiative, a five-year project just begun this March, which aims to greatly expand the amount of airborne laser scanning or LiDAR data that is available over the archaeological landscapes of Cambodia. I would like at this point also to acknowledge Excellency Tan Boun Suy as the co-author of this work.

[slide] Many of you will already be familiar with the technology from our 2012 campaign, which involved many of the teams and colleagues in this room, so I won't elaborate in any detail on it here. The main point is that LiDAR has a unique ability to see through vegetation and map archaeological remains.

[slide] The instrument is mounted to an aircraft, such as a helicopter as you see here, and systematically fires millions of laser pulses at the ground as it flies along.

[slide] In forested areas, most of those laser pulses simply bounce back off of vegetation. However a small number of laser pulses find their way to the forest floor, and using algorithms we can filter the vegetation from the picture, and can get a pretty clear picture of the topographic variation that represents the remains of cities made of wood and earth.

[slide] By flying systematically over the landscape and acquiring millions or even billions of points we can effectively lift the vegetation and remove it from our picture of the archaeological landscape, as we can see here at Angkor Wat, inside its moat.

[slide] In 2012 we completed what was, at least at the time, the largest LiDAR survey ever completed for archaeology anywhere in the world, involving a very broad cooperation between eight international teams here at Angkor, a cooperation that was forged here at the ICC. A range of pretty significant outcomes have followed from that work.

[slide] Our 2012 LiDAR acquisition covered about 370 km<sup>2</sup> over the Angkor, Kulen and Koh Ker areas, as well as some other important areas of the heritage landscape, even if, because of the very high cost of LiDAR, the coverage was really quite partial. [slide] It is worth briefly reviewing the results at places like Angkor Wat, for example, although we have seen many examples of the LiDAR in use today.

[slide] Here, the remains of the urban core of Angkor during the first half of the 12<sup>th</sup> century have traditionally been obscured by vegetation. [slide] In spite of these limitations, a significant amount of archaeological mapping had been completed in this area up until the 1990s, eventually compiled by Christophe Pottier of the EFEO.

[slide] By stripping away the vegetation, the LiDAR data add a whole new dimension to this particular point of view, and show that the landscape is incredibly complex, in fact way more complex than we have mapped in the past. That being the case, [slide] new interpretations of features are underway right now, unpublished, using the LiDAR as a base for understanding urban forms, and they turn out to be really very different from the previous views of the area.

[slide] LiDAR is not just useful for archaeology of course, and there is a whole range of applications in the management of elements of the landscape, for example in forestry, where we have been able to do studies of biomass working with APSARA, and even train software to identify individual tree species with a fair degree of accuracy using the LiDAR data.

[slide] Building on the success of the previous mission, I applied last year to the European Research Council for a further block of funding to expand the existing coverage across Cambodia by about 400 per cent, and eventually they awarded that grant to the EFEO last December.

[slide] One of the first priorities was to greatly expand the coverage of the mountain ranges to the north of Angkor, where it was clear from the work of the ADF Kulen team that we had only captured a subset of the urban and industrial network in the area. You can see this is the coverage that we now have for Phnom Kulen.

[slide] The grant from the EU also allowed us to extend the coverage to provincial military and industrial centres of the Khmer Empire, and also to the capitals that came before and after Angkor, to help us understand how cities and empires developed over a couple of thousand years of Khmer history.

[slide] Using the grant from the European Union, in March 2015 we started an international effort to install and deploy a LiDAR instrument on a helicopter at Pochentong Air Base in Phnom Penh, with the particular assistance of Mr. Heng Kamsan from the Ministry of Culture and Fine Arts.

[slide] Over about four weeks of operations in remote areas we fulfilled all project requirements, as well as holding a public open day here at APSARA to communicate what we were doing to the general public. My sincere thanks go to Mr. Long Kosal and Mr. Keo Dara for organising these respective efforts.

[slide] As a result of this cooperation we were able to fulfil all of the expectations of the project for data acquisition as well as accommodating some special requests for data, for example at the highly significant site of Choeung Ek near Phnom Penh. [slide] As well as the very important industrial corridor that connects iron and ceramic production sites to Angkor along ancient roads via Beng Mealea, and also linking quite nicely with the previous 2012 study as you can see.

[slide] The data has not been delivered yet. The results will still take a month or more to process, but already we have some very rough results which show the value of the new data. Here for example is the complex of Sambor Prei Kuk, whose central temples had been mapped in detail by a joint Cambodian-Japanese team. The central temple area is these days almost completely covered by forest, as you can see here, which makes it very difficult to move beyond schematic maps. Already, however in the very raw LiDAR data we can see a landscape of much greater complexity involving channels, ponds, moats and other features of archaeological interest. And it will be interesting to see what changes can be made to our view of a place like Sambor Prei Kuk as we move forward with data delivery and analysis in coming months.

[slide] Again I will not bore you with statistics here except to note that this is once again the most extensive LiDAR survey for archaeology completed anywhere in the world, nearly doubling the previous effort around Maya sites in Belize, and that we ended up getting something like 2,000 km<sup>2</sup> of additional data rather than the 1,600 km<sup>2</sup> that we planned for and was funded initially.

[slide] One of the things that I would particularly like to underscore is that since 2012 this has been a large and cooperative effort between multiple institutions from many countries and the 2015 campaign extends this even further. In my opinion, this requires a significant rethink about how we can overcome structural and institutional barriers to make the data more available and more open and accessible to the people who need it, and I look forward to having that conversation with all of the stakeholders over the next day or two at the ICC.

[slide] As I mentioned, the data will be delivered in the next few weeks, with the main priority being the processing of the Sambor Prei Kuk data, which to my knowledge will be the first time anywhere in the world that LiDAR data has been used in support of a dossier for World Heritage nomination. Fieldwork, training and other activities will then continue to 2020.

[slide] Excellencies, colleagues, thank you for your attention this afternoon."

Comment from the Co-chairman for France: "Thank you very much. May I take this opportunity to congratulate all speakers as since the start of the session they have presented in their allocated time slots. We are on time, which is great. I now ask Mr. Pheung Dara to present on the inventory of archaeological artefacts in Angkor. Thank you."

### **III.A.6 Inventory of archaeological artifacts in Angkor, by Mr. Pheung Dara, archeologist, Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority**

[OrigE] “Excellencies Co-chair,  
Ladies and Gentlemen,

[slide] I am Pheung Dara and I work as an archaeologist at the Department of Conservation of Monuments in the Angkor Park and Rescue Archaeology. Today, I will give a brief presentation on the inventory of the sculptures and bas-reliefs found scattered inside the complex of the 91 temples listed as World Heritage at Angkor.

[slide] Why do we need to carry out an inventory for the movable sculptures inside the complex? Many sculptures remain scattered on the grounds of the temples. Sometimes, the sculptures are displayed, moved to other sites or exhibited. It is essential to document these artefacts, either in photographic form or in descriptions. If a statue is damaged or removed from its original place, the inventory could allow for re-identifying its origin and previous condition.

[slide] It is a long-term project for the Department of Conservation of Monuments in the Angkor Park and Rescue Archaeology. It started in 2014, after an interruption in 2004. The inventory is divided into two parts: The definitive inventory and that which is temporary.

[slide] For the first one, the sculptures have been inventoried and we can manage and prevent the sculptures from being looted and enable their future restoration. Until now, we have been doing the inventory on the movable sculptures of the Bayon temple. [slide] The sculptures listed include Buddhas, lions, nagas, pediments, lintels, etc. We have also documented and listed all the artefacts into a master plan with an inventory number. The data of the inventory is recorded into a Filemaker programme.

[slide] For the temporary inventory, the work focuses on the scattered artefacts found at temples, using simple forms and then registered into the temple master plan. If necessary, we also move some scattered artefacts to protect them. So far, we have finished inventory work on 27 temples. [slide] Our future work is to continue the inventory on sculptures and bas-reliefs from all the 91 temples listed in the World Heritage site and expand the scope of the work to other temples in the Angkor region.’

Thank you for your attention.”

Comment from the Co-chairman for France: “Thank you very much. We now move on to the black patina issue in Khmer temples, presented by H.E. Tan Boun Suy. Thank you very much.”

### **III.A.7 Black patina on Khmer temples: Banteay Srey and Neang Khmau at Koh Ker site—causes and chemical reactions, by Professor Tan Boun Suy, APSARA National Authority**

“Excellencies,  
Your Excellency Sok An, Deputy Prime Minister,  
Ladies and Gentlemen,  
Friends,



[slide] The object of my presentation is to answer questions asked by the *ad hoc* experts on the black patina that is found at Banteay Srei and at *Prasat* Neang Khmau in Koh Ker.

[slide] At Banteay Srei we already know the work of Pierre Fusey in *Altérations des grès cambodgiens et recherche de moyens de protection*, published by the EFEO in 1991. What does it entail?

[slide] The pink sandstone of Banteay Srei contains a very compacted black patina with high levels of manganese. The analyses showed that with relation to the inner part of the stone, the superficial layer has a strong manganese content, as this slide shows. A fungus was also found, the *Cladosporium herbarum*. We are now going to talk about the outcomes of our work in collaboration with researchers from Rome, Italy.

[slide] We used proton and electronic microscopes and a Raman spectroscope. [slide] We sampled the stone at Banteay Srei on the main temple at the southern and northern exposures: The exact locations are indicated in red. Obviously, we did not take any samples from carved sculptures.

[slide] These are the outcomes: In the southern sample, many cyanobacterias were found, including many scytonema also found in the northern sample, where it is more humid. [slide] On the southern exposure was also found the round-shaped gloeocapsis, which contains many cells.

[slide] This is the APSARA National Authority laboratory. Adding to the southern exposure's gloeocapsis were also filaments originating from the scytonema. Unlike Fusey, we did not find the *Cladosporium*, which will necessitate complementary analysis.

[slide] The mineral analysis with the Spectoraman did not reveal any manganese. In a first instance we found some AU, gold. Do not worry, the temple was not covered with gold, we put a little bit of it in to start up the Spectoraman. There is actually the presence of a lot of silicon and aluminium. The EDS Spectroscope is showing in green the silicon and in red the aluminium at the bottom.

[slide] This black patina often can be found at Angkor Wat, Bayon and Ta Keo. As I said, we did not find any *Cladosporium* fungus but additional sampling needs to be done in other locations. We did not multiply the sampling, only quickly analysed with Italian experts that were visiting at the time.

[slide] To conclude, you can find in Banteay Srei, on the northern aspects, filaments made up of *scytonema* and, in the south, *gloeocapsis*. We did not find any manganese in either aspect, which requires complementary sampling.

[slide] This is *Prasat* Nang Khmau; this last word means 'black' in Khmer. This is the typical black feature of these temples. We sampled in 2015 and used EDS electronic microscopes and Raman Spectroscopes.

[slide] No living organisms were found, but a high content of manganese and iron was. [slide] These are pictures from the EDS electronic microscope that displays in fuchsia the manganese and in blue the iron. There is a lot of iron. We did not find any living organisms as in Banteay Srei, mainly strong levels of manganese and iron content.

[slide] The conclusion is that Banteay Srei has been colonised by cyanobacterias which when put together are called *scytonemogloeocapsetum*, which can also be found in other temples like Angkor Wat, Ta Nei or Ta Keo. It is a fungus that can survive without humidity. At *Prasat* Nang Khmau we did not find any living organisms, but mainly the black colour that is the result of the accumulation of iron and manganese.

Thank you.”

## **General discussion**

*Comment from the Co-chairman for France:* “Thank you very much. Are there any comments or observations on these papers on research and conservation? I am looking around the room and I am pretty sure that questions will come from my right hand side. I was right. Mr. Lablaude, the floor is yours. Thank you.”

*Comment from Mr. Pierre-André Lablaude:* “I would like to comment on Preah Pithu. It is an outstanding complex of monuments located at the heart of the visiting tour of Angkor Thom that no one visits, as it sits just off the itinerary. The complex exudes a harmonious balance between the ruins and the tree canopy above the temples and traces of ancient ponds and moats: A very charming place.

Of course, some conservation work is needed, notably with stability issues and some clusters of stone that are presenting a threat. I nevertheless believe that it is necessary to remain very cautious and to hold back the conservation work. We are delighted that the Korean team has decided to look after this temple. The speaker mentioned some partial dismantlement, but I believe that we could make some initial recommendations in holding back the intervention for the overall value of the site.

I saw that something was mentioned in the December, 2014 recommendations; I am looking for it. This recommendation perfectly summarised the very particular conservation that must be undertaken on this temple. It specifically mentioned, if I remember correctly, the need for small-scale dismantlement and reassembly, to preserve the vegetation and the wish to re-flood the several water expanses that seem to me very important for the harmony of the complex.

I would ask you to refer to this former recommendation which I could not find but which I summarised. Thank you.”

*Comment from the Co-chairman for France:* “Would Mr. Kim like to react to this recommendation?”

*Additional comment from Mr. Pierre-André Lablaude:* “I apologise, Co-chairman but I have found the recommendation at hand. It is dated from the 4<sup>th</sup> and 5<sup>th</sup> of June, 2014 and can be found on page 4: ‘Recommends, for the conservation and showcasing programme, that attention be given to the harmony of the site as well as the balance between the historical buildings and the forested environment; b. Recommends, therefore, that interventions be strictly limited to consolidation of unstable elements; c. Recommends, finally, that the expressed intention to reflood different bodies of water be approved’. Thank you.”

*Comment from the Co-chairman for France:* “Mr. Croci, the floor is yours.”

*Comment from Professor Giorgio Croci:* <sup>[OrigE]</sup> “I would like to stress one point of general aspect. Often we have to give advice on site, but the project does not exist yet. This should be changed, to make a project obliged to think and go into detail. In the recommendations of the Angkor Charter, a document that should be used more often, it is stated that any project should be planned with an explanatory record. The intervention has to be described, reasons given as to why it was chosen and state any side effects, etc. For example, this morning we heard about products with negative impacts. I will not go further into detail, but I think teams should be obliged to follow this avenue. Thank you.”

Comment from the Co-chairman for France: "I believe that these recommendations should be included in this session. Mr. Beschaouch, the floor is yours."

Comment from Mr. Azedine Beschaouch: "We will come back to this matter, as we are in a transitional phase. Today, the new project was presented to respect the procedure we have been following for twenty years, that is with the plenary Session adopting. It is only in rare cases that this did not happen; may be two or three times in the past twenty years. The financing for this project is available and should not be lost, so the experts quickly analysed the project and recommend its immediate start. These projects have been presented to us and we will recommend them, including that beautiful work on Banteay Thom, but the experts have to review the projects."

Comment from the Co-chairman for France: "May I add this item that will be discussed tomorrow. This is just a hypothesis, but the second technical session that should be held prior to the plenary could allow for a second review of these new, more elaborate projects following the observations made by the experts during this session. Then the Plenary could validate them."

Comment from Mr. Azedine Beschaouch: "Co-chairman, this will be clarified by our colleagues tomorrow, as we are shifting to a new system that was wished for by the two plenary session co-chairmen and agreed upon by H.E. the Deputy Prime Minister. To this matter, we will be clearer on what will be done tomorrow. Today is the review and presentation; in the meantime they will have longer to review and then adopt. I think that it is the best way."

I will have three types of questions and one observation. I start with the latter. We congratulate the Department of Monuments and Archaeology which has started documentation work. I have in front of me a box filled with documents and we will file them in the archives so that archaeologists and APSARA National Authority staff are informed. I must say that Professor Lablaude and I have looked at them and the work done is of quality.

The recommendation I would state is not only for Cambodia but the whole world, including countries that have been undertaking archaeological studies for centuries (Japan, India, France, etc.). Never circulate information outside the APSARA National Authority, as immediately you will have people that will look for artefacts. This is like an archaeological map that should never be release. It is sad, but that is how it is.

Nowadays, we can no longer do this due to modern means of transferring information. Keep this work at the APSARA National Authority, at the Centre for Documentation and Research, and make sure there are no leaks. The managers must be informed and you did it, but beware of looting. I wanted to flag this, although I congratulate you for your work. This was my first observation.

Now, the patina: Good to know that there are two types of them. Manganese or iron, which are part of the stone composition. What can we do in this case, as this is part of the stone composition? I am not a specialist, but we have treated problems like these before. At Banteay Srei, it is created by a fungus and it can be treated. Fortunately, among us is one of the great specialists of this treatment and others, Professor Hans Leisen. He did not take part in the analysis, but he could help us with their findings.

What we are interested in is to know how to avoid this black darkening to a greater degree and that in the future these temples turn like Paris was 50 years ago, before it was facelifted. I remember a black Paris, as I was going to high school there, and this was due to fungi. This can be treated and it would be good for Professor Leisen to disseminate the information.

My last observation is on the LiDAR. Dr. Evans summarised it. We all know that Cambodia is presently at the forefront. The foremost country in the world using this technology

is Cambodia. It has been used in Angkor and soon it will be in Banteay Chhmar, Koh Ker and etc. My question is the following, and I turn to the team representative not Dr. Evans, but Professor Tan Boun Suy.

I use as an example the Banteay Thom presentation. He mentioned the LiDAR and said that the mapping stops there. Is this temporary or is the work completed and the data not yet available? There is a major APSARA National Authority project with the involvement of the TMP and the association of Italian researchers, Phnom Bok. We looked for it and the LiDAR data is non-existent for this site. It is important, because if an access road has to be built, it could damage some ancient structures. If we had LiDAR data we would know.

What is going on Professor? Banteay Chhmar and Sambor Prei Kuk will be surveyed, which is good, but we should complete Angkor. Why has not this been done? Or, are we waiting for mapping of the data? Could you please answer, as this is essential?"

*Answer from Mr. Tan Boun Suy:* "I believe that the steps taken up to today depended on the financing. The first stage focused on key sites that are of interest to our partners. The second stage has been spurred by the University of Sydney and submitted to the European Union. The latter granted US\$1.5 millions, which could not be sent to Sydney but to France through the EFEO.

The latter is in charge of the funding and manages it and I believe that Sydney University prioritised the sites. This does not mean that it cannot be changed in the future. For example, His Excellency the Deputy Prime Minister would like us to visit Preah Vihear, but sadly lack of time did not allow for it. Besides it is a complex site. I think that a third stage of the LiDAR survey could be planned in the footsteps of the second stage. Thank you."

*Comment from Mr. Azedine Beschaouch:* "Co-chair, I am sorry to say this, but there is something basic here. We cannot let this happen and neither can the international community. I am not trying to bicker with Professor Tan Boun Suy. One cannot state: 'the European Union decided'. The European Community decides based on the country's request, you know that.

Secondly, the APSARA National Authority is the client. A schedule was drawn up. Before starting surveying Oudong or the Preah Khan of Kampong Svay, which are important sites, the Angkor site should not have been left aside and should be completed before surveying other places. It is pure logic, I do not understand. I do not know who took the decision, but I want to be honest. When people in foreign countries mention Cambodia being at the forefront of using this technology and yet has left the site not completed and focused on other sites like the two I named earlier, I think that, scientifically speaking, it does not look good. The APSARA National Authority finances as well. They are going to survey Oudong. I do not understand the value of the site right now."

*Comment from the Co-chairman for France:* "Dr. Evans would like to answer I believe."

*Reply from Mr. Damian Evans:* <sup>[OrigE]</sup> "Thank you very much Professor Beschaouch for your comments and input. The question of LiDAR coverage is essentially a question of funding. If we have it, we can expand as much as we like. The areas are defined on a range of competitive interest from various teams, different priorities of scientific research. You raised the issue of Longvek and Oudong. They were chosen as part of this programme because these two areas are particularly under threat from the development of Phnom Penh City. So, in discussion with the ministry of Culture, we decided specifically to target this archaeological landscape before it disappears.

There was a very long consultative process with various stakeholders onto which these areas were decided upon. It is not arbitrarily that we decided that Angkor was finished and that we moved elsewhere. It is a question of funding. If more funding was to be obtained, we could cover the whole country, which would be magnificent.

The second point is that this funding comes from the European Union Research Council. This is quite different from aid-granting organisations which would be quite happy to fund LiDAR for issues such as development, urban planning and these kinds of very useful applications. The European Research Council specifically funds frontier research into topics of scientific research interest, therefore the application for funding had to be framed in terms of a comparative study of different sites in Cambodia that would add value to our long term knowledge of Khmer civilisations. As much as I would have liked to expand the coverage on Angkor, I hope that adds some context to those areas that have been chosen."

*Comment from Mr. Azedine Beschaouch:* "I do not want to debate and give you the feeling that I am here to polemic, but I remember that I was there when the Council of Ministers, a few months ago, explained perfectly the project and insisted that even if we have funds, there are no questions of opportunities or different teams. My question comes late in the day, as the programme is finished. To have Oudong is important, yes, but when you have part of the Angkor site left out of the programme, we have to wait for 2017, if not later, that is regrettable. Thank you for your information."

*Comment from the Co-chairman for France:* "Hotly debated topic. Are there any more comments or questions? There is a ten-minute coffee break planned that we can uphold, as long as everyone comes back on time, otherwise the meeting will extend beyond schedule and that would be bad for all. Ten minutes break, no longer. Thank you very much."

### **III.B NEW PROJECTS: SUSTAINABLE DEVELOPMENT**

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*Comment from the Co-chairman for France:* "The session is resuming."

*Comment from the Co-chairman for Japan:* "Thank you very much. We have a small hour to conclude this first day of the technical session. We should pay close attention to new projects with new speakers that are all welcomed to this session of the ICC. I give the floor to Mr. Khuon Khun Neay."

#### **III.B.1 ACHA-Angkor Community Heritage and Economic Advancement, by His Excellency Mr. Khuon Khun Neay, Deputy Director General, Department of Land Planning and Habitat Management in Angkor Park, APSARA/NZAID**

"Distinguished Co-chairs,  
Excellency, Deputy prime Minister, president of the APSARA National Authority,

[*slide*] I have the honour to present a project in cooperation between the APSARA National Authority and New Zealand. This is the third phase of the Angkor Community Heritage and Economic Advancement Project (ACHA). The goal of the project is to see to the sustainable development of the Angkor Park while protecting heritage and conducting to the economic prosperity and food security of the people living in the Park.

[*slide*] A Memorandum of Understanding was signed in June, 2014 during the ICC session between the representative of the APSARA National Authority and that of New Zealand. The project budget amounts to US\$3.8 millions for five years, from 2014 until 2019.

[slide] The project's expected outcomes include the economic development of the villages, the commitment and capacity of villagers and the management of natural resources. We began conducting a preliminary study in order to assess the economic situation of the villagers and to be able to compare it at the end of the project, including the benefits brought by the project.

[slide] This study has been conducted in several villages of the Angkor Park. The first six villages have been selected as target villages. Two in Puork district, two in Siem Reap Town and two in Roluos district in order to balance them geographically.

[slide] A participative community assessment was also carried out. This entailed meeting with the villagers and asking them questions: What they have and what they are missing or would like to have.

[slide] For the first phase, the expected outcomes are economic progress of the villages with market farming, self help groups and community-based tourism. Regarding agriculture, the baseline study indicated that it was necessary to bolster rice farming, not only during the wet season, but also to grow a different type of rice, also known as 'light rice'. Market farming allows families to meet their vitamin and protein needs and to sell the surplus at the market. The study determined that special species of bamboo grow in the summer and in winter and can be used as vegetables, in making products or in handicrafts.

[slide] We introduced a new technique for natural compost making that has shown better yields than more traditional techniques. [slide] This is the market garden and the bamboo called sweet bamboo by Cambodians, as it can be cooked without adding any sugar and contains vitamins. I would like to point out that during the ploughing ceremony in Battambang, one of these bamboo baskets was presented to the King.

[slide] More economic activities, like chicken and fish farming. We also thought of pig farming and honey production. Regarding handicrafts: we support associations that have been established in former projects and aspire to the establishment of new ones. For this project we target the granting of a special label only for handicrafts produced in the Angkor Park. We have begun drafting the administrative procedures to obtain this label.

[slide] We also help the artisans to produce and offer market output. We have made stalls available for them in the temples. For example, here, at Ta Prohm *parvis* or here, at that of Banteay Srei, where you can find an Artisans of Banteay Srei boutique.

[slide] Of course there is a need to develop jobs for artisans, but where does the money come from? They do not have any capital investment. The goal is to establish in the village self help groups that collect money that is redistributed to the members in need of cash to invest in new activities.

[slide] During the second phase, we would like to support the economic endeavours and training of the community liaison officers. We organised a study trip to New Zealand and exchanged on best practices in this country. We also made contact with institutions to consolidate community liaison officer training.

We also met with staff from the Ministries of Foreign Affairs and Commerce and the General Secretary of the Minister, Mr. John King. [slide] We linked with the Director General of the Department of Conservation, who is an important figure in the country. The director promised to help us with several programmes. [slide] We also searched educational bodies in universities, in order to try to find a way to exchange and assist in the community liaison officer training.

[slide] Regarding the commitment of villagers: We have hired several Cambodian consultancies and we launched small projects in six villages, including a baseline study, and

established a monk committee for Siem Reap province. [slide] This is an assembly in a village and a workshop with Buddhist monks.

[slide] We continued our activities on heritage education and I circulated the short comic book *Angkor is our Heritage*. Two years ago, the project produced an animated cartoon and we used the pictures from that cartoon to produce this small notebook for school children. [slide] Education has continued in primary and secondary schools and in the villages.

[slide] The third part of the outcomes is mostly to repair and build hydraulic infrastructures, to use solar energy and to draw up a land registry in the Angkor Park. [slide] These are small infrastructures built in villages to control flooding and also irrigate the fields in the dry season.

[slide] Regarding solar stations: Two of them have been built; a third is under way. The same goes for the land registry and GIS, both on-going projects. [slide] The populations are invited to contribute to the registration of the land in villages. This has been digitalised, so that land use is represented. Up to now, we have worked on ten villages. An additional six will be worked on this year. [slide] Based on aerial photographs, we identify land and then check on site and ask for the participation of the locals in identification.

[slide] All these activities, social businesses, solar stations, boat or ox cart rides and potable water treatment are social enterprises that aim at improving villagers' lives. Small-holder business management respects the principle that the project is directly targeted to a committee of elected villagers. The APSARA National Authority assists only in an advisory and technical assistance role.

[slide] The profits generated by this social enterprise are distributed in three elements: To the villagers taking part in the scheme, to the elected committee and, what is more important, to set up a development fund for the village. This fund is deposited in a bank and the money will be used once decided upon by the village Committee, either to help villagers or to implement valuable projects for the village. This situation can be considered as sustainable as the village always has some money to start up projects in the village.

[slide] In these pictures are the community-based tourism activities. [slide] Finally, I would like to talk about the visit of the Governor-General of New Zealand (the Chief of State), who wanted to visit the implemented projects.

Thank you very much."

Comment from the Co-chairman for Japan: "Thank you. The next topic is on the UNESCO/ Japanese Funds-in-Trust for museums. Misses Sam Thyda and Chhom Kunthea will present."

**III.B.2 UNESCO (Paris)/Japanese Funds-in-Trust project: Linking World Heritage sites, museums and populations–Khmer Women in the past, present and future, by Mrs. Sam Thyda, Deputy Director of the National Museum of Phnom Penh and Ms. Chhom Kunthea, Director of Preah Norodom Sihanouk Angkor Museum, Department of Cultural Development, Museums and Heritage Standard, APSARA National Authority**

**Ms. Sam Thyda:**

[OrigK] "Your Excellency Deputy Prime Minister,  
Co-chairs,

Excellencies, Ladies and Gentlemen,  
Honourable Delegates,

On this joyous occasion and with the permission of Ms. Nao Hayashi, the UNESCO project manager based in Paris, I am delighted to present on the second phase of our project implemented in the Angkor Park, World Heritage site.

The project is financed by the Japanese government and friends and aims at linking museums and communities within the World Heritage sites of Cambodia, Laos and Vietnam. Four museums in Cambodia take part in this project and they are all located in the World Heritage sites of Angkor or Preah Vihear.

As field project manager, Ms. Nao Hayashi—who could not be among us today—asked us to present this project with previous achievements already explained here at the Angkor ICC. The main object of the project is the establishment of relationships between museums and communities living in World Heritage sites and notably at Angkor.

[slide] These are pictures of an exhibition poster that we produced for the first phase of the project (2011-2013) when three Southeast Asian countries took part in the project (Cambodia, Laos and Vietnam), representing nine museums from six World Heritage sites. This poster is on display at the Preah Norodom Sihanouk Angkor Museum and depicts nature and mythology. The other museums selected their own exhibition topics. [slide] These are pictures of the six World Heritage sites and of the nine museums engaged in the project.

The second phase of the project rolls out over three years (2013-2015), with seven villages and four museums contributing. It is a project entitled Photo Voice and all the descriptions, interviews and photo shoots have been mainly the achievement of villagers. One of the components of the project is on intangible heritage in a World Heritage site.

[slide] This is an example of the work carried out in Vietnam. [slide] Here is a picture of a young family living in the World heritage site of Angkor. We are two presenting, and I now hand over the floor to my colleague, who will present the second part of the presentation.”

### **Ms. Chhom Kunthea:**

[OrigK] “Excellencies,  
Ladies and Gentlemen,

As described earlier, the Photo Voice Project is financed by a Japanese/UNESCO funds-in-trust and reaches out to Cambodia Laos and Vietnam, each of these countries producing their own exhibitions. In Cambodia there are four museums participating in the project: the Cambodian National Museum in Phnom Penh, Angkor Siem Reap National Museum, Preah Norodom Sihanouk Angkor Museum and Preah Vihear Territory Eco-museum. Seven villages located in the Angkor Park have been invited to join the project. The villagers will write texts and take pictures to design the exhibition.

We organised two seminars, in October 2014 and April 2015. In the October 2014 seminar, villagers took pictures and wrote texts. In the April 2015 seminar, the villagers and the project managers met to improve the texts and select pictures, such as is illustrated in this image. In April, 2015, during Khmer New Year, we set up a test exhibition to sample national and international visitors’ opinions.

In the halls of this conference room you can see part of the temporary exhibition, which only focused on two subjects: Women and Skills Transfer and Women and Beliefs. For those who have not read them, please feel free to do so. [slide] The main exhibition in



Angkor focuses on several topics, as this picture shows, with the main topics being Women and Skills Transfer.

[slide] Women play a pivotal role in farming. Pictures of this exhibition highlight the work of women in the fields and their role as financial support to their families. Craft is also a main topic and another field where women contribute in numbers. Villagers have written the texts that you can see on the left part of this slide and they also took the pictures. The texts were proofread and translated into English.

Women not only work in their villages, but also help each other when giving birth, educating children and taking care of them when ill. They educate them and transfer their skills to younger generations. [slide] Another important topic in Khmer culture is clothing. The exhibition also mentions the role of women in beliefs through several religious ceremonies and the giving of alms.

The project's next step is to set up the final exhibition in July of 2015 and to organise education sessions and proceed to project review. The project teams of the three countries strive to bring museums closer to the communities and visitors. I thank you for your attention."

Comment from the Co-chairman for Japan: "Thank you Ladies. Let's move on to Mr. Philippe Delanghe and Ms. Ai Sugiura on the Water Working Group project, which is supported by UNESCO Jakarta."

### **III.B.3 Working Group on Water on the Angkor Site and in Siem Reap City, project funded by UNESCO Jakarta, by Mr. Philippe Delanghe, Culture Programme Specialist and Ms. Ai Sugiura, Coordinator and sustainability science specialist, UNESCO**

#### **Mr. Philippe Delanghe:**

"Your Excellency Deputy Prime Minister,  
Distinguished Co-chairmen,  
Excellencies,  
Ladies and Gentlemen,

Some of you remember that in 2007, UNESCO restarted the discussion on water in close collaboration with the APSARA National Authority and more specifically with the Department of Water Management, spearheaded by H.E. Dr. Hang Peou.

[slide] This collaboration materialised with the organisation, in the margin of the Angkor ICC and attended by the co-chairmen, of a Water Colloquium presided over by H.E. the governor of Siem Reap. This colloquium was deemed necessary, as we all know how essential water is for the conservation of Angkor, a World Heritage site, and for the city of Siem Reap.

This colloquium was also very important in terms of environmental management at Phnom Kulen and the Tonle Sap. Finally, it was key to bolstering cooperation between the different national and international bodies that work in this field and to fill the absence of any centralised database.

[slide] A total of three colloquia were organised in 2007, 2008 and 2009. They succeeded in the adoption of recommendations at the 2010 ICC and the establishment of a Secretariat dedicated to the different partners. This has brought together national and in-

ternational bodies with a view to establishing a centralised database and in order to better understand the situation of water in the Siem Reap/Angkor region.

I am delighted today to announce that, after an intense period of discussions and negotiations, the UNESCO Regional Office for Science, based in Jakarta, Indonesia has decided to support this matter. We can, consequently, already establish a Secretariat and on-going talks have already started with the government and in particular the APSARA National Authority.

I will talk longer on this matter tomorrow during the water debate and I now hand over the floor to my Jakarta office colleague, Ms. Ai Sugiura, whose role was key to the success of the negotiations and who will explain the overall picture for the granting of this support.

Thank you very much."

**Ms. Ai Sugiura:**

"I will continue, but in English. <sup>[OrigE]</sup> My name is Ai Sugiura. I am the coordinator for the Japan Funds-in Trust science programme in Asia and the Pacific and based in Jakarta.

<sup>[slide]</sup> I would like to present our project on Sustainability Transformation across the region. Its aim is to develop a framework on sustainability science for the region and implement it.

<sup>[slide]</sup> Let me start by giving a definition to explain what sustainability science is. It focuses on the interaction between nature and society. It is trying to reconcile in the long-term society development goals with the fact that the planet's environment has limits. It is problem-driven and results-based. Its purpose is to create and apply actionable knowledge in support of decision making for sustainable development and lead to sound policies.

Another specificity of sustainability science is that this actionable knowledge would be co-produced and co-designed with all practitioners and stakeholders. It will also lead to transforming society into a sustainable and resilient society. It comes from the fact that understanding individual major society systems does not give understanding on the behaviour of those systems.

<sup>[slide]</sup> We had already within the Japan Funds-in Trust Programme two workshops on sustainability science and the meaning and framework for the region. Within this project we have three case studies. They all deal with water issues, and in particular, one, in Malaysia, on urban water and water pollution-related problems. Another one, in the Philippines, is on World heritage and irrigation and how sustainability science can provide specific solutions.

Finally, the last one is here in Angkor with Restoring and Enhancing the Angkor World Heritage Site and Water Management System at Siem Reap City and Tonle Sap Biosphere Reserve Programme. This case study is very particular, because sustainability science will have to include benefits and constraints from the fact that we have a World Heritage site and a biosphere reserve.

Thank you very much."

Comment from the Co-chairman for Japan: "Thank you very much. The next item is on the Introduction of the Environmental Management System according to the ISO 14001 standard, by H.E. Mr. Chhor Thanat."

### **III.B.4 Introduction of the Environmental Management System according to ISO 14001 standard by His Excellency Mr. Chhor Thanat, Deputy Managing Director in charge of the Department of Forest Management, Cultural Landscapes and the Environment, APSARA National Authority**

[OrigK] “Your Excellency Mr. Sok An Deputy Prime Minister and President of the APSARA National Authority,  
Distinguished Co-chairs,  
Excellencies,  
Ladies and Gentlemen,

My name is Chhor Thanat; I am Deputy Director General of the APSARA National Authority and in charge of the Department of Forest, Environment and Cultural Landscape. Let me introduce you to the Angkor Environment Management System.

[slide] You all know what ISO means: International Standard Organisation. An independent body established in 1947, with its head office in Geneva, Switzerland. [slide] In this picture is the number of organisations that were labelled ISO 14001 in 2012 to become members of the organisation delivering the ISO certification. The organisation has 285,844 members, with 143,387 located in Southeast Asia and ten in Cambodia.

[slide] ISO 14001’s objective is to promote the protection of the environment and to prevent its pollution while ensuring the balance between social and economical needs. It also reviews the activities of its members with regard to impacts on the environment and assists them in minimising these direct or indirect impacts. The body requires its members to comply with its standards. I will later on detail ISO management.

[slide] The legitimate question is to ask, what is the need of the ISO certification? The answer is that ISO helps to:

1. Raise awareness among staff of any given organisation on the protection of the environment and increase vigilance on this issue;
2. Increase work efficiency;
3. Reduce the environmental pollution in the Angkor site;
4. Reduce costs and increase receipts;
5. Guarantee the public’s trust, notably that of visitors. ISO reassures the public and fosters better cooperation with the APSARA National Authority.
6. It guarantees to our partners a better reputation of our site worldwide. On this particular point I would like to add that Angkor is the sole World heritage site awarded the ISO 14001 certification.

Thanks to the long term vision of H.E. the Deputy Prime Minister Mr. Sok An on the increase of visitors to the Park for the forthcoming years, the request and subsequent delivery of the ISO 14001 certification is a must for sustainable management of the Park.

[slide] In this picture, the Memorandum of Understanding signed on the 23<sup>rd</sup> of March, 2003, between the representative of JQA (Japanese Quality Assurance Organisation) and the Director General of the APSARA National Authority, attended by the Deputy Prime Minister. Three years earlier, we were granted for the first time, on the 17<sup>th</sup> of March, 2006, the ISO 14001 certification. On the background panel on this picture you can read the certificate awarded by JQA. JQA stands for Japanese Quality Assurance Organisation. It is the biggest audit organisation in Japan and Asia. A neutral organisation, it is part of worldwide network of audit organisations.

[slide] This is the visit of the director of JQA in February, 2012. He personally went to the Angkor World Heritage site to review the compliance with the ISO 14001 standards. He took this opportunity to visit the Deputy Prime Minister at the Presidency of the Council of

Ministers.

Before obtaining the ISO 14001 certification, the APSARA National Authority had to adopt an environmental policy agreed on by JQA. The main stance of this policy is the environmental perceptive conducive to harmonious development between the environment, the monuments and the communities in order to guarantee sustainable development for generations to come. It is also based on the following principals:

- 1.The aforementioned environmental vision;
- 2.The participation in the preservation of the environment of Angkor and the establishment of waste management; cleanliness of rivers, canals, ponds and moats; seeing to the air quality; the protection of the forest and other natural resources within the Angkor Park;
- 3.Raising awareness among the people living in the Park on environmental protection;
- 4.Compliance with standards, regulations and any other conditions;
- 5.Constant improvement of the Park's environmental conditions.

Our objective is to see to the APSARA National Authority staff's awareness on protection of the environment, waste management, preservation of natural resources and protection of cultural landscapes. A PDCA (Plan, Do, Check, Act) model is applied for the implementation of these principals. In order to succeed, the APSARA National Authority has set up a secretariat composed of 15 members representing the 15 departments of the APSARA National Authority and 55 staff appointed to the implementation of the programme. Each year, environmental programmes are to be implemented.

*[slide]* This is a picture illustrating a training session for the APSARA National Authority staff and *[slide]* here for the Tourism and Heritage Police forces and *[slide]* for guards and workers. Adding to these training sessions we also see to the quality of water and air. Each year, representatives of JQA visit the APSARA National Authority's headquarters to update the staff on the latest developments of the organisation with regard to standards and criteria. They also work with hotels, restaurants and travel agencies to raise awareness on the issue of the environment.

*[slide]* These are pictures of an audit to all departments and the outcomes. As recently as the 17<sup>th</sup> of March, 2015, our certificate was renewed for three years after JQA and internal audits. These are all the certifications that have been granted since 2003, a total of four, and we hope to renew them every three years. I thank you for your attention."

*Comment from the Co-chairman for Japan:* "Thank you very much. As we are behind schedule, let's listen to the next two presentations on the agenda and start the general discussion after. The next presentation is from Dr. Ea Darith, on ceramics at the Chong Samrong site."

### **III.B.5 Report on the international training on ceramic of Chong Samrong site to archaeologists from different Asian countries, by Dr. Ea Darith, Deputy Director of the Department of Conservation of Monuments Outside Angkor Park, APSARA National Authority**

*[OrigE]* "Excellencies,  
Ladies and gentlemen,

*[slide]* My name is Darith and today I will present two points. The first regards the Chong Samrong kiln site and international training, excavation and the Ceramic Study-Storage Centre.

[slide] This is the timeline for Chong Samrong's timeline development. In 2010, the Henry Luce Foundation supported an International Workshop on SEA Ceramic Technology in Washington DC and Philadelphia (2010). A kiln and ceramic technology workshop was then held in Siem Reap (2011), also supported by the Henry Luce Foundation.

The Torp Chey kiln was excavated following the workshop (2011-2012) with support from the APSARA National Authority and ISEAS-NSC-AU (separate project). Torp Chey is an intact, brown-glazed Angkorian stoneware kiln site. It is the largest kiln yet identified in Southeast Asia. The structure of the kiln is unique and different from other kilns found in Southeast Asia. Therefore, I invited, with the support of FOKCI, Don Hein (kiln expert) to contribute to the Torp Chey project, including a site visit to confirm kiln conditions and training potential (2011-2012).

The initial results of Torp Chey kiln excavations were discussed with Don Hein and Louise Cort (experts in Southeast Asian ceramics and kilns). A plan of action for advanced professional training, analysis, and conservation regarding ceramics and kilns was designed. The training potential, conditions and timing were excellent for offering advanced training for young professional archaeologists interested in ceramics, kiln technology and industries.

Chong Samrong kiln (similar to Torp Chey) was decided to be the most appropriate site for further on-site professional training. The Smithsonian Institution then supported Chong Samrong kiln excavations and training (2013) with Henry Luce's support, while FOKCI supported conservation and storage efforts.

[slide] These are the Torp Chey, Chong Samrong and Veal Svay kilns. They are located east of Angkor, circa 60 kilometres away. [slide] We received 37 applications, of which 17 were selected; including 5 women and 12 men from Cambodia, Laos, Vietnam, Thailand, Myanmar, China and Germany.

[slide] The training programme began with a three-day lecture and discussion series: 1) Background history and culture of the Angkor region; 2) ceramic and kiln archaeology, technology and analysis; and 3) current research projects in Angkor, including LiDAR. Training excavations were conducted on site from the 27<sup>th</sup> of February until the 1<sup>st</sup> of April, 2013. We used Don Hein's handbook on the archaeology of Southeast Asia's historic ceramic kilns and the Ceramic Classification System (CCS) database, which provided critical structure and guidance.

[slide] This is a 3D Map of the Chong Samrong Kiln site, produced by the APSARA National Authority IT team. [slide] During training, we camped near the site so that the crew would stay close during the excavations. This is the on-site training, with systematic archaeological excavations and recording of all artefacts found during the digs.

[slide] After excavating, we hosted a site visit by APSARA National Authority officials, the FOKCI director and local students. [slide] The kiln site of Chong Samrong is very large: 20 metres in length and 3.2 metres in width. The ceramic found, as in Torp Chey, is mostly brown. After the excavations, we discussed with His Excellency Tan Boun Suy the possibility of creating a ceramic study-storage centre on his premises.

[slide] We trained ten returning trainees in December of 2014. The training focused on: Study-storage facility operations; identification and registration methods; storage and retrieval systems; use of hand-held lenses to observe the ceramics; and a documentation system at the Angkor Training Centre and AIRDC. We were fortunate to be able to use these tools for the first time and enjoy the premises of the Angkor International Training Centre. We had to examine finds from excavation, and then we selected diagnostic pieces for photography, drawing, cataloguing and publication.

[slide] These are training activities at the Angkor Training Centre and the Angkor International Research and Documentation Centre (AIRDC). We displayed all the ceramics to be analysed together by the teachers and trainees. This is to show how to prepare samples and cut ceramics. We got support from a lot of books related to ceramics from the Smithsonian.

[slide] The training exercise was very successful. Trainees gained knowledge and practical skills for specialised research on ceramic kilns and ceramic recording systems. The creation of a dedicated Ceramics Study-Storage Centre (CSSC) within the APSARA Authority has useful long-term potential for advancing the study of ceramics in Cambodia. The CSSC will play an important role in properly managing and storing ceramics and artefacts according to international standards.

[slide] These are the cabinet and boxes funded by FOKCI during the training and we thank them very much. [slide] In these pictures are the teachers and trainees during the programme, with the CSSC in the background.

Thank you very much for your attention”.

Comment from the Co-chairman for Japan: “Thank you. The floor is now to H.E. the Deputy Prime Minister.”

Comment from the Deputy Prime Minister, Mr. Sok An: “I would like to make a comment on the presentation of the APSARA National Authority on the ceramic centre. We noticed that Dr Darith has been working for a long time on ceramic research. We all know that within the APSARA National Authority we have an International Research and Documentation Centre managed by H.E. Tan Boun Suy. We will now discuss among ourselves the setting up, within the framework of the International Research and Documentation Centre, a new centre on Ceramics. Dr Darith will lead this new centre. We will try our best to help enlarge this research centre on ceramics, to equip it with a laboratory, thanks to the cooperation with our partner countries.

I would like to announce the establishment of this Ceramic Centre under the leadership of Dr Darith. He has been entrusted with building up this Centre and turning it into a leading centre in the region. I would like to send an appeal to our friends so that he will be able to establish a quality Ceramic Centre within the APSARA National Authority.

Thank you very much.”

Comment from the Co-chairman for Japan: “Thank you very much, Excellency Deputy Prime Minister. The last item of the day, by Mr. Beschouch.”

### **III.B.6 Report on activities of the Angkor Training Centre first six months of 2015, by Professor Azedine Beschouch, Chairman of the Center**

“Distinguished Co-chairmen,  
Your Excellency, Deputy Prime Minister, President of the APSARA National Authority,  
Excellencies,  
Ladies and Gentlemen,  
Dear colleagues,

[slide] You remember that last December was officially inaugurated the Angkor Training Centre. At the time, the value of training for future managers of the World Heritage site

was mentioned. I have the honour of being the chairman of this Centre and I am very grateful.

[slide] From the onset, a continuous programme has been set up. We started with training on cultural tourism. Fortunately, a former colleague from UNESCO and international consultant for ICOMOS, Mr. Hervé Barré, agreed to a request by H.E. Sok Sangvar to come for one week for a very fruitful and positive seminar. [slide] We know that our colleague will come for another programme and this has been scheduled. This training was a real exchange. All of those that attended the different sessions in class or in the field have been delighted with this opportunity. In this picture you can see him with TMP staff in the field.

The other programme honoured the APSARA National Authority. It focused on youths working in different departments of the APSARA National Authority (Culture, Tourism, TMP, Monuments) and also of the ANPV (Preah Vihear National Authority). Three of them came from the Preah Vihear site.

[slide] They graduated from a different programme, that of the University of Palermo, in collaboration with the Ministry of Culture, represented by H.E. Chuch Phoeun. [slide] We organised a graduation ceremony that delighted all those attending, as these pictures show.

The Centre is also fortunate to have a laboratory in Angkor. In the future, this centre will of course be moved to the headquarters of the APSARA National Authority, as it is presently located at the Angkor Conservancy. This laboratory assisted in several researches. [slide] This particular one is of spiritual value. This is a Buddha foot that was used for training youths beyond their diploma course by Italian trainers. Within the framework of the APSARA National Authority, we have trainers coming from Florence, Turin, Bologna and Palermo. These are the main training centres in Italy, and they are among the best in the world working with us and training these young people.

They were able to restore this Buddha foot. [slide] An analysis and stratigraphy of this foot was also carried out, as these pictures show. The artefact has been restored and is a real museum piece. Eventually, it will be exhibited in museums. It is a shame that H.E. the Minister of Culture is not with us, as she would have been delighted to be informed that all this work is not only for the APSARA National Authority but for the nation, the country.

Actually, once restored, these objects will not remain at the APSARA National Authority in a laboratory, but will be exhibited. Not that many types of Buddha feet can be found. There are only two of these kinds here and it is very important that they are exhibited in a museum, as they are sacred items.

[slide] The other activity concerns the Royal pagoda of Vat Raja Bo. This pagoda is of value, as it contains ancient features (stucco, paintings, statues). [slide] This picture shows you how the young trainees learnt to analyse. I would like to insist on this matter, as it is not always mechanical work: first a study is necessary, before starting the restoration work *per se*. [slide] Here, they are working on the paintings. This is the stratigraphy of the decor, to discover the dating and type of materials. They are, most of the time, natural materials and the trainees wished, in tune with their trainers, to re-apply these ancient methods and not to use materials that would not be sustainable.

[slide] Briefly, I skip these works that presented the aesthetical value. This, for example, is a column where the traces of ancient colours were analysed to restore them. [slide] No further comments, as you can see how these columns were restored to their original glorious condition. These are the young men and women at work.

Here to the left are majestic statues of Buddha that were actually gilded. The venerable Abbott came to see them and he was delighted with the work undertaken by these young Khmers and, extraordinarily, decided to open the doors of his museum. He told them: 'All these items are for you and tell H.E. the Deputy Prime Minister that all these ob-

jects are at his disposal'. Because this is a historical treasure that proves that Khmer society was extremely dedicated to Buddha, as even poor people would make offerings so that these statues could be as beautiful as possible.

This work has been achieved <sup>[slide]</sup> but recently a group of Chinese tourists leant on one of these windows here at the centre and broke part of it. Emergency repairs were needed and the trainees started the work, coached by their teacher. The work has been completed. We then realised that what was broken needed to be repaired, but that preventive work was also necessary. The APSARA National Authority director was informed. The consolidation work on other windows will be enabled, preventing any potential hazard for tourists and preventive restoration was carried out.

<sup>[slide]</sup> We had laboratory and pagoda activities at Wat Raja Bo and finally, the last project was that at Phnom Bok. This is a major project for the APSARA National Authority, enlisting several departments (Tourism, Monuments and etc.). There is even an inscription that mentions an eclipse, and even informs on the time and date. This means that this was used as an astronomical observatory. It was very important at the time and an inscription authenticated it.

<sup>[slide]</sup> The last idea fermented by the minds of these hard-working trainees regards the linga. It was shattered into pieces: They found the pieces, more than 40 fragments, and they may be able to restore the complete linga, which would be great for this hill where three temples, as you can see, are located. Finally, the last idea brought up by the architect that trained these youths is based on the inscription that states that there was probably an observatory and that this could be turned into a modern planetarium. He is in the process of consulting with a planetarium in Italy to see if establishing one here is feasible.

This would boost tourism at Phnom Bok and we will work on this with our friend Sangvar. Not only will visitors tour a monument but also a site, a museum with a planetarium, something unusual.

I hope that the president and the director general can trust these young trainees, as can their respective departments, so that they can continue their work with the same bravery. I congratulate them and all departments.

I would add that for health reasons, I was away for two months. During this period, the President of the APSARA National Authority kindly detached a team, led by Ms. Mam Vannroth <sup>[slide]</sup>. This is a remarkable person, as when I was absent, she managed very well, so that the Italians were able to smoothly undertake their assignment. Lastly, more congratulations to the Secretary of the National Commission, Ms. Tan Theany, who kindly agreed to help me while I was away and has continued since I have been back.

I thank you for your attention."

## **General discussion**

*Comment from the Co-chairman for Japan:* "Thank you very much. The floor is now to the attendees, whether you have questions on the previous presentations. It does not seem to be the case, so let's close this first day of proceedings. Maybe there is an announcement from the Secretariat?"

*Announcement from the Co-chairman for France:* "I would like to draw the attention of the floor to the fact that tomorrow meeting starts at 8 a.m., sharp, and not at 8.30 as was the case today."



Comment from Mr. Azedine Beschaouch: "As requested by the Co-chairmen, we have handed out the new recommendations. They are for your information and your review so that we will not lose any time reading them out tomorrow. Please, you should read them between tonight and tomorrow afternoon and make suggestions for improvements. This will smooth the workload. Thank you for your help."

Comment from the Co-chairman for France: "Enjoy your evening."

**\*\* Conclusion of proceedings for Thursday 4 June, 2015 \*\***

**Friday 5 June 2015**

## **IV.1 CONSERVATION, RESEARCH AND ARCHAEOLOGY: TECHNICAL TEAMS ACTIVITY REPORTS**

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Comment from the co-chair for Japan: "We are now entering the third chapter of our meeting with Conservation Research and Archaeology and let us start with the recent research by Mafkata, French-Khmer research on archaeology presented by Dr. Christophe Pottier of the EFEO."

### **IV.1.1 Recent research by Mafkata (French-Khmer archaeological mission for the development of the Angkor territory) by Dr. Christophe Pottier, Senior Lecturer, EFEO**

"Excellencies,  
Ladies and Gentlemen,  
Dear colleagues,

[slide] I'll be very brief and introduce the latest outcomes of the Franco-Khmer archaeological mission on the Angkorian land use and, in particular, the 2015 archaeological excavations season undertaken in March and April of 2015. This archaeological mission started fifteen years ago. It has focused on the establishment of urban features in the Angkor region and notably those of the West Baray and Roluos.

[slide] This complex of sites that is represented in this picture has been already excavated, in 2000. This year we focused on an area to the west of the West Baray. This site was briefly depicted in Victor Boulbey's work in the 1930s, but had never been researched since.

This year we focused on a complex of sites, in this picture, which are the following: *Prasat* Trapeang Sen, *Prasat* Boeng Kandal and *Prasat* Kôk Ta Pok. They are actually inside a private parcel that is owned by foreign investors.

[slide] *Prasat* Trapeang Sen was built on a large and long area of more than four kilometres east-west dike. Boeng Kandal followed a traditional mound design and Kôk Ta Pok extended over 600 metres. Golubew mentioned *Prasat* Trapeang Sen briefly and there we found carved blocks from the Baphuon style. The site is made up of a very large mound atop a dike.

[slide] At *Prasat* Boeng Kandal, no remains have been found apart from some scattered laterite blocks and at *Prasat* Kôk Ta Pok, enclosed by a longer than 600 metres wall, are a series of mounds, ponds and orthonormal alignments that suggest a specific organisation.

[slide] The three sites were excavated in March and April 2015. Two large trenches were dug on *Prasat* Trapeang Sen and *Prasat* Boeng Kandal and a series of small test-pits at *Prasat* Kôk Ta Pok.

[slide] These images show the types of work carried out. At *Prasat* Trapeang Sen we dug a 120 metre-long trench on top of the mound and at the base of the dike. [slide] Another trench connected with *Prasat* Boeng Kandal dike. [slide] Finally at Kôk Ta Pok, we dug four test-pits of ten metres in different components of the site, in particular banks and ponds.

[slide] A series of measured drawings were conducted, including the entire trenches, material analysed and so on. The work is partly done and is continuing at the EFEO Siem Reap. Additional corings were also done in collaboration with Sydney University.

[slide] Visitors came to see our sites, including the national authorities and student groups. All the digs have been filled in and the fence that had to be removed to let the machinery through was completely reinstated before Khmer New Year, as was planned with the landlords.

[slide] As for the preliminary findings, actually very preliminary, as this morning I was woken up with the first Carbon 14 dating. We can confirm that there was a temple at *Prasat* Trapeang Sen; based on the architectural remains and the C 14, it was probably built in the early 11<sup>th</sup> century, probably simultaneously with the construction of the West Baray.

[slide] This temple was also built on a much older dike, as confirmed by C 14 dating. It is from the 10<sup>th</sup> if not the 9<sup>th</sup> century and could be pre-Angkorian, although we do not have sufficient evidence to confirm this dating. Conversely, it was not possible to confirm the existence of a pre-Angkorian temple at Boeng Kandal, though we found habitat traces from the post-Angkorian era, which are now being investigated.

[slide] The large complex of Kôk Ta Pok remains unusual, but we can confirm that it was related with the Angkorian period and not pre-Angkorian. Its function is still unknown and the small test-pits dug did not yield additional clues. Work is on-going and I will of course update you on our progress via ICC presentations and scientific papers.

I would like to thank our donors and notably the *commission nationale des fouilles française à l'étranger*, our main partner. I thank you for your attention."

Comment from the Co-chairman for Japan: [OrigE] "Thank you and congratulations. The next presentation is that of Dr Karoly on new archaeological evidence of landscape transformations around *Prasat* Krachap, Koh Ker Site."

## **IV.1.2 New archaeological evidence of landscape transformations around Prasat Krachap, Koh Ker Site, by Dr. Karoly Belenszky, leader of archaeological mission in Cambodia, HUNINCO-HSARI, Hungary**

[OrigE] “Co-chairs,  
Experts,  
Ladies and Gentlemen,

I would like to present the really fresh results of our excavations at *Prasat Krachap* in Koh Ker, and the title is New Archaeological Evidence of Landscape Transformations around *Prasat Krachap*. A difficult title, which I hope at the end of my presentation will be clearer.

[slide] Within the framework of the Memorandum of Understanding for cooperation at Koh Ker (MoU), we continued the fieldwork at *Prasat Krachap* according to our five-year archaeological programme.

Last year, I said in my presentation that the results of the LiDAR survey by the Khmer Archaeological LiDAR Consortium (KALC) had immense importance in relation to the understanding of the environment of the site. In this context, the evaluation of the data primarily concentrated on the detection of various changes in the inhabited areas, generated by the modifications in the water level. Moreover, a number of built structures, made of non-durable materials were mapped, which have been interpreted as the remains of the earlier settlements partly aligned to the walls.

[slide] The identification and description of these objects were the most important subjects of research. My opinion was that the anomalies in different structures may refer to chronological differences, and the changing of the natural and anthropogenic environment. With the help of LiDAR analysis we aimed at specifying our preliminary concept of the former settlement structures and the built elements, close to *Prasat Krachap*.

[slide] That's why this season we focused on the LiDAR analysis, which previously detected road construction leading from *Prasat Krachap* down to Rohal and industrial activity close to the temple. We opened four trenches between the 10<sup>th</sup> of March and the 19<sup>th</sup> of March, 2015. [slide] Primarily, this research concentrated on the main structure and line of the road, and aimed at the investigation of the natural sandstone layer to find the quarry previously hypothesized.

[slide] The four trial trenches (30 m<sup>2</sup> in total) provided information on the following aspects of the site: The line of the road was centred on the main east-west axis of *Prasat Krachap*. The former border structure was found with traces of laterite and sandstone blocks in the forest, and a demolished terrace close to Rohal. We opened a trench close to the end of the east-west stairway of the storage building in front of the temple, in order to cut the former road (almost 180 metres long and four metres wide) and provide evidence on the original layer structure (Trench 18). Fortunately, this trench yielded body-fragments of a sandstone lion, close to its original position.

[slide] We also documented the main structure of the road, in this trench, which consisted of compacted laterite chips, clay and sand layers covered by small sandstone blocks. [slide] In the middle section of the road construction, several signs of wooden columns were identified on the laterite blocks. That's why we opened the second trench across this area. [slide] Here (Trench 20), we found the same structure of layers, but the sandstone block layer was demolished. However, we noted signs of its traces close to the laterite blocks. The excavation confirmed the original structure, but we did not find any indication of the former wooden superstructures, except for fragments of roof tiles.

[slide] We opened the third trench on the east bank of Rohal, where we previously detected a stairway structure made of small laterite blocks. It was 8 metres wide. We

excavated this area, and documented the stairway, as well as a bank wall structure outside of it. <sup>[slide]</sup> We opened the fourth trench close to the temple, where we observed previously few marks of sandstone extractions on the natural surface (Trench 19).

In this trench, we located a small quarry, where extraction of sandstone blocks was verified. We found three column-shaped stones and a refilled area. It looks like this small quarry had a special function during the course of construction, but later it was terminated and refilled. The presence of such phenomena at the site in my opinion reveals that the construction works at *Prasat Krachap* radically transformed the former natural environment.

<sup>[slide]</sup> According to our arrangement with APSARA, we kept open trench 19, and 21, and to avoid accidents we constructed an enclosure around the open research area.

What would be the perfect summary after this preliminary report? My general opinion is that the archaeological site at Koh Ker (as in other areas) has a special character. We have, however, insufficient information about the former settlement structure. I think that Koh Ker was more than a historical site; Koh Ker was a special network of planned elements.

Until now, we have focused on the most important features in the town plan, but the details of this network, the areas between temples, the connecting links between them, such as roads or the water system and the surroundings of the temple structures (like settlements, industrial activity), except in the cases of some unique areas, remain almost unknown. These details have immense importance concerning the interpretation and the understanding of the establishment and the function of this area.

<sup>[slide]</sup> In the next research season we will focus on the road leading toward Rohal, and the presumed terrace. Moreover, we plan to follow and discover the line of this construction behind the temple, in order to understand the connection between this structure and *Prasat Krachap*.

<sup>[slide]</sup> After digging the test-pit, we cleaned and selected the collected finds, then processed them to the HUNICO base in Siem Reap. We prepared the description, photography and drew the most characteristic artefacts from the excavated material. We placed all the finds in plastic boxes at the APSARA centre.

To finish, I would like to express my thanks to the Khmer workers, my colleagues, for their excellent cooperation and hard work. Thank you for your attention."

Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "Thank you very much. Now we invite a colleague from Prague, Dr. Karel Kranda, Institute for Nuclear Physics, for his presentation."

#### **IV.1.3 Searching for past records of aerosol pollution in sandstone microstructure, by Dr. Karel Kranda, Institute for Nuclear Physics, AVCR**

<sup>[OrigE]</sup> "Ladies and Gentlemen,

<sup>[slide]</sup> As you can see, this picture has a rather chilling effect that may entertain some in this hot summer. <sup>[slide]</sup> This is our laboratory where we do the measurements. <sup>[slide]</sup> This is the equipment we use most of the time. Here is a new accelerator with its own source producing ions, subsequently accelerated scan samples; in this picture, a fragment of sandstone.

The idea behind these rather complicated arrangements is to find traces of past pollution by aerosols. We would assume that some of them deposited at the surface of the stone and migrated at a yet unknown rate into the stone. Combined with dendrochronology, we could find a match in the trees of particle elements, and then we could find the time when an element or pollution entered the stone.

[slide] The aims are to test the feasibility of detecting the distribution of individual sandstones. What we basically carry out are 2D maps of the distribution within the sample, to assess the concentration of the elements within the scan window. The scan window is part of the sandstone scanned with a proton beam. It is like what you have present on the television screen with electrons, it is the same principle.

The ultimate purpose is to detect the present and past record of aerosol pollution from the examination of the elements' concentration. Why are we using this rather complicated and expensive method?

[slide] I listed here four reasons which occurred to me: One is the higher density of detecting individual elements, which may allow us to detect and identify certain elements at very low concentrations which cannot be seen using other methods. Second is to spatially resolve and have a look at the concentration of particle elements in a particle location of the scan window. The third is the resolution, down to 1 micro metre, which gives us a lot of detail to see the microstructure of the stone. Finally, the feasibility of identifying a particle mineral, not just an element, but a mineral within the sandstone.

[slide] This is the experimental set up. This is the end part with the chamber, which you can see here where you put the sample of the sandstone. It is a small piece and you have the beam coming from here and various detectors.

[slide] This is an example of the microstructure of the sandstone. This was taken years ago from Chau Say Tevoda. It is extremely heterogeneous. You can see some very nice-looking, crystal-like structures, similar to precious stones, but they are probably not what they appear to be. [slide] By scanning the samples, we get a spectrum of counts so that the irradiated elements emit X-ray radiations and we can resolve the radiation according to its energy. These are the various energies and you can see the various elements on the abscissa. On the ordinate we have the number of counts, so that the higher the peak the higher concentration of the element is in that particular sample.

[slide] These are some examples of what we can see. This is the iron, and manganese, which I included because Professor Tan yesterday talked about the problem of manganese concentration and the growth of microorganisms.

[slide] This is the surface of the sample, and you can see that for iron the concentration seems somewhat lower than whatever is below and the same thing goes for the manganese. For nickel, you seem to see a lot of nickel deposited on the surface of the sandstone and the same pattern you can see for strontium, for unknown reasons.

[slide] The nickel is a kind of pollutant that is generated by burning heavy oils, and why we find it here I really do not know. I do not know the rate of migration of this element; it is probably a recent type of pollution. These last two examples just show that it could have a distribution with gradients. You see some kind of a gradient here, a concentration gradient; those with light colours are high concentrations, those in blue are low and in this particular case, for gallium, there is no difference at all, so you would not think this is a pollutant. It is quite lowly distributed within the sample.

[slide] We wanted to go further into the stone and to see what were the differences at five-millimeters' depth. This is the iron again at the surface, and this is the scan five milli-

meters below. Even though it is very difficult from this heterogeneous sample to assess the distribution, it seems that there is not a particle gradient in this case.

[slide] This is an example for nickel. Again, as you have seen before, most of it is at the surface—if you go down, there is almost uniform distribution. It is not some kind of anomaly of the stone, but it is really something that has been deposited on the surface.

[slide] You see the apparent holes, which means that there is no aluminium or iron and if you scan it with different filters, you can detect a lighter element, silicon. It appears clearly how these grains fit exactly into the holes. This is quite a nice superposition and by superimposing several scans like that you can identify the minerals with the sandstone.

[slide] I included this picture just yesterday about manganese. There were uncertainties as to whether you have it in the sandstone or not. You can see that you have it in quite a lot of areas in certain quantities. There is no obvious gradient. It could just be an anomaly or a grain containing a lot of manganese.

[slide] To conclude: I would say that I am presenting a proof-of-concept. You can actually take any gradient and to do it properly would require slicing a lot of samples and averaging the results. This exercise is to understand the heterogeneity of the stone.

Even at this early stage, it is possible to assert that the microPIXE method is a particle induced X-ray emission; maybe I forgot to say this at the beginning. It detects concentration gradients in individual elements in order to reveal small anomalies within the sandstone's microstructure. Concerning the heterogeneity, it remains a problem inherent to the nature of sandstone and nothing can be done about it.

Thank you for your attention."

Comment from the Co-chairman for Japan: [OrigE] "Thank you. We now invite the Japanese team to expound on the Bayon temple, represented by Professor Nakagawa, Dr. Kou Vet and Cheam Pross."

#### **IV.1.4 Overview of restoration work from June 2014 to June 2015, by Dr. Takeshi Nakagawa, Dr. Kou Vet, Mr. Cheam Pross, JASA**

##### **Dr. Nakagawa:**

[OrigE] "I would like to start by proposing something to the chair. We have a later presentation on point IV.1.9, and Ms. Katsura Sato proposed to reduce his presentation time by half and very kindly give us this time for our presentation. This is obviously after approval from the co-chairs. Thank you.

Excellencies,  
Ladies and Gentlemen,  
Dear guests,

On behalf of JASA, I would like to present an outline of activities with this presentation paper. This is a short, new publication concerning our collaborative activities.

[slide] During the fourth phase we have implemented the following projects: Landscape Improvement of the east facade of the Bayon. From April 2014, we have been implementing landscape improvement work around Tower 55 and the eastern causeway, as well as an archaeological survey in this area. The detail of this work will be presented later.

[slide] Preparatory Work for the stabilisation of the Central Tower, Bayon: We have collected and analyzed many kinds of monitoring data, in order to understand the present structural state of the Central Tower, as well as establishing the parameters to set up a monitoring system for the Central Tower in the near future. From the result of analysis of the resistivity survey last year, we can recognise high-ratio resistance, except at the east part of the platform. We estimate the existence of an interior laterite structure in the platform around the Central Tower, except in the eastern segment.

[slide] We informed at the last ICC that using wind tunnel testing, we revealed dangerous parts on the upper structure. We also implemented test construction of a vertical shaft with masonry lining, to demonstrate our method to support horizontal earth pressure after excavation of a vertical shaft. In the second half of this year we plan to study the test results shown to draw up the method of reinforcement for the central tower.

We plan to evaluate the best method of reinforcement for the upper structure, using construction experiments from August, 2015. In any case, we plan to compile the results of monitoring and testing until 2016 and from 2017 to implement the fifth phase. We hope to plan the process of the work for stabilising the platform of the tower first and the upper structure thereafter. We would like to share the details of the study by organising another Bayon symposium for December this year.

[slide] Preparatory Work for the Conservation of Bas-reliefs of the Inner Gallery, Bayon: We have continued climatic tests to confirm the effect of strengthening agents, water repellent and replica stone by using as a trial object new sandstone blocks, in December, 2014, at the designated wall that has no bas-reliefs and displays typical deterioration conditions in Bayon in February and April of 2015. We have also continued microbiological studies to evaluate the effects of microbiology and lichen on bas-reliefs in August 2014, and February and April 2015.

[slide] In March 2015, we implemented an AE (acoustic emission) test for evaluating any deterioration phenomena that may have affected the strengthening agent and water repellent because of the continued heat expansion and deflation of the stone caused by solar insolation.

In the second half of 2015, we plan to study the following: Weathering evaluation of the trial object new sandstone blocks to check the effect of the strengthening agent and water repellent and verify the cause of deterioration by the effects of biology. We will share the details of this survey in the Bayon symposium.

[slide] On December 2014, JASA held a symposium introducing restoration and conservation work of the Bayon, and made presentations about technical issues and future prospects. Several important comments were given by *ad hoc* members, as follows: Firstly, for Stabilisation of the Central Tower of the Bayon Temple it is 'better to avoid unnecessary interventions as long as there are no severe deteriorations and displacements.' Since JASA has not yet fully understood the causal relationship between two factors, low moisture content and high intensity of compacted layer soil inside the platform, more detailed surveys will be conducted.

[slide] Secondly, regarding conservation of the bas-reliefs of the inner gallery of the Bayon Temple: They 'need careful consideration in the case of adopting conservation science methods.' JASA agrees and has continued to perform experiments.

[slide] In addition to the above, JASA has provided technical assistance to the Restoration Reconstitution and Reinstallation Project of the Bayon's Great Buddha. Until now, JASA has received two suggestions for this project: informing on the Great Buddha, and the potential existence of another Great Buddha. JASA delivered its perspective and received one opinion saying that a lot of care would be appreciated because of the long-time maintenance.

nance and protection activities of the local residents.

[slide] JASA will hold the second Bayon symposium in December, 2015. For this symposium, JASA would like to invite our Cambodian partners, UNESCO, *ad hoc* experts and all members of the international community, to gain a broader understanding of our activities and policy. We have also implemented a collaborative project, as shown.

Thank you very much.”

### **Cheam Pross:**

[OrigE] “Ladies and Gentlemen,

[slide] My name is Cheam Pross and I am a member of the JASA’s technical staff. Thank you for giving me the chance to present here on the Landscape Improvement of the East Façade of the Bayon. The intervention is on several towers, namely 57, 58 and 69, to reduce rainwater penetration into the inner structure, as far as possible, and to prevent any risk of collapse and bring new safety and security to the structure and also to improve the landscape and to reinforce the stability around the tower.

[slide] We identified many scattered elements between the gallery and the tower. We also found unforeseen traces of a previous construction buried under the floor of the terrace, and Dr. Kou Vet will present later on this discovery.

[slide] While working in this area, we began to think that there was a need to rearrange the working schedule of the landscape improvement of the north and south gallery and Tower 55. Activities of landscape improvement have continued on this Tower. With respect to our policy, original construction material is being used as far as is possible, in order to preserve the authenticity of the temple. The original technique of construction of the Khmer temple is also implemented. [slide] Many scattered stone elements were identified in their original locations and set onto the existing structure, to be supported by scaffolding or, if possible, repaired and reset. All removed scattered stone records have been edited into a digital scattered-stone database to be passed on to our successors.

[slide] The landscape improvement work was planned first for the exterior wall structure, and after for the interior structure of Tower 55. This picture shows you the progress of work before and after.

[slide] Structural Stability Improvement of the Causeway: We were asked not to remove the tree in front of the Bayon temple. After removal of sandstone pavers, we found many roots entangled in the foundation. After discussion with JASA experts and the APSARA National Authority, it was decided to remove the tree roots at the east and west, but to the north and south of the tree we have maintained them in stable conditions, as these tree roots reinforce the foundation.

[slide] Regarding the wooden platforms: After observation, it was noted that the wooden stairs standing along the gallery of the Bayon are in bad condition. Though these stairs protect the structure from tourists and enable work on the stones, we will have to revise this situation and install removable wooden platforms, so that they can be cleaned. We also have to study the impact of damage with or without wooden platforms.

[slide] Our aim is the preservation of the original form of the temple after restoring the stone: Repair work cannot be delayed. Due to the damage of the original elements, JASA established specifications for stone repair that have been applied for the past twenty years. All repaired elements have been recorded in the stone database for the use of future generations.



Thank you for your attention.”

**Dr Kou Vet:**

[OrigE] “Excellencies,  
Ladies and Gentlemen,

My name is Kou Vet and my presentation concerns archaeological surveys on Tower 55 and the eastern causeway of the Bayon. [slide] These are the archaeological surveys at Tower 55 and the eastern causeway, from January 2014 until present. The purpose of the survey is to study the construction process and modification of the main entrance of the eastern causeway of Bayon temple. We dismantled and found very interesting features that were buried below the floor. [slide] We found some steps below tower 55 and here another step, slightly east of another step. [slide] Here are two steps we found in front of tower 55.

[slide] Another important point is the rectangular/square indents on the present platform. There are also circular/oval postholes found on the present platform. The postholes were formed by cutting into the current stone pavement from the first and second layers through to the sand foundation of the platform building.

Based on the results of the recent survey, we can conclude that we need to extend the survey to study the construction process and modification of the main entrance of the eastern causeway of the Bayon.

Thank you very much, and we apologise to other teams for having taken so much time.”

*Comment from the co-chairman for Japan:* “Thank you. We now invite the representative of the APSARA National Authority, Mr. Tann Sophal, to speak on the restoration of brick monuments.”

**IV.1.5 Results of restoration work on brick monuments, by the Department of Conservation of the Monuments in the Angkor Park and Rescue Archaeology, APSARA National Authority, by Mr. Tann Sophal**

[OrigE] “Ladies and Gentlemen,

Today I would like to introduce a short presentation related to the results of restoration and conservation of brick monuments. [slide] The presentation is divided into three. The first is brick conservation history, the second consolidation techniques and the third is human resources.

[slide] Since 1956, there has been restoration carried out on brick shrines in the Angkor Park. I start with previous interventions carried out by the EFEO. There are five temples where restoration was carried out: Preah En Kosei temple, *Prasat Bei*, *Prasat Bay Kaek Rong Lmong* and *Kravan*. The APSARA National Authority carried out other consolidations in collaboration with international teams, such as in *Prasat Pre Rup* with GACP and at *Lolei*, *Preah Ko*, *Bakong* and *Kok Chark*. We have also been collaborating with the WMF team at *Phnom Bakheng* since 2001.

[slide] This is a brick shrine that was restored by the EFEO in 1996. It included the following temples: *Kosei temple*, *Prasat Bei*, *Prasat Bay Kaek Rong Lmong* and *Kravan*. Now,

the northeast and west towers of Lolei are being restored by the APSARA National Authority. <sup>[slide]</sup> This is the result after consolidation and stabilisation at the east and north shrines.

<sup>[slide]</sup> This is the result after consolidation of Lolei. As for Preah Koh, all six shrines are concerned. In blue, partial consolidation from 2000 until 2009, and the blue and red colours represent full intervention by the APSARA National Authority. Pictures showing the work on the central east tower and, once finished, consolidation of the southeast tower since 2009.

<sup>[slide]</sup> Current activities concern consolidation of the southeast library and the west and south doors. The structure of the superstructure of the south wall of the library presented many holes, so we filled them by adding new bricks. Here are pictures of consolidation work after and before in these pictures of the south wall of the south-eastern library at Preah Koh.

<sup>[slide]</sup> At Bakong, the APSARA National Authority has worked on three towers: Towers 6, 7 and 8. The consolidation of the shrine, Tower 7, is completed. This the project of the APSARA National Authority implemented by our department. <sup>[slide]</sup> It is a good project, carried out at Kok Chark. You can see the previous conditions, with trees growing on shrines and many structures damaged, thereby creating problems.

We planned to clean the trees, and divided them into different sections, with removal of the trees and restoration. These are the activities to remove a piece of root on the southeast corner of the shrine and this is the result of the consolidation process in May, 2015. This is a view from the east side.

<sup>[slide]</sup> Phnom Bakheng has been worked on since 2011-2012. The APSARA National Authority works in collaboration with WMF to complete the restoration of brick shrine G10. <sup>[slide]</sup> Here are the conditions before and after the work. The north side before and after conservation.

<sup>[slide]</sup> One more project that our department implements together with the department for Monuments outside of Angkor is the restoration of Opaong temple at Phnom Kulen.

<sup>[slide]</sup> Brick consolidation techniques have to be slowly and carefully done at the following points: 1) Cleaning and removing unstable bricks, using a numbering system. 2) Insertion of new bricks, respecting the original size of their layers. 3) Use of ancient bricks for outer structures and new bricks for inner structures. 4) Creating a new interlocking system for the anchorage structure. 5) Use of a mortar composed of slaked lime, sand, brick dust, palm sugar and buffalo skin. 6) Re-pointing mortar base grout in order to close opened joints.

<sup>[slide]</sup> In this picture: insertion of new bricks to fill the inner structure. <sup>[slide]</sup> Here, chipping holes and insertion of anchorage points from the outer to the inner wall. <sup>[slide]</sup> This is the mortar we use for brick conservation, made of slaked lime, sand, brick dust, palm sugar and buffalo skin. Regarding human resources: <sup>[slide]</sup> we have two Cambodian technicians and three more are being trained. As for skilled workers, we have 18 brick craftsmen and 45 being trained. Here are the best three workers that we have selected and the ICC will reward them.

Thank you for your attention."

**Following this contribution, three skilled workers will be introduced to the ICC-Angkor. Specializing in brick restoration, they have been working at Preah Ko temple for over 22 years and have been nominated for "Best Workers" by H. E. Dr. Sok An, Deputy Prime Minister, President of the APSARA National Authority.**

Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "I have the pleasure to introduce Messrs. Sim Eam, Sim Ai and Pheng Phoeum, and we invite H.E. the Deputy Prime Minister to come to the podium to present them with their certificates."

**Mr. Sim Ay:**

"Excellencies,  
Ladies and Gentlemen,

My name is Sim Ay and I work at Prasat Lolei. I am delighted to be able to restore Lolei. I have been able to fulfil my wish and continue in the footsteps of my father. I started working as a stone restorer in 1994 and I asked to work with Mr. Henri, who agreed. Since then, I have restored four to five temples, including Lolei, Bakheng and Kok Chak. I have also trained numerous workers. I presently work on two temples, Lolei and Kok Chak. I continue training workers who later will take over from me. Thank you."

**Mr. Sim Oeum:**

"My name is Sim Oeum and I am 63 years old. I worked on the restoration of Preah Ko and Bakong. I have been a restorer for more than twenty years and started in 1994. I worked with the German team, which teaching was essential for me. I like working on brick temples as they are more decayed than those in stone. I will continue training the younger generations on restoration techniques for brick temples. Restoring a brick temple requires specific skills, as bricks decay with tree roots and water infiltration. Despite these difficulties, I enjoy this work and will continue. Thank you."

**Mr. Pe Phoeum:**

"My name is Pe Phoeum. I worked on the restoration of Preah Ko, Bakong and Lolei. Although the restoration of brick temples is an acquired skill, I still enjoy it and I respect the traditional methods of our forefathers. Thank you."

Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "Thank you and congratulations to these three workers, to whom we wish all the best in their important work for the conservation of Angkor. Let's move on to Ms. Carter's presentation."

**IV.1.6 Angkor Wat, archaeology of residence pattern identified by the Greater Angkor Project, by Dr. Alison Carter, Robert Christie Research Centre, Faculty of Arts, Sydney, Australia**

<sup>[OrigE]</sup> "Ladies and Gentlemen,  
Distinguished guests,  
Excellencies,  
Deputy Prime Minister

<sup>[slide]</sup> Today I report to you on recent work by the Greater Angkor Project, or GAP, within the enclosure of the Angkor Wat temple. This work has explored settlement and habitation patterns during the Angkorian and post-Angkorian periods.

<sup>[slide]</sup> There have been two field seasons of excavations within the Angkor Wat enclosure. The initial field season, in 2010, sought to identify the function and dates of

occupation within the enclosure. An on the ground field survey identified a series of mounds and depressions that were arranged in a rough grid pattern within the eastern half of the enclosure. However, it was difficult to determine the extent of this pattern due to the extensive tree cover.

The excavations focused on mounds and depressions within the northeastern quadrant, near the laterite wall and eastern gopura, along the eastern roadway to the temple, and near the western gopura. The trench close to the western gopura did not show evidence for residential activities; however there is evidence for occupation in the trenches located in the eastern half of the enclosure, which I will focus on today.

[slide] Trenches 3, 4, and 5 along the eastern roadway contained a thick layer of sandstone chips, which is likely associated with construction and carving of stones for the temple. On top of the sandstone chip layer was a thick cultural layer showing evidence for Angkorian period occupation, including the presence of Angkorian stoneware and Chinese tradeware ceramics.

[slide] Overall, the majority of the ceramics found in the trenches were earthenware sherds, with smaller quantities of stoneware, and only 65 tradeware sherds. These sherds are associated with domestic activities like cooking, and many sherds had charring on the exterior, likely from use as cooking pots on a fire. Most of the tradeware sherds were found in Trench 3, along the roadway, and in Trench 7, in the northeastern quadrant.

[slide] Based on this promising work, GAP returned to Angkor Wat in 2013 to continue the investigation of potential occupation areas. This field season greatly benefited from the recently acquired LiDAR data, which showed the extent of the urban planning within Angkor Wat's enclosure. The LiDAR mapping seen here shows clear evidence for a planned grid pattern of mounds and depressions, which may have been ponds, which were arranged according to the cardinal directions. There are also linear features, which are considered to be roads running throughout the enclosure space. Notably, this pattern extends outside the enclosure, to an area east of the eastern moat that is referred to as the External Eastern Enclosure.

[slide] Although evidence for this grid pattern is best-preserved in the eastern portion of the Angkor Wat enclosure, it may have originally extended to the western portion of the temple enclosure as well. My colleague, Heng Piphah, has reconstructed what the original grid system pattern may have looked like, presented in the upper left hand corner. It is possible that up to 4,000 people may have lived within the enclosure. Here you can see an additional reconstruction of what the residence pattern within Angkor Wat may have looked like.

[slide] In the 2013 field season, additional trenches in the southeastern quadrant were added, as were trenches in parts of the External Eastern Enclosure. The locations of the excavation trenches are seen here in yellow. Trenches were excavated on the tops of mounds, within depressions, next to the laterite wall, and along possible roadways.

[slide] As with the earlier excavation, there was additional evidence for domestic activities, including ceramic concentrations in several units. Also of note, was the identification of large pieces of sandstone and laterite, which appear to have been used in the mound's construction. Interestingly, there are similar patterns of ceramic concentrations and the use of sandstone in the external eastern enclosure area as well. See the examples in this picture.

[slide] In some cases, this sandstone appears to have been recycled from the construction of the Angkor Wat temple, as some of the pieces were decorated.

[slide] Based on this work, four distinct layers have been identified, which appear in nearly all of the excavation trenches. Layer 4 consists of the natural soil, a sandy clay. Layer 3 marks the construction of the grid pattern of mounds and depressions surrounding the

temple, as well as the likely construction of the temple itself. This layer consists of a sandy clay with manganese inclusions.

In several trenches, cultural features were identified in the top half of Layer 3 that may be associated with the use and occupation of the mounds during the temple's construction period. There is evidence for additional Angkorian period habitation in Layer 2, which was the primary cultural layer and contained most of the ceramics, some of the sandstone pieces, and possible postholes. Layer 1 consists of organic, loamy topsoil that also contained some cultural materials, and frequently post-Angkorian ceramics.

[slide] Here you can see a more comprehensive breakdown of the quantity of ceramics found in the excavation units. As with the 2010 excavations, the majority of the sherds were earthenware, with Khmer stoneware sherds also being fairly common. Tradewares from China and Thailand were less frequent.

[slide] This data can be used to provide a preliminary chronology of occupation. Khmer ceramics are found within layers associated with Angkorian period habitation, as well as tradewares dating from the Song Dynasty. Ming and Suvannakhalok ceramics that date to the 16-17<sup>th</sup> centuries are found in layers associated with post-Angkorian occupation and use of the mounds. [slide] You can see specific examples of some of these ceramics found in the excavations in this slide.

[slide] I am also pleased to report on the new results of radiocarbon dating from the 2010 and 2013 excavations that further help refine the chronology of occupation within the enclosure. The earliest activity at the site appears to have been related to the construction of the grid system within the enclosure, which includes the layout of the Angkor Wat temple and the mounds and depressions surrounding the temple. There are two radiocarbon samples dating to the 10<sup>th</sup>-11<sup>th</sup> centuries from Trench 3 in association with sandstone chips that might be debris from temple construction.

[slide] There is evidence that people were living on the newly constructed mounds during the implementation of this grid system and construction of the temple. In two trenches, there is evidence for domestic activities in the middle of Layer 3, including ceramic concentration in Trench 19 and a charcoal feature in Trench 17 that might be associated with a hearth. These features date to the 11<sup>th</sup> or 12<sup>th</sup> centuries.

[slide] Radiocarbon dating from Trench 17 and Trench 7 show continued occupation during the 12<sup>th</sup> and 13<sup>th</sup> centuries. This is confirmed by the presence of Angkorian stoneware, earthenware, and Chinese tradeware ceramics in several trenches, including the concentration of these ceramics in Trench 17 that you can see here.

[slide] It appears that parts of the enclosure were re-used during the post-Angkorian period, as there is evidence in the form of Ming Dynasty tradeware ceramics in many of the trenches, as I mentioned earlier. It was observed that the trenches closer to the laterite enclosure wall generally have higher quantities of these later-period ceramics than others in the southeast and northeast quadrants. In addition to this ceramic data, there are also radiocarbon dates associated with 15<sup>th</sup> and 16<sup>th</sup> century post-Angkorian occupation in Trench 6, which was situated near the laterite wall, and in Unit 8, in the northeast quadrant. Stratigraphically, there is not a clear boundary between the Angkorian and post-Angkorian period layers; therefore, it is unlikely there was a complete abandonment of the Angkor Wat temple area during the political transformation of the 15<sup>th</sup> century.

[slide] It is notable that dense occupation deposits and faunal remains are rare in the excavations. However, preliminary analyses of macrobotanical plant remains from a ceramic concentration have identified charred rice grains and rice fragments. We hope to expand the understanding of Angkorian and post-Angkorian residential patterns by continuing the work within the Angkor Wat enclosure. A planned fieldwork project to begin this month will focus on a more extensive excavation of a single house mound within the enclosure, seen

here circled in red. With this work we hope to better understand the nature of the activities taking place on the mound, identify the layout of a house structure, and examine evidence for the presence of household gardens around the mounds. We look forward to presenting the results of this work.

[slide] Thank you for your time and many thanks to the APSARA Authority and the following institutions and organisations for their assistance and support of the work in Angkor Wat."

Comment from the Co-chairman for Japan: [OrigE] "Thank you very much. We now invite the representative of the World Monuments Fund and the presenter has changed, as it is now Ms. Cheam Phally."

**IV.1.7 World Monuments Fund Projects: a) Phnom Bakheng: The ongoing restoration and stabilisation of central shrine and related stone and brick shrines on the terrace levels, b) Preah Khan Temple: The ongoing work to conserve the east gopura, selected garudas, and other elements of the monastic complex; c) Ceiling patterns in the Angkor Wat east gallery by Ms. Cheam Phally, architect, World Monuments Fund**

[OrigE] "Deputy Prime Minister,  
Excellencies,  
Ladies and Gentlemen

[slide] My name is Cheam Phally and I am a senior architect for the World Monuments Fund (WMF) programme in Angkor. It is an honour for me to participate in the ICC meetings and for the first time to report the work that World Monuments Fund has been doing in the past months. This morning I would like to give you an update on our work at Phnom Bakheng, currently our largest project at Angkor. Then, I would like to review some of our work and plan for future projects at Preah Khan. I will conclude with a short update on our work for the wooden ceiling at the Churning of the Sea of Milk Gallery at Angkor Wat.

[slide] WMF's commitment to the restoration of Phnom Bakheng started in 2004 with the creation of a conservation master plan. Since 2008, my team has been responsible for the restoration of the east half of the central temple. The goal of the project is to restore the central temple in a way that guarantees its long-term preservation. The restoration programme includes: 1) Dismantling of structures where it is required in order to repair them and the related bedrock; 2) repairs to the bedrock; 3) waterproofing of the terraces; 4) rebuilding the pavement of the terraces at a small pitch and with tight joints. We hope that in this way we will minimise the amount of water that enters into the structure as much as is possible.

[slide] As the programme has become more and more well-defined, we have produced a set of drawings that describe the intervention that will take or has taken place at every location of the terrace walls. I think this work represents the great output of my team: it reflects a comprehensive approach to the temple and it can serve as a reference document for both APSARA and UNESCO's expert committee as our work progresses. Here is a portion of it, which refers to the south elevation of the temple.

This year we have also considered the alternative of pinning some relatively stable portions of the wall into the bedrock. We discussed this idea at the experts' site visit this week and we will consider implementing it following the recommendations of the ICC.

[slide] WMF's efforts at Phnom Bakheng's first work location, at the northeast corner, are drawing nearer to completion. Reassembly of stone shrine C12 has been accomplished and B11 is almost completed too. As a next step in the temple restoration, the team plans to focus its attention on the north sector, near the northern stairs. Work will entail structural stabilisation of unsound portions of the terrace and the waterproofing of each level.

[slide] The work at the southeast corner applies the same philosophy of work. For the past year and half, the team has focused on reassembling the elevation walls of levels E and F, where about half of the original stone units were completely missing. These were replaced by about 1,100 scattered stones, which were found in the surroundings of the pyramid temple and from the wooded side of the hill, following the recommendations of the ICC experts in 2011. Currently, the team is installing pavers on top of these two terraces, while work at level D is in preparation.

[slide] At the request of *ad hoc* experts, WMF undertook a structural survey of the 23 brick towers that are still standing at Phnom Bakheng. A systematic approach was used for this survey. The survey resulted in a priority plan for the urgency of intervention. We will plan on shoring the most unstable structures and we will take any other measures that we can. Unfortunately, the brick shrines are beyond the scope of work that WMF originally committed to, so the resources that we can dedicate to this task are limited, but we understand its importance. We know that this is a matter of concern to the ICC as well. We will give an update at the next session of the ICC.

[slide] As underlined by French academics in past years, a portion of the original stones belonging to the 5 shrines located on the top platform, which were part of the giant seated Buddha built in the 16<sup>th</sup> century, has been inventoried and preserved at site in the past. Project archaeologist Chea Sarith has been continuing this inventory, which was extended to the scattered stones from the hill. This work has allowed the cataloguing of a total of 119 stones stored at level A and B and 57 from the hill slope.

[slide] During the past five years the WMF team has also discovered five sandstone lingas on the hill of Phnom Bakheng. Studies are being conducted in order to identify the original locations of these pieces.

[slide] In these years at Phnom Bakheng, WMF and APSARA have been working closely to guarantee visitor safety at the temple and together protecting the monument. In the past few months, WMF has continued its commitment by installing additional protections and barriers to address tourist circulation on both the path along the hill and atop Phnom Bakheng's central temple.

[slide] World Monuments Fund has been working at Preah Khan for more than twenty years, since the inception of the restoration programme in Angkor in the early 1990s. Currently, one of the main tasks of our team is to monitor the condition of all areas of the temple in order to identify locations that are structurally unstable. For this reason, we have created a structural database, in order to record information about our inspections over time. The database will help us make good decisions about intervention priorities.

We have also been studying locations that will require the implementation of a bigger stabilisation programme. We will plan on presenting a proposal for the East Gopura IV and the embankment of the moat next to it to the APSARA National Authority and the UNESCO expert committee.

[slide] Our team continues to pay attention to the garudas surrounding the fourth enclosure of the temple. Restoration of Garuda 38 has been completed, together with reconstruction where necessary and structural stabilisation of the surrounding wall. The team is planning for a similar intervention at Garuda 39 in the upcoming months.

[slide] WMF has been asked by APSARA to design a project to replicate the carved wooden ceiling of the Churning of the Sea of Milk Gallery at Angkor Wat. WMF commissioned a report on the state of knowledge on the wooden ceilings of Angkor Wat to Dr. Olivier Cunin. WMF and the APSARA National Authority will make a joint presentation about the proposed ceiling design at the next ICC

Thank you very much for your attention.”

*Comment from the Co-chairman for Japan:* [OrigE] “Thank you very much. Next speakers are Mr. Thomas Bernecker and Mr. Tek Touch from the GIZ team.”

#### **IV.1.8 2014 activity report, by Mr. Thomas Bernecker and Mr. Tek Touch, GIZ/APSARA Stone Conservation Unit**

##### **Mr. Thomas Bernecker:**

[OrigE] “Excellencies,  
Co-Chairmen,  
Ladies and Gentlemen,

[slide] It is my pleasure to present the progress report of the Apsara Stone Conservation Unit, a cooperation between the APSARA Authority and GIZ. First, I would like to introduce myself, because I am new to the ICC, then show the projects that were carried out last year by the SCU and present other events that happened within the SCU and outline future projects.

[slide] My name is Thomas Bernecker. I am a stone conservator and graduated from the University of Applied Sciences in Cologne, where I studied with Professor Hans Leisen. I have been here since September last year to replace Ms. Rösler as a Technical Advisor from GIZ.

[slide] But now back to the APSARA Stone Conservation Unit. The APSARA Authority assigns all conservation projects that are carried out by our unit. In the last year we worked in the following sites.

[slide] At Bakong temple, the bas-reliefs of Level 2 were in danger, so an emergency consolidation was carried out. As GACP and SCU were working at the same place, we divided the bas-reliefs between the two projects. The bas-reliefs were in a severe condition and a lot of the decorated surface had already been lost. Our task was to prevent further loss.

[slide] We secured endangered scales, closed gaps and reinforced the stone structure of sanding parts with ethyl silicate. [slide] Some weathered parts were protected through the application of wash mortar. After the treatment, the decay has now been significantly slowed down.

[slide] On the temple on top of Phnom Krom we worked at several locations. On the south tower, the doorframe was in severe condition and was treated as an emergency. One block at the north tower was loose and about to fall down. It was repositioned and secured with fibreglass dowels. One carved apsara at the south tower was already very damaged, with the risk of losing the last remaining parts. Those parts were consolidated and secured; the large scales were filled.

[slide] Two lion statues from the central and the southern towers were heavily damaged and in pieces. They were reassembled, concrete additions from previous interventions were replaced by sandstone pieces and the lions were put back in their original positions.



[slide] In storage at Preah Norodom Sihanouk-Angkor Museum was a lintel from Bakong temple. The lintel was broken in some bigger parts and lost a big amount of small pieces. As the decoration was almost lost, the reassembly of the lintel was decided. First, the big parts were put together again. [slide] After that, hundreds of small fragments were gathered and reassembled to restore the decorated surface. This work is still ongoing.

[slide] During a heavy storm, a tree at the South Gate of Angkor Thom fell on top of the western Naga head. It caused severe damage; the whole structure was out of alignment. Several pieces were broken off. As the structural stability of the construction was no longer guaranteed, it was decided to perform an anastylosis during the restoration measures. [slide] The single pieces were stored and conserved on the ground. The remains of an old restoration effort consisting of iron clamps and concrete additions were removed.

As a substitute for the concrete, sandstone pieces were fit into gaps, and iron clamps were replaced by dowels from stainless steel and fibreglass. To ensure a smooth reassembly of the naga head, it was first tentatively assembled on the ground. Just in time, before Khmer New Year, the work on the naga head was finalised

[slide] The naga balustrade of Banteay Samre is in bad condition. The conservation of this will be the next project of the SCU. In this case, every student individually performed a damage assessment and action planning on one specific part of the balustrade. Students handed in a report, which not only serves as documentation but also forms part of their final exam.

[slide] Now for other events that happened during last year: At the end of last year, APSARA offered a new training centre to the Stone Conservation Unit. It is here on the grounds of APSARA centre, just a few steps from this hall. We have moved into a large house with enough space for our classroom, workshop, storage and a new stone laboratory, which we are setting up right now. We are very happy that we are now much better connected to APSARA

[slide] In March the students of the SCU finished their training with a final exam. The training consisted of lectures in the classroom and practical work on site. It followed a specific curriculum which was prepared following the system of vocational training used in Germany. The final exam was composed of an individual project report for each student, a written test, evaluation of each student's performance through the trainers and the results of the mid-term exam.

The certificates we will give to the students are prepared by the APSARA and GIZ. The whole training course received the official patronage of ICCROM. There will be a handover ceremony for the certificates soon, to which APSARA will be invited too.

[slide] Finally, I would like to outline the next steps. The vocational training for stone conservators was a great success. As it is the first vocational training for conservation professionals in Cambodia, the APSARA is now working on governmental approval. A round-table in Phnom Penh is in planning, where the concerned partners for this step shall meet to discuss the proceedings. They are the Ministry of Labor, Ministry of Education, Ministry of Culture and Fine Arts, UNESCO and GIZ, together with the APSARA National Authority.

[slide] A new stone conservators' course is also in discussion for 2016. Before we can make a decision about that, we need to evaluate the need for skilled conservators in the country. To determine that need, a new questionnaire will be distributed to all national and international conservation projects. It is a follow-up to a similar questionnaire that was handed out in 2014. We would really appreciate the participation of every single one of you. Only with your help are we able to set up a really sustainable training course, which will help safeguard the temples of Angkor and create new jobs for young Khmer people. So please check your inbox around August and fill out the questionnaire from the SCU.

[slide] At the end I would like to thank the APSARA Authority, GIZ and all other projects and colleagues for their support and cooperation, and everybody for your attention. If you have any specific questions, please feel free to contact me at any time."

*Comment from the Co-chairman for Japan:* [OrigE] "Thank you. We now invite Madame Sato from the National Research Institute for Cultural Properties, Tokyo, on the 3D documentation of Ta Nei Temple."

#### **IV.1.9 3D documentation of Ta Nei Temple, by Ms. Katsura Sato, National Research Institute for Cultural Properties, Tokyo**

[OrigE] "Excellencies,  
Ladies and Gentlemen,

[slide] On behalf of the National Research Institute for Cultural Properties, Tokyo, I will make a brief report on our cooperation activities, undertaken with the APSARA National Authority at Ta Nei, located to the northeast of Angkor Thom. The Department of Conservation and Monuments in the Angkor Park and Rescue Archaeology leads the project for the conservation and enhancement of Ta Nei Temple in Angkor. It is a five-year project divided into two phases. The first two years concern the research and study of the site prior to the implementation of the next three years. The Japanese experts are technically assisting this project.

[slide] The first objective of our cooperation is preparing basic documentation of the site, and creating a risk map in the next step. [slide] This is a plan of the site with boundary lines on the ground and important tree locations around the building. The drawing is a result of the last two-year training programme on GPS and Total Station.

[slide] After the programme, we tried to establish an easy and simple method for documentation of the site, because we think an easy updating system is very important for the APSARA National Authority's staff. It means that the site conditions may change, due to many reasons. In addition the APSARA National Authority staff always has a lot of on-going projects, so we thought that this would help minimise their site work.

[slide] I explain our method to get an accurate 3D model of the site. It can be a basic site record without any special budget, nor any special equipment. Firstly, we set several markers on the building and to get their coordinates, we measured them with a Total Station.

[slide] Simultaneously, we took pictures of the building, overlapping 60 to 75 per cent of them. This method is called Structure from Motion (SFM), generating 3D models by matching these point pictures and creating cloud points of the objects.

[slide] For the upper part, we used a long pole onto which was fixed the digital camera. In this case, a smart phone connected with the camera via Wifi did the shutter operation. After processing this photo data, 3D models can be created. By inputting marker coordinates, the model can have an accurate scale and orientation.

[slide] In one week of work at the site we almost completed the photographing and surveying of the inner temple. I am showing some examples; the blue indicates the camera position. Once a 3D model is made, we can obtain an elevation from the ortho-image or details of the bas-reliefs and etc. according to the requirements.

[slide] I am going to show you some pictures of models made by totally open-source free software. [slide] Fallen and scattered stones on the ground have also been recorded following this method.

[slide] We thank all the project members who worked very well with us and understood the method. After the 3D model, they will make necessary 2D drawings based on it until the end of this year.

Thank you very much for your kind attention.”

Comment from the Co-chairman for Japan: [OrigE] “Thank you very much. We now invite Dr. EA Darith on the preliminary results from studies of the physicochemical properties of ceramics and dating.”

#### **IV.1.10 Preliminary results from studies of the physicochemical properties of ceramics and dating, by Dr. Ea Darith, Deputy Director of the Department of Conservation of Monuments Outside of Angkor Park, APSARA National Authority**

[OrigE] “Excellencies,  
Co-chairs,  
Ladies and Gentlemen,

Today, I would like to take the opportunity to thank H.E. the Deputy Prime Minister Sok An, who appointed me to lead the Angkor Ceramic Centre. I promised to raise the Centre up to international standards and to build up its capacity by collaborating with international teams working in Angkor.

[slide] I am now going to present on the Khmer production and exchange project characterising Khmer stoneware and kilns. This project was launched in 2013, in collaboration with the APSARA National Authority and Australian and American institutions. The goal is to study the change in Angkorian economical organisation, focusing on the production and distribution of Khmer stoneware. The data is obtained from Khmer stoneware samples produced by kilns.

[slide] The international collaborating team involves researchers from Cambodia: HE Tan Boun Suy (APSARA), Dr. Tin Tina (APSARA) and myself, and also Australian counterparts: Dr. Peter Grave (University of New England, AU) and the US team: Dr. Miriam Stark (University of Hawaii, USA) and Dr. Lisa Kealhofer (University of Santa Clara, USA).

[slide] Previous ceramic studies from the past 35 years included production from the Buriram highlands and over ten kiln complexes in Cambodia. We know that a two-phase model has been developed: the first in the 9<sup>th</sup> and 11<sup>th</sup> centuries, with small kiln sizes and green glazed and unglazed stoneware; and the second, from between the 11<sup>th</sup> and 15<sup>th</sup> centuries, with larger kilns and brown glazed stoneware.

[slide] This is the structure of kilns and ceramics in phase I. This is the Tani kiln site where we collaborate with the Nara Institute. In phase II the kilns are larger and the ceramics are brown glazed, which differs from phase I.

[slide] After learning the structure and typology of ceramics, we have begun to learn the scientific analysis of Khmer ceramics with Australian and US institutions. Current funding for this project (KPX) comes from the Australian research council grant. However, KPX

is a collaborative, open-source project to expand partner institutions and projects. Here you can see them on this slide.

[slide] The goals of our project are to study the expansion and contraction of the Khmer Empire through time, as well as dynamics to examine the relationships between the Angkorian court and its provincial centres. We also study production in Khmer kilns and the use of products in other sites called consumption centres. We can determine where specific parts were produced by studying stoneware fingerprints and sediments in the geology surrounding kiln sites.

[slide] The KPX methodology combines scientific analyses of stoneware with kiln dating. Scientific analyses of Khmer and kiln potteries established a geochemical fingerprint for each of the Angkorian stone kiln complexes. Another project strategy is the characterisations of the location of stoneware from many other sites. We can trace stoneware from many other sites to other production sources. We will use this pattern to identify changes in pattern, in interaction. We will also date as many kilns as possible. Radiocarbon and luminescent dating will be combined with a new experimental dating technique called rehydroxylation.

[slide] We carefully choose samples from existing collections. This is an example from Preah Norodom Sihanouk Angkor Museum. The samples are processed and documented for shipping and testing. Only small portions of sherds are sampled and destroyed during the process. Documented and processed samples are shipped to the University of New England in Australia to be prepared for Neutron Activation Analysis or NAA. This research will reveal kiln and pottery signatures.

[slide] The 2012 and 2014, pilot studies aimed at differentiating Khmer stoneware production using neutron activation analysis. Other pilot studies of four kilns in the province of Siem Reap analysed a total of 2,000 samples. The geology of the region is complex. It is likely that the clay in each area is distinct. Each clay will be likely to have a different fingerprint. Thereby, kiln locations may also exhibit unique products and fingerprints.

[slide] NAA allows us to determine fingerprints. On the left we present the location of the four samples: Tani, Bangkok, Torp Chey and Thnal Mrech. The four sampled kilns are found in Siem Reap province, but are located in slightly different geographical settings. On the right we present the results of multi classification of the stoneware researched. Torp Chey and Bangkok kilns have the most analytically distinct and homogeneous samples. Ceramics from Tani kiln are the most varied. Some clusters with Thnal Merch and other with Bangkok are distinct. Thnal Merch samples are the most chemically distinct. We can distinguish some kilns from each other. This kiln database will help to understand the 9<sup>th</sup> until 15<sup>th</sup> centuries' Angkorian economic dynamics.

Thank you very much for your attention."

*Comment from the Co-chairman for Japan:* [OrigE] "Thank you very much. The next item is on the conservation of O'Paong temple and emergency shoring of the temples on Koh Ker site, by Dr Chhean Ratha from the APSARA National Authority."

#### **IV.1.11 Conservation of O'Paong temple, Phnom Kulen and Emergency shoring of the temples on Koh Ker Site, by Dr. Chhean Ratha, interim Director, Department of Conservation of Monuments Outside of Angkor Park, APSARA National Authority**

[OrigE] "Excellencies Co-chairs,

Excellencies,  
Ladies and Gentlemen,  
Friends and colleagues,

Within the imparted ten minutes, I will try to focus on the general point of conservation and will not go too much into technical detail. My presentation will be divided into two parts. The first is the Conservation of O'Paong Temple, the second on Emergency Shoring of the Temple of Koh Ker.

[slide] Located atop Kulen Mountain, O'Paong Temple was built in the beginning of the 9<sup>th</sup> century, under the reign of Jayavarman II. After long and careful investigation and monitoring we found several risk areas. There are three places presenting cracks on the structure: Two cracks on the western wall near the corner, as shown in the picture and another smaller one on the southern wall. The gaps allow the penetration of rainwater. We consider that this is one of the reasons for the decay of the walls and foundations of the temple.

[slide] Small brick shrines on each corner decorated the brick tower, as you can see in the picture. Sadly, only four small shrines out of twelve remain and in bad condition. The sandstone structures of the main entrance lintel, *colonnets*, and top horizontal doorframe have collapsed. Only two vertical doorframes remain and the brick corbel arch is in very bad condition.

[slide] By monitoring the gaps, we found out that they were expanding. We then decided to fill the gaps with bricks of the same size so that rainwater would not be able to penetrate the structure. The detailed plan of the laying of new bricks has been recorded for future use.

[slide] The three small brick temples have been reinforced, as is shown in the picture. The decaying areas have been removed and replaced by good quality bricks which can support the load. In particular, the bottom part of the corner which supports the small tower has been carried out carefully.

[slide] As illustrated here, small pieces of wall have detached, almost separating from the main wall. They have been repaired by using fibreglass to reconnect the small pieces to the main wall.

[slide] The main entrance of the corbel arch has been repaired using emergency shoring work with steel pipes and wooden panels. The second stage of the project will see to the sustainable restoration of this area.

[slide] I now move to emergency shoring of the temples on Koh Ker Site and other temples located outside of Angkor Park. The complex of Koh Ker is located in the province of Preah Vihear, where most of the temples were built at the beginning of the 10<sup>th</sup> century, under the reign of Jayavarman IV. As the temples were abandoned for a long time, there was a lack of maintenance and safeguarding, with natural and human factors deemed responsible for the collapse of the temples. A total of 75 risk areas in ten temples in the complex of Koh Ker have been identified and emergency propping work has been carried out using wooden structures and also in some cases cables. [slide] An example here at *Prasat Thom*.

[slide] This is the sandstone gate of *Prasat Thom*. As illustrated, the whole structure of the building is in an unstable condition. We had to solve two issues: the first was to support the heavy load of the roof in order to stabilise the whole structure of the building. The second is to keep access for visitors, as it is a function of that gate and tourists may still use it normally. Therefore, wooden structures and cable belts have been used.

[slide] Due to their decay, the main entrance of the stair structure of the pyramid and the steps could not be used anymore. The access to the top of the pyramid was temporarily prohibited for investigative reasons. Therefore, the number of tourists decreased in that period. However, from January 2014 and after consultation and recommendations from the *ad hoc* experts, the new stairs were built on the northwest corner of the temple. This was considered the best location, as it would not interfere with the view from the main entrance. Since then, the number of tourists has increased, notably of domestic visitors.

[slide] This is one example of two laterite structures at *Prasat Thom*. You have all seen the picture of the northeast corner of the building, which was at risk with outward tilting. In order to prevent further damage, steel cables and wooden shoring have been used.

[slide] This is the tower of *Prasat Damrei* which was in poor condition due to the movement of foundations, lack of safeguarding and maintenance and the actions of tree roots which produced gaps between the sandstone blocks of the pavement and the foundation. Therefore, the soil backfill was washed away on a daily basis by rainwater which induced cracks in the structure. Cable belts have been used to reinforce the upper part of the structure and keep it standing until further long term conservation work is implemented.

[slide] This is work done at other temples, *Chao Srei Vibol* and *Prasat Phlang*. [slide] Here are maintenance activities at *Prasat Ampil*, where we are monitoring all members and wooden structures and have applied a protective coating to wooden members to protect them from insects. This type of activity has been carried out frequently.

[slide] Let me move to the conclusion. With regard to the Conservation of O'Paong Temple: Three large gaps in the wall have been filled using new bricks of the same size in order to prevent rainwater from running off inside the temple. Consolidation works on three corners include three small brick temples. The whole part of a brick corbel arch at the main entrance has been supported with emergency shoring and stainless steel bars with wooden panels, until sustainable consolidation work in the next stage of the project is carried out. Physical surveys of new bricks and recording for future documentations have been undertaken.

Second point: Emergency shoring of the temples on Koh Ker Site and other temples located outside of Angkor Park. In total, 79 risk places for 16 temples have been shored in emergency using wooden structures. The third very important point is that observation and maintenance work have been carried out frequently.

Finally, a point of information: last month, the APSARA National Authority discovered two temples: *Banteay Rabeuk* and *Phnom Dub*, located in Chong Spean Village, Khvao Commune, Chikreng District. Both temples are not yet listed in the inventory list established by the Ministry of Culture and the EFEO. The detailed investigation and physical survey are in progress.

Thanks to the *ad hoc* experts, especially professors Lablaude and Hidaka, who have always come to Koh Ker to comment. I would also like to thank ADF, the Ministry of the Environment and the Department of Conservation Outside Angkor Park, who have greatly cooperated for the smooth conservation of O'Paong Temple.

Thank you very much for your attention."

Comment from the Co-chairman for Japan: [OrigE] "Thank you very much. We now invite Dr Ly Vanna, who will be speaking on the results of excavations of Angkor Wat's western moat."

#### **IV.1.12 Results of excavations of Angkor Wat's western moat by Dr. Ly Vanna, Director of the Department of Conservation of the Monuments in Angkor Park and Rescue Archaeology, APSARA National Authority**

[OrigE] "Excellency Deputy Prime Minister,  
Excellencies Co-chairs,  
Ladies and gentlemen,

I only have five minutes, so I will be brief. This is part of the conservation project run by the APSARA National Authority. My presentation topic is on the results of archaeological excavation and to propose adopting ancient techniques to reinforce the embankment.

[slide] This is a general view with, in red, the site, and this is one of the most ambitious plans of the APSARA National Authority: to conserve and consolidate the entire embankment of the 5.6 kilometres of the moat bordering the central complex.

[slide] These are the works accomplished. The project started in 2014, with completion planned for late 2015. The project has been executed by DCMA, in technical collaboration with IGeS of Professor Santoro. We first carried out research work.

[slide] This is the 40 metre span of the embankment to be restored and consolidated by the APSARA National Authority. The first 20 metre span was restored in the 1960s and it has collapsed; it needs to be reassembled.

[slide] A map of our activities, with the northern section of the excavated pit; the south part here in this picture. The most important element to research is the original compacted soil. It is a very interesting and beneficial reference for the adoption of ancient techniques in soil compaction and reassembly of the scattered stones in this area.

[slide] This is a very simple joint to show the reassembly technique. There is no scale here but we used this to explain to the *ad hoc* experts the method we would like to use to reassemble the stones.

[slide] The technique proposed is the following: Removal of the former backfill soil of the foundation and introduction of modern material for the consolidation of the foundation, or reconstructing the new backfill soil of the foundation by following the initial structure of the foundation. Expanding the bottom soil foundation up to 2 metres in length and 80 centimetres depth, while the old one is only 80 x 30 centimetres. Introducing a key lock system into the first laterite step structure beneath the surface of the soil foundation; an ancient technique of stabilising the bottom foundation found in some areas of Angkor Wat.

We also have very good documentation thanks to the work of Sophia University when they carried out the restoration work of half of the causeway. The last technique is to reach a permanent water level at a minimum of 3 steps from the bottom, and up to 6 steps at maximum. The reason for maintaining the water level constantly at a certain level is to avoid the drying out of the foundation and washing away of the sand.

[slide] Next steps are: To consolidate and fix broken stones; remove collapsed soil, compact the foundation soil; refill the foundation with rock fragments, sand, clay and laterite chips and finally reset old stone blocks into their original positions.

To finish, I would like to clarify that we try to use, as much as is possible, the ancient technique. When there is a collapsed area and there is a need to introduce modern material, we make sure it has been used previously on the Angkor Park sites.

Thank you for your attention."

Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "Thank you very much. It is now the turn of Mr. Hans Leisen from GACP, who will report on activities in Angkor Wat and the programme for 2015."

#### **IV.1.13 Report on activities in Angkor Wat and programme for 2015 by, Dr. Hans Leisen, Project Director, GACP**

<sup>[OrigE]</sup> "Your Excellency Deputy Prime Minister,  
Excellencies,  
Dear Colleagues,

I will briefly present our activities in 2014-2015 and due to the lack of time, I will not go into detail on our research, especially the question of brick behaviour and the development of repair mortar for bricks and something we started several years ago: the preservation of stucco.

<sup>[slide]</sup> The title of my presentation is misleading, as we have been working in the whole of Angkor for many years, not only in Angkor Wat, and also in other Cambodian heritage sites. As you can see here, these are all the areas we have been working on and the red spots are the areas where we are still active. Angkor remains the main area, then Bakong, where we are dealing with stucco brick.

<sup>[slide]</sup> Mr Tann Sophal from the APSARA National Authority mentioned sandstone conservation yesterday, as we work in cooperation with them at Lolei on the top stone of the northwest tower. We still cooperate with the Ta Keo conservation project of the Chinese government team.

<sup>[slide]</sup> As I said, the bulk of the work is at Angkor Wat, where we have five worksites as of today. The biggest is the central west gopura on the enclosure, which you can see in the picture. Since 2011, we have been investigating and conserving all sculptures and decorations on this building. We have preserved more than 300 m<sup>2</sup> of bas-reliefs and walls with friezes and additionally, we have also conserved the roof. All this area was preserved without dismantling any stones.

Up to now, we did this work on the southwest section of the roof of the northwest pavilion, where we can prove that water infiltration can be stopped more or less totally. We still work on that building and plan on finishing by the end of the year, followed by quality control and dismantlement of the scaffolding and movement to another place. <sup>[slide]</sup> Another picture of one of the friezes of the wall.

This is the situation now, with most of the parts of this building preserved. We switch to the next building. <sup>[slide]</sup> By the time we have completed the work on the third gopura of the central enclosure, we will move the big scaffolding to the northwest tower on the second level. You can see some pictures of highly damaged surfaces and some are caused by the roots of tress which show missing maintenance. In this case they grow underneath the scale and even push them off and former repairs that we did several years ago on the right side cannot stand this pressure. This will be our next intervention; we will have the scaffolding around the whole tower and start our intervention.

<sup>[slide]</sup> The next worksite is the southeast tower of the second enclosure. There you can see intensive black biofilms. The damaging influence of this biofilm is certain. I would not use the word patina. Patina is something positive. The biofilm in this case is damaging and is not comparable with the black layers we saw during H.E. Tan Boun Suy's presentation on



Banteay Srei. Here, we will work intensively to remove former intervention cement and layers of acrylic resin. It was not protective: On the contrary, it induced more scaling on this surface.

Finally, we have another worksite on this gopura, at the first level, which we will finish probably in the spring of 2016. We also continue with the monitoring and maintenance of the bas-reliefs in the gallery. This is a crucial situation near the Historic Parade and the picture of Jayavarman II, where there is a big bubble that requires constant maintenance.

[slide] At the temple of Bakong we have five worksites dealing with the conservation of stucco and sandstone. We have also installed a test area for brick repair mortar. We would like to test the mortars that are used nowadays for the restoration of brick towers.

[slide] We continue with the restoration of stuccos, here in green. The blue areas are test areas for brick conservation, and on all brick towers there are these sandstone elements that we have already conserved on three towers. We have preserved nearly two thirds of the sandstone elements, doorframes and lintels. We have also repaired some of the staircases of this tower and at the moment we have two worksites for the conservation of sandstone elements. Thomas Bernecker showed you some pictures of the second floor. We did some special investigation on this particular decay phenomenon at Bakong with very thin scaling. We call it elephant-skin scaling. It needed further investigation, which we have started.

[slide] One result from the investigation on stucco: You might remember that I once showed this picture where we can see on this small hole the primary design of the temple with brick colour wash and on this temple we have two locations of this occurrence. On a later phase there is plaster with drawings and, finally, the three-dimensional stucco. Recently, we have discovered another one on the southern tower which, as you can see, is part of the capital. We have, primarily, the brick-coloured wash with painting. The stratigraphy is here a little bit different than on the other tower. We have carvings that are for sure the first wash, as we cannot find any traces of the wash on the depth of the carving, and, finally, the three-dimensional stucco.

[slide] I will be brief with Lolei, with the central west tower's top stone. You can see a big *lacuna* and if you look at this fragment, it seems unique for Angkor. We have not found any other pieces like this, which closes the top of the brick shrine. It is in an extremely damaged condition and it will require close cooperation with DMA1 and Dr. Ly Vanna and his team to preserve this member. We are in the process of establishing a system on how to approach this problem.

[slide] The last project is at Ta Keo, where we are cooperating with the Chinese team for safeguarding Angkor. We did a lot of research and have now developed a system, methodology and materials for the preservation of this extremely damaged surface which has a specific weathering dynamic. I just wanted to remind you, as I have shown these sections already.

[slide] This is at about 8 millimeters and in the lower part we see the un-weathered Ta Keo sandstone, and you can clearly see that there something changed on the un-weathered composition of the sandstone due to water infiltration from the back. We have the dilution of calcite mineral represented to a great amount in the Ta Keo sandstone, which makes it different from that of Angkor Wat, for example. The water transports the solution and the calcite is precipitated into the pores of the outer zone. There it creates greater stress compared to the inner side and you can see these cracks everywhere in the outer zone, which is causing total fragmentation of the scales at Ta Keo.

[slide] I will now move on to the ashlar. We have developed a system where you have to treat every single fragment with a special methodology, treatments and materials. Once again, the steps of this ashlar are very time-consuming. You have to inject, glue, repair the

edges and etc. [slide] You cannot read this on the slide, but basically it concerns four ashlar, and for each of them you need a specific programme for conservation. This is of course very intensive work which has to be done.

[slide] We sealed the upper platform and protected it with a tarpaulin. We think that we can reduce the humidity coming from the back to the stone blocks and this will be tested during this rainy season. We will be able to know whether the ceiling is perfect and is properly working without any water infiltration behind the walls.

[slide] We also continue with conservation work, in particular of stucco, and I am very grateful to my team, which is very dedicated to the work it has to do.

This is the end of my presentation; thank you very much for your attention.”

#### **IV.1.14 Activity report from the Archaeology and Development Foundation (ADF) at Phnom Kulen, by Dr. Jean-Baptiste Chevance, ADF**

“Your Excellency Deputy Prime Minister,  
Excellencies,  
Ladies and Gentlemen,

[slide] We report today on the activities at Phnom Kulen of the Archaeology and Development Foundation (ADF) since the last technical session and on future prospects. [slide] These are some pictures recalling the importance of the massif in the region and its statutes. These are the administrative borders and the watershed. This presentation will unfold in three parts: Conservation, research and maintenance, the dangers Kulen is still facing and development activities.

[slide] The first part is on conservation. Mine clearance has been the first step in this endeavour and we were in charge of coordinating the CMAC teams on 35 sites or 36 hectares. We compiled the following data for 2015 and this map explains how important it is to proceed to a new baseline survey in order to identify risk areas. Existing data can sometimes been incomplete and misleading. We shared this data with the APSARA National Authority and the Ministry of the Environment.

[slide] Another objective of our conservation programme, in collaboration with the APSARA National Authority, is to improve management of the highly-visited areas of Preah Ang Thom and Kbal Spean. [slide] The topographic surveys of these sites were completed in 2014, and in 2015 we assisted in the production of informative signs that are yet to be drafted and submitted to the APSARA National Authority before being put up. Here are some examples.

[slide] Our conservation programme also includes the *in situ* verification of new archaeological structures located after the 2012 LiDAR survey. Up to now, more than 280 of them have been confirmed and recorded in our GIS, which is a subsequent input to the Phnom Kulen archaeological map.

[slide] It also included work to determine and demarcate the archaeological protected areas. In late 2014, we extended and completed these areas by including several LiDAR structures. Almost 800 hectares are now protected under this denomination. They are in yellow on this map.

[slide] The 2013 Ambassador’s Fund for Cultural Preservation granted to ADF by the USA State Department assisted us in implementing this work under difficult conditions. The

areas have been demarcated with georeferenced cement poles interspersed every 60 metres.

[slide] Twenty signs also inform the villagers. Most of them respect these areas and have stopped dividing parcels inside them, but the destruction of the forest has increased on the periphery of these areas.

[slide] A reforestation programme, with the planting of 5,000 trees in collaboration with the APSARA National Authority, will start next week in the archaeological protected area of *Prasat Neak Ta* (here on the right on this map) which has been strongly threatened by cashew-nut tree plantations. It includes identifying each farmer and monitoring the affected plots of land.

[slide] We organised meetings with local authorities, villagers and school children to raise awareness on cultural heritage and the environment. A report in the Khmer language has been drafted and circulated.

[slide] These areas are under official recognition by the Royal government of Cambodia. They have recently been officially recognised by the APSARA National Authority and the Ministry of the Environment. This week we have submitted documents to H.E. Khim Bun Song, the governor of Siem Reap province, to be granted a final legal status and name the bodies responsible for it. For us, a joint team made up of APSARA National Authority workers and of Park rangers would set a good cooperation example to carry out this assignment.

[slide] Regarding archaeological research: we have continued our activities focused on the remains of the ancient capital revealed by the LiDAR. This year we did not excavate. The 2014 data has been analysed and the research is on-going. [slide] Several publications related to the Royal Palace of this capital Banteay (here to the top right of the map), Phnom Kulen inscriptions and rock art sites are soon to be published.

[slide] ADF also collaborated for the Kulen region with the KALC programme and the EFEO for the second LiDAR survey that was presented yesterday. Conducted last April, it surveyed the whole massif, representing 900 hectares, compared to 30 in 2012. The expected outcomes should not only shed light on the borders of the urban network of the 9<sup>th</sup> century capital on the Kulen plateau but also on a sizeable number of unknown sites on the Kbal Spean plateau and on the flanks of the National Park; notably, several quarries and associated structures that were used to build the temples of Angkor.

[slide] Let's recall the different threats that the massif faces, with a population of 4,000 distributed across ten villages. There is a clear distinction between the population, tourism, development, livelihoods and infrastructure between the village of Preah Ang Thom and the other archaeological sites.

[slide] Massive tourism in Preah Ang Thom and the lack of infrastructure and human resources do not allow for solving flow regulation, especially during celebrations. [slide] Waste management is non-existent; the regulated areas are not respected, car parking is chaotic, illegal constructions continue, etc.

[slide] As for the protected archaeological areas and the Community Protected Areas—another type of area that has been established by the government—they have shown some encouraging signs, but our latest checks have revealed that it is still necessary to consolidate human and technical resources to improve protection. They are still under threat from illegal logging or simply lack resources.

[slide] Outside of these areas, devastating farming practices still threaten archaeological sites and, in particular, recently on Thnal Mrech dike where the namesake ceramic kiln sites are located. Once again, cashew-nut tree farming is mainly to blame for this. Here are two

examples in these pictures. [slide] Another view of Thnal Mrech and a comparison of the condition of the forest canopy between 2009 and 2015.

[slide] You are familiar with these pictures. Let me show you the most recent, to explain the phenomenon and its scope, which is still ongoing. Slash and burn agriculture is now reaching plots of land containing old trees. This is adding to logging and cashew-nut tree plantations. This is a typical landscape of Kulen once you drive away from the road leading to the waterfall.

[slide] Now, let's move up into the air to have a better view of the phenomenon. This is the southern flank of the massif towards Svay Leu, and the northern flank. [slide] Illegal logging is still ongoing at Phnom Kulen, as these pictures prove.

[slide] Lately, we explored the western part of the National park, up to Kbal Spean, and systematic logging of large trees was seen along the path used, symbolised by red dots on this map. The oxcarts used to ferry the logged wood use extensive networks of pathways. More recent pictures. These paths meet at the edge of the cliff to allow the loggers to slide the wood down towards the plain.

[slide] Finally, the environment of the National Park suffers from the gradual encroachment of outer borders, due to the lack of clear delineation and staff.

What are the solutions? Our development programme is striving to face the numerous issues often created by the locals, who are the first to actually suffer from them. [slide] For the past few years we have offered and continued to promote alternative farming practices that generate incomes (support to handicraft production, fish and poultry farming, mushroom and vegetable farms). Overall, forty families are benefiting from this programme, which is only a small percentage.

[slide] This programme is extended to the commune level. A cooperative has been opened in Preah Ang Thom to offer additional incomes to several workers and to generate incomes for this self-sufficient structure. The aim is also to centralise the existing agriculture and handicraft products from remote villages, thus establishing a link between the producers and the large output market.

[slide] Recently, following a request from the population of three villages, the upgrading work of an Angkorian dike has started. It includes a series of hydraulic studies (conducted by the APSARA National Authority Department of Water Management), the restoration of the ancient canal and repairing the recent hole. In the future, this project should benefit a large population for development of crops or alternative animal husbandry and activities related to tourism. [slide] It could be replicated to other similar structures on Phnom Kulen.

These activities are hard to set up, as the National Park regulations on the Environment have not been enforced. For example, banning the establishment of new cashew-nut tree plantations could slow down the deforestation phenomenon.

The protection of the Park also includes economic development from other sources, alleviating shortages. [slide] We also collaborate with the private tourism sector to develop stays in the villages and community activities benefiting the population. To this end, we are designing with the TMP team of the APSARA National Authority a tourism development plan.

[slide] The nutrition and sanitation programme continues. The first phase, 2011-2013, succeeded in decreasing malnutrition by 30 per cent for all participants. With renewed financing, we now focus on four villages, reaching from newborn babies to five-year-old children and their mothers.

[slide] The Rice bank is bridging the shortcomings and sees to the food security of the poorest families, and in the same vein sponsors [slide] upgrading of the water network in villages.

[slide] Finally, the last item in the development field will strive to consolidate the equipment of the most remote primary schools and villages. The scope of the educational and environment programme may be enlarged in 2016 if we succeed in raising the necessary funds.

[slide] In conclusion, we are satisfied with the progress made in terms of conservation, for example with the restoration of O'Paong Temple, additional staffing with workers and guards of the APSARA National Authority and with the reforestation and dike upgrading projects.

In terms of the environment, the recent visit of H.E. Say Samal, Minister of the Environment at Phnom Kulen and his attendance at the ICC prove his personal commitment to this dossier, especially following yesterday's announcement: the Phnom Kulen management plan, mine clearance activities to resume, negotiation with concessionary company and etc. The intervention of the UNESCO representative on the inscription of the massif to the World Heritage List is also promising.

Nevertheless, we would like to recall some matters that are urgent and among them the consolidation of the technical and human resources of the APSARA National Authority and of the Ministry of the Environment at Kulen to control the Park's protected areas and law enforcement and development of activities generating additional incomes to local populations.

All these actions combined could allow for Phnom Kulen National park to uphold its name as the Water Tower of Angkor and to preserve the remains of one of the first Angkorian capitals on this sacred mountain of Cambodia, in harmony and for the benefit of the locals.

[slide] On behalf of all the ADF team, I thank you for your attention."

*Comment from the co-chairman for Japan:* "Thank you. We now call on Mr. Pierre Bâty from INRAP to talk about the cooperation with the APSARA National Authority and research and training perspectives after a five-year programme."

#### **IV.1.15 Institut national de recherches archéologiques preventives (INRAP): Cooperation with the APSARA National Authority and prospects for research and training at conclusion of first five-year phase, by Mr. Pierre Bâty, project manager, INRAP**

"Excellencies,  
Ladies and Gentlemen,  
Dear colleagues,

[slide] This year marks the closure of the five-year programme on archaeological research at the Siem Reap airport domain and also the twentieth anniversary of the Afan, then called Inrap, archaeologists' contribution to archaeological activities in Angkor.

It is time to look back at this partnership and to talk about continuing our scientific and institutional collaboration with the APSARA National Authority with respect to the Inrap and French Ministry of Culture and Communication's commitments.

[slide] Archaeological works at the Siem Reap international airport started in 2004, thanks to joint efforts by the APSARA National Authority, Inrap and the Airport concessionary company. In 2005, an international cooperation framework agreement was signed between Inrap and the APSARA National Authority, which was extended in 2013, when the former Minister of Culture and Communication, Ms. Filippetti, visited Siem Reap.

Encouraged by these first experiences, the two public bodies worked even more closely in 2010 for a five-year programme for the excavation of the archaeological sites located inside the airport boundary and immediate surroundings, as upgrading and redevelopment of the airport was ongoing.

[slide] Today, these excavations represent more than 444,000 m<sup>2</sup> of archaeological expertise, of which 38,000m<sup>2</sup> have been excavated and 12,600 m<sup>2</sup> diagnosed digging trenches. These excavations and the diagnosis of the National Road 6 Angkorian bridges undertaken by the APSARA National Authority have been the first large-scale archaeological operation carried out in Cambodia that mirror what is done in Europe before land-use planning operations.

Note that in the European Union, rescue archaeology is considered by Member States within the framework of the 1992 Malta Convention, which aims at including archaeology within planning policies.

The 2001 and 2003 laws regulate rescue archaeology in France. Inrap was consequently established and the financing of all activities was also regulated: Diagnoses are financed via a rescue archaeology tax that is due when development works affect the subsoil for buildings larger than 1,000 m<sup>2</sup> and for roads, highways, car parks, quarries, canals and etc., development. Excavations are under the responsibility of the public or private developers and may be subjected to subsidies from the *Fonds national d'archéologie préventive* (National Fund for Rescue Archaeology).

Inrap's role throughout a national community provision scheme is to carry out a basic public service task by studying and saving archaeological sites under threat from necessary economic developments for our society.

[slide] This is exactly the same scheme that has been respected when excavating the Siem Reap airport. A private developer, Cambodia airports, has financed it. These excavations have contributed to understanding the Angkorian society; they have supported the development of a public service infrastructure necessary for tourism development and visitation of the archaeological Park and have also contributed to the economic development of the Angkor region.

Once again, I would like to highlight the exemplary attitude of the Cambodia Airports' approach, which has willingly supported this archaeological programme.

[slide] The APSARA National Authority/Inrap framework convention includes a field-training programme for young and senior Cambodian archaeologists contracted by the APSARA National Authority. It has benefited fifteen of them until today.

The main objective of this programme is training on rescue archaeology methodology. Part of the training is in the French language during three months of training organized by Inrap through the *Profession culture* programme and co-financed by the French Ministry of Culture and Communication. Up to now, six trainees have attended the training in France and three more will leave in September.

Only senior archaeologists can attend this training in France. The training modules include complete professional immersion within the Inrap research team. It is also a show-

case of the entire public chain of operation of French archaeology and of all the institutional stakeholders, such as:

- The regional departments of archaeology ordering excavations;
- Excavation operators Inrap or local authorities;
- Research partners, including mixed units associating CNRS, Inrap and university researchers.
- The Institut national du patrimoine (INP, National Institute for Heritage), which is training State heritage conservators and etc.

All these encounters with public stakeholders aim at informing on the interdisciplinarity of the French system. They also present our job and different specialties, either in the field, at the office or in the laboratory.

[slide] The result of the Siem Reap airport excavations has yielded eight large diagnoses and ten open-space excavations. The large scope of the research has enabled work on different types of sites, notably villages located in specific areas and associated with temples. These habitats had been hardly documented by archaeology until today and have brought a wealth of information on the material culture of the ancient settlers, village economy and organisation.

[slide] Trapeang Thlok site is located below the present international terminal. It included a temple and its associated habitat. It was briefly occupied in the late 10<sup>th</sup> and early 11<sup>th</sup> centuries. The excavation covered 15,000m<sup>2</sup> in open space.

[slide] *Prasat* Trapeang Ropou shrine was excavated three times, covering a total area of 12,000m<sup>2</sup>. Besides the temple platform that brought scores of unprecedented remains, the extensive dig of a mound to the west on 4,500m<sup>2</sup> revealed the different occupation phases from the 10<sup>th</sup> until the 15<sup>th</sup> centuries.

[slide] At *Prasat Prei*, all of the shrine buildings were cleared. Four buildings have been discovered besides the central tower. In one of those a foundation deposit included gold leaves. [slide] This complex was occupied from the 9<sup>th</sup> until the 14<sup>th</sup> centuries. All the habitat mounds located to the south and west of the monument were surveyed and dated. Their occupation perfectly matches that of the monument.

[slide] At Trapeang Svay, we discovered an unprecedented site now occupied by the airport. Similar to Trapeang Thlok, it was briefly occupied and all remains found have been dated between the late 10<sup>th</sup> and early 11<sup>th</sup> centuries. [slide] This complex was comprised of a temple and its habitat, connected by an east-west causeway dike.

[slide] In Tuol Ta Lo, a temple and a village were unearthed. A total of 7,000 m<sup>2</sup> have been dug. The temple is dated from the late 10<sup>th</sup> century to the early 11<sup>th</sup> century. When the site was abandoned, a village settled close by in the 12<sup>th</sup> century. [slide] The excavation revealed unprecedented entire plans of houses. They were set around a pond which, once dug, offered numerous archaeological objects.

[slide] At the southwest end of the runway, and due to aerial security, night archaeological excavations were undertaken. The airport was shut between midnight and 6 a.m. so that we could work. In this place, remains of a temple were found, although it was deemed as having been destroyed in 1966 due to the extension of the runway when a magnificent set of 44 statues was also unearthed. [slide] They were stored at the National Museum in Phnom Penh. As is the case for many sites at the airport, the temple's occupation was short-lived, between the 10<sup>th</sup> and the 11<sup>th</sup> centuries, and preceded a village.

[slide] The findings of these activities are multiple and include several avenues for reflection on the south area of the Baray. First, it seems that many religious foundations were located in this area in the late 10<sup>th</sup> century: Trapeang Ropou, Trapeang Svay, Trapeang

Thlok, Tuol Ta Lo, etc. Some of them were abandoned as early as the 11<sup>th</sup> century, meaning a short duration of occupation.

The only sites that were occupied over a long period after the 10<sup>th</sup> century are the main shrines of Trapeang Ropou and *Prasat Prei*. Maybe this corresponded to a restructuring of the space in the 11<sup>th</sup> century, probably related with the construction of the Baray. It is most likely that in this restructuring period, Trapeang Ropou and *Prasat Prei* remained major attractions.

[slide] Reducing the scale and observing the habitat site, we are able to describe their organisation and to establish comparisons. Wooden fences interspersed with alignments of stakes or posts enclosed all the mounds researched. These were enclosed spaces separated from other mounds. The fences delineated courtyards. Food supplies were produced and stored in them. On the mound were built one or two rectangular buildings of 45 m<sup>2</sup> until 55m<sup>2</sup>. Houses were built in non-durable materials on posts and covered with thatch or tiles. A water source was always located near these houses. The mounds are located at the periphery of the temples, either in clusters or isolated.

[slide] Finally, these excavations are very lively illustrations of the daily lives of the ancient habitants of Angkor. The tools, ceramics, and everyday objects gave us information on consumption patterns, domestic and farming activities.

[slide] As expounded, rescue archaeology offers major findings. It enables the study of sites in their entirety. Repeating these activities on a same area leads to interesting comparisons and in the long term the study of a region.

All these archaeological findings will soon be published. An exhibition at the National Museum of Phnom is being prepared. It will open in the spring of 2016. It will present the outcomes of our excavations to a large public and is a co-production between the APSARA National Authority, Inrap and Cambodia Airports. Obviously, the National Museum and the Ministry of Culture are also closely associated with this event.

This partnership between the APSARA National Authority and Inrap has now been clearly established and will continue with training and new fields of application. They include a vast programme of activities and fit within an operating chain that ranges from planning a public utility development until ordering and carrying out diagnoses and excavations.

Coming to the closure of these five years of research, I would like to thank on behalf of Inrap and, personally, the president of the APSARA National Authority, H.E. Sok An, the director general, H.E. Bun Narith and the deputy director general H.E. Ros Borath for the quality of their attention and informed input to this common project.

We would also like to thank all the APSARA National Authority staff engaged in this project directly or indirectly. Our gratitude goes also to Cambodia Airports, a subsidiary of the Vinci Group, which has financed the totality of the programme. Lastly, thank you to the Co-chairmen, Ms. Lemaistre and the UNESCO representatives, the *ad hoc* experts, the ICC office, colleagues and friends as you made this project possible by listening, encouraging and helping.

I thank you for your attention.”

## **General discussion**



Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "Thank you. I would now like to open the floor for discussion. This morning we had very interesting presentations on rather big projects, such as the Bayon or Phnom Bakheng. We also listened to the Angkor Wat project, which did not deal with conservation itself, but rather habitat. Also interesting is the recent technique adapted to the conservation, research and archaeology, traditional and contemporary, such as the treatment of bricks and analysis of sandstone. We also heard new techniques like microwave analysis or 3D filming and imaging. We welcome any suggestions or questions from the floor."

Question from Mr. Valter Santoro: <sup>[OrigE]</sup> "Thank you Co-chair. My name is Valter Santoro from IGeS. I would like to ask a question to Mr. Tann Sophal, who made a presentation on the restoration of brick monuments in Angkor. My question is on the type of mortar used for the restoration of brick structures."

Based on our experience from the restoration of Pre Rup in the late 1990s, we used a special recipe for making mortar containing a so-called glue as a binding material made of lime, sand and brick dust and also a termite dust component that developed a very high binding effect based on the organic and silicate contents, according to the chemical analysis made at that time. This was derived from experience of the work of the German team, GACP, at Lolei and Preah Koh, which the best workers awarded by H.E. Sok An belong to. I would like to know why the termite component is no longer present in the recipes for these kinds of mortars. Thank you"

Comment from the Co-chairman for Japan: "Is there in the room an expert that may answer this question?"

Suggestion from Mr. Ly Vanna: <sup>[OrigE]</sup> "We will try to find an expert and then answer you later, if that is ok."

Comment from the co-chairman for Japan: "Thank you. The floor is to Mr. Tan Boun Suy."

Comment from Mr. Tan Boun Suy: "Co-chair, I would like to talk about the development at Phnom Kulen. You know that assisting the population for development is a basic factor, as they use slash and burn agriculture. This is why I would like to underscore the endeavour undertaken by ADF on development. I believe that we should support this effort and contribute to it for smooth development. Thank you."

Comment from the Co-chairman for Japan: "Thank you very much. Are there any other observations? Professor Beschaouch, you have the floor."

Comment from Mr. Azedine Beschaouch: "Thank you, Co-chair. First, I would like to make an observation. I think that we have all noted with satisfaction that during most interventions the Cambodians are speaking. There are now young experts, some of them now doctors, who excel at presenting their work. I believe that we should recognise this fact, as they are many Cambodians now presenting, whereas previously there were only a handful. This is an important matter, that there is a partnership in the expertise. I am not going to single out any of them, but it is impressive."

I would like to ask a question to Professor Leisen. I should start by congratulating him, because he was one of the first to visit Angkor. Sometimes his project encounters financial difficulties, but he is still among us and we should thank him. I have a question on the means of safeguarding. I am talking about the presentation on the stone, from yesterday, of Professor Tan Boun Suy, which included the findings of the research from a specialist of the University of Rome. Please, correct me if I am wrong. If I understood correctly, some stones contain manganese and iron, which is a natural phenomenon as the stone was extracted from a quarry, whereas at Banteay Srei the black patina is caused by a fungus. These are fungi, which Latin name is escaping me, of type X, Y, Z. My question is to know whether a treatment is possible in this case.

May I illustrate this by mentioning that fifteen years ago at the Phnom Penh National Museum we had the same problem that you mentioned earlier, that of bat guano. At the time, I went with a team, which name I will not divulge, demonstrated for UNESCO and I was considered as the 'No bat person' of the UNESCO office. Fortunately, the Ministry has remedied this and the bats have been expelled. It was a complete disaster in waiting as statues started to suffer from what we see at Ta Keo and what Professor Leisen presented. I wanted to know whether treatments are possible."

Answer from Mr. Hans Leisen: <sup>[OrigE]</sup> "First, I will ask you whether you mean treatment for the black crust in Koh Ker or in Banteay Srei? I would like to mention that I was a bit astonished that in the analysis for Banteay Srei they could not find the same distribution of elements as Madeleine Giteau did, who was the one who carried out the analysis. That there was no iron is stupendous for me, as the reddish colour comes from homothetic iron and we also have a brownish or ochre colour which comes from limonitic iron, so at least iron should have been visible in the analysis."

As for the crust in *Prasat Khmau* in Koh Ker, we should undertake tests. You can try to remove it mechanically by cleaning with particles, but first we have to analyse the thickness of the crust, its connection and depth inside the stone. We have similar problems at the Cologne Cathedral. In the 19<sup>th</sup> century, the sandstone used was more or less similar to that of Banteay Srei, with a whiter colour, as it has less iron content. This stone is very sensitive: It takes in a lot of water like Banteay Srei and very quickly appear processes of dilution and precipitation on the surface, which you cannot clean all of, because they make a very thin layer on the outer surface; if you want to clean this, you have to remove the surface and thereby destroy the surface.

As for Koh Ker, I do not know what the situation is. How is the connection between the crusts? Of course, with iron you cannot dilute but reduce it with chemicals. The best solution would actually to remove it without chemicals, using particle blasting, for example, but this is something we have to test. Thank you."

Comment from Mr. Karel Kranda: <sup>[OrigE]</sup> "May I say something regarding the iron? I just showed that this is throughout the matrix. To claim that there is no matrix is something very amusing. In fact, on the surface there is less concentration and that it goes down. There is therefore no point of blasting it off, as was made by the suggestion."

Comment from the Co-chairman for Japan: "Thank you. The floor is to Mr. Tan Boun Suy."

Comment from Mr. Tan Boun Suy: "I would like to take the floor regarding the iron, to mention that at *Prasat Khmau* in Koh Ker laterite was involved, not sandstone. Sandstone contains iron which may reach the surface in the monsoon and dilutes and evaporates when in contact with water. Previous analyses have demonstrated that the sandstone surface contains a strong content of iron and that is well known. Thank you."

Comment from the co-chairman for Japan: "Thank you. The floor is to Ms. D'Orgeval."

Comment from Mrs. Francine d'Orgeval: "I would like to comment on the ongoing activities. I am very impressed, because there are around 50 projects that have been reviewed and among those many deal with conservation and in particular archaeology. I carefully listened to the presentations of the teams and archaeology takes the lion's share, as the Angkor Charter provides for rescue archaeology to be implemented before any restoration work is started."

In twenty years, a huge amount of data has been accumulated that helps us better understand land use, the function of temples, etc. I was wondering whether it could be good to begin compiling these archaeological works to get a bigger picture of the massive

task that has been undertaken. This actually would add resources to each team and offer new clues for research.

This is a question I was asking myself and I believe that it is a major task to be undertaken. Maybe this is a task that could be led by the APSARA National Authority, with the input of all foreign teams. This is a suggestion that I make because I would like to see more on this point. Thank you."

Comment from the Co-chairman for Japan: <sup>[OrigE]</sup> "Thank you. We now have an expert that can answer the previous question on brick."

Reply from an unidentified speaker: <sup>[OrigE]</sup> "Thank you. The question previously asked on the mortar that we are using at Preah Koh and that used at Pre Rup. I believe that the mortar used at Preah Koh temple has been used since 1994, when the Royal Angkor Foundation (RAF) carried out the restoration of Preah Koh. The RAF carried out research about the composition of the mortar based on ancient techniques. As for termite dust, I think that we did not research this point. The mortar we use in Cambodia differs from that used at My Son in Vietnam. Over there, they used a different mortar to set the bricks with tree resins. I think that the mortar used in the region (Cambodia, Thailand or Vietnam) had a different composition according to the country."

Comment from the Co-chairman for Japan: "Thank you. Maybe it is time to wrap up this session. Thank you all for your presentations and contributions on technical and academic points. We express our gratitude to all of those who contributed to this morning's session."

## V. NEW RECOMMENDATIONS

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Comment from the Co-chairman for France: "We now move on to a new item and commence the new recommendations section. I remind you that you have been distributed the written recommendations. Let's give the floor to the group of *ad hoc* experts for conservation, made up of Professors Lablaude and Hidaka. Professor Croci should be among them, but he had to leave yesterday and should have contributed to the recommendations.

As we are late on the agenda items, we may shorten the time allocated for the discussions of the recommendations, and maybe our experts could do their best to restrict their speaking times. I thank them in advance for this. Professors, you have the floor. Wait, as Mr. Beschaouch would like to take the floor, but you do not belong to the group of experts?"

### V.1 Report from the *ad hoc* group of experts for conservation by Professors Giorgio Croci, Pierre-André Lablaude and Kenichiro Hidaka

#### Mr. Azedine Beschaouch:

"You are right, I actually do not belong to it, but the Secretariat would like to explain the working procedure with the group of experts. To recall also something of importance: The UNESCO director sent one of our eminent experts, Mr. Bouchenaki, to Iraq, a sensitive region. He is in charge of monitoring some damage with an international commission: This is why he cannot be among us.

We still managed to get in touch with him and to send him the recommendations for his approval. He read them and sent us his comments. This is proof that one can be in Baghdad and still work for Angkor.

The procedure was the following: The three attending experts visited the sites and distributed the tasks among themselves. The reports are then presented on their behalf although when drafting the report it is only presented by one of them representing them all.

Finally, the recommendations distributed yesterday have been improved. First, by the Deputy Prime Minister's delegation and the President of the APSARA National Authority, who made some observations on some points. He suggested adding major items like Mount Kulen, following the intervention of H.E. the Minister of the Environment. We reassured him, as yesterday we had already planned to add this item.

Professor Hidaka will introduce the recommendations on behalf of the group. Professor Lablaude will then talk about Banteay Srei and Angkor Wat (moats and Gallery of the Churning of the Sea of Milk). Professor Hidaka will then speak on the West Mebon, Ta Prohm and Roluos (Lolei, Bakong and Preah Koh). They will conclude by reading Professor Croci's report on Ta Keo and Phnom Bakheng. This is how it will unfold and immediately Co-chairman, Professor Hidaka will make this brief introduction before reading his section of the report."

#### **Professor Kenichiro Hidaka:**

[*OrigE*] "Thank you for your introduction. General comments: We *ad hoc* experts highly appreciate the significant progress in the ICC Technical session programme by which the follow-up reports of each team were presented for the first time as direct feedback for the recommendations. While in the past sessions, technical or plenary, the reports of *ad hoc* experts were a one-way statement addressed with the Recommendations, now we have mutual exchange of reports, which is very important, not only for drawing-up our recommendations, but also for sharing technical information toward the better and effective conservation of heritage. We express our gratitude to the cooperation on the part of the quadripartite, French and Japanese Co-chairs, UNESCO and the APSARA National Authority.

As we received and understood follow-up presentations yesterday, we have a little to add, as an independent report from our side. The following recommendations will be our full feedback of site visits and follow-up reports submitted and discussed yesterday.

In some cases, however, without being given particular reasons or information of difficulties on site, we were simply given the general information such as 'the recommended item is now under consideration, preparation or is waiting to be started'. It is not exceptional to encounter new problems or unexpected difficulties in the process of implementation of the recommendation. If they arise, we should share the challenges to reach better solution. I would like to ask all the participants not to hesitate to try to open any technical problems and challenges to allow for better understanding and to achieve better working cooperation in each site."

#### **Professor Lablaude:**

"I am taking over from my colleague and will talk about Banteay Srei. Banteay Srei Temple presents mixed and combined issues of heritage conservation and tourism visitation with likely clashes that these two objectives may cause.

[*slide*] The small scale of the monuments has increased these difficulties, causing bottlenecks in some entrance doors, lack of space and the treading on of stones. Water run-

off drainage inside the monument is at the heart of these issues. Water stagnation in the wet season turns some areas into big puddles that visitors cannot walk through and are also a great threat to the conservation of the ancient laterite pavers and of their adjacent masonry.

It is thereby imperative to restore the ancient water run-off system with potential necessary additional outlets and canals to be built and to undertake urgent archaeological work prior to starting the works.

Moreover, old and more recent collapses of the walls of several enclosures complicate the control of the visitor flow as they use parallel itineraries or pass through wall breaches, forcing the temporary cordoning off of these breaches.

Some of the walls of the monuments are also aesthetically affected. <sup>[slide]</sup> Restoring these breaches on their ancient foundations and using ancient materials (laterite still found at the foot of the wall, as you can see in these pictures) preserved on site is technically easy and seems to be indispensable for the better management and presentation of the site.

<sup>[slide]</sup> Finally, the construction of a lapidarium (a storage area for architectural and carved members coming from the site, of any dimension, and at risk of being looted) is now one of the priorities of conservation of the monument, as it has become vital to shelter these elements.

The location of this new building should not be detrimental to the site's landscaping quality. This is the reason the group of *ad hoc* experts advocates using a space available close to the recently built visitor and information centre. It would be difficult to set this building in the vicinity of the temple and rather have it near the visitor centre.

<sup>[slide]</sup> I move on to the next site, Angkor Wat. I start with the moats of the western side of the west moat to the north of the causeway dike (to the left when you enter the temples, with the great naga statues).

<sup>[slide]</sup> The first works have been explained by Mr. Santoro and used reinforced soil with geotextile on a first span. The second span's work was delayed due to some red tape issues regarding material supply, a problem solved recently.

The APSARA National Authority, using a different traditional technique, will restore another span. Side by side are work sites using traditional and modern techniques. Why? Because this 40-metre span has not been disturbed and still has its complete archaeological substrate, with alternative layers of clay, chips or fine sand.

<sup>[slide]</sup> Subsequently, the restoration scheme that has been adopted by the APSARA National Authority aims at using ancient materials and techniques on this site in opposition to the neighbouring span. This means that this site is more respectful of the archaeology and cheaper, notably due to the lack of expensive imported materials. It will also require more manpower and generate local jobs.

How can the use of two different restoration techniques for the same structure be justified, with one using modern techniques and materials and that other using traditional techniques and materials. Is this indecision or a case of competing projects? It is actually the illustration of recurrent issues at the core of our discussions of the ICC, a constant equilibrium of our restoration techniques between modern and ancient solutions.

Personally, I would remain cautious when making a too-ideological choice between what could be deemed as the future on one hand and the past on the other. I believe that modern and ancient techniques can both be placed in the toolbox of the restorer. A good restorer is one using the right tool in the right place.

The mixed use on this site of two different approaches is in this particular case justified because this technique of consolidation of the tiers could one day be scaled up to the entire inner and outer banks of Angkor Wat, representing kilometres of tiers and involving huge technical and economic stakes. Before starting more ambitious works, it is important to establish this comparison with two trial spans that will enable the comparison of the pros and cons of both solutions and notably assess their sustainability.

[slide] I move on to the next item, still at Angkor Wat, on the Ceiling of the Churning of the Sea of Milk Gallery. It is probably the most beautiful and famous bas-relief of Angkor Wat. Located on the east facade, it has been dismantled and reassembled by WMF, as the vault was unstable and prior cement joints with lead water tightness applied on this vault could have generated salt that may be particularly devastating for these outstanding bas-reliefs.

This new water sealant was completed using lead sheets inserted between the joints and folded to the outside, which remain visible for visitors inside the gallery. This is why H.E. Ros Borath asked WMF to study the potential of resetting a ceiling that would restore the ancient layout that could be found everywhere on the temple enclosure and thereby to restore a historical structure and also hide the folds of the lead sheets.

[slide] The APSARA National Authority built an initial trial panel. The ICC asked the WMF to carry out the historical study of the ancient layout of this ceiling. Olivier Cunin was entrusted with this task and some ceiling fragments have been found at the Guimet Museum or at the National Museum in Phnom Penh, and they are fascinating for the history of the building.

A second panel has been designed by WMF, based on this study. We studied this document with Ly Vanna in the past few days. We hope to find a final design, as the ICC has fully endorsed the resetting of this ancient ceiling.

This project should, as a matter of principle, strictly use ancient techniques. This means a masonry panel (and not carpentry) made up of wooden beams laid side by side and probably originally carved from beneath. An agreement was struck on a pattern from one of the panels found at the Guimet Museum. You will find in the recommendations the museum references. A new test is to be designed using ancient construction techniques and the ancient pattern from the Guimet Museum and will later proceed to some patina and artificial wearing mark trials so that this ceiling does not appear too new inside the gallery.

We also recommended laying it in such a way that it follows the deformation of the gallery. This gallery has had a long life and walls, floors, beams and cornices have been deformed and the new ceiling should not be laid out strictly to plan but follow the deformations of the whole building.

[slide] These might be considered as details, but one needs to understand that the Gallery of the Churning of the Sea of Milk at Angkor is as precious as is the Sistine Gallery in Rome. It is really a masterpiece of Khmer architecture and justifies the accuracy put into the project. WMF agreed, in cooperation with the APSARA National Authority, to produce by next December and the next technical session, a new sample presenting some of the wearing out marks and the insertion of the this new element that will certainly add a spectacular component to the new vision of Angkor Wat.

Finally, I would like to mention some of the contents of the report that Professor Croci drafted, as he had to leave prematurely. Recalling that at Phnom Bakheng during previous site visits (mentioned in the recommendations), we had agreed between the ICC and WMF to potentially restore the central pyramid already being worked on; to recycle scattered stones found around the monument subsequent to previous works undertaken by the Ang-

kor Conservation during the dismantlement of the huge structure that was added in the 16<sup>th</sup> century on top of the pyramid.

[*slide*] Materials are available. Of course, when these materials are walled in or carved they cannot be recycled in the construction, but there are a certain number of parallelepipedal stones that can be perfectly inserted in the monument following the principle that stones found on the monument ground are reset on the monument, maybe with a new function. One more question raised by this project is to know whether these stones can be re-carved or the old surface kept. It was agreed to preserve the ancient marks on the old stones either as per the carving of the original construction of the 10<sup>th</sup> century or the re-carving of the 16<sup>th</sup> century.

I segue to Professor Croci's text which is, I am sorry, in English:

[*OrigE*] "The visit of the experts to the site helped in evaluating the works carried out and, in particular, the reconstruction of the walls. Two situations are clearly visible in relation with the extension of the collapses and the instable condition of large points of the structure. In these cases, most of the blocks were removed and placed back after the rear bedrock was consolidated. The result is satisfactory and stones of different ages and different geometry are well harmonised.

A completely different situation appears when large sections of the wall present limited deformation. In this case, following the criterion of minimal intervention, it is convenient to consolidate the rock behind without removing the ancient stone statue. In the light of what was observed and discussed on the site, the experts suggest the following recommendation that you can read on your paper'."

### **Professor Kenichiro Hidaka:**

[*OrigE*] "Regarding the Mebon and West Baray. [*slide*] The *ad hoc* experts confirmed the steady progress of the work, both archaeological challenges such as the excavations or inventory of stones; and geological-hydraulic works such as reinforcement of the eastern embankment by the reinforced earth method combined with geotextile wrapping-up. This combination of reinforced earth and geotextile sheets was recommended by us as appropriately secure measures for this difficult site, which is threatened by the large seasonal change of water level.

[*slide*] The monument is featured with three small towers on each side. We were informed that nearly 20 per cent of the original stones of these towers are missing. We propose anastylosis of each tower without introducing new stones. Interesting was the episode of two broken stones of a naga found separately in two quite distant places that have been perfectly joined together. We hope that the team makes advances on the eastern side in 2015, on the western side in 2016 and finally on the platform leading to the central small structure with two pits in 2016, as is scheduled in their yearly programme.

[*slide*] I move on to Ta Prohm. This is another exemplary case where the achievement of our recommendation is very clear and *ad hoc* expert appreciate the continuous effort of ASI to follow the requirements.

Two points should be noticed. It was nine or ten years ago that our recommendation for the Hall of Dancers required the method of half restored, half untouched; that is, one half of the Hall is restored while the other half left untouched, to make a visual contrast of the space before and after the intervention. The restoration followed this principle and we see the sharp contrast between the two.

[*slide*] In 2011, a rare discovery occurred. A large seated Buddha statue was found just outside the enclosure, which was followed by the discovery of second, smaller statue. The

restoration and consolidation of these statues were completed by 2014, and it is time to put them back into their original places. The position of the larger Buddha has been identified to be at the centre of the hall and the smaller Buddha stood beside the larger.

While the position of the smaller Buddha was under the restored vault, the larger statue, being at the centre of the hall, would be half covered and half exposed, which is not at all appropriate from either religious or technical points of view. Heeding this new circumstance, the *ad hoc* experts encourage the continuation of the restoration of the remaining half of the Hall of Dancers to house the two statues.

Second point: the *ad hoc* experts propose a workshop, with the topic focused on Ta Prohm, where challenges and conservation experiences have been accumulated. The workshop aims at discussing and planning the master plan of this unique monument, both in and around its enclosure.

[slide] Three sites in Roluos, and I start with Lolei. As the presentation of yesterday by DCMA showed, the recommendations of the *ad hoc* experts have been followed and completed with correct understanding, utmost care and steady progress. We appreciate the meticulous implementation of the relevant recommendations. Now the structural situation of the northeast shrine has remarkably improved.

One challenge may be the reinforcement of the heavy lintel above the east door. The option I would like to propose is to connect the opposing two lintels in a back to back fashion with tie-rods passing through the interior space of the shrine. In cooperation with a structural engineer, accurate structural calculations should be conducted.

[slide] Another challenge may be the consolidation of the small conical tower of sandstone on top of the northwest shrine. We hope to find an ingenious solution for the delicate work that is necessarily related to the restoration and consolidation of the brick roof just below the cone.

I skip Preah Koh as there is nothing to add and move on to Bakong. [slide] At one of the two western brick towers (number 8), the large and heavy sandstone lintel fell down and broke into pieces some seven or eight years ago. Following our recommendation, the lintel was consolidated and now it should be placed back in its original position. The lintel should support itself and the brick pediment on top of it. Again, structural calculations should be carefully conducted for the efficient reinforcement with, horizontal bars to be embedded underneath for the bearing capacity of the slender side columns.

Now the report on Ta Keo, prepared by Professor Croci with the agreement of all members:

[slide] 'The visit of the experts to the site enabled controlling the state of the works and the satisfactory results acquired. The restoration of the Gopura has reused scattered blocks from the ground and has recovered part of the deformation of the blocks following the criterion of minimal intervention. [slide] The specific problem of the stability of the pediments has been consolidated. Due to their position as vertical cantilevers, some provisional external cables are visible. The latter's removal is programmed and stability is going to be ensured with steel bars inserted into drilled holes'."

### **Mr. Azedine Beschaouch:**

"Co-chairmen, these reports have been drafted on behalf of the three experts and agreed on by our absentee colleague, Mr. Mounir Bouchenaki. They present the document circulated yesterday, the recommendations. If you wish, you could give the floor to those who would like to take it to comment or contribute. We received some observations on



wording and grammar in both languages; they will be heeded. What is now important are observations on the substance, as for the form we have time to improve it.”

## **V.2 Discussion on the new recommendations for conservation, research and archaeology**

*Comment from the Co-chairman for France:* “I would actually add that the site visits have also been satisfying. Let us focus on the recommendations and the fact that this session is not final and that of course additions or answers may be given later on. Would the technical teams now comment? I cannot see any reactions or any hands rising. Yes, Mr. Santoro, please, take the floor.”

*Comment from Mr. Valter Santoro:* <sup>[OrigE]</sup> “Thank you Co-chair. Just a remark regarding the recommendation of Mr. Lablaude related to the different approach or philosophy for the restoration and stabilisation of the embankment of the moat of Angkor Wat. We have two spans close to each other. On one, the technology adopted uses new materials such as geotextile and the other, promoted by the APSARA National Authority, supports traditional techniques.

The first one involves using new technology and thereby more expensive material, and the technique is also more invasive but according to us, from an engineering point of view, it is easier because it allows both functions in just one operation. It supports higher drainage capacity of the embankment and higher shear strength for the soil to ensure stability.

I fully appreciate the use of traditional techniques in the restoration of the embankment; many spans have been successfully restored over the last century. Others have not been successfully restored because of collapses and damage. I do not trust the drainage effect of the original sand layer of the present embankment. I would like to suggest the use of a draining material, natural material not based on technology, geotextile, in order to secure the drainage effect of the embankment. The fact is that, it is not that easy to render to the soil on site the necessary density and the subsequent shear strength of the soil to guarantee the quality.

The traditional technique should be used in a secure and successful manner but we also have to ensure drainage with coarse sand or gravels behind the staircase in order to give them the capacity to drain water during flooding. Thank you.”

*Comment from the Co-chairman for France:* “Thank you. Would anyone else like to comment on the experts’ recommendations? Earlier we did not have enough time, now we will have too much. Professor Lablaude would like to take the floor.”

*Comment from Mr. Pierre-André Lablaude:* “I thank Professor Santoro for his intervention. I do not want to go into the nitty gritty of a technical debate, but I believe that we need to detail further and be attentive to both approaches. One of them was to magnify the old days with perfectly mastered techniques, good materials and that the ancient Khmers had perfect knowledge of construction and if we replicate their method, then it will be perfect. I would call this an ideological approach.

The other approach would be to recognise constant evolution of the technique, that the future is bright and tomorrow will be better, causing the excessive use of modern technology, as what is present is better than the past. This is the myth of the golden age, of better tomorrows; it will all be rosy in the future.

I think that when studying a site we must always keep a cool and technical approach based on calculation and experience, without exaggerating the rich past or the bright future. These technical choices should not be tarnished by debates turning into discussions on the identity, the philosophy or the dialectic.”

Comment from Mr. Azedine Beschaouch: “May I recall that today we are not approving the recommendations. This is done during the plenary, as usual. Today, we get everyone's consent and take note of the lack of objection on the form and substance. We welcome comments and questions and the final point is to know whether anyone has observations to make on the substance.”

Comment from the Co-chairman for France: “Professor Beschaouch, I would just like to detail one point or even amend what you just said. From now on, and this is what happened before, the recommendations are (and were) applied from the technical session. We will talk about this in more detail later, but it is not the role of the plenary session to validate the recommendations, as they are more scientific and technical and consequently belong to the technical session. We have to consider that the recommendations drafted during the technical sessions are to be applied as soon the session ends. But we will talk about it later. Thank you. Are there any more questions or comments? The floor is to the Ambassador of India.”

Comment from the Ambassador of India: <sup>[OrigE]</sup> “Thank you very much. I think that the technical session recommendations for conservation and sustainable development will be adopted later on by the plenary. I would like to go back to the first day, when H.E. the Ministry of the Environment recommended that a management plan for Phnom Kulen was to be included in the recommendations. I do not see it in them. He asked for a management plan for Phnom Kulen and we discussed that day that we are doing a lot of work at Phnom Kulen, including the work by ADF. I feel that we should have a sentence in the recommendations asking for the formation of a management plan for Phnom Kulen. This is the least we can do for the minister. Thank you very much.”

Comment from the Co-chairman for France: “Of course we concur with this request. This is actually more a request than a recommendation. We are taking note of it and it is recommended to answer to it. Mr. Beschaouch would like to take the floor.”

Comment from Mr. Azedine Beschaouch: “We thank H.E. the Indian Ambassador for his vigilance, but we have done things correctly. First conservation, and after lunch our two colleagues attending will circulate the recommendations on sustainable development, including the recommendation on Mount Kulen. We can give it to you in person now.”

Comment from the Co-chairman for France: “That’s grand. Thank you. Everyone agrees: It is amazing. Are there any other comments, or questions or answers to input now, knowing as I said, that this session is not final. Our *ad hoc* experts would like to insist and get more answers? Nothing to add? If this is the case then let me invite Professor Beschaouch, who is going to read an ICC motion. It is not on the agenda, but I am sure that you have all been given the text that Professor Beschaouch will read out.”

### **V.3 ICC Motion presented by Mr. Azedine Beschaouch**

“I recall that in his opening speech, H.E. the Deputy Prime Minister Sok An, primarily in his function as head of the Royal Government delegation and who two years ago was the head of the World Heritage Committee, with these hats on, proposed that we express our solidarity with the ongoing tragic events unfolding in two major countries of the Mediterranean basin, cradle of human civilisation. You are all aware of them; the whole world has reacted and the ICC cannot stay idle.

Besides, we are part of the procedures and bodies of the World Heritage Committee and UNESCO is our head office. H.E. has expressed the wish to take on this initiative so that our solidarity and our support are expressed to the initiatives undertaken by the UNESCO director. The motion is the following; an English version will be distributed later on.

'Meeting for its 24<sup>th</sup> Technical Session in Siem Reap (Kingdom of Cambodia) on the 4<sup>th</sup> and 5<sup>th</sup> of June 2015, co-presided over by the representatives of France and Japan, in the attendance of H.E. the Deputy Prime Minister Dr. Sok An, former chair of the World Heritage Committee, with the contribution of more than 300 people (architects, archaeologists, engineers, senior technicians, heritage managers and diplomats) from around twenty countries:

The International Co-ordinating Committee for Angkor:

- Shares the general indignation felt worldwide caused by the criminal acts of armed groups which, in Iraq and Syria, have massacred defenceless populations, forced into exile others, looted museums, destroyed monuments and trafficked archaeological items; [All of this is not invented-it is all over the media]
- States its full and complete solidarity with those who, from all continents, have mobilised to contribute as much as possible to salvaging Iraq and Syria's cultural heritage; [Sadly this is not safeguarding but salvaging that can be done]
- Expresses its full support to the stances and initiatives of UNESCO Director General, H.E. Ms. Irina Bokova, in facing this tragic situation.'

That's it, Co-chair."

Comment from the Co-chairman for France: "Thank you, Professor. I believe that these are the last words of this morning's session and we will break for lunch. We are a bit early regarding the schedule, so we will have more time for lunch. We reconvene at 2 p.m. although Professor Beschaouch is going to shorten our break as he would like to add something."

Comment from Mr. Azedine Beschaouch: "We have been told that H.E. the Deputy Prime Minister must leave early this afternoon and while he is attending we mention the motion and two points will need to be also added. We took a public stance and we thank him for his initiative.

He also decided that the APSARA National Authority will finance the burning of a CD where has been recorded the last session, pending a printed version. We thank him for this. We are also fortunate to have re-formed our team, as Blaise Kilian and Lim Bun Hok are among us. Thanks to them, we will be able to redo the work so that there is a proper recording of the proceedings. Generously, H.E. the Deputy Prime Minister has given instructions so that we will have the financial means to print the ICC report. We thank him publicly. This report will be circulated to Cambodia, in libraries and to institutions such as universities and in foreign countries (ICCROM, ICOMOS, etc.) to ensure wide circulation. I wanted to thank H.E. the Deputy Prime Minister. Thank you."

Comment from the Co-chairman for France: "Your Excellency Deputy Prime Minister, I will not be able to say it later on as you will not be attending: I would like, on behalf of the co-chairmanship, to thank you for attending this technical session and for your personal commitment. Thank you very much. Bon appétit."

Comment from the Co-chairman for France: "Ladies and Gentlemen, let us resume the session. Let's move on to the section on the sustainable development recommendations. Professor Beschaouch will, as usual, introduce them."

## **V.4 Report from the *ad hoc* group of experts for sustainable development, by Professors Jean-Marie Furt and Shinji Tsukawaki**

### **Mr. Azedine Beschaouch:**

"We have adopted the same methodology with our two experts. The main point onto which we will focus longer is the Angkor Wat *parvis*, although we will take the necessary time with regard to Ta Prohm and of course the west and east façades and the enclosure. This will appear throughout the recommendations.

I also wanted to add that to bolster the experts' action, Anne Lemaistre, the representative of UNESCO and I accompanied them and that this must be said publicly, the Cambodian side and the APSARA National Authority delegated H.E. Sok Sangvar to work on the *parvis*.

The report presented by our colleagues will present the methodology adopted on these items. At the end, the floor will be yours for comments. We added at the request of H.E the Deputy Prime Minister, a recommendation we did not overlook, that on Phnom Kulen. We also added the Training Centre and something we have been repeating for the past ten years: giving importance to ceramics.

Thank you."

*Comment from the Co-chairman for France:* "Very well. The floor is now to Professors Tsukawaki and Furt; I believe Profesor Tsukawaki is starting. Thank you."

### **Professor Shinji Tsukawaki:**

[*OrigE*] "Ladies and Gentlemen,

I suppose you are now full after a good meal. I know my voice could easily take you into deep dreams, but I would like to take you through our recommendations for sustainable development. This time we visited five sites. My colleague Jean-Marie Furt will explain in detail and I will make a kind of introduction of each site that we visited and what we saw and identified in order of our visit.

[*slide*] We started with Angkor Wat's western access area, then Phnom Bok, followed by discussions at the Office of the Tourism Management Plan (TMP Unit). The second day we went to Angkor Wat's *parvis* area, then Ta Prohm's access areas, both the east and south gates.

[*slide*] I would like to explain the area of the western access to Angkor Wat, part of the TMP project. We went to the drop-off zone, then we walked to the main approach zone and in a van visited the area of green plots. This slide shows you the proximity of the site, with to the north, the airport, Angkor Thom and the city centre. This area has been selected as a drop-off zone. It is a tentative project and we studied it. On the way to the main area we passed a miniature of the landscape from Phnom Kulen to the West Baray and Tonle Sap. It was unique staying there. Mr. Sok Sangvar explained the festivities held during Khmer New Year.

This area is a preset area of the west approach to the west of the western causeway to Angkor Wat. This is where the tourists will be dropped off and will walk until the main entrance of Angkor Wat.

[slide] Finally, we visited a green area located north-east of Ta Prohm. It is a beautiful green area. These are all the areas we visited for the Angkor Wat west approach.

[slide] That same day we also went to Phnom Bok that the TMP Unit would like to develop for tourism, notably for sunsets and to admire this large linga. I did a calculation with my GPS and got the altitude, although I am not sure it was accurate. We got an explanation on site of the TMP plan. An access area where there is a pagoda and a toilet. It was a hot day so we had to decide whether we would go to the summit of the temple and inspect the big linga.

We climbed 634 steps to reach the summit, nearly 200 metres in altitude. [slide] We saw the temple and the five metre-long linga. It is the largest one in Cambodia. We visited two sites for sunset: one to the south and the other to the southwest facing Phnom Krom and Phnom Bakheng. Due to the present dense vegetation, it was difficult to see.

[slide] On the way back we took a stony path back. On the upper area we saw sandstone outcrop rock that belongs to this area. It is very stony and difficult to walk on. We had a lot of exercise and after we enjoyed a coconut and a Coca-Cola. So we recognised that this way is difficult to walk along, even for someone fit. As a geologist, I go to the field everyday and even for me it was hard, though, yes, I am a bit old. The stairway is also long.

[slide] In the afternoon, we visited the office of the APSARA National Authority here. We had a detailed explanation from the TMP Unit and we discussed about the Visitors' Code of Conduct. Mr. Sangvar explained it and said very interesting things yesterday and he has filled you in.

[slide] The next day we visited the Angkor Wat *parvis* (approach area) project. The moat of Angkor Wat is here, with local shops fronted by cars, tuk tuks and buses. We had further discussion at the Tara Hotel and then went on site. The *parvis* area and shopping area will be behind these fences. The size of the *parvis* is now one third of what was planned. We went on to visit the present car park to discuss the size and traffic orientation and direction. [slide] I saw many bamboo edges in this area and I personally felt that these are not very usual in this area. They might provide good snacks for baby cows, but I still feel a bit strange about the use of bamboo fences.

[slide] I partly walked on the pavement area of the current car park and I observed many fissures and cracks on the surface and also undulations due to partial subsidence. I would like to recommend a careful and neat execution of the work in this area.

[slide] We ended by visiting the east and west of Ta Prohm. We started with the western access area, assisted by the staff of the Department of Conservation of the APSARA National Authority. We first had detailed on-site explanation of the results of archaeological research on the basis of LiDAR images of the western access area by Mr. Ros Borath and his staff.

[slide] I mentioned two years ago that this area sees very poor management of the roots of large trees. I found one dead tree and a lot of rubbish in this area. This is a snapshot of the shops to compare them with the east entrance.

[slide] We travelled to the east and saw the chaotic organisation of shops and tuk tuks parked in disorderly fashion. I do not understand, but I would like to mention that the sellers in the east of Ta Prohm are very forceful and aggressive and pester you. I would say simply that it is very disturbing. [slide] This is my recognition of the eastern area of Ta Prohm and I now give the floor to my colleague."

## **Professor Jean Marie Furt:**

"Excellencies,  
Ladies and Gentlemen,

Shinji, my colleague presented the different projects that have been submitted to us and primarily insisted on their environmental aspects. I will rapidly go back to their values and impacts in terms of tourism development.

As with regard to the Phnom Bok development project, the team headed by Mr. Sok Sangvar would like to develop it as an alternative to sunset (Phnom Bakheng for example) knowing that it is currently hardly visited. This could also enable the alleviation of pressure on some of the most congested sites by facilitating the visit of an unknown place and also allowing the locals to accrue revenue from the visits.

The presented plan of action includes development of a car park, a first aid and services area (information, small interpretation and commercial centre). Prior to these developments, and as you saw, the difficult terrain got the team thinking about carrying out rough grading and drainage works.

Access to the temple and its outstanding vistas is done through a small path that cannot be driven on. Then a never-ending set of stairs will take you, after a long hike, to the temple. The panorama is breathtaking and at the base of the temple, a light-structured esplanade could be developed to host visitors. In terms of tourism, the potential is there.

As far as the management of the Angkor site is concerned, it is an interesting project. You also heard from Mr. Beschaouch that this site has historical relevance. Nevertheless, considering the amount of necessary investment to develop the access and secure the itinerary, this project cannot be prioritised. For the moment, it would be better to continue thinking it over and in terms of tourism development to include this site in a more global vision (economic development of some sites and to include it in a wider understanding of the territory).

[slide] Ta Prohm working sites and development project: In December we reported on the works and recalled that our first visit to the site was in June, 2014. Just to recall what were the main objectives of the works and projects: At the West Gate, to relieve car park congestion and reduce the chaotic flows opposite the temple entrance, to build a bypass road blocking the stretch fronting the temple and to develop a car park at the back for vehicles.

This has been done partly on the West Gate; still to be done is the construction of the visitor centre (including first aid area, interpretation centre and etc.). As presented in the pictures, the vehicles, including tuk tuks, continue to park in the tree-shaded areas of the entrance causeway. One can hope that once the trees have grown in the car park, the tuk tuks will stay there.

[slide] At the East Gate, the objective was to diminish the number of stalls to that of 2005 and simultaneously to scaled down their size and chiefly to set further back the stalls to their original area, which means in the background of the site, below the road. This would clear the entrance and free an area to establish a car park and driving zone that would prevent bottlenecks and secure the approach areas of the entrance. As these pictures show, nothing has been done.

To conclude, I would say that in any case, chaos continues on both gates and as Mr. Beschaouch would say, it is like being in a souk! Overall, we insisted on the need to have, in terms of flow management, an overall view of the issues in order to prevent them being transferred to other areas of the site. In other words, the West Gate is being developed and the East Gate may suffer from it.

All the issues at Ta Prohm must be looked at in a coordinated fashion with the TMP team, which has worked on itineraries inside the temple. Once the studies and the trials have been conducted, it may be that there will be separate entrance and exit gates and planning of subsequent developments.

The Angkor Wat *parvis* was our third visit. This year's visit was conducted by Mr. Uk Someth, with Mr. Sok Sangvar and Mr. Beschaouch coming along.

This visit has sparked two series of observations: The first one regards the forthcoming *parvis* building site. Discussions on site brought important information, notably with regard to the organisation of flows inside the *parvis*. The submitted file has also answered some of our questions on the choice of materials, colours, layout and total ground area, permanently downscaled to 5,000 m<sup>2</sup>. We still need to draw the attention of the ICC to the visitor and services areas, as they only now represent 10 per cent of the overall area.

A construction calendar is now to be set with the starting date and detailed schedule, so the group of *ad hoc* experts may monitor the progress of the works.

The second series is on the car park and traffic flow. My colleague presented them. The work on site enabled us to together validate the need to extend the areas of the car park and to debate on the direction of traffic to access it (several solutions were studied), and also the need to break down the flows and bottleneck areas. To this end, widening of the Angkor Thom access road is a considered option, but rescue archaeology will first need to take place. Finally, in December we talked about turning the road located between the car parks into a pedestrian zone for safety of the visitors and also abandoning, as quickly as is possible, the drop-off areas so that vehicles drive directly to the *parvis*.

All these positive aspects should not overlook the urgent need to rapidly commence studies and works on the carrying capacity of the main monuments and, foremost, of the vehicles, the public and their behaviours. Otherwise, many decisions (on carrying capacity or flow, etc.) may quickly become obsolete, as would the planned investments.

Last stage: the studies carried out by the TMP team. They have been presented during a meeting at the office of the department. Headed by Mr. Sok Sangvar, this team has committed to administrative reforms that should convey the message of the TMP's culture. It is also interesting in terms of productivity. The team also undertakes international scope activities and staff training. The team also takes part in reflection on the Angkor Wat *parvis*.

We would like to focus on two interesting initiatives. That first regards the setting up of a control team on tourism quality service. We consider this initiative is going in the right direction in order to improve service which could, in the mid term, justify higher entrance fees and disseminate the TMP philosophy. One can just regret that the team lacks human resources and, but maybe this is just the beginning, we would expect an annual progress report on activities undertaken.

The second item is on the drafting and implementation of the Code of Conduct. Aimed at tourists, this document is an important piece of paper that recalls the sacred features of Angkor. It includes simple and sensible regulations, including the need to wear proper apparel, respect the monuments, the monks and safety regulations. It will be published in several languages and distributed to hotels, guesthouses and of course be on display in several areas of the site. It must be publicised, as you saw yesterday with the promotional clip. It must be launched as early and as widely as possible.

We do not fool ourselves in thinking that this document may change tourist behaviours, let's remain modest, but it is part of the educational endeavour and the need to ask visitors to be more responsible. Last year, we recalled that the TMP was simultaneously a

philosophy that should transcend all the teams, and a tool. I think that this is a good example of this philosophical view and of the tool.

I thank you for your attention.”

## **V.5 Discussion on the new Recommendations for Sustainable Development**

Comment from the Co-chairman for France: “The presentation is now finished. The floor is open for the relevant technical teams. This is the last segment of this session. May be Mr. Sok Sangvar would like to say a few words on the recommendations?”

Answer from Mr. Sok Sangvar: “Thank you Co-chairman, but I have nothing special to add. These recommendations are very fulfilling and we are going to heed them to improve the management of Angkor. Thank you.”

Comment from the Co-chairman for France: “Thank you. Mr. Beschouch, would like to take the floor.”

Comment from Mr. Azedine Beschouch: “May I talk about Ta Prohm? We are missing the opinion of the manager for the forthcoming years, which is of the Archaeological Survey of India. We should listen to Dr. Sood in case he has any observations or whether he likes what has been proposed.”

Comment from the Co-chairman for France: “That is a good idea. Mr. Sood, you have the floor.”

Reply from Mr. Sood: <sup>[OrigE]</sup> “Could you repeat the question please?”

Comment from Mr. Azedine Beschouch: <sup>[OrigE]</sup> “Just to know whether you agree with the proposal made by our *ad hoc* experts, because you are primarily interested by this proposal.”

Reply from Mr. Sood: <sup>[OrigE]</sup> “I believe this proposal is very nice for the tourists, as they can feel free to go inside the temple and also they will not create any problems. Thank you.”

Comment from the Co-chairman for France: “Thank you. Mr. Ros Borath, the floor is yours.”

Comment from Mr. Ros Borath: “Thank you Co-chair. I may be of help and answer the questions on the *parvis*. From the onset, I have been in charge at the APSARA National Authority with designing and thinking on *parvis* situations, locations and functions. The APSARA National Authority has beefed up and is now healthy enough to rely on several departments. I would like to suggest something. In order to extend the reflection on the issues of *parvis* and to be efficient on management questions, one needs to take a step back and to see which department is responsible for what on the *parvis*.

Of course, we work together, but there is a need for someone in charge that allows crosscutting work with others. For example, at the APSARA National Authority, my department may intervene anytime, anywhere. Let’s take the East Gate at Ta Prohm. I will come back to this. My first question is: who does what?

I now come back to the matter underscored by the experts. On the Angkor *parvis*, I fully agree with the comments made by the floor. There is one thing that I would like to insist on: this large green rectangle, the green zone, must not be affected. Let me explain.



These green areas must not be encroached on at Angkor Wat. Maybe a picture would help.”

Comment from the Co-chairman for France: “Professor Beschouch was asking whether the picture could be put up on screen so we know what we are dealing with.”

Additional Comment from Mr. Ros Borath: <sup>[slide]</sup> “Look at the bottom of the picture and there is an area marked ‘drop- off zone’ on this section up to the north section to the east of the Trapeang. This green area must not be affected. It actually should be maintained, embellished and etc.

For me, all the thinking behind Angkor Wat is represented there and the rest is at the back, with car parks and infrastructure. Angkor is presented with large trees and the existing green area. This is what I believe in for the Angkor Wat *parvis* and what I have worked on for many years. This is my thinking today.

<sup>[slide]</sup> Now, if you will allow me, I would like to deal with Ta Prohm. To the west of the temple, the archaeological test-pits have shown that the road laid over, following a decision that came outside the APSARA National Authority, is located in a place that has not been archaeologically destroyed, as Mr. Ly Vanna showed yesterday. The works carried out had been on pre-studied areas. Yet, due to the speed of the implementation, we could only catch up. This is for the west *parvis*.

Regarding the plantation that Professor Hidaka mentioned and that may block the West Gopura. The initial idea was to clear the vegetation so that the gopura would be visible. In this area, it is slightly hidden by the dense plantation. This is the only criticism I have to make. Otherwise, regarding the locations of the bathrooms and of the visitor centre, there is no need to question further, as the places have been checked or will be.

Regarding the east side. The question at Ta Prohm is: do we enter from the west and exit to the east or vice versa? There have been some hesitations and at a certain time to ease congestion and facilitate the flow of the itinerary, it was decided to exit to the south. Sadly, this exit has been speculated on and the land occupation was not working, so we could not continue. I thank India, which in the same momentum decided to reassemble the south gopura for the visitors with all members of the structure scattered on the ground.

Regarding the shop owners: To the south, an archaeological test-pit was carried out on the land occupied by stalls and the bathroom. Why did the locals voice their dissatisfaction? Usually, when you carry out works and people are displaced, you may move thirty that you accounted for and whilst you are still at the design stage, they suddenly turn out to be 60, then 90. This is pressure and it is understandable, as people want to own a small business opposite monuments.

The story at Ta Prohm is a simple one. We started the works by simply developing an area for a car park, as every year it was flooded. The first reaction of the shopkeepers was to request to be located further east, as the vehicles were stopping further to the west because it was flooded. The intermediate solution was to close our eyes and to let them get closer, but once again this is a provisional solution that must not last.

The solution, or rather what is left to do: Let us select an itinerary, then develop around it; it is now clear who is in charge of the development of the east and west side car parks and let us not use the word *parvis*.

Thank you, Co-chair.”

Comment from the Co-chairman for France: “Thank you for this comment. I now turn to the experts in case they would like to react. It is not forced, it should be enjoyable.”

Answer from Mr. Jean-Marie Furt: "Maybe part of an answer, but actually maybe not really. I fully agree with you, that we need to think out the direction of the itinerary before starting the development works. As for the question on crosscutting *parvis* management, this type of question and its answer are not under my purview."

Comment from the Co-chairman for France: "Professor Lablaude would like to take the floor."

Comment from Mr. Pierre-André Lablaude: "I think we should all agree on one thing: That the eastern bypass did not work out. A road was laid and after this LiDAR images showed that the archaeological substrate was of interest. Archaeological test-pits were dug afterwards, but some layers had already been destroyed. What I fail to understand in the presentation is why this eastern bypass road was so urgent. Why was it built so fast and who did it? It would be interesting to look back on what happened at this entrance gate so that we do not replicate shortcomings on the west and south entrance gates or on other temples, like Ta Keo, for example. Failures always happen, but we need to understand why it did not work out and not repeat the same mistake on other sites. I do not know whether H.E. Ros Borath could explain what happened."

Comment from the Co-chairman for France: "Please, Excellency."

Reply from Mr. Ros Borath: "I will tell you that I cannot answer, because it was a political decision. I believe that in terms of organisational level, the Director General should explain his choices."

Comment from the Co-chairman for France: "Would H.E. Bun Narith like to potentially answer this question? Thank you Excellency."

Question from Mr. Bun Narith: "I am sorry, but could you please repeat the question?"

Question from Mr. Pierre-André Lablaude: "I was explaining that Mr. Ros Borath showed us that the road was urgent work and laid very fast, and that time was not given to review the project and to carry out archaeological test-pits before the construction of this road. I was hoping to get some information on what happened in order not to replicate those mishaps on other sites."

Answer from Mr. Bun Narith: "According to some information that I have yet to cross reference, it seems that the Department of Monuments and Archaeology had been allocated a budget for rescue archaeology. But for unexplained reasons, difficulties arose and the digs never happened. This is the main reason, which is internal to this department, according to unverified information. This is the explanation for the car park west of Ta Prohm."

Comment from the Co-chairman for France: "The floor is to Ms. Lemaistre."

Comment from Ms. Anne Lemaistre: "Thank you Co-chair. The direction of traffic has been mentioned and they are some simple answers that have been mentioned several times by Professor Claude Jacques. The fact is, most Angkorian temples face to the east and that for an improved itinerary it is recommended to start in the east and end to the west, except of course at Angkor Wat, which as a Vishnu temple faces west."

Comment from the Co-chairman for France: "Are there any more questions, observations, comments on the *ad hoc* experts on the sustainable development report?"

Question from Mrs. Francine d'Orgeval: "May I ask a question? We recently, in this forum, had a discussion on *parvis*. I understand that it is a complex matter and that many symbolical, cultural and economic parameters are at stake. I fully concur with what has just been said. We are being told that further studies are needed to set up a project that may suit everyone. I am talking about Angkor Wat. I would like to talk about schedule. Could we say

that in the next five to ten years this *parvis* must be designed and built? There are yet to be any timelines and this is a concern as things could deteriorate. That's all."

Comment from the Co-chairman for France: "Can anyone answer this question on a planned schedule for the development of the Angkor Wat *parvis*?"

Answer from Mr. Uk Someth: "I thank you for this question, but I believe that the development of the Angkor Wat *parvis* has been the subject of a comprehensive study. It started more than ten years ago. There is a deadline, which is to complete it in the next three years. Based on the recommendations, we modified the project several times, the design, the size. We listened to all advice for and against and struck a balance. I think that I already presented, four or five times, this project, in different ICC meetings.

Finally, these last recommendations have been taken into account and we have tried to make sure that in the next six months we will know whether there will be any changes to improve the project conditions based on new recommendations. May I point out that on the right hand side area when you come from the airport, Trapeang Ses will not be disturbed and that only the south area will be developed. We will try to preserve the entirety of the vegetation. The architecture is kind of wavy so that we do not cut down trees.

The next stage is that of the earth moving works, and in case some trees that are not precious were to be cut down, others, more precious, would replace them. A vegetal screen will cover the area along the *parvis*, so that the *parvis* is isolated and the central axis perspective remains undisturbed. The north of Trapeang Ses will not be modified. The square will be cleaned up and the people displaced to a new location for them to fully benefit from the presence of tourists, either local or foreign. We will try to actively engage the population in this project in order to improve their living standards.

I can assure you that nothing else will be developed, although, later on, in the case the APSARA National Authority has financing, a botanical garden will be landscaped. The reason is that some tree species are in danger of extinction and we would like in the future to transform this area into a botanical garden.

Vehicle traffic will be subjected to a general study that is based on vehicle and tourism flows. The aim is to optimise the traffic, the promenade and the visit by then improving the quality of the visit and the enjoyment of the space around the temple.

I am not sure I answered the question. I can assure you that the project started in 2010 and now five years on, almost to the day, we have just completed the study, after many discussions and recommendations and points of detail. The documentation is very bulky. Thank you."

Explanation from Mr. Sok Sangvar: "To answer Ms. d'Orgeval, I believe that it is a very good idea to have a schedule of activities. I believe that activities at the *parvis* will begin soon with the commencement of the works. It could almost be said that the development has already started, as the TMP has already began the traffic regulation opposite Angkor Wat to facilitate the *parvis*' operation.

As was shown yesterday, the TMP began studying and surveying the private sector, tuk tuk drivers and other private sector operators regarding the closure of the road fronting Angkor Wat. The aim of the *parvis* is to secure the entrance and exit of the temple as currently visitors risk accident. <sup>[slide]</sup> The basic idea is to bypass this road and, with a U-shape road, bring visitors to Angkor Thom, whereas pedestrian would follow a T direction.

The team has already started the study and we went on site with the experts to make sure that before the construction of the *parvis*, the traffic will be closed here, there and here again. These developments require a provisional drop-off area, here, before the car parks are completed. The drop off area should prevent traffic congestion on this corner,

when the car park is full, pending the development of the additional car park and the construction of the *parvis*.

As is stated in the recommendations, it is necessary to quickly start the traffic flow organisation opposite Angkor Wat. Rest assured that the APSARA National Authority is committed and ready to begin as early as possible this traffic project, which is part of the overall *parvis* project that will be submitted to the experts in the coming months. Thank you."

Comment from the Co-chairman for France: "Thank you for these additional explanations. Are there any more comments, questions? Hands are raising and to my right is Ms. Lemaistre."

Comment from Ms. Anne Lemaistre: "Thank you Co-chair. I may repeat myself here, but I think that when designing this *parvis* we absolutely, and we talked about it during the site visit, need to complete the traffic inside the temple. This means that we cannot design the vehicle traffic without this being tied up in a logical fashion to what is happening inside the temple. An agreement will be needed on the itinerary."

Comment from the Co-chairman for France: "Fine, this is noted."

Question from Mr. Pierre-André Lablaude: "In the same vein, as said by Ms. Lemaistre, what will happen with the causeway dike during the APSARA National Authority-led restoration site of that same dike? Will there be a one-way system? We will have simultaneously two construction sites, that of the *parvis* and that of the causeway dike restoration. Does provisional traffic planning exist during this period, as it will be rather complicated before planning the yet-to-be-studied traffic scheme inside Angkor Wat?"

This is a very important issue, as bottlenecks may occur—a proper touristic thrombosis in front of Angkor Wat. It needs to be mastered, so it does not get out of control and negatively impact the overall image of the monument."

Comment from the Co-chairman for France: "This is a very good question. This item is taken into account. Thank you very much. Mr. Ros Borath is asking for the floor."

Comment from Mr. Ros Borath: "I apologise for taking the floor once again. Regarding the matter mentioned by Mr. Lablaude, we are currently studying, with Sophia University, the sequence of arrival of visitors. We know that we cannot close the west entrance, this is impossible. If you do this, there would be riots. We have thought about constructing a temporary, floating access located to the south side. You come in by descending the steps then there would be a wharf and the exit is made to the east. This is the state of our reflection with Sophia University.

I think that when we talk about bypasses, floating bridges, we need to take into account the variation of the water level in the moats. Maybe once the study is more detailed, then we will put forth another concept to the *ad hoc* experts. In any case, the goal of the project is to secure access for tourists."

Comment from the Co-chairman for France: "Thank you for your proposal. The floor is to Mr. Sok Sangvar."

Comment from Mr. Sok Sangvar: "This bridge is very interesting. This is a crucial time, as the Departments of Tourism and Conservation will have to cooperate. I find it essential that both departments provide the necessary documentation, so that the Tourism Department can understand the scope of the work. Do we really have to close the access and, as said by Mr. Ros Borath, we cannot prohibit tourist from entering? So, either the floating bridge or change the entrance gate. What matters is that both departments cooperate so that we make a beautiful project that can soon be activated."

Comment from the Co-chairman for France: "Thank you. We could use helicopters to access the temple, but may be is this not a good idea. Mr. Lablaude, the floor is yours."

Question from Mr. Pierre-André Lablaude: "I would like to insist further. The issue is to know whether we set up a one-way entrance system and, if access is through the west gate, where is the exit and how will buses pick up tourists? There would be a drop-off area to the west side, then the buses would drive around and wait for the tourists on the east side. This scheme seems the most realistic, but to the east would there be enough parking capacity for the vehicles that would bring these tourism flows? This is something that requires rapid study."

Comment from the Co-chairman for France: "These observations are very relevant. Professor Beschouch and maybe Mr. Sok Sangvar would like to react. Mr. Beschouch, you have the floor."

Comment from Mr. Azedine Beschouch: "Co-chairman, I am sorry to come back to the matter at hand with a strong stance. We have requested a study of the traffic and this should not be prefigured. Actually, and maybe I will be dogmatic, but when we ask the question 'should one enter that side or this side?', then what will happen is what happened at Ta Prohm. At this temple, my friends know about this, as does H.E. Ros Borath, he had to change a word on a document. It was written 'Ta Prohm *parvis*'. I reacted and he said he did not know who took the decision. There was a document that qualified the place as a *parvis* when it was just a temporary development to the south. Within a week it turned into a souk. Anything can be bought and the drivers were going to the other side to nap—although I have nothing against that. Then, it was over and they threatened to demonstrate in front of the Prime Minister's office. Someone came to me and said that the union wanted to see me. Where are we heading when tuk tuk drivers and the union dictate heritage policy? There is no way we can progress."

I am proposing to conduct a thorough study and to discuss it with the department in charge of this study and that it debates with the experts, the TMP and the Department of Monuments, the main unit in charge of maintaining the monuments. This study needs to be done and submitted, then the experts will be able to comment. Otherwise, this is going to turn into a Ta Prohm and let us not use this word again, there is no *parvis* at Ta Prohm.

There will not be any additional entrance gate as long as the traffic issue is not solved. Otherwise, it will be a repeat of before and the south gate will turn into a souk. You realise that when tomorrow we do the same thing in the biggest temple on the World Heritage List, we will have around the main monument of Angkor Wat, two, three exits, and etc.

I am sorry to have a strong position, but I am warning against any potential mistakes. There is a project manager, H.E. Uk Someth, and he must be provided with all available documentation. There is a deputy director general that is now head of a department and who has been entrusted with the TMP study. There is H.E. Ros Borath who is in charge of a department and whose experience brings guarantees and then they turn to us. It is worth going on site. If tomorrow morning we are being told to come at dawn, we will and we will be four or five.

This is to say that this is a concerted effort that must be set forth and we should not listen to some external views on a situation that may worsen. Thank you."

Comment from the Co-chairman for France: "Professor Beschouch, thank you. You know very well that some souks can be very charming. I am kidding of course. All of these exchanges have been recorded and noted. Are there any more comments, questions, or observations? Every time I ask this question a hand comes up, although now this does not seem to be the case. The recommendations are adopted unanimously and let us move on to the next item. Thank you."

As you all know, the technical sessions have now, as we wished, a general interest debate. If I am not wrong, this new agenda kicked off last year. A general interest debate has been tabled for this session and it is on water. I invite Professor Beschouch and Messrs. Hang Peou and Delanghe to present this debate which, as indicated by its name, is a general discussion. Professor Beschouch is first on. Please.”

## **VI- GENERAL INTEREST DEBATE ON WATER MANAGEMENT**

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### **VI.1 Introduction by Professor Azedine Beschouch, Standing Scientific Secretary of ICC-Angkor**

“Excellencies,  
Ladies and Gentlemen,

This is how we have organised these two hours on a key topic, as it is one of the pillars of the study and development of this site inscribed on the World Heritage List. We have considered water a research topic for many years. Before H.E. Hang Peou, a hydraulic engineer dedicated his research to it; there was a French academic, Mr. Groslier, who at the time was the conservator of the Angkor site. He published a memorable document, *La cité hydraulique* (the hydraulic city). This is how I understood what it entailed even before I was familiar with Angkor.

The works on water and research: What can the latter bring to us? It has confirmed what has been written, are there any novelties? For the past four years, through Dr. Hang Peou, we have listened to presentations on water and hydraulic systems. The first part is on water and research.

The second part takes into account the water distribution, the usage. Talking now on behalf of UNESCO, when we arrived in 1993 to look after the site with the royal Government, just after the site was inscribed on the World Heritage List, we had the West Baray. Of course, academics, and researchers knew about it but I asked at the time if this was a reservoir and I was told that a Water Authority existed to distribute water for irrigation and so on. Its functioning was not very clear, but we ended up with an absurd system as the water distribution was for many years limited, as the West Baray had to be emptied.

Why am I talking about water and its distribution? Because a disaster was prevented. I am not talking theoretically. I was on site and H.E. can confirm it to you, and also the governor of the city and some ministers. The water was so high that it was about to flood the city. Water and the distribution is a second problem. On this matter, I believe that a representative of the Water Authority was asked to present so that he gives us his opinion.

Water is also a development topic. At our ICC fifteen years ago, during the first meeting dedicated to water, a representative of JICA presented on the possibility of distributing water to the west side of the region. The fact was that there was no water access in this area, not only of drinkable water but also water for the daily usage of the poorest population of the city.

At the request of the royal government of Cambodia to Japan, the decision was taken to give way to JICA’s intervention. For four years, JICA worked on this project and this can be found in our archives, and a representative of JICA kept us informed on the project’s progress. Did we have time to ask a representative of JICA to comment on this, or to inform on new on-going activities?”

Intervention from the Co-chairman for Japan: "Sadly, the JICA representative is not attending, so no one can answer. JICA is also deeply committed to the Angkor Wat west causeway dike restoration project so I believe that they will be attending future sessions."

**Mr. Azedine Beschouch:**

"Thank you. Water and development also includes the French side of the co-chairmanship, with the AFD working with the Water Authorities. They are attending, and we will give them the floor later on, so that this aspect of water and development is talked about during our discussions.

The future of water and of all these questions mentioned over the years in this forum will be dealt with by a focus group including the Secretariat and all relevant bodies. This is a major topic and two hours are dedicated to it today. We began by forming a Secretariat. Thanks to the intervention of H.E. Sok An, we count representatives of the different ministers and regional services. We often had the governor of the region attending. Twice the representative of His Majesty the King honoured our meetings. Once the Secretariat formed, it only lacked the financial resources to operate.

Great news: UNESCO found a solution and we congratulate them for this success. The Jakarta UNESCO Office has earmarked resources to operate the Secretariat and Mr. Philippe Delanghe of the Phnom Penh Office will present on the financial prospects and operation of a standing secretariat on all water issues working with the APSARA National Authority.

You can see how research, distribution and development as well as the necessary studies and coordination among all stakeholders can be planned. These are outlines of what we would like this debate to be today and let's not wait and allow me to ask Dr. Hang Peou who is deputy director general but first an engineering researcher to present his summary.

May I also add that last year, when His Majesty visited Paris, during a session organised at the *Académie des inscriptions et belles-lettres*, Dr. Hang Peou read a remarkable paper that will be published in one month in last year's volume of the said Academy. It was a panorama of all his researches. You presented during 35 minutes in front of His Majesty the King; today could you please, in thirty minutes, present the outlines of what you discovered and take stock on water research. I hope you will do it with the same clarity as that of last year."

**VI.2 His Excellency Dr. Hang Peou, Deputy Director General, Department of Water Management, APSARA National Authority**

"Thank you Professor Beschouch. I have not used word by word the presentation from last year. This time, it is more a summary that I have categorised in order to shorten it. The paper is in English.

[OrigE] Excellencies Co-chairs,  
Excellencies,  
Ladies and Gentlemen,

I will make a presentation on water management in the region of Siem Reap Angkor and how we can find a way to ensure that these natural resources are used in a sustainable fashion.

[slide] This is a satellite picture illustrating the locations chosen by the Khmer Empire to build their temples. You find Kulen Mountain to the north and the Tonle Sap downstream. There is a very good flow of water from the northeast until the Tonle Sap to the southwest. Between these two places they set up a system that allowed them, one thousand years ago, to use natural flow and bring water from north to south. Water was important not only for the people who lived in the city, as the water was flowing from Kulen to Roluos then to Phnom Bakheng where it was stored. The combination of the three watersheds I mentioned yesterday.

[slide] The reason they chose this area at the time of the development of the Khmer Empire was certainly down to the surface and underground presence of water. As I said, we are not only thinking of water for humans or animals but also for the long-term stability of the temples. Combining the watersheds that are mentioned here on the map allowed us to use three rivers to support all the development of the city.

[slide] I am not going to expand on how the city extended along with the Khmer Empire. I would like to talk to you on how the hydraulic system constructed by the Khmer, hundreds of years ago, was mostly to support monument conservation, as all monuments are built on this system. To come to this conclusion we researched not only documents but also used modern technology to combine ancient knowledge with what we have discovered in the region. This system also supported in the past what we qualify as sustainable development of the region, which I will detail in a few minutes. All of this ancient system we understood can be used for the Angkor Park and for the city to optimise water and flood management for the whole area.

I will give you a brief overview of our work over the past eleven years. [slide] We started by mapping and going on site to see what the remains of the hydraulic management structure are. If you look at that picture, some of you could say that it is only a bridge. For us, water engineers, we do not think it is only a bridge, as it has a more important function than crossing a river. It is really interesting how it has been considered throughout history, and this is where local knowledge came to help the research.

[slide] At the beginning, when we started surveying the level of water, we did not have the right equipment. Later on, we began using more or less modern technology to understand how this data should be recorded properly and converted into digital data to be exploited.

[slide] When we collect data in the field, it could happen that we have to intervene at night, something we could not do, especially during flooding. We have set up an intelligent system that enables us to collect data without being in the field physically. It is an automated system collecting all data such as water level, rainfall, humidity, climate, etc.

[slide] Combined with satellite images, it helps us taking the right decision on what to do and so on. In the future we will try using this automated technology, which will prevent us from having to go in the field. Thanks to the data and information received by the system, we will act accordingly.

[slide] I now move on to the conservation aspects. You all know that Khmer temples are surrounded by water. I will not go into detail. Just to recall how moats and ponds play a very important role in keeping the backfill. I have to be specific here and mention that this is the artificial sand layer and not the natural sand layer that was on site before building the temples. You can probably make the experience by going to a water expanse, a river or beach, and when the sand is wet it can support a load but as soon as it dries it cannot. It makes it easy to understand that moats or barays draw their recharge from underground water. We have to make sure that the sand layer under the temple is always humid so that it can support the load of the construction.



You realise that our temples are built with stones stacked on top of each other and even the slight movement underground may cause stability issues and that temples could collapse slowly, stone by stone. Some of us could think that the collapse is normal because the temples were built one thousand years ago, but technically it is not normal. Think about why some of the big temples are still standing and some smaller ones have already collapsed. We can say that in the whole region of Siem Reap there are 700 temples and about 200 are still standing. The small have collapsed because their moats are too shallow and the level of water decreased when surface water dropped into the underground water.

[slide] The APSARA National Authority has tried to find ways to restore the moats and the barays, you can see them in the pictures and you have the list, Angkor Wat and Angkor Thom's moats and etc. We have tried to balance the underground water so that the latter is high enough to support the sand layer. [slide] An example is at the North Baray and the process we followed to refill it, but I will not go into detail.

[slide] Let's move on to sustainable development and what professor Beschouch was mentioning on the irrigation system. When we carried out restoration activities, you remember this picture from yesterday: it is the northern part of the West Baray that you have here on the map. It is not only an upgrade of ancient canals to manage floods, but we also tried using water to help the locals to plant more vegetables or different types of rice by increasing the yield from one harvest to two or three a year. We can assist in developing the area. At the West Baray, as I said yesterday, we have a large system of irrigation for the locals to plant rice or vegetables, they then can sell onwards to the market in Siem Reap. This is thanks to the extensive demand from tourists in Siem Reap. The Baray, as I said yesterday, has become the most important reservoir not only for irrigation, but also for water supply.

[slide] Most people living in the region of Siem Reap use underground water. Siem Reap Water Supply Authority calculated that today's draw from the ground is 14,000 m<sup>3</sup>/day and that the private well draw down was estimated, in 2005, to be 16,000 m<sup>3</sup>/day. JICA made a projection back in 2009 and estimated that in 2015, this year, we would need almost 30,000 m<sup>3</sup>/day because of the rapid expansion of Siem Reap linked with the development of tourism, reaching now 3.5 million visitors.

In 2005, a survey was also conducted on the use of water in downtown Siem Reap. Local people use around 70 liters a day per person including all usage of water, whereas tourists need some 300 liters of water a day. This is a big difference. The only good thing is that we have a lot of Asian tourists who use less than 300 liters per day per person. We need to make a new study on consumption.

In 2030, it will be about 85,000 m<sup>3</sup>/day. The problem of the 2009 JICA study is that we would need a very big capacity to allow pumping underground water. Linking with the 1998 JICA study, we have to think of the stability of buildings. All big cities use underground water and if you exceed the recharge capacity then there will be a risk of subsidence of the soil if we pump more than what we can recharge. For us it is worse because our temples are built on the same layer and need this humidity. It concerns not only modern constructions and the soil but also the historic temples.

The solutions we worked out with the Water Supply Authority, which will be tried next year, are based on a study financed by AFD. It plans on drawing water from the West Baray, as it can store more than 56 million m<sup>3</sup> and to try to take only surface water. Next year, we will draw down 15 000 m<sup>3</sup>/day to combine with the 14,000 m<sup>3</sup>/day being presently pumped from underground. After our study, as I said yesterday, we have been given by the government of Cambodia control of the water of the West Baray following a recommendation from the ICC.

[slide] The APSARA National Authority has installed equipment that gives us the hourly level of water at the West Baray. It enables the control water of used for irrigation and to

exactly know the number of cubic metres available. If it is more than 15,000 m<sup>3</sup>/day, we will draw more water from the West Baray so that the underground water remains untapped, as a lack of study does not allow us to know the situation of the latter exactly.

We had a telling experience last year when we could not open the water gate of the West Baray. We destroyed this dike to let water out and we had an immediate effect in the beginning of 2014, during the dry season. Most people living along Route 6 saw their wells dry out. It is easy and clear to understand why JICA gave a recommendation limiting pumping from wells, because they know they recharge from the Baray. This is why last year, during the 2014 dry season, it was demonstrated to all (local people, Water Supply Authority, APSARA National Authority) the need to agree with the recommendations of the JICA in 1998 and 2009 and that there is water potential thanks to the West Baray recharge. We now have permission to draw down from the West Baray.

[slide] I move on to the last part, on the optimisation of water and flood management of the whole area using the ancient system. [slide] Maybe some of you have seen this picture, from before of the bridge in Banteay Srei. There, in 2012, there was frequent flooding and the bridge remained submerged. Upstream from the Park we tried to manage the flow.

[slide] This is the place I showed you earlier, where the ancient hydraulic structure was broken. We built a new structure with a temporary dike, as you can see here, but the flow was coming too strongly and we tried to divert the water towards Puork River to reduce the flow towards Siem Reap.

[slide] A reminder in this picture of the floods in 2009, 2010 and 2011, when we managed to avoid flooding at the temple, but not in the city centre. In 2011, we had five occurrences of flooding and even in the Old Market in the centre of Siem Reap, larger cars could not drive through. Since 2012 and the works implemented, we started to replace ancient structures with new. We kept the old structure so that people can understand how the hydraulic system worked in Angkor. It is no longer functioning, as we built a new structure to carry out the work it used to do.

In 2012 there were four occurrences of flooding and we managed to protect the city, the airport and, more importantly, the temples, using this system. In 2013 there were also some occurrences, but no flooding, and in 2014 there was no flooding in Siem Reap, but there was in some other areas because we lacked information. We are in the process of installing twenty stations that send data to the APSARA National Authority centre in order to immediately know what happens in Kulen, Banteay Srei and etc. This information can be sent at nighttime, enabling us to monitor the evolution of water on the ground. We can better deal with the problems, as we did in 2012 or before.

[slide] The system we have installed is a mix between the ancient millennium system and the new technology. The latter allows us today, in a time of climate change, to manage. We have optimized the use of these ancient structures and now we can send water to the reservoirs and we use the barays, the moats of Angkor Thom and Angkor Wat as temporary storage in the case of floods. These structures are also used as storage for recharging underground water and for irrigation. We hope we will soon be able to use the North Baray which, after the West Baray, is the largest water body we can store water in and support our temples.

We also have a back-up system where we use two natural streams: Preah Srok and the Puork River, where a dense population lives. To secure the management of flow we know exactly what the limit is in terms of cubic metres before it can impact the areas affected. We are trying to use the reservoirs to store and release water in a timely fashion. We sent very little to the west and east in 2012 and 2013. We favoured using the storage of Angkor Thom (2 million m<sup>3</sup>) and Angkor Wat moats (1.5 million m<sup>3</sup>) and of the West Baray (56 million m<sup>3</sup>) to manage the area.

At the West Baray we had an issue with a spillway, but this has been solved. There is still a limitation in case of huge amounts of water coming from upstream. This is the reason we need a system, as was originally designed; a back-up system. This is what we carried out this year, to use these two rivers. Preah Srok River has already been dredged up to the Tonle Sap and is now very deep.

Thank you for your attention"

*Comment from Mr. Azedine Beschaouch:* "Thank you very much and please stay at the podium, as I am sure that questions will be asked. Please, leave the map on the screen. May I quickly summarise? How did the landscape look twenty years ago?"

The North Baray was dry and the West Baray's northeast quadrant was also dry. Angkor Thom's moats were dry unless there had been heavy precipitation. UNESCO intervened to the International Labour Office regarding the water inside the Angkor Wat moats between 1994 and 1998, and this for two issues: first, the shortage of water in the moats, which created a mud where red algae thrived. The Office devised a plan to clean the moats. Why am I telling you this? Because now you see moats filled with water which previously were almost empty. The North Baray has subsequently been refilled and the east quadrant of the West Baray to the east of the Mebon has now been reflooded. The Angkor Thom moats were finally reflooded and cleared to reach 90 metres' width, if I am not mistaken, which is impressive.

I recalled these facts but let's move on to the questions before continuing. We will keep some other questions for later. In this room are architects and archaeologists that can debate on this key question of the relationship between water and wet sand below the monuments, water consumption, drying of the water table and the condition of the monuments. This will be part of the end. After authorisation from the co-Chairs, I would now like to let the floor voice their questions."

*Comment from Mr. Tan Boun Suy:* "Co-chair, I am an agronomist and I am interested in water used for farming. Earlier on, Dr. Hang Peou demonstrated the role played by the West Baray in irrigating the area downstream from that same Baray. I studied for a long time the northern and poorest area of the West Baray. As soon as there is a pond, people feel happier and improve their income. Now that these two canals have been developed to the north of the West Baray, this will strongly contribute to farming expansion. Thank you."

*Comment from Mr. Azedine Beschaouch:* "Are there any other questions or requests for additional information? Mrs. Lemaistre, the floor is yours."

*Question from Mrs. Anne Lemaistre:* "My question is that of a laywoman, as I am not familiar with this field, although we have organized several meetings on this topic in the past. The question regards the lack of contemporaneity between those hydraulic structures, which means that they were not used at the same time and had their own water flows. Addressing the archaeologists, I would like to know whether we have knowledge on the way these different water systems functioned in the 9<sup>th</sup> and 10<sup>th</sup> centuries, during the respective construction of hydraulic structures."

*Answer from Mr. Hang Peou:* "Thank you Anne for this question that I have been waiting for for a while. I have already explained this and let's look at the general map of the area. <sup>[slide]</sup> Some people say that Khmers built the reservoirs one after the other. Once one was not working anymore they built another one. There are two reasons for this.

The first is based on hydraulic calculations. I tallied the whole storage with that of the Baray located here in the southwest axis of Angkor Wat. With a volume of 20 million cubic metres, which adds to that of the East Baray of 36 millions and of the Lolei of 10 millions, we reached about 110 million cubic metres. The water flowing from upstream represents

130 million cubic metres. There is moderation, as not all water can be collected and continues to flow. This means subtracting 10 million cubic metres of the North Baray. This means that the upstream water supply has been reached.

In the 12<sup>th</sup> century the storage capacities were too small and Jayavarman VII decided to add more hydraulic structures. At the time, the King could collect water from the river but it did not directly supply the North Baray, unlike for the three or four other barays. They decided to design a complex supply system for the North Baray. There is a small watershed located here, close to the Royal Road towards Kulen, which aimed at collecting water as you can see here, as the ground is lower. A dike was built with a 90 degree curve to supply the North Baray. This was done in such a way that the water flow direction was stopped by the dike and flowed back up towards the North Baray.

This was the last technology used in the Siem Reap region that allowed for the collection of water via an upstream river to be further diverted to the North Baray. It is difficult today to upgrade this system, as locals have settled in this area. I had to draw up a system where water splits at this point. This system was only used during flooding and not to fill the North Baray. A calculation of the volume of water flowing from Kulen arrives at 100 million cubic metres once moderated. This hydraulic network developed new technologies to collect run-off water towards the most important North Baray; I will detail this later on.

The second reason is easier to understand. You all know the temples built by the King of the Kings, Jayavarman VII: Angkor Thom, Preah Khan and Banteay Kdei. Why did he build the temples of Ta Prohm and Banteay Kdei set back and why did he leave a 7.2 x 1.7 kilometre plain, the East Baray. This was unprecedented at the time. There were hydraulic and town planning reasons.

This means that at the time, all the barays were used simultaneously and as I mentioned in my paper, this is basic knowledge. There is no need to repeat the words 'to eat, to eat' everyday. This is a natural occurrence for Cambodians who have been living with water since the beginning. These technologies enable us to understand how the Khmers knew how to control water at the time.

Another point: Banteay Chhmar is a name familiar to you and last year a meeting was organised on this temple. There is a similar system to that used at the North Baray, although even more sophisticated. Within ten years they had developed further. It is clear that at the time a team of water engineers advised the Khmer King. It is sometimes a bit complicated to understand what was achieved at this time. For example, over 17 kilometres water is being collected and what was their knowledge to manage this territory? A team must have been fully dedicated to this task. I hope I answered your question."

*Comment from Mr. Azedine Beschaouch:* "Thank you very much. You and others who have been carrying out these studies for years will be able to get more accurate facts to inform on questions that are being asked year on year whilst knowledge improves. Try to be more accurate on these questions as they bring input to improve knowledge.

I am now asking my colleagues whether they have further questions or need explanations. Professor Nakagawa, maybe? The floor is actually to Mr. Tan Boun Suy."

*Comment from Mr. Tan Boun Suy:* "Co-chair, my intervention is not a question but a reflection. You are aware that we have to face climate change, bringing flooding and drought. Controlling water flow has become a key instrument in taking on climate change. Cambodia should look into this in detail. Thank you."

*Comment from Mr. Azedine Beschaouch:* "Thank you. We are all awaiting the major Paris meeting on climate, as some people are still sceptical regarding climate change. In the room right next to ours at the *Académie des inscriptions et des belles lettres*; they organise discussions for hours. In the newspaper as well, actually in *Le Figaro*, three pages were

dedicated to the fact that some scientists in the *Académie des Sciences* are literally battling, like in the times of the ancient and modern. They deny climate change's existence, based on arguments rooted on glaciations and etc. On this item let us wait for the Paris conference, which should shed some light. The global community will meet and state whether this is climate change or not, or only hypotheses.

Unless there are more questions, I would like to thank you for your presentation and we can move on to the second part on water and distribution and I will ask our colleague from the Regional Water Authority to present."

Intervention from Mr. Hang Peou: I think that it would be better if the Siem Reap Water Authority takes the floor first."

Comment from Mr. Azedine Beschaouch: "They can take their place at the podium. Before that, Mr. Nakagawa has a statement to read."

Statement read by Mr. Nakagawa: <sup>[OrigE]</sup> "Concerning the consolidation of the basement, I would like to make a small intervention. The central part of the main structure was built on a platform consisting of a single sandstone and laterite layer and a compacted sandy surface. The compaction of the soil of the Bayon has high strength, assumed to be caused by the relatively low moisture content, therefore sustaining the weight of the whole structure.

We, JASA, have studied the formation of the structural system of a compacted soil layer like this. There is a clear interference of the climate during the dry and rainy seasons. Based on this concept, we have analysed this structure, but in recent years climate change has caused longer rainfall. We need to take into account the impact of the rainfall on the structure of the platform and associate the compacted sandy soil of the foundation.

We believe that this is a very severe problem. Thank You."

Comment from Mr. Azedine Beschaouch: "Thank you Professor. We will deal with these major topics in the conclusions and please do take the floor later on as there will be several questions on this item that you have analysed: the relationship between water and monuments."

### **VI.3. Presentation on water distribution in the Siem Reap region by Mr. Cheav Chany, Deputy Director General, Siem Reap Water Authority, and Mr. Paul Galzin, expert, AFD**

**Mr. Cheav Chany :**

<sup>[OrigK]</sup> "Co-chairs,  
Excellencies,  
Ladies and Gentlemen,  
National and International guests,

My name is Cheav Chany and I am the Deputy Director General of the Siem Reap Water Authority. I would like to briefly introduce the management and distribution of drinkable water to Siem Reap dwellers.

The present production and distribution capacities of the Water Authority in Siem Reap are of 13.000 cubic metres per day, which covers 25 percent of Siem Reap town.

In order to remedy water shortage and need, the Authority has designed a long-term project for the 2015-2030 period. JICA has granted financing to the Authority to build a

water treatment and production centre that will draw water from the Tonle Sap. The production capacity of the centre will be of 60,000 cubic metres per day. Works will start in 2017 and be completed in 2020. Until this date we will have to face water shortages, notably with the increase in population and increasing tourist arrivals. According to a statistic of the Province Tourism Department, four million tourists visited Angkor in 2014.

The Authority has an additional project, financed by ADF (French Agency for development). This project analyses the possibility of drawing water from the West Baray as it could supply 15,000 cubic meters per day. Until 2030, the forecast is that 85 percent of Siem Reap town will be connected to the Authority's drinking-water network. Mr. Paul Galzin, a consultant for AFD, will fill you in on the details. I thank you for your attention."

Comment from Mr. Azedine Beschaouch: "Thank you. Could Mr. Paul Galzin take the floor please?"

**Mr. Paul Galzin:**

"My presentation may be slightly off the topics I just heard, as I was not aware of them when preparing. I will present briefly on Siem Reap's water supply. The slides are in the English language and I would rather present in French.

[slide] The authority finds it difficult to meet present-day demand, with insufficient water resources. JICA finances a project which will only be operational from 2021. The Authority has planned bridging programmes until this date. It is actually a unique programme, divided into two phases. The first phase concerns the right of water use of 17,000 m<sup>3</sup>/day bestowed to the APSARA National Authority at the West Baray. Presently, the Authority draws down 14,000 m<sup>3</sup> south of the West Baray and the second phase of 9,000 m<sup>3</sup>/day will be added to the West Baray project in order to ensure homogeneity of the size of the equipment and to bridge the needs when the JICA project will kick off. [slide] The 9,000 m<sup>3</sup>/day that we are sourcing cannot be draw down from surface water and we strongly believe that underground water would allow the draw down.

[slide] This is a brief presentation of our study and content: Water demand, resources, water quality, treatment and supplying the town and all the programmes to be implemented.

[slide] Water consumption is actually higher than the 14,000 m<sup>3</sup>/day supplied to town, which does not allow for sufficient pressure. At the hotel, when you open the tap, there is very strong pressure. You can be sure that this is not running water from town but private wells from the hotels. The Water authority will never be able to reach this pressure, as added resources and subsequent increase of pressure will be redistributed. This 17,000 m<sup>3</sup>/day that will be added in late 2016/early 2017, will be consumed in one year and the water authority will be able to connect 36,000 households and about 630 small businesses.

The second phase drawing water from underground will supply more households, as in the meantime the pressure will have increased in town and 30,000 additional households should be connected. An additional 60,000 m<sup>3</sup>/day seems to be the necessary figure to reach to meet future long-term demand. Some uncertainties remain on the exact date this figure will be needed. It ranges from 2027 until 2050. A simple factor is key to this matter: How many households that draw from private wells in Siem Reap would take the steps to connect to the network?

To simplify, let's use a ballpark figure: it costs 90 riel per cubic metre to draw from a private well; why would these households pay 3,000 riel to make viable a project drawing 60,000 m<sup>3</sup> per day of water from the Tonle Sap? The day the Authority is able to have competitive production, private wells will cease to exist. If it cannot, then private wells will continue. This is a simple argument, but it is telling. To gamble a lot of money with an un-

certainty of return is another issue. The earmarked budget to draw 60,000 m<sup>3</sup> per day of water is US\$100 million. This cannot be planned lightly and what would be more fitting is to install small units that would be adjusted depending on the demand. It is an old-fashioned approach to the water supply of Siem Reap.

[slide] This picture shows the water resources calculation that we looked at. During the monsoon, the West Baray collects more water than evaporates and increases its nappe by about 50 centimetres. This is a rather simple calculation. When the water rises, the nappe saturates and meets the water of the Baray. In hydrology it is called a run-off respecting the pitch of the water table, inducing little loss from infiltration, according to my calculation about one millimetre per day.

[slide] In the dry season, evaporation is much higher than rainfall, with a deficit of about 70 centimetres. In the case the structure does not have any outlet, the sole evaporation would decrease the level of water by 70 centimetres in the dry season.

[slide] Regarding the different resource potential: we did a calculation not heeding any external supply in the dry season, only using the volume inside the baray. This time the infiltration is much higher, as there is a decrease of the level of the water table due to the outfall, the Tonle Sap, which level decreases by seven to eight metres, causing a tipping of the water table and evaporation. It represents 4 ml/day of infiltration in the Baray. This infiltration equals 40,000 m<sup>3</sup>/day of water, a figure much higher than any draw down could achieve in this area. We are today drawing down 14,000 m<sup>3</sup>/day, with a potential increase to 26,000 m<sup>3</sup>/day, knowing that the Baray proper infiltrates and refills the water table with 40,000 m<sup>3</sup>/day. These figures are much higher.

According to the assessment presented, 2 m<sup>3</sup>/second could be allocated to other uses such as irrigation, but only in the dry season. There would be, based on our study, sufficient water to irrigate 2,000 hectares.

[slide] This table summarises what I have just said. This is the upstream water supply of the Baray, the evaporation, the rain falling on the Baray, the infiltration and the draw down. The latter is the 17,000 m<sup>3</sup>/day allocated to Siem Reap Water Authority and 2 m<sup>3</sup>/second for irrigation.

[slide] For Phase II of the programme, it has been planned to balance between the surface and underground water resources. This is a rather complicated sketch presenting the programme's implementation. The first column is the resource and then the water draw down, the treatment and the distribution. It is slightly technical.

[slide] This is an overview of the existing plant, located here, and that new will be there. The West Baray canal, where is located the water intake. [slide] Zooming in. The treatment plant is traditional, with treatment and pumping. The only specificity adapted to the local environment is sludge treatment. Disposal of the sludge is necessary, as in the Siem Reap region the impact of sludge to be disposed of is very strong. This is a sensitive point. Sludge management is also one of the main limitations regarding treatment.

[slide] Here is the main transmission of water along National Road 6 leading to Phnom Penh from the fields. The second phase has been carried out thanks to the French FASEP support, which will help us in checking the potential capacities of underground water. The APSARA National Authority has already calculated the surface water, and the ongoing large scale-upgrading programme of hydraulic structures heads towards the right direction. One should even go further. Not a lot can be added to this. Our study will mainly focus on underground water and we will try assessing the real refill capacity of the West Baray using tests and trials. This is our key component. Monitoring of some wells will also be conducted and geophysical tests and others will be carried out and gradually adapted.

We will redraw the aquifer modelling, although this was done recently by NJS. We realised that it dated from 2010 and at that time the West and North Barays were not flooded and this has considerably impacted the water table intake. This modelling will be reviewed, and one criterion often overlooked in tropical countries added: water table evaporation. I always include it as I have worked in many desert areas.

We always think that water taken into the ground by the water table will not evaporate. I guess that many of you do gardening, and that when you fill a watertight pot, in the next three to four days it dries up. Water tables can evaporate much more deeply than previously thought. I did some recording in Baluchistan and there were 2.70 metres of yearly evaporation, including 900 millimetres of yearly evaporation at four metres' depth. These figures are quite high. I can even mention hollow water tables in the Sahara, which do not have any outlet and where evaporation creates a gradient and subsequently a depression. It could be compared to a sink that drips but without any drain below for water run off. Modelling of only the evaporation up to 150 metres can be done. A value of 90 millimetres per year must be measured to explain the gradient found on hollow water tables.

This point is to emphasise the importance of this parameter and that modelling must include these types of elements. In terms of calibration, we would make a mistake by not including them. In order to calibrate a model, we play with numbers to try to find the situation that we have monitored and recorded. A model is as simple as that. The criteria are twisted so that the presented simulation can represent what is monitored in the field. In case one of the factors is wrong, then something has been left behind and the modelling will not work properly.

[slide] Another component that will be included in the FASEP study regards wells containing iron and others with no iron found throughout the region. We kind of already know the reason for this, but we will try to better detail the reason. Theories are wonderful but they need to be completed by tests to demonstrate that they could differ. We will only focus on the eastern area and the study lacks funding to widen it. This should give us sufficient overall understanding to air our expert views on the hydrology of the whole area.

I would like to invite the APSARA National Authority to discuss with us, high-level seasoned experts, on sensitive topics that have been on the table for decades. It would be a good idea to assemble a team composed of the APSARA National Authority, the Water Supply Authority and us to transfer skills and share our perspectives on different items. I have been in this country for 16 years and have been hearing controversies on hydrology in Siem Reap. If I continue my presentation I might touch sensitive points. Would you allow me to go that far?"

*Comment from Mr. Azedine Beschaouch:* "Sir, we take an interest in controversy. Sadly, time is passing and there are still a few minutes remaining and we would be delighted to hear how one can argue on water later on during the discussion."

**Mr. Paul Galzin:**

"I would rather stop now. I do not have much to add. Only that the Water Authority needs financial support and that the Tonle Sap project is not feasible due to its high cost of US\$100 million. This project should be adapted to the capacities of the Water Authority knowing there exist many solutions to succeed. Financing should look at other options. Do not say it aloud, but underground water is part of the alternatives. I have finished and have nothing else to add."

*Comment from Mr. Azedine Beschaouch:* "We may ask you and your colleague some questions. What I take back from this presentation, and do correct me if I am overseeing some items: First, we note with satisfaction the Bridging Project until the start of the cooperation



between Cambodia and Japan in 2017 with the JICA project. Also, that the FASEP project will establish a link between the present programme and the future JICA project. This is a matter for satisfaction, as both countries will see throughout time to conducting key studies for the water supply of the region.

*Comment from Mr. Paul Galzin:* "The good point is that support exists for Siem Reap. There is a bridging period between today and the JICA financing which will supply the town with enough water, which is essential."

*Question from Mr. Azedine Beschaouch:* "We have been told new things, well at least for me, who has been attending since the first ICC of September 1993. In 1995, we had an expert visiting who mentioned the Tonle Sap's potential. Twenty years on and you just told us that this was a fantasy and that financially speaking this will not work unless US\$100 million is raised. This amount could be used for something else towards development. Is this your opinion? »

*Answer from Mr. Paul Galzin:* "Absolutely. Sadly, time is lacking, but if you wish I could detail my argument."

*Interruption from Mr. Azedine Beschaouch:* "We believe you."

*Answer from Mr. Paul Galzin:* "There is a simple logic attached to this. Here is a water tower and you have an outlet, I believe that to pump from Kulen Mountain is cleverer than from the outlet. It is even easier explained when looking at a toilet seat, if you see what I mean."

*Interruption from Mr. Azedine Beschaouch:* "Your hydraulic expert and historian colleagues explained to us that ancient Khmers used the Kulen Mountains."

*Answer from Mr. Paul Galzin:* "I will not go further down this avenue, as this is not my job and I have not studied this item in particular. We can still look at satellite pictures and I have seen many structures throughout the world and many are unknown to today's technicians. The hydraulic system of Angkor is much more complex than what is currently visible. There are notions of pond transfers of water spreading of flooding. There is a type of farming that now exists only in Africa and that can be guessed. It is a farming based on ridges when water recedes. It means that saturated soils are farmed by hydraulic transfer. The planting is done on ridges in a dry area. The plant extends its roots to the water, whereas the plant stays dry.

On the satellite pictures there are clear traces of ridges and of dikes around them that enabled the spreading. I believe that studying the traditional Angkorian hydraulic system will yield great discoveries on the Angkorian system. I have linked this system to those I have encountered in other corners of the world and some very, very remarkable things can be imagined. There are other points relating with the hydraulic system, but I will not dwell on this."

*Comment from Mr. Azedine Beschaouch:* "We turn to our colleague and his team so that within the framework of the research they follow the avenues you mentioned. We would be delighted to invite you in the coming years to present on these subjects in association with Dr. Hang Peou. Actually, do you have a question, Mr. Hang Peou?"

*Comment from Mr. Hang Peou:* "Just to inform you that water and farming and underground water research was conducted in 2005 by Mr. Acker, an American academic. He mapped the whole area and explained the whole system. This was published in 2005. I also wanted to mention the West Baray's water availability, and maybe JICA could present their studies on this matter. Thank you."

Question from Mr. Azedine Beschaouch: "A last question addressed to you and your colleague from the Water Authority, regarding the 250,000 m<sup>3</sup> that could be withdrawn from the West Baray. Is it possible for the West Baray to support such a draw down?"

Answer from Mr. Paul Galzin: "This is not the right figure, though I do not have that exact. There will be 17,000 m<sup>3</sup> of surface water from the West Baray to be drawn as long as we can prove that the impact on the underground water of the Baray area is non-existent. A maximum of 20,000 m<sup>3</sup>, 250,000 m<sup>3</sup> sounds more like the water consumption in 2100."

Interruption from Mr. Azedine Beschaouch: "I heard your colleague mentioning this figure; that is the reason I asked the question."

Interruption from Mr. Paul Galzin: "May be it got lost in the interpretation, as this figure was never mentioned."

Interruption from Mr. Azedine Beschaouch: "You are probably right. He was speaking in Khmer and my first reaction was asking myself whether the West Baray could handle such a high amount."

Answer from Mr. Paul Galzin: "No it cannot. The Water Authority presently supplies 14,000 m<sup>3</sup> and hotel consumption (including swimming pools and etc.) draws heavily, about 40,000 m<sup>3</sup>, right below Siem Reap. If we were to reach saturation today, the number would be about 55,000 m<sup>3</sup>, plus the areas not supplied by the Authority. The 100,000 mentioned are for 2027 or 2050."

Comment from Mr. Azedine Beschaouch: "Thank you, Sir. In case there are no more questions, I would like to move on to the third part. Following these two presentations on water and perspectives from the JICA, AFD and the Water Authority, I would like to talk about the Water Secretariat that has been established by UNESCO and the APSARA National Authority and supported by the Deputy Prime Minister and local authorities. I would like to call on our UNESCO colleague, the head of the Culture Programme, Mr. Philippe Delanghe, to recall the perspectives. We already know about them, but this is for the co-Chairs and some of our colleagues attending today."

#### **VI.4 Mr. Philippe Delanghe, culture programme specialist, UNESCO**

[OrigE] "Thank you very much. I hope to be brief during my presentation, linked to many of the things that have been said. The first presentation was more on the monuments of Angkor and then we had this question on the water issue and its direct link with the preservation and conservation of monuments. Finally, we had a presentation on different on-going projects in and around the World Heritage site of Angkor.

Yesterday, I announced to all of you that the APSARA National Authority and UNESCO are now in a position, after years of discussion, to support a small Secretariat (if we can call it that), mainly two people. One linked with the UNESCO Phnom Penh Office and one with the APSARA National Authority, who will try their best to collect data.

Where is this coming from? I think the discussion started somewhere in 2007 and especially with Dr. Hang Peou in a lot of instances when working in and around Angkor and Siem Reap dealing with water. There is of course the municipality, the APSARA National Authority, the province, the institutions on national and international levels and projects with international bodies such as AFD or JICA. All of these stakeholders have been working for many years in this region. Actually, there has never been, to our knowledge, the establishment of a kind of a group where all this available data could be shared.

This is the reason why, in 2007, with the APSARA National Authority we decided to organise what we called at the time a 'Water Colloquium'. It included different partners indicated yesterday, such as the co-chairmen, and it was presided over by the governor of Siem Reap province. All the institutions working in the field of water in Siem Reap attended. There was a sort of general feeling that there was not enough cooperation, especially in the exchange of data.

UNESCO would like to contribute with the APSARA National Authority to the establishment of a system where data of different bodies would be put together and could shed light on the situation of water in the region. There is no data on the volume of water that is being pumped. Hotels are doing this themselves, and I do not mention guesthouses and tourism arrivals on the increase. We think that it would be good to have a centralised data system; it would facilitate the monitoring of the situation in the area.

What I would like to do, to end this presentation and to add to the forthcoming discussion, is to recall some of the recommendations made during the water colloquia between 2007 and 2009. They will highlight what was discussed at the time and where this small Secretariat that we have established is actually coming from.

[slide] Coming back to 2007, one of the recommendations was, and I quote, ' Due to the importance of the water issue (drinking, distribution, evacuation, but also cultural aspects and social impacts) in the Angkor/Siem Reap area, the ICC should routinely address the issue of water in the agenda set up for the committee sessions. This will help in establishing useful assessments on the reflection regarding water and suggestions will be submitted to the national and regional authorities'.

[slide] The second one: 'From now on, studies and programmes relating to the water issue are increasing and diversifying. This must be commended. Nevertheless, in order to facilitate coordination, complementarity and, if necessary, cooperation, the documentation should be disseminated during the draft stage. It is strongly recommended to set up coordination procedures establishing a centralized system for data collection which can regularly receive input and be available for each contributor involved in the water field. This data will then be shared by everyone, to ensure the efficiency of the programs. They could be used as a basis for water management'. This is basically what I was just talking about.

[slide] The setting up of a water observatory was another recommendation raised in 2007: 'In order to collect data and to improve the analysis of the environment, the urban context and the changes concerning the quality of life of the Siem Reap population, it is strongly recommended to set up under the common aegis of the APSARA National Authority and the municipality, an Environment Observatory'.

[slide] Then we have the 2008 recommendations, which I am sure will stimulate our discussion: ' Prevent the degradation of agricultural and residential land and put an end to unregulated urbanisation. In this way, in keeping with Agenda 21, advocated at the global level, a broader level of environmental safeguarding can be achieved:

- a) Conserve water resources and, consequently, by means of awareness-raising campaigns, appeal to the public-spiritedness of all to avoid wasteful or improper use of water; [this is very much in connection with what we have here today in the Siem Reap area]
- b) Protect water reserves by reducing the amount of water drawn from the water table through the use of other water supply sources; [I think the project we just heard can be related to this]
- c) Recycle wastewater by putting in appropriate water treatment systems, thereby recovering appreciable volumes of water, cutting down on the consumption of fresh water and controlling pollution'.

[slide] You can see most of the issues that we have already heard relate to these recommendations that were made in 2007 and 2008. As I said, I will stop here and I hope we can have discussions on these different topics. [slide] Thank you."

## General Discussion

Comment from Mr. Azedine Beschouch: "Thank you very much. I would like to ask our colleague from the Jakarta Office, Ms. Ai Sugiura, whether she has any comments. She has not."

Comment from Mr. Philippe Delanghe: [Orig] "Just to inform everybody, as was referred to by Professor Beschouch earlier: the small Secretariat that we are establishing would start working immediately, up to the end of this year. We are in negotiations with the Jakarta Office to get some extension through a UNESCO Funds-in-Trust, although we are yet not sure which one. It could be Malaysian, as was discussed with the director of the relevant office. This would take us further in time, through 2016 until 2017. That is what we are planning."

Comment from Mr. Azedine Beschouch: "We are relying on the APSARA National Authority and of course on Dr. Hang Peou, who works in the field so that they can find an agreement with the Water Supply Authority. This Secretariat should work with the APSARA National Authority, with the latter spearheading the operation and with other partners including the Siem Reap Water Authority. We rely on you. This is conditional for the efficiency of the Secretariat to prevent any inner strife that could endanger the project. We can rely on you. Thank you."

I do not think that this presentation necessitates further discussion, as this was more a point of information. We have twenty minutes left, knowing that we caught up twenty and overall there are forty minutes left. Co-chairs and friends, you have twenty minutes for the last question.

Earlier on Dr. Hang Peou mentioned water and monuments and Professor Nakagawa started the debate. The question we will ask to end this session is directly linked with the future of the monuments, and our role within the framework of this ICC with architects, archaeologists and heritage managers attending is to debate the following point. Is there really a link between water and the monuments, especially for the water table? We are not here talking about the water in the immediate vicinity of temple foundations. This is clear to all of us. The question deals with the following points: a) Can drawdowns from the water table destabilise the monuments? And b) what is the relationship, and, if this is a fundamental point, how can it be dealt with?

Professor Nakagawa will quickly summarise what he mentioned earlier so that he does not have to read it all again. I would like to ask some of you, in particular Professor Lablaude, who as an architect dealt with similar problems in other places to take the floor, and also Dr. Santoro in his capacity as an engineer. We already talked about this many years ago with these people: an architect, an architectural historian, Professor Nakagawa and an engineer. Others may want to take the floor. Professor Nakagawa, could you summarise your intervention and we will ask Professor Lablaude to intervene and then Professor Santoro."

Comment from Mr. Takeshi Nakagawa: [Orig] "Regarding the foundation of the Bayon. The moisture level is very low but the base remains strong. We have analysed it for a long time and we think that there is a huge structure of laterite along the central basement of the Bayon. We need to conduct preventive analysis because, as you know, there is global climate change; sometimes it rains in the dry season and we are afraid of this matter, with

the rainy season lasting longer. As you know, high-level moisture in compacted soil is very dangerous. We are concerned that it could be the reason for a future collapse of the central tower of Bayon. We have carried out many tests and analyses aware of the climate change. We have also asked for assistance from Professor Santoro."

*Comment from Mr. Azedine Beschaouch:* "Thank you. Mr. Santoro, you have the floor."

*Comment from Mr. Valter Santoro:* <sup>[OrigE]</sup> "Thank you, Professor Beschaouch. I just would like to comment on the speech of Dr. Hang Peou, which I found fascinating, regarding the hypothesis on ground water level and the stability in terms of safety factors for the foundation of the temple. Most subsidence is due to the pressure of the water level.

When we started studying the lower part of the towers of Pre Rup between 1995 and 1999, according to the results of our monitoring system and also based on measurements of water levels, we discovered the influence of the subsidence on the deformation, not stability, of the lower part of the towers was very high. Namely, for the south external tower, the southern tower of the east side group of the south towers. We called it the Pisa Tower, not only because it was an Italian project but also because it tilted between 3 and 5 degrees, taking into account the main vertical cracks. According to our studies, this was justified by low level content of water compared to the north side. A small difference in water level can justify this kind of tilting. This is not the only case I know of in Angkor. There are some other temples that show variation results which, according to me, are linked with the variation of the water level.

Regarding Dr. Hang Peou's hypothesis, I find it fascinating. Nevertheless, we consider that it corresponds to a very critical situation. In order to take into account the effect of the sand cohesion on the stability of the ground level soil foundation, I think it is a more an effect of the elastic behaviour of the soil layer due to the reduction of pore water pressure. It is something that needs further analysis, as said by Dr. Nakagawa, and more detailed studies and also local monitoring of the pore water pressure on the foundation soil of the monuments. Thank you."

*Comment from Mr. Azedine Beschaouch:* "Thank you very much. The floor is now to Professor Lablaude."

*Comment from Mr. Pierre-André Lablaude:* "I believe that when taking an overall approach of the impact of water on monuments, there are several types of impacts. Let us start with what lies above ground. Some pathology of the materials is caused by water. This can be weathering from top to bottom, rainwater that infiltrates the brickwork and may cause salt migrations, as was presented by Professor Hans Leisen earlier on Ta Keo. This material pathology also included the capillary rise of water, which actually moves up instead of down. These are types of material alterations that can be seen often on one to two metre strips in lower parts of monuments. These are all pathologies of materials.

Water may also be causing structural pathologies, notably when penetrating into the foundation backfills of Khmer monuments. Khmer monuments have a very peculiar foundation system. It is made of square boxes that are built and then backfilled and beat down to create a solid and resisting compacted soil. Another item is the lowering of a load of Khmer monuments calculated in kilos per square centimetre. This lowering is usually small, which means that the system can work as long as water does not infiltrate into the foundation backfills.

Time and centuries pass, and vegetation has grown on the temples and the roots of that same vegetation have searched for humidity in the backfills opening up joints. Once this vegetation dies, termites eat the roots and the backfill empties, as the soil is washed away through opened joints. For the moment, we are only talking about water coming from the upper parts of the monuments that may cause pathologies of the structures.

Regarding the underground water below the natural soil, there exist variations of the water table that translate not in terms of pathology of the monument and associated structures, but rather by pathology of the architectural structures located below the soil level. Professor Santoro gave us a good example this morning when presenting the Angkor Wat tiers. He showed extremely interesting animated sketches that described the difference in levels of water between the moat and the water table. Movements were in one or the other direction and translated in washing away the sands and subsequent subsiding of the inner structures.

I think that the impact of water is clearly shown in that case. Should we cross the Rubicon and say that the deep underground water table may have a direct impact on the monuments, although they are found way below the foundation levels and that the lowering of the load are not conducive? The monuments have such a footing that the pressure per square centimetre remains rather low.

I am always cautious. I must say I was shocked reading some articles recently published in the French press. When you follow their discourse, the Siem Reap hotel bathrooms should hang the following notice: 'Take a shower and you save Angkor Wat, run a bath and the temple will collapse.'

I think that we should not fall into this portrayal of caricatures. The water table issue is major, this is a fact, but the real damaging impact on monumental structures is the changing levels of water tables and levels of hydrometry. Maintaining a constant hydrometry, either humid or dry, would solve the problem. Dangerous are the changes in levels as the soils are clayish and may swell. As for the monuments proper, these changes to the hydrometry of the soil are only dangerous for the first one or one and a half metres below the level of the foundation. When you go deeper, it is a different game."

*Comment from Mr. Azedine Beschouch:* "Thank you for having enlightened us. Let me continue with no delay. Since we have started the ICC, the first operation to be carried out has been to install a good drainage system, something that all teams and the APSARA National Authority have carried out. Khmer temples were built with an outstanding drainage system and their abandonment created the decay. Before conducting work on a monument, the first operation is to restore the drainage system.

You also drew our attention to the impact of termites. That gives me the opportunity to recall that Mr. Ros Borath presented, in collaboration with a Singaporean university, a paper on termites, but there was no follow up. Each time we visit the site, we notice the termites, not only underground but also around the monuments and trees. Thank you for having recalled the points linked to water and collapses that may incur and etc.

The question is now clearly presented on the impacts on monuments and associated structures. The relationship with water is now better understood. Before the floor is given to Dr. Hang Peou to share his analyses and arguments, I would like to ask Professor Leisen whether he would like to comment with his well-known experience of the site."

*Comment from Mr. Hans Leisen:* <sup>[OrigE]</sup> "Thank you for giving me the floor. We are actually not dealing with stability issues, so we are also ready to execute any measures regarding this question. Of course we have to deal sometimes with the results of differential settlements and etc. Concerning the influence of water in general (on pore structures and sandstone materials) I could say a lot. I think this is not the issue when we discuss the question of water and water table.

I remember when Professors Nakagawa and Santoro exchanged during an ICC meeting. Professor Nakagawa was measuring water table changes in Angkor Wat on the southern side where unstable galleries are located. Remember in 1947 the collapse of the Heaven and Hell Gallery and of the Gallery of the Historic Parade. Dr. Santoro could show his sketch measurements and that there was a clear relation between water table move-

ment in the dry and rainy seasons and the gaps' opening and closure. There is a direct influence. What is the impact of the water table when it takes out too much water? I do not know whether there is a relationship. It is probably necessary to do some drilling and to constantly monitor the water table, which is quite difficult to model because we have these very quick changes between dry and rainy seasons. Thank you."

*Comment from Mr. Azedine Beschaouch:* "Thank you. Mr Lablaude would like the floor."

*Comment from Mr. Pierre-André Lablaude:* "I believe we need to be cautious when talking of water tables. There are deep and higher up water tables and depending on the time of year, some water tables stick closer to the surface and they are presenting a threat for the foundations. When the backfills are clayish, there are swelling and emptying events that could translate into volume changes of the backfills and decrease the bearing capacity of these backfills. That is what Professor Beschaouch was mentioning and this is key. The drainage system aims at preventing these higher water tables because they are threatening the monuments' stability due to their presence right below the foundations. Regarding deeper water tables, one to one and a half metres below, I believe that the changes of these deep water tables have no impact on the monuments' stability."

*Comment from Mr. Azedine Beschaouch:* "Thank you for this very useful comment. Dr. Hang Peou, would you like to say something or should I conclude?"

*Comment from Mr. Hang Peou:* "A word on the water table level changes. When we conduct monitoring of the changes between the monsoon and dry season for several years, the water table decreases. You could say it is only a weak impact when one metre below, but if it continues it could worsen. Let us experiment on something simple. Take a wet shirt and place it in front of the fireplace, it will take time to dry up. The long-term effect is that impacting. When I mention our observations, the latter are based on a documentation that encompasses most temples and I observe sand layers at a certain depth."

Take the example of the West Baray worksite, where there is a small temple located in the middle of water. Sand was used to preserve stability. It was the same at Srah Srang. Chau Sei Tevoda Temple was restored in the 1930s and studying the archives it states that the EFEO emptied the sand of the backfills, as they were too fine. This means that the sand size is not always right. The current commune chief of Pradak, who witnessed the work and is still alive, told me how the workers had the sand measured before resetting the soil of the foundations prior to the temple restoration.

Another item I did not mention in my presentation and that concurs with Professor Lablaude's explanations on the drainage system concerns the moat. The moats play a dual role. They store water and link with the drainage system of the temples to prevent humidity at the surface. During the monsoon, the moats drain as much as possible, water running off the temple and store and recharge the deeper sands, although not directly through humidity. The moats are associated with the drainage system and when the latter is broken the temple collapses."

*Comment from Mr. Azedine Beschaouch:* "Thank you. This can be related to what Professor Lablaude was mentioning on the water table and the need to maintain drainage. I would take this opportunity to recall, although maybe the French Co-chair will also mention this, and renew the wish to organise thematic meetings between sessions. Some of you know that I am fully supportive of this and that I was a great supporter of the yearly meeting held for nine years, the Bayon Symposium. That was like this session. Professor Nakagawa used the resources of Waseda University and that of the Japanese government to organise these meetings. I am not saying this because he asked me to be the secretary of those meetings, but rather because we learnt a lot."

We may find another avenue to restore these meetings and we will talk about it with the APSARA National Authority management so that we can discuss further on water and

monuments. A round table would enable us to optimise the field experience of those gathered in this room and to look back. Angkor and Water was organised in 1995 and we need to revert to it as it helped many people. Anne can tell you that there are people coming to the UNESCO office in Phnom Penh and requesting the 'Angkor and Water' brochure, as this was the only place you could find it. We need to revert to this to communicate, to a maximum level.

I thank all of you and foremost Dr. Hang Peou for his remarkable opening presentation and the colleagues who graciously took the floor, water experts from the Water Authority from the AFD and FASEP project and our colleague from the UNESCO office, Philippe Delanghe. We have tried to be comprehensive on this topic. Thank you to all colleagues, experts and professors who took the floor. I believe that the best conclusion is the establishment of a Secretariat, which is possible thanks to the cooperation of the UNESCO offices of Jakarta and Phnom Penh which we thank on behalf of the APSARA National Authority and all the Cambodian authorities. Let us hope that a round table or a seminar on 'Water and Monuments' is to be organised as early as possible; with the sheer number of us here, we will be able to ask some of us to attend.

I thank the co-Chairs, who allocated us sufficient time. We spoke for two hours and we even finished early. We rose to the challenge of organising a major session on this founding topic for a World Heritage site."

*Comment from the Co-chairman for France:* "Thank you, Professor. For us co-Chairs, these discussions are very comfortable, as we do not have to moderate and can use the time to rest. Thank you very much.

Let us move on to the next topic, on Miscellaneous Items. The floor is back to you Professor Beschouch, and you will share with us some interesting publications."

## **VII- MISCELLANEOUS ITEMS**

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### **VII.1 Points of information**

#### **Mr. Azedine Beschouch:**

"I leave to you the item on the changes to our sessions. Two items on databases: UNESCO hosts two comprehensive, available and accessible databases. To share them, and this is something for the APSARA National Authority, material and staff are needed and documents need to be made available. To this end, Professor Tan Boun Suy should study a way to link his Documentation Centre with the UNESCO office so that data can be shared.

The next item is what has been previously mentioned, namely the meeting between the two Co-chairs of the Plenary Sessions and H.E. the Deputy Prime Minister, so that they are more closely associated with the overall reflection when we organise one plenary and two technical sessions. This will be explained later on by our Co-chair. UNESCO was asked to put forth a provisional budget, but it is not the ICC that will raise the funds but the four meeting authorities, if I can call them that: Japan, France, the APSARA National Authority and UNESCO. We mentioned at length thematic meetings; they have been validated and our Co-chair will mention this during his final speech.



I come to the publications, a regular feature of our ICC, with three this time: First, to thank Professor Nakagawa and his team, as he held his words with an updated document, the *Project for Siem Reap Angkor* (2013, 2014, 2015). Siem Reap is located in the vicinity of the World Heritage site and hosts two million international visitors and one and a half million domestic visitors. The architecture of the city is of traditional and colonial styles, built along the river, the main axis of the city, where tourism and now also cultural activities have developed. This is all mentioned in the brochure that Professor Nakagawa handed out. I would like to tell the Co-chairman for Japan that we are delighted that Greenwin Asia and the Ministry of Foreign Affairs supported Professor Nakagawa and the Waseda University for this updating exercise. These documents form a small library for 2013, 2014 and 2015 with well-designed maps.

The second publication is on the Angkor site and water. We have just allocated two hours of our time to this topic, and in Amsterdam an ICOMOS-backed international meeting was organised on 'Water and Heritage'. The report of the proceedings has just been published. Two of those who attended are among us. Ms. Lemaistre's paper deals with World Heritage as a whole and its relationship with water in a paper called *Water and Heritage*, found on page 87. Dr. Hang Peou wrote on *Water and World Heritage in Angkor*, which presents the monuments, the ancient Khmer hydraulic systems and upgrading works. This was at the heart of the topic developed today. It proves that he follows a thread. Two copies of this book will be available thanks to the APSARA National Authority's generosity and the work of Dr. Hang Peou. They will be available at the Documentation Centre and at the Training Centre. For those who wish to purchase it, ask Dr. Hang Peou. It is a fascinating volume, with other major papers besides the aforementioned two.

Finally, I would like to thank Professor Leisen and his generosity, as he took part in a major event in Egypt on rock art paintings under the leadership of Rudolf Kupper, supported by the Federal Republic of Germany. He mentioned his participation and that of his spouse last year and that he would offer me a volume. It is rather heavy, as I can barely keep it standing. This volume is gifted to the APSARA National Authority and I will leave it there so we can all enjoy it. The value of the book resides in its outstanding methodology to collect, save and analyse, knowing that they may be some rock art in the Cardamom Mountains, so it could be of interest. I immediately pass it to Professor Tan Boun Suy and I am sure he will make good use of it.

Thank you professor Leisen and thank you Co-chairs. These are three books published in Khmer for schools which are part of a series. Anne will introduce them."

*Presentation from Ms. Anne Lemaistre:* "Within the framework of the UNESCO Education Programmes, I have the honour to present a co-edition by SIPAR and UNESCO on the life of Jayavarman VII. This is another series on biography, developed by SIPAR that we are circulating. You all know the author, Ms. Hedwige Miltzer O'Naghten, whose PhD was on Jayavarman VII and who usually attends these ICC sessions, although she is not among us today. I think it is a valuable book for children on the life of Jayavarman VII. The last publication released on the life of this monarch was that by Coedés, and I will invite H.E. Khun Neay to join me for the distribution of the book to schools in Angkor. Thank you very much."

#### **Mr. Azedine Beschaouch:**

"Thank you very much. I would like to recall something. I am delighted to have heard from Anne that the PhD was done at the University of Sorbonne Nouvelle, Paris IV. I am saying this because I want to talk about Tunisia, a country that I know very well. Every time a children's book is published over there, any Joe Public writes it and the texts are ludicrous. An historian must write based on the scientific truth. I am glad that Cambodia and UNESCO are leading by example. It will be distributed in schools. Thank you to all of you."

Comment from the Co-chairman for France: "Thank you, Professor. Point VIII is on the agenda now and I am not really sure how to manage, it as we already talked a lot on the recommendations."

## VIII- ICC RECOMMENDATIONS

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### VIII.1 Presentation of the draft recommendations by the Standing Secretariat

**Mr. Azedine Beschouch:**

"I am being reminded by my colleagues of a few things. I work a lot using my memory and once it is gone this will be the last of me. We already presented them and the texts have been circulated. Actually, the Deputy Prime Minister, in person, has added three more items to the recommendations that were debated and asked upon by the Cambodian authorities. He has reviewed the text and agreed. With regard to Kulen, H.E. the Minister of the Environment has launched the idea of this biodiversity corridor, which is outstanding. His Ministry has made some efforts for the safeguarding activities by adding rangers and etc. Now, he has asked for the drawing up of a management plan for the Kulen National Park. The recommendations have been drafted and, please, review all of them. The last page includes the three added recommendations.

For the recommendation on Kulen, archaeology was not overlooked. Notably, related to what our colleague presented today on research and the concern for the APSARA National Authority to strengthen human and material resources for the Mount.

Yesterday I presented the Training Centre and I asked the experts to book some time (Professors Leisen, Santoro and etc.) and they all agreed. This recommendation is like an appeal to all experts attending this meeting to bolster training here on site with all facilities available (classroom, restaurant and etc.). A smooth training day can be spent here with all your needs catered to.

The last item is on the presentation of Dr. Darith on the value of ceramics. I would have liked Ros Borath to be among us, as he, Professor Tan Boun Suy and I talked about the cooperation between the two departments, and finally our recommendations have been heeded by H.E. the Deputy Prime Minister. Today, it was decided to establish a unit within the Documentation Centre. We all invite you to bring any ceramics found, even a potsherd, so that they will be documented. Collection, documentation and dating are required to move from archaeology to history.

I guess that you will agree on the three items we added. We now ask our colleagues to tell us whether they adopt these recommendations that have been tabled."

## ICC-ANGKOR

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24<sup>th</sup> Technical Session  
(Siem Reap, 4-5 June 2015)

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## RECOMMENDATIONS

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### RECOMMENDATIONS FOR CONSERVATION

#### GENERAL RECOMMENDATIONS

The ICC-ANGKOR:

1. Recommends again that for all conservation and development operations undertaken in Angkor Park, given the complexity of such projects and in compliance with the specifications of the Angkor Charter, the team in charge submit its project documents to the appropriate jurisdictions for upstream advisement by the *ad hoc* experts.
2. Reminds regarding all road right-of-way that it is imperative to refer to data from the LiDAR map and other archeological information.

#### SPECIFIC RECOMMENDATIONS

##### **3. Western embankment, western moat, northern side of Angkor Wat (APSARA)**

- Supports the technical choice proposed by the APSARA National Authority team;

This option involving a reassembly of the step structures along the embankment using traditional techniques and using the same ancient material is justified here due to the presence of the ancient stratigraphy of the soil below the steps. It also has the advantage—unlike the neighbouring span using certain modern materials, namely geotextile—of implementing right next to the neighbouring span an experimental span using ancient techniques, and thus comparing respective effectiveness of these options.

##### **4. Western embankment, western moat, northern side of Angkor Wat (IGeS, Italy)**

- Regrets to learn that this work site is lagging behind by a year;
- Is pleased to learn that the obstacles have been removed and that the work site can resume.

##### **5. Wooden ceiling in the Churning of the Sea of Milk Gallery, Angkor Wat (WMF, APSARA)**

- Recommends that a new trial panel be done for the ceiling, based on the original principle of abutting wooden crossbeams of uneven widths.

- Recommends that finalisation of this trial panel and the decorative pattern eventually proposed be based on the ancient fragment from Angkor Wat, now at the Guimet Museum in Paris (inventory No. MG 23153 – cat 19h).
- To finalise the finishing work to be done on this future ceiling in its entirety, recommends that trials of sanding and patina be carried out, to be applied for instance on the previous trial panel, to artificially ‘age’ its surfaces and thus provide a basis to determine the most appropriate finishing treatments;
- Recommends that these trials be exhibited *in situ*, in the Churning of the Sea of Milk Gallery, for the next Technical Session of ICC-Angkor in December 2015.

For the future implementation of this ceiling throughout the gallery, it is also recommended:

- a. To scrupulously avoid putting this in as simply a flat ceiling but rather to follow the general deformations of the inside cornices of the gallery, after verifying how sound these cornices are at this time;
- b. To this end, when doing the final work, to consider an initial temporary installation of the new ceiling in view of adjusting its deformations, prior to taking it down, do the sculpture work on the ground and then put it up permanently.

## 6. Ta Prohm (Archaeological Survey of India)

- Recommends that operations scheduled for 2015 be completed—including putting the two Buddha statues back up on their pedestals and reassembling the southern gallery of the Hall of Dancers, leaving only two openings in the vaults so that the two large trees located at those spots can be preserved.
- Recommends as part of the ongoing temple restoration programme, that the APSARA National Authority in tandem with ASI organise an international symposium during which proposals for the master plan would be reviewed and debated, that the ASI team will develop for this purpose. The symposium will enable the *ad hoc* experts and international experts (World Heritage Centre, ICCROM, ICOMOS, etc.) to broaden the analytical process to cover all of the issues encountered in this monument, as well as the conservation, restoration and showcasing choices to be made.

## 7. Banteay Srei (APSARA)

- Strongly recommends that the emergency drainage measures be implemented on the site. However, the layout for these works can only be finally decided after upstream archeological investigations have been done, in particular to minimise the impact of the new networks on the historic soils;
- Recommends that a programme be undertaken to set back up on their original foundation (after upstream archeological investigation) the collapsed sections that can be seen at certain points along the different enclosure walls. This will enable the better management of visitor flows as well as enhancement of the display of the monument’s perimeter areas;
- For the construction of the *lapidarium* to house small and large architectural elements, recommends that it be set up in a wooded area near the visitor intake center to limit its visual impact in the vicinity of the monument. The project is to be submitted in a timely manner to the *ad hoc* experts.

## 8. Western Mebon on the Western Baray

- Notes with pleasure the progress of the works on the steps on the east side of the reservoir in conformity with earlier recommendations, and draws attention to the interesting archeological discoveries made during these operations;
- Recommends that inventorying of the ancient stones stored on the site continue rapidly so as to fine-tune the final restoration project.

## 9. Phnom Bakheng (WMF)

- Reminds the principle of minimal dismantling justified by the static situation of the structures, such as the section of the wall examined on the east side, second level, which can be consolidated without dismantling;
- Acknowledges with satisfaction the implementation of an earlier recommendation regarding the collection and inventorying of different architectural or sculptured fragments scattered around the monument;
- Notes the satisfactory result of the principle of reusing ancient, unidentifiable stones scattered around the monument and recommends that they be reused without cutting their original facing. Stones will thus conserve the marks made by cutting tools used at different historic construction and transformation of the monument;
- Recommends along the same lines that throughout these operations, all archaeological traces that come to light, such as cutting marks on the stone discovered on the southern face, be conserved and documented as much as possible;
- Knowing that the current project only involves the central sandstone pyramid, ICC-Angkor reminds the urgent need to conserve the different peripheral brick towers and the need to set up as soon as possible a specific conservation programme to achieve this.

## 10. Ta Keo (CSA)

- With regard to the stability of the different pediments of the first Gopura on the east façade, recently reassembled, if their internal vertical anchors have actually been put in, then ICC-Angkor recommends that the temporary cables be removed, having served their purpose.
- Regarding stone conservation work now underway, ICC-Angkor reminds the value of strengthening interdisciplinary technical cooperation;
- Recommends that the stone storage areas on the monument's periphery be inventoried, in view of proposing their final conservation or possible reuse *in situ*. Moreover, in the same area, ICC-Angkor recommends that appropriate borings or test pits be done to ascertain the implantation, nature and interest of the buried structures emerging at the surface of the soil.

## 11. Roluos site: Lolei, Preah Ko, Bakong (APSARA)

- Notes with pleasure the proper implementation of previous recommendations regarding Lolei temple and congratulates the APSARA National Authority team in charge of brick conservation for the quality of its work on the various Roluos sites.
- With regard to the brick library on the side of Preah Ko temple, ICC-Angkor recommends that the existing wooden struts be removed from the upper part of the building. However, this work will require careful attention, given the instability of this superstructure. This will allow the final brick restoration to take place safely and progressively;
- On the western façade entrance door of this library, ICC-Angkor recommends that the brick sections above the door be reassembled in order to provide for better rainwater evacuation outside the building;
- For Bakong Tower 8 from which a sculptured lintel collapsed some years ago, ICC-Angkor supports the principle put forward that this lintel be put back in its place, as it has now been properly restored. For the additional consolidation work needed to do so, ICC-Angkor requests the team in charge to submit in due time a proposal of how this will be done, including detailed sketches, for the advisement of the *ad hoc* group of experts.

## RECOMMENDATIONS FOR SUSTAINABLE DEVELOPMENT

### 12. ANGKOR TOURISM MANAGEMENT PLAN (APSARA National Authority (TMP) (APSARA)

- a. Congratulates the TMP Unit for its implementation of the first points recommended at the 21<sup>st</sup> plenary session, including the adoption of a “Visitor’s Code of Conduct,” the holding of regular meetings of the Tourism Industry Consultative Group, the setting up of monitoring teams in the temples and having the unit integrated in the Department of Tourism;
- b. Recommends the immediate adoption and launching of the Visitor’s Code of Conduct submitted by the TMP Unit;
- c. Reiterates, in order to ensure overall coherence of present and future initiatives, that these actions be made part of a mid-term strategy comprising clear purposes, a detailed action plan, an implementation timetable, the distribution of tasks within the TMP Unit and that they be promoted among the general public and private sector on the APSARA National Authority’s regularly updated website;
- d. In view of ensuring the efficient operation of the TMP Unit, further recommends that additional training be given to APSARA staff in site management with the future integrated management of the main monuments on the World Heritage Site in mind. Such training programmes, in addition to on-site training (at the Angkor Training Center) could be funded by international scholarships to enable APSARA personnel to get degrees abroad;

### 13. ANGKOR WAT PARVIS (APSARA)

Appreciates that operations have been suspended in order to adopt the experts’ recommendations, i.e. cut the approach area down from 15,000 to 5,000 square meters, reduce maximum heights from 15 meters to 7.75 metres, change the materials allowed in approach area buildings and ensure better coordination with the TMP Team;

- a. Recommends that a detailed traffic flow plan throughout the entire park be drawn up quickly so as to determine the general traffic direction and to what extent thoroughfares need to be widened;
- b. Recommends enlarging the current car park to the south in order to accommodate large buses;
- c. Recommends that the visitor drop-off zone be moved to the approach area car park;
- d. Recommends that the follow-up of architectural and environmental issues be carried out by a joint delegation of the *ad hoc* experts at the different stages, including the design stage, the final project and the actual work in order to monitor issues such as location of functional areas, green spaces, choice of materials, etc.;
- e. Recommends that high-quality local arts and crafts be promoted in this highly symbolic place and that, in this regard, a handicraft itinerary in different park villages be looked into;

### 14. TA PROHM (APSARA)

- a. Takes note of the archaeological work being done, including test pits and research based on LiDAR images at the Ta Prohm Temple western gate;
- b. Reiterates that the opening of a new visitor intake area on the west side of the temple has not resolved the disruption on the east side;
- c. Recommends that the two areas of the western and eastern gates be given proper treatment using a similar strategic approach;

## 15. PHNOM BOK

- Welcomes the management and conservation plan proposed for Phnom Bok and its surroundings but encourages the TMP Unit to consider alternative sites suitable for sunset viewing within Angkor Park where interventions could be less invasive and easier to undertake.

## 16. PHNOM KULEN (Ministry of the Environment)

- a. Welcomes the significant progress of the sustainable development of Phnom Kulen as well as that of archaeological research undertaken by the APSARA National Authority and reiterates its recommendation to them regarding the necessary strengthening of human and material resources;
- b. Welcomes the proposal put forward by H. E. Mr. Say Sam AI, Minister of the Environment, for the establishment of corridors of biodiversity; the completion of the site mine clearance and the elaboration of a Management Plan for the Kulen National Park;

Recommends that the Ministry of the Environment consults as soon as possible with the involved parties in order to elaborate this Management Plan and requests that a progress report about this consultation process be submitted to the next Technical Session in December 2015.

## 17. ANGKOR TRAINING CENTRE

- Congratulates the APSARA National Authority for the establishment, in 2014, of the ANGKOR TRAINING CENTRE and for the on-going activities provided by this Centre during the first semester of 2015;
- Takes note, with satisfaction, of the means and working conditions set up by the APSARA National Authority to welcome the professors and expert-trainers;
- Recommends, for the implementation of the training programmes, the participation of the *ad hoc* Experts as well as that of specialists working at Angkor.

## 18. ANGKORIAN CERAMIC UNIT (APSARA)

Reminding the importance, for archaeological and historical studies, of establishing of a typology of ANGKOR CERAMICS and, as much as possible, of a chronology:

- Remind its previous recommendations regarding the collection and inventory of ceramic items as well as that of any sherd discovered during archaeological investigations;
- Congratulates the APSARA National Authority for the establishment of an ANGKOR CERAMIC UNIT within the International Centre for Research and Documentation (CIRDA);

Invites all missions and teams working on the Angkor site to actively cooperate with this "Unit".

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## VIII.2 Approval of the recommendations by the ICC-Angkor

Comment from the Co-chairman for France: "Thank you. I guess they are approved unless someone disagrees. Mr. Soutif, the floor is yours as you request it."

Comment from Mr. Dominique Soutif: "Thank you. Only a reaction on the last item. First, I would like to congratulate Dr. Ea Darith for the establishment of the Ceramic Study Centre. Within the framework of the Costiks, we organised a major international conference to look back on production sites, consumption and export of ceramics—I announced it at the ICC. To this end we set up at the EFEO a space open to the public, researchers and students, where is gathered a benchmark collection linked to a database. I believe that this is a natural addition and an opportunity for future cooperation between the Ceramic Study Centre and this library of potsherds that has been opened to all since December. Thank you."

Comment from the Co-chairman for France: "Thank you, very useful information. Professor Beschaouch would you like to add something?"

Comment from Mr. Azedine Beschaouch: "One thing to add. Something I should have mention in the points of information, and I rebound on what Mr. Soutif just said. Thank you. I have been a staunch champion of Francophonie for the past twenty years and I will not give up. I told the Deputy Prime Minister about this and he is already convinced. I refer to publications as most of them, even those newer, are in the French language."

The Deputy Prime Minister would like to get in touch with someone at the EFEO via the consulate to pay for French classes organised here for the staff of the APSARA National Authority. This could enable young Khmer researchers to learn basic French, so that they can learn history and archaeology in the original language and not through a translation. Otherwise, they will spend their life translating without appropriating the knowledge. I can inform you that very soon the APSARA National Authority will ask you to organise lessons, maybe away from these premises. It is very important for the APSARA National Authority."

Comment from Mr. Dominique Soutif: "A quick reaction. I am absolutely delighted as consul and EFEO manager. In the same vein last year, the EFEO succeeded in obtaining an international fund for French language that has supported French lessons for four archaeologists of which three, at least, are APSARA National Authority staff, if I am correct. It is highly feasible to organise lessons at the APSARA National Authority and benefiting from that momentum to teach more technical topics for heritage stakeholders. Thank you."

Comment from the Co-chairman for France: "Thank you very much. As Director of the Institut Français I am very interested in this matter, as the Institute's goal is, among others, promoting French. I am ready to start discussions with the relevant actors. Last point of information: the date of the next Plenary Session."

### **VIII.3 Date of the next plenary session**

Comment from Mr. Azedine Beschaouch: "H.E. the Deputy Prime Minister was already asked and the two co-chairs of the Plenary will also be, and the dates of the 8<sup>th</sup> and 9<sup>th</sup> of December seem to be suitable. He would like them to be confirmed so that his office can book the dates. He also approved much of the idea of one and a half days of technical session and another half day for a plenary session. He said that three days could not fit but two would be fine. There again, we have to wait for the co-Chairs' feedback."

Comment from the Co-chairman for France: "Thank you. I immediately hand over the floor to Ms. Anne Lemaistre, who will read her concluding remarks, as we are ending this session. Anne, the floor is yours."



## IX- CLOSING SESSION

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### IX.1 Speech by Ms. Anne Lemaistre, representative in Cambodia of the UNESCO Director General

"Your Excellency Bun Narith, Director General of the APSARA National Authority  
Excellencies Co-chairs,  
Colleagues,

I am delighted to briefly summarise these two extremely intense days. This session has been under the 'S' sign; 'S' for Solidarity: UNESCO would like to thank H.E. Sok An on his proposal for a recommendation on the humanitarian crisis associated with heritage disaster that is taking place in the Middle East. You are all aware that the whole world is holding its breath on Palmyra. This recommendation concurs with an initiative launched by the UNESCO director general called 'Unite for Heritage' with the aim of safeguarding these treasures of humanity.

'S' for Satisfaction with the progress made on several projects and fields; especially in Kampong Phluk, at the Kulen, at Angkor Wat *parvis*, at Roluos and in tourism and community development activities. All the stakeholders of these positive changes should be thanked here for their zealous endeavours.

'S' for Systematic follow-up of the recommendations; the Secretariat would like to thank national and international teams which graciously agreed to take part in the exercise, clearly presenting and illustrating their work. All have, it seems, taken on board this new *modus operandi*. The follow-up also contributes to the exchanges with the *ad hoc* experts, whom I would like to thank for their insight, personal dedication and outstanding work capacity. They spent several evenings drafting these recommendations.

'S' for Serendipity: An English word that means fortunate discoveries, such as the old structures at the Mebon and at the Bayon which have forced us to adapt our projects. The LiDAR survey revealed unprecedented archaeological structures at Kulen, Angkor Wat and even to the west of the Baray. These new frontiers require consolidating support for research informing us on chronology, iconography and history. I encourage the team to extract the essence or to elaborate on the historical conclusions deduced from them, as was proposed by Francine d'Orgeval this morning.

'S' for Superlative: 47 presentations for as many projects; we have beaten the record of ongoing projects at Angkor. Some are missing, as some teams were not able to come and present for these two days. The number does not seem to cause much of a problem as long as we are well organised, like those in the tourism industry. It is a sign of both good health and ceaseless interest in the Angkor temples; works of genius and passion, as Henri Mouhot said.

Finally, 'S' for Success, and I could even add *Singe* [monkey]: UNESCO would like to congratulate the Cambodian authorities for the return of the Hanuman Monkey, the sixth statue from Koh Ker. You recall that during last December's Plenary Session, the findings of the joint-led APSARA National Authority EFEO excavations were presented. These excavations established the evidence supporting the complaint to the Museum of Cleveland, which, eventually, graciously agreed to return the statue. UNESCO would like to foster all stakeholders in this project (APSARA National Authority, EFEO and UNESCO) and also keenly ask the Cambodian authorities to continue in this effort.

'S' for Secretariat: This session was a maiden one for our new colleague, Nou Niran. Ms. Chaun Sun Kérya has positively supported him over recent weeks, and during these last two days our own Bun Hok and Blaise amicably assisted him. Let's thank them all and the whole team of the Secretariat.

I also thank the president of the APSARA National Authority, Mr. Sok An, who despite a busy agenda, always attends; also, the APSARA National Authority through its director and all the staff that worked effortlessly to organise this meeting in this room.

Of course, we thank our Scientific Secretary (another 'S'), a self-proclaimed 'Quill artist', and our Co-chairs, masters of time, who have been attentive and magnanimous, as they have allowed us a lot of freedom. The incredible team of interpreters is also to be thanked; they have been with us for many years.

We should reconvene on the 8<sup>th</sup> and 9<sup>th</sup> of December, dates agreed to by H.E. Sok An. This will be the time to celebrate two events: The twenty years of work of our Italian friends; we pay tribute to their faithful engagement to Angkor through several projects; and twenty years since the establishment of the APSARA National Authority, which active contribution to this meeting was for all to be seen and should be commended.

I thank you for your attention."

*Comment from the Co-chairman for France:* "Thank you very much. I will give myself the floor, which might be a pleasure for you, and is a distinguished honour for me to conclude this session."

## **IX.2 Speech by the French Co-chairman, Mr. Romain Louvet, Counsellor for Cooperation and Cultural Affairs, Embassy of France in Cambodia**

"I have the great honour, and I am sure it is a satisfaction for all of you, to take the floor to conclude this, for me, very constructive session. I will not hold a speech. I would rather take the floor to look back at some of the bullet points of the exchanges we had during these, 45 minutes ahead of schedule, which enables me to speak for that long while still being on time. I will not be criticised for having been a bad timekeeper. No, I will not make you suffer this ordeal. I wrote down some notes and I will share some items, in particular the ICC session's improvement.

I would first like to thank Ms. Tiphaine Ferry, who assisted me in ordering my notes and Ms. Nao Otsuka, sitting next to her for her moral support. Please bear with me if my speech is not fluid, but this is not a pre-written speech.

The ICC aims to modify the organisation of the sessions; you've heard this before. This is included in the agenda of this 24<sup>th</sup> session, which highlighted the recommendations and new projects. I believe that this is a step forward, as recommendations are key components for all of us here.

You heard it mentioned during these two days—the new item regarding the organisation of an additional technical session. It should be organised next December. The proceedings need to be planned but it would aim—among other things—at improving readiness for the Plenary Session. The latter could by then only focus on strategic issues (dealing with more political subjects), including adopting new projects. The technical session predefined the new projects where they are debated, amended, detailed and fine-tuned in the time between this technical session and the next. The latter would then validate these new projects to be adopted during the Plenary Session, as it is its role. We now

need to widen the discussion on the feasibility of this technical session after the principle has been agreed on. This requires your contributions: The teams, the *ad hoc* experts, and all the stakeholders that have contributed to the efficiency of this meeting.

Personally, I believe that the values of the research and work deserve longer presentations in our meetings, by then lightening the density of the agenda. There is such denseness that stress can be heard in the voices of those presenting. It is a shame as presentations are often interesting and I believe that we would get more from them by distributing over two sessions what is now packed into one.

There would also be more time for discussion, and that can only be to the benefit of all. I have yet to ask my colleague, but I would also like to add that the co-chairmanship stands available for the Secretariat to improve, as much as is possible, the future technical session followed by the plenary. Setting up a second technical session has this aim. As was mentioned by Ms. Lemaistre, we could imagine one day and a half as the plenary, as I said earlier, will focus on key political and strategic items that require formal approval.

I repeated several times and I am sure that the message came across, that the implementation of recommendations is being applied by the different teams after the technical session, in fact from now, apart from more technical recommendations that require plenary consideration and submission. The co-chairmanship remains available in supporting the necessary works to see to the feasibility of this additional session.

We also mentioned that thematic meetings could be organised between the June and December technical sessions. This is a very interesting suggestion, as it would gather a corpus of thinking that could benefit beyond Angkor and may bestow on the APSARA National Authority, in association with the ICC, a greater influence at the regional and international levels.

Angkor is a flagship due to its size and concentration of diverse archaeological and conservation activities and also, we all know this, activities for economic and social development and the environment. This makes of Angkor a point of reference. We are all striving to echo as far as possible, beyond the ICC's fringes, this abundance and production of ideas and works.

The willingness of Cambodia to be at the forefront of certain techniques and technologies has been noted, highlighted and confirmed by several new projects presented during this session. We acknowledge this goal to position Cambodia at the vanguard of the regional scene, in several fields of expertise.

The capacity development endeavour that is central to many projects is essential to meeting this goal. As highlighted by Mr. Beschouch, it is important to underline the new momentum and professional behaviour of the young Cambodian experts who presented their projects over the past two days.

Note also the continuous progress of the professionalism and engagement of the APSARA National Authority that has been and should continue to be prioritised within the framework of the international cooperation with respect to national sovereignty.

This consolidates the role of the ICC as a monitor and springboard. I believe and hope that this view is shared. The ICC's role is even more legitimate, as now the APSARA National Authority has all the human and financial resources vital to implement its assignment to safeguard and develop the Angkor site across all fields.

This morning's session, when we praised the merits of three skilled workers, was a good illustration of the value of the human resources and professionalism of the APSARA National Authority, also reflected in the presentations given by actors and managers of the Authority.

Under the authority of the royal government of Cambodia, Angkor is a great international cooperation endeavour. Our thanks go to the international teams, which dedication, professionalism and passion have always been reasons for satisfaction and encouragement. I did say that last year but I repeat myself. I am new in this arena and I have an external perspective. I notice that the presenting teams have always shown genuine passion and I think this should be underscored, as it is essential to the success of our proceedings and of the ICC.

The APSARA National Authority has and must continue to act as a coordinator to preserve the harmony of the site, a place which is not only a heritage site or a museum; certainly not, but rather a living space. The lives of people that deserve our greatest respect and of tourists that may threaten conservation but whose economic input contribute to the influence of Cambodia. These components need to be harmonised and this is the mammoth task that everyone implements.

Angkor, I repeat, is an example of international cooperation, where works, research and teams are plentiful. The overall consistency of the interventions is a must and the APSARA National Authority is mostly responsible for this. May they be thanked for this effort.

Ms. Lemaistre has already done it, but I would thank, and please forgive me if I do not respect the hierarchy the members of the Secretariat from UNESCO and the APSARA National Authority: Ms. Chau Sun Kérya, Mr. Lim Bun Hok, Mr. Blaise Kilian, Mr. Nou Niran, Mr. Philippe Delanghe and Ms. Zoe Caselli. All of them contributed to the smooth proceedings of this meeting.

I would also like to again warmly thank the interpreters. I am sorry to repeat myself but their work is arduous. It is a genuine craft and they should be congratulated for the quality of their work. I thank the *ad hoc* experts. Their working technique and their dedication have been praised. I thank the Standing Scientific Secretary, who has shown constant and I hope eternal liveliness—I remember we made a pun on these two words at the last session—and who is our best energiser.

I would also like to thank all of you in the room, and in particular those who are still here, for your attendance. I noted earlier that the room started emptying and some may have had good reasons to leave, others maybe not. Some did stay against all odds. I thank them. I also thank UNESCO, the representative of the Royal Palace, H.E. Kol Bunly and H.E. Bun Narith, who stayed until the end.

I thought that this session was particularly constructive and I felt a bit of weariness and fatigue towards the end of the day. I will now stop and wish you a safe trip home.

The 24<sup>th</sup> ICC Angkor Technical Session is now closed.”

**\*\*Conclusion of the 24<sup>th</sup> ICC Technical Committee Meeting \*\***

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