

**International Co-Sponsored Meeting on
Culture, Heritage and Climate Change
Virtual Meeting
6-10 December 2021**

Proceedings

Collated by Sarah Forgesson

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Day One: Knowledge Systems

Outline of Knowledge Systems Theme:

As outlined in the White Paper ‘Intangible cultural heritage, diverse knowledge systems and climate change’, knowledge systems can be ‘defined as sets of interacting “agents, practices and institutions that organise the production, transfer, and use of knowledge’ and as ‘complex ensembles of connected values, practices, institutions – as well as beliefs, worldviews, emotions and senses.’ It also points to opportunities to work across the three systems of knowledge (e.g., Indigenous knowledge, local knowledge, and scientific knowledge) and the willingness of individuals and groups coming from all three knowledge systems to work together to address the widely acknowledged threat of climate change.

The aim of covering this theme throughout the Meeting was to explore these diverse forms of knowledge systems, how they interact with each other in relation to heritage and climate change, and how to understand the challenges, opportunities and responses to climate change

Following on below will be a summary and breakdown of the themes covered and discussion prompts for each session. Finally, a summary of attendees will also be provided, with any further information given in the appendices.

Session 1a and 1b – 1am and 4pm Monday

Knowledge Systems, Power, and Interpretation of Climate Change

Breakout Room One and Four

Note: Attendance for this meant only one breakout room – but these were the topics discussed across the course of the workshop

What are possible ways to resolve the possible lack of local and traditional knowledge and practice in adaptation planning?

This question was predominately based around the notion that adaptation planning and implementation at all levels of governance are contingent on societal values, objectives, and risk perceptions, and that recognition of diverse interests, circumstances, social-cultural contexts, and expectations can benefit decision-making processes. Decision support is also most effective when it is sensitive to context and the diversity of decision types, decision processes, and constituencies.

Furthermore, despite recognition in studies of the value of local and traditional knowledge, such knowledge is most often not included in adaptation planning. Additionally, challenges include limited resources, including finance, technology, and capacity. National and local governments need to be willing and able to engage with local and Indigenous communities and the body of traditional knowledge and practices.

Discussion Prompters

- Local governments tend to implement adaptation plans that adopt a reactive or event-driven approach to adaptation relying on technical measures. How to move beyond this?
- How to move beyond tokenisation inclusion that has no proper inbuilt sustainability?

Breakout Room Two and Five

What needs consideration regarding what counts as evidence in understanding of climate change?

Much of current evidence acknowledged by policy makers about climate change has come from research on the natural sciences, which has mostly relied on large-scale records and the use of modelling techniques to both describe climate change in data-deficient regions, and to make projections for the future. This knowledge is trustworthy because the infrastructure that generates it has proven robust and because the data is subject to ongoing re-evaluation. However, most researchers now acknowledge that the dependence of climate research on a few quantitative metrics is too coarse to detect the disparate and insidious impacts of climate change, particularly at local scale and for periods when instrumental observations are scanty or missing. Natural scientists have addressed social phenomena, calling for integration of other fields into their understanding of climate change. In that sense, in line with scientific positivism, the integration of social sciences into the understandings of climate change has been often interpreted as the inclusion of social, demographic, and economic data in models dominated by natural components. Integration of social science approaches has also been proposed through the dissemination of scientific results to policy makers or the public. This question therefore sought to identify the process of identifying and recognising what constitutes different forms of climate change evidence outside of the current accepted and trusted forms.

Discussion Prompters

- The production of information with non-scientific sources such as indigenous knowledge or stakeholder views is also enriching climate change research.
- Narratives of catastrophic risk and vulnerability demotivate local or indigenous peoples whereas narratives combining scientific knowledge and active citizenship promote resilience.
- While science can quantify climate change risks in a technical sense, based on the probability, magnitude, and nature of the potential consequences of climate change, determining what is dangerous is ultimately a judgment that depends on values and objectives.

Breakout Room Three and Six

How can institutional dimensions adapt to enable adaptation planning and implementation?

Adaptation planning and implementation follows formal institutions associated with regulations, policies, and standards created and enforced by government actors but also requires the participation of informal institutions through interactions among stakeholders according to cultural, social, and political conditions in societies. However, current practices alone may not be adequate to cope with future climate extremes or trend changes. Furthermore, public, and private institutions influence the distribution of such resources as well as the development of policies, legal instruments, and other measures that facilitate adaptation. Therefore, institutional weaknesses, lack of coordinated governance, and conflicting objectives among different actors can constrain adaptation, with this question directly seeking to address ways to overcome this, while also recognising the importance institutional frameworks for adaptive capacity.

Discussion Prompters

- Institutions are composed of tangible formal procedures, laws and regulations and tacit informal values, norms, traditions, codes, and conducts that shape expectations and guide actions among actors and organizations.
- Adaptation planning and implementation follows formal institutions associated with regulations, policies, and standards created and enforced by government actors but also requires the participation of informal institutions through interactions among stakeholders according to cultural, social, and political conditions in societies - what are the issues with this structure?

Workshop Attendance Statistics

1am Workshop

Region	Attendee Numbers
Asia (WMO Region II)	5
Europe and Great Britain (WMO Region VI)	1
North America, Central American and the Caribbean (WMO Region IV)	4
South-West Pacific (WMO Region V)	8
TOTAL	18
Expertise	
Climate Change (without previous major focus on culture or heritage)	3
Culture or Heritage	14
Natural Heritage	1
Gender	
Female	11
Male	7
Indigenous/Knowledge Holders	
	1

4pm Workshop

Region	Attendee Numbers
Africa (WMO Region I)	4
Asia (WMO Region II)	9
Europe and Great Britain (WMO Region VI)	22
North America, Central American and the Caribbean (WMO Region IV)	7
South America (WMO Region III)	2
South-West Pacific (WMO Region V)	1
TOTAL	45
Expertise	
Climate Change (without previous major focus on culture or heritage)	7
Culture or Heritage	36
Natural Heritage	2
Gender	
Female	27
Male	18
Indigenous/Knowledge Holders	
Total	1

Attendance List:

1am Session – Monday 6th December

Chair: Andrew Potts

Rapporteurs: Kate Lim

Yolo Lucio

Azad Thapa

Monalisa Maharjan

Zoom Coordinator: Sarah Forgesson

Participants:

Participant s	Expertise	Region	Gender
Melinda Tignor	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Deborah Coen	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Lauren Rickards	Climate Change (without previous major focus on culture or heritage)	South-West Pacific (WMO Region V)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Jeong-eun Kim	Culture or Heritage	Asia (WMO Region II)	F
R. Michael Feener	Culture or Heritage	Asia (WMO Region II)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Elia Nakoro	Culture or Heritage	South-West Pacific (WMO Region V)	F

Sue Hodges	Culture or Heritage	South-West Pacific (WMO Region V)	F
Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Jon Day	Natural Heritage	South-West Pacific (WMO Region V)	F
Tomo Ishimura	Culture or Heritage	Asia (WMO Region II)	M
Gabriel Caballero	Culture or Heritage	Asia (WMO Region II)	M
Milagros Flores-Roman	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Chris Marrion	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Ruth Morgan	Culture or Heritage	South-West Pacific (WMO Region V)	M
Ariadne Gorring	Culture or Heritage	South-West Pacific (WMO Region V)	M
Christopher Ballard	Culture or Heritage	South-West Pacific (WMO Region V)	M

4pm Session – Monday 6th December

Chair: Will Megarry

Rapporteurs:

Oliver Sukrow

Priyanka Panjwani

Azad Thapa

Monalisa Maharjan

Laure Marique

Zoom Coordinator: Sarah Forgeson

Participants:

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	F
Aseel Alharthi	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Nourah AlSudairy	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Mirela Kamberi	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Ibidun Adelekan	Culture or Heritage	Africa (WMO Region 1)	F
Joanne Clarke	Culture or Heritage	Africa (WMO Region 1)	F

Salma Sabour	Culture or Heritage	Africa (WMO Region 1)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II))	F
Gabriela Mora Navarro	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Elena Osipova	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Jyoti Hosagrahar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Rosario Carmona Yost	Culture or Heritage	South America (WMO Region III)	F
Jennifer Rubis	Culture or Heritage	South-West Pacific (WMO Region V)	F
Franziska Haas	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Bill Bordass	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	M
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Zhang Rouran	Culture or Heritage	Asia (WMO Region II)	M
Aziz Ballouche	Culture or Heritage	Asia (WMO Region II)	M
Yunus Arikan	Culture or Heritage	Asia (WMO Region II)	M
Kh Mahfuz ud Darain	Culture or Heritage	Asia (WMO Region II)	M
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Dario Camuffo	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Dorian Fuller	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jordi Pascual	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Neil Dawson	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Robin Coningham	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Max Friesen	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Tim Kohler	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Alexey Butorin	Natural Heritage	Asia (WMO Region II)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M

Session 2a – 7am and 6pm Monday

New Conditions, New Knowledge?

Breakout Room One and Five

Is a new integrated knowledge system needed because of extreme or new climate-related events that are beyond current local, indigenous, and scientific knowledge and cultural repertoires?

Discussion Prompters

- Adaptation to both environmental conditions and climate change includes accumulating traditional experience and knowledge for adaptation.
- Community adaptation planning is strengthened using geographic information systems (GIS), modelling, climate change scenarios, ecosystem services, and other scientific research methods applied to foster the ability of the community to design adaptation-how might these be integrated better? (Or should they be?)
- TEK (traditional ecological knowledge) does not simply augment or supplement the sciences but stands on its own as a valued knowledge system that can, together with or independently of the natural sciences, produce useful knowledge for climate change detection or adaptation. There are numerous examples worldwide where TEK has been shown to mirror scientific findings, but through independent knowledge frameworks and terms.

Breakout Room Two and Six

How can local knowledge-based adaptation be harnessed to increase adaptive capacity at the community level?

As with other knowledge systems, there is a high diversity in local knowledge systems; from the knowledge found in new settlements, developed by migrants from different places to the knowledge of local populations with long-term historical continuity of engagement with the environment (Aikenhead & Ogawa, 2007). Local knowledge can also be complemented with scientific climatic data, research, and planning tools (GIS, modelling, etc.) to strengthen community-based monitoring and vulnerability assessment in disaster risk management and adaptation to climate change. Following from this, the question sought to explore the role of local knowledge systems in developing and building adaptive capacity within communities.

Discussion Prompters

- In addition to raising adaptive capacity, local knowledge often highlights vulnerabilities and impacts that may not be well known, especially when the areas where local knowledge is still held are remote and poorly monitored

Breakout Room Three:

Explore how different knowledge systems and their adaptive strategies can be used in evaluating contemporary responses to climate change

The contributions from different knowledge systems have been discussed in reports by UNESCO, the IPCC, IPBES and other organizations, with a notable increase of attention in recent years. The term ‘knowledge system’ is the most used in these reports, but other terms, particularly ‘ways of knowing,’ have also been used. This question sought to explore how there needs to be a transformational shift to full recognition and inclusion of plural knowledges across international assessments and policy frameworks, based on mutual recognition and respect, though gaps remain for putting this into practice.

Discussion Prompters

- What are the challenges in managing, utilising, acknowledging, and incorporating different knowledge systems into practice?
- Narratives of climate change have evolved over time and invariably represent uncertainty

Breakout Room Four:

Can integration and co-production of local, traditional, and scientific Knowledge Systems increase adaptive capacity and reduce vulnerability to climate change?

Adaptation planning and implementation may require significant inputs of knowledge as well as human, social, and financial capital. This question sought to explore whether integration of these three knowledge systems into climate action can enhance the effectiveness of collaboration between them to support such action, and whether integration is compatible with maintaining the autonomy and distinctiveness of each. Governance mechanisms can assure the autonomy of each system and to promote their effective joint efforts.

Discussion Prompters

- Where are the biggest areas of friction and what are the areas of greatest overlap?

Workshop Attendance Statistics

7am Workshop - Monday 6th December

Region	
Africa (WMO Region I)	3
Asia (WMO Region II)	8
North America, Central American and the Caribbean (WMO Region IV)	2
Europe and Great Britain (WMO Region VI)	10
South America (WMO Region III)	1
South-West Pacific (WMO Region V)	6
TOTAL	30

Expertise	
Climate Change (without previous major focus on culture or heritage)	3
Culture or Heritage	25
Natural Heritage	2
Gender	
Female	22
Male	8
Indigenous/Knowledge Holders	
Total	3

Chair: Will Megarry

Rapporteurs:

Oliver Sukrow

Priyanka Panjwani

Olufemi Adetunji

Saranya Dharshini

Zoe Leung

Zoom Coordinator: Angelique Ploteau

Participants:

Participants	Expertise	Region	Gender
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Melinda Tignor	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Siona O'Connell	Culture or Heritage	Africa	F
Jeong-eun Kim	Culture or Heritage	Asia (WMO Region II)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Poonam V. Mascarenhas	Culture or Heritage	Asia (WMO Region II)	F
Chandni Singh	Culture or Heritage	Asia (WMO Region II)	F
Milagros Flores-Roman	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Franziska Haas	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Carola Hein	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Rosario Carmona	Culture or Heritage	South America (WMO Region III)	F
Jennifer Rubis	Culture or Heritage	South-West Pacific (WMO Region V)	F
Chrissy Grant	Culture or Heritage	South-West Pacific (WMO Region V)	F
Sue Hodges	Culture or Heritage	South-West Pacific (WMO Region V)	F

Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Ariadne Gorring	Culture or Heritage	South-West Pacific (WMO Region V)	F
Salma Sabour	Natural Heritage	Africa (WMO Region I)	F
Nick Simpson	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region I)	M
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Zhang Rouran	Culture or Heritage	Asia (WMO Region II)	M
Tomo Ishimura	Culture or Heritage	Asia (WMO Region II)	M
Kh Mahfuz ud Darain	Culture or Heritage	Asia (WMO Region II)	M
Nick Shepherd	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Oliver Martin	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jon Day	Natural Heritage	South-West Pacific	M

6pm Workshop

Region	
Africa (WMO Region I)	3
Asia (WMO Region II)	5
North America, Central American and the Caribbean (WMO Region IV)	8
Europe and Great Britain (WMO Region VI)	14
South America (WMO Region III)	2
TOTAL	32
Expertise	
Climate Change (without previous major focus on culture or heritage)	5
Culture or Heritage	25
Natural Heritage	2
Gender	
Female	23
Male	9
Indigenous/Knowledge Holders	
Total	0

Chair: Andrew Potts

Rapporteurs:

Saranya Dharshini

Prajina Karmacharya

Azad Thapa

Gül Aktürk

Zoe Leung

Priyanka Panjwani

Zoom Coordinator: Sarah Forgesson

Participants:

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	F
Malak Al-Nory	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Aseel Alharthi	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Nourah AlSudairy	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Ibidun Adelekan	Culture or Heritage	Africa (WMO Region 1)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Gabriela Mora Navarro	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Antonia Gravagnuolo	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sarah Sutton	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
A.R. Siders	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Maya Ishizawa	Culture or Heritage	South America (WMO Region III)	F
Alexey Butorin	Natural Heritage	Asia (WMO Region II)	F
Moses Chundu	Culture or Heritage	Africa (WMO Region 1)	M
Jordi Pascual	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Dorian Fuller	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Tim Kohler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M

Max Friesen	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M

Session 3 – 2:15pm

The Challenges and Opportunities of Integrating Knowledge Systems

Breakout Room One and Five:

Knowing that Knowledge Systems are forged by region/territory, how might this affect understanding of climate change, and how might climate change Knowledge Systems?

As with Indigenous knowledge systems, local knowledge systems encompass personal and collective experience as well as indirect experience and oral history to continuously generate collective, intergenerational, place-based knowledge. In addition to being forged by the territory, local knowledge systems are also shaped by historical and social processes, whether by resisting imposed practices. Furthermore, national climate measures generally underestimate or ignore the cultural and symbolic relationships that each people establish with their territory. This question therefore sought to address how regionally varied knowledges systems are in their conception and understanding, and in turn how climate change impacts the formation of such systems.

Discussion Prompters

- How to scale up adaptive capacity found in KS?
- Each country has also developed its own policies and options to prevent, cope with, mitigate, and utilize various environmental changes: what does that mean for thinking globally and does that matter?
- Local knowledge may fail to detect regional environmental changes while scientific regional or global scale analyses may miss local variation. What scales are they effectively each working at, can they be scaled up or down?

Breakout Room Two and Six:

What are the overlaps between issues of accessibility and intersectionality of knowledge and inequalities of climate resilience?

This question directly addressed how differences in the knowledge held by women and men, or gendered knowledge, are considered one of the most significant sources of intra-cultural knowledge variation, which is also related to the intersection of gender with other racial, ethnic, caste, and class divisions. Knowledge differences are also associated with a person's age and life stage. Recognising the uneven distribution of knowledge and understanding its dynamics provides

better insights into local responses. For example, since the challenges and vulnerabilities posed by global environmental change are not gender-neutral, specific attention must be given to impacts on women's knowledge and access to resources.

Discussion Prompters

- Common problems with institutional arrangements for adaptively managing natural resources include a frequent incompatibility of current governance structures with many of those that may be necessary for promoting social and ecological resilience
- Marginalisation reduces resilience.

Breakout Room Three and Seven

What are some of the constraints of knowledge system integration and transmission that might restrict adaptive capacity?

Despite well-established acknowledgement of the importance of engaging with diverse knowledge systems, sources of information, and scales of evidence, the practical integration of these systems has been more difficult to operationalize. This question looked at some constraints of integration which included informational, financial, institutional, technological, linguistic, educational, political, cultural, epistemological, ontological, and human factors.

Discussion Prompters

- Constraints of knowledge transmission e.g., between generations
- How do we consider language issues; some indigenous terms have no equivalent in other languages, how to get around that?

Breakout Room Four

How can diverse knowledge systems enable and enhance the range of local climate action solutions?

Each Knowledge System itself may have its limits and may or may not be sufficient to provide the proper response to unexpected or infrequent risks or events. Therefore, this question looked at how new conditions may require new knowledge to facilitate and maintain flexibility and improve livelihoods.

Discussion Prompters

- What is the role of intangible cultural heritage in informing mitigation and adaptation actions?

Workshop Attendance Statistics

Summary	
Region	
Africa (WMO Region I)	4
Asia (WMO Region II)	13
North America, Central American and the Caribbean (WMO Region IV)	9
Europe and Great Britain (WMO Region VI)	26
South America (WMO Region III)	3
TOTAL	55
Expertise	
Climate Change (without previous major focus on culture or heritage)	7
Culture or Heritage	46
Natural Heritage	2
Gender	
Female	35
Male	20
Indigenous/Knowledge Holders	
Total	1

Chair: Hana Morel

Rapporteurs:

Oliver Sukrow

Saranya Dharshini

Prajina Karmacharya

Gül Aktürk

Yolo Lucio

Priyanka Panjwani

Zoom Coordinator: Silvia Coraiola

Participants:

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region I)	F
Malak Al-Nory	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Nourah AlSudairy	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Aseel Alharthi	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Melinda Tignor	Climate Change (without previous major focus on culture or heritage)	North America (WMO Region IV)	F

Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America (WMO Region IV)	F
Salma Sabour	Culture or Heritage	Africa (WMO Region 1)	F
Joanne Clarke	Culture or Heritage	Africa (WMO Region 1)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Poonam V. Mascarenhas	Culture or Heritage	Asia (WMO Region II)	F
Gabriela Mora Navarro	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Birgitta Ringbeck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Antonia Gravagnuolo	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cristina Sabbioni	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Mechtild Rössler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Elena Osipova	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Prof Jane Downes	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Sarah Sutton	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F

Marcela Hurtado	Culture or Heritage	South America (WMO Region III)	F
Rosario Carmona Yost	Culture or Heritage	South America (WMO Region III)	F
Maya Ishizawa	Culture or Heritage	South America (WMO Region III)	F
Nick Simpson	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	M

Panel Discussion – Monday 1pm – Knowledge Systems

Panellists:

Shadreck Chirikure
Pasang Dolma Sherpa
Tim Curtis

Chair: Jyoti Hosagraha

Summary:

This panel session included four expert panellists to discuss the intricacies and importance of differing knowledge systems working collaboratively together for climate and heritage solutions.

The first question presented to panellists discussed how deeply accumulated and long developed indigenous and local knowledge bases and systems can be strengthened and integrated with scientific knowledge to inform climate change related actions and policies. Professor Chirikure spoke of local and indigenous knowledge being practice based and solutions led, working based on observations and is experimental in nature - characteristics and a structure well familiar with scientific knowledge systems. However, he points out that despite these similarities, in order to strengthen these knowledge systems, the current knowledge hierarchy that marginalises local and indigenous knowledge needs to be dismantled with a clear mindset shift. He spoke of a 'democracy of knowledge' where there is no hierarchy that starts with science with everything else fitting around it like a puzzle, but rather acknowledge that each knowledge has its own purpose. Dr. Pasang Sherpa echoed similar sentiments regarding the prioritisation of scientific knowledge systems which forces a standardisation that in turn does not allow for balanced and nuanced responses that will be needed in the face of the climate crisis. Dr Curtis drew it towards the role of education and the need for ensuring intergenerational transmission before following it up with the need to distinguish between intangible and tangible heritage, local and indigenous knowledge systems and also living heritage. He points out the need to take these systems, to understand them also in their creative, artistic and social elements, in terms of their cultural meaning and their social roles, which then become the platform on which they can be transmitted from one generation to the next.

The next question asked about how knowledge and practices are able to respond to drastic changes in the face of extreme climate related events and how such events impact them in turn.

Dr Curtis spoke of the malleability and transformative nature of these knowledge systems, having survived for millennia. More critically is the need to ensure the survival of the communities and their social networks which allow these systems to continue. He spoke of work being done in regard to disaster response and intangible heritage, noting that for many communities their heritage was their primary resource when facing impact from extreme events. There is a dichotomy in regard to how disasters may risk transmission but also harnessed as a key resource for response. Dr Pasang Sherpa continued this discussion in the context of education with the need to balance remaining knowledge systems with science as to allow for more complex changes that communities are struggling to deal with, and may have the opportunity to adapt. Dr Chirikure challenged how we may ensure that with integration there are good intentions that actuates in proper change on the ground.

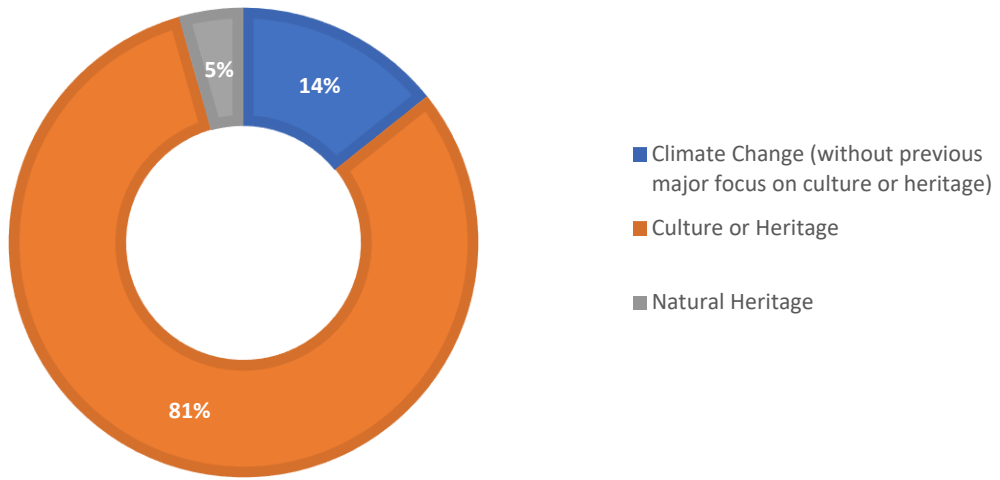
The third question built from these discussions of local experiences in asking how local based adaptation strategies and knowledge systems can be harnessed at the community level to increase adaptive capacities. Dr Chirikure spoke of needing to understand that building adaptive capacity is a long-term process, requiring mechanisms that empower communities to speak and engage in a way that is inclusive and meaningful. He also briefly spoke of intellectual property issues which was also picked up by other panellists. Dr Pasang Sherpa reiterated the need for localised or self-governance systems with their complex and integrated value systems.

Three key points brought out from the panel include the need to not only look at the forms of these knowledge systems, but the larger systems they are embedded within and how that impacts their integration and ability to be transmitted to the next generation. Following from this is the need for better education and transmitted, with a need to ensure it is not done so in a standardised formulaic way that decontextualises, devalues or disconnects knowledge in way that does not allow it to be fully integrated. Finally, a last point was the need to carefully recognise and consider local approaches and institutional forms, as there is no means of continuing knowledge systems when their ways of governance are dismantled

Overall Attendance – Knowledge Systems Workshops

TOTAL ATTENDEES FOR KNOWLEDGE SYSTEMS WORKSHOPS	
91	
Region	
Africa (WMO Region I)	6
Asia (WMO Region II)	20
North America, Central American and the Caribbean (WMO Region IV)	14
Europe and Great Britain (WMO Region VI)	36
South America (WMO Region III)	5
South-West Pacific (WMO Region V)	10
TOTAL	91
Expertise	
Climate Change (without previous major focus on culture or heritage)	13
Culture or Heritage	74
Natural Heritage	4
Indigenous/Knowledge Holders	
	4
Gender	
Female	56
Male	35

EXPERTISE REPRESENTED AT IMPACTS WORKSHOPS



Day Two: Poster Sessions – Tuesday

Sessions:

7-8am

Akifumi Iwabuchi

Title: Climate Crisis and the Underwater Cultural Heritage of Stone Tidal Weirs

Theme: Solutions

Tomo Ishimura

Title: Geoarchaeological information and cultural heritage disaster risk management: Cases in Japan

Theme: Impacts

Ariadne Gorring

Title: Reigniting Traditional Fire Stick Farming

Theme: Solutions

Kin Hong Ip

Title: Evaluation of the Roles of Heritage Buildings as the Sustainable Future of Architecture in Macau

Theme: Impacts

Tiffany Morrison

Title: Political dynamics and polycentric governance of World Heritage ecosystems

Theme: Solutions

8-9am

Csaba Zsolt Torma

Title: On the evidence of orographical modulation of regional fine scale climate change signals: The Carpathian

Theme: Knowledge Systems

Cecilie Smith-Christensen

Title: Enhancing World Heritage stewardship & community resilience through tourism & visitor management – A polycentric approach

Theme: Solutions

Chiara Bertolin

Title: Analysis of Natural Hazards and Climate Change Impacts on the still existing 28 Norwegian Stave Churches

Theme: Impacts

Jose Lobo

Title: Urban Science: Learning from the Past, Adapting for the Future

Theme: Knowledge Systems

9-10am

Jorgen Hollesen

Title: Climate impacts on Greenland's frozen past

Theme: Impacts

Robin Coningham

Title: Exploring Seismic Adaptation through Indigenous Knowledge Systems and the Increasing Challenges from Climate Change in Nepal

Theme: Solutions

Oliver Martin

Title: "Klimaoffensive" – an initiative by professional and civil society organizations for climate actions with high-quality Baukultur

Theme: Impacts

Jon Day

Title: Recent improvements applying the Climate Vulnerability Index (CVI)

Theme: Knowledge Systems

Christos Zerefos

Title: Facing the challenges of cultural and natural heritage protection in the climate crisis era

Theme: Solutions

11-12

Eugeny Kolbowsky Leonid Petrov

Title: Modelling regional risks of transformation of the North Caucasian cultural landscapes under the impact of climate change

Theme: Impacts

Cornelius Holtorf,

Title: How culture and heritage matter in relation to climate change

Theme: Knowledge Systems

1-2pm

Michael E. Smith

Title: Heritage Sites as Sources of Scientific Data on Past Urban Adaptations

Theme: Solutions

Max Friesen

Title: Polar Heritage in Peril: Understanding the Accelerating Destruction of Northern Heritage Sites, with an Example from the Mackenzie Delta Region, Northwestern Canada

Theme: Impacts

2-3pm

Dulma Karunarathna

Title: Multifaceted contribution of women in small-scale tank cascade communities- Heritage and climate change adaptation

Theme: Impacts

Chris Underwood

Title: Cultural Heritage: a driver for transformative change, adaptation and sustainability

Theme: Knowledge Systems

Jon Kohl

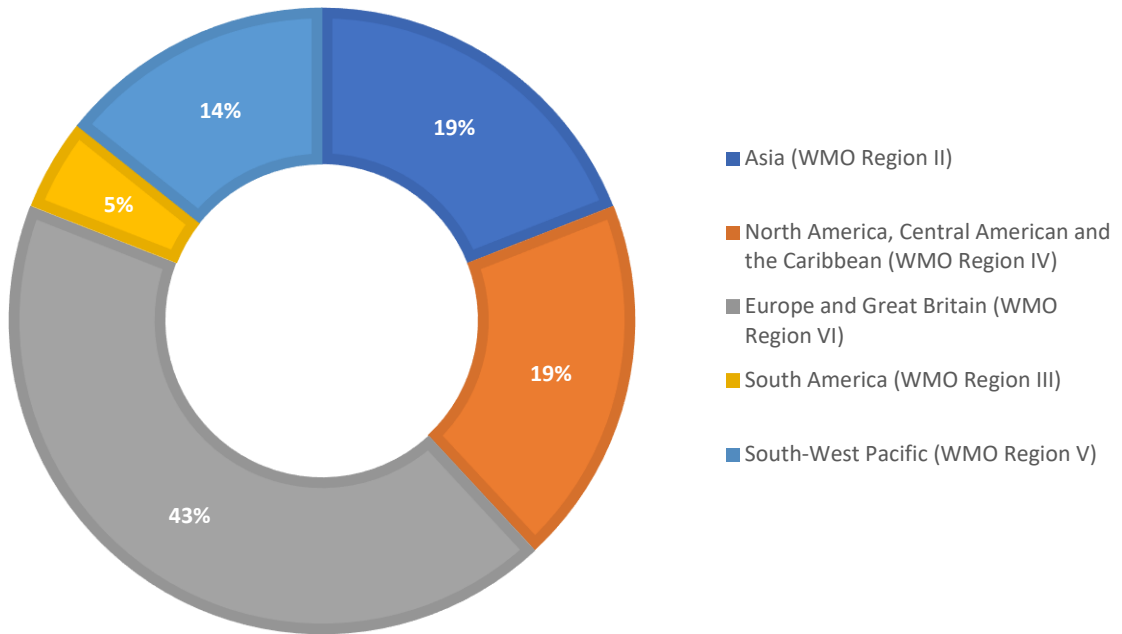
Title: Heritage Interpretation Guides Humanity Through Its Climate Bottleneck

Theme: Knowledge Systems

Poster Session Analytics

Region	
Asia (WMO Region II)	4
North America, Central American and the Caribbean (WMO Region IV)	4
Europe and Great Britain (WMO Region VI)	9
South America (WMO Region III)	1
South-West Pacific (WMO Region V)	3
TOTAL	21
Expertise	
Climate Change (without previous major focus on culture or heritage)	3
Culture or Heritage	15
Natural Heritage	2
Indigenous/Knowledge Holders	
	0
Gender	
Female	6
Male	15

REGIONS OF POSTER PRESENTATIONS



Theme Coverage	
Impacts	8
Knowledge Systems	6
Solutions	7
TOTAL	21

Day Three: Impacts – Wednesday 8th

Outline of Impacts Theme:

In the White Paper ‘Impacts, vulnerability, and understanding risks of climate change for culture and heritage’ it was stated that ‘there is a global imbalance in the number of publications assessing the impact of climate change on heritage between different regions. Regional, national (for example Europe) and sub-national disparities are also observed (example of Australia East vs West).’ As a result, it is difficult to know if what we know about climate change impacts on and risks to heritage is just a reflection of where the science is funded rather than where or when heritage is being affected by climate change.

The Paper also flags that in addition to ‘climate change mitigation and adaptation, Loss and Damage (L&D) is now considered the third pillar of climate action under the United Nations Framework Convention on Climate Change (UNFCCC).’ It continues, “Disaster loss estimates are lower-bound estimates because many impacts, such as loss of human lives, cultural heritage, and ecosystem services, are difficult to value and monetize, and thus they are poorly reflected in estimates of losses” (IPCC, 2014f, p. 19), leading to ‘potentially significant implications for heritage across these regions which stand to face undocumented losses and damages from climate change without recognition or possible compensation.’ (REF).

Findings from the WP which informed this theme’s discussions include:

- The implications of climate change for heritage are diverse and complex due to the variety of global climate and environmental change, compounded with local anthropogenic factors
- Consequences of climate change for heritage within disasters and extreme events have been less studied than the more gradual changes
- “There is an urgent need to promote a collective understanding and use of representations of uncertainty and likelihood, within both IPCC and heritage related fields, in line with the relevant broader communities to foster cross-disciplinary collaboration and impact (REF)
- Current literature predominantly evaluates exposure in a data-driven or data-informed ways, causing a bias towards listed and protected heritage, and areas in which heritage is well-documented and well-described.
- Regardless of this bias however, there is evidence that is informed by informal, local, and traditional representation and understanding of exposure in climate change-heritage risk assessment.

Session 4a and 4b – 1am and 4pm Wednesday

‘Collective Understanding of Uncertainty’

Breakout Room One and Five

How to approach long-term versus short-term impacts?

This question builds off the well-argued notion that consequences of climate change for heritage within disasters and extreme events have been less studied than the more gradual changes induced

by anthropogenic climate change or changes in social, cultural, and economic contexts in response to it. In some instances, a disaster or extreme event may result in rapid and permanent loss of heritage (Cookson, Hill, and Lawrence, 2019). In other circumstances, one challenge to studying the effects and consequences of disasters and extreme events for heritage is that the long-term implications may not be immediate.

Attribution science robustly assessing the impacts of anthropogenic climate change separately from environmental exposure (both long-term change and extreme events) is emerging as a key direction within the broader field of climate risk (Strauss et al., 2021) and in turn heritage studies.

Discussion Prompts

- Questions/problems of (un)predictability
- Our need to change lifestyles and behavioural changes
- Adaptation activities tend to be short term and reactive in nature
- Comprehensive adaptation planning must consider underlying social issues when addressing new challenges from climate and development
- Vulnerability of dependencies to food, culture, way of life, health, location etc.

Breakout Room Two and Six

How to learn from the past, and is there a need to distinguish climate change and variability from anthropogenic climate change?

Improvement of data reliability and resolution allows for more nuanced reconstructions of impacts of past climatic events, facilitating historically important factors of societal adaptation processes proportional to those changes. However, they do not provide straightforward solutions for contemporary anthropogenic climate change as the scale of recent changes across the climate system are unprecedented over many centuries to many thousands of years. While the past cannot be a perfect analogue, they can provide an empirically grounded legacy for reflecting on the efficacy and feasibility of adaptation to the current and projected impacts associated with anthropogenic climate change.

There is a mature, diverse, and growing understanding of the vulnerability of heritage to changes in the environment, social, economic, and cultural contexts. There is also growing recognition that anthropogenic climate change is already impacting multiple types of heritage across all regions of the world. Further, future climate change poses increased risks to heritage globally including Loss and Damage to heritage of current and future generations and particularly severe impacts on the intangible cultural heritage of Indigenous communities. However, the literature and knowledge of anthropogenic climate change and its impacts on heritage is less developed and we have no comprehensive list of types of heritage affected by climate change. The challenge remains how to systematically identify the range of impacts from climate change on heritage commensurate with the diversity, quantity, and severity of its impacts. This challenge is compounded by the diversity

of heritage types, flux, and scales. Therefore, this question sought to explore how we may learn from the past, whilst also being engaged with complicated notions of whether there is a need to distinguish climate change and variability from anthropogenic climate change.

Discussion Prompts

- Importance of not making false equivalences of climate change in the past and current climate change.
- What advancements, if any, are there in science, innovation, policy, or practice to address short-term and long-term climate impacts?
- What are the challenges and opportunities of managing, utilising, acknowledging, and incorporating different understandings of impact into adaptive planning?
- Are there any specific and/or innovative local climate actions that respond to short and/or long-term impacts?
- What might be the opportunities and challenges with institutional arrangements for adaptively managing climate impacts to heritage?
- Where does the need to empower and build capacity within communities feed into this?

Breakout Room Three and Seven

How to better understand risk as an important starting point for value judgements about the danger of climate change?

This question built off the notion that adaptation can be constrained by social and cultural factors that are linked to societal values, world views, and cultural norms and behaviours (O'Brien, 2009; Moser and Ekstrom, 2010; O'Brien and Wolf, 2010; Hartzell-Nichols, 2011). These social and cultural factors can influence perceptions of risk, what adaptation options are considered useful and by whom, as well as the distribution of vulnerability and adaptive capacity among different elements of society (Grothmann and Patt, 2005; Weber, 2006; Patt and Schröter, 2008; Adger et al., 2009; Kuruppu, 2009; O'Brien, 2009; Nielsen and Reenberg, 2010; Wolf and Moser, 2011; Wolf et al., 2013). Alignment of climate change risk terms may facilitate collaboration between climate science and heritage research fields and enhance the likelihood of uptake by large climate change assessments like the IPCC. Furthermore, this question explored how innovative methods, especially those which are ideal for assessing social and cultural vulnerability, are needed to integrate the value of intangible cultural heritage with assessments of climate change risk.

Discussion Prompts

- Individuals will value the present versus the future differently and will bring personal worldviews on the importance of assets like biodiversity, culture, and aesthetics.
- Values also influence judgments about the relative importance of global economic growth versus assuring the well-being of the most vulnerable among us.
- How to systematically identify the range of impacts from climate change on heritage commensurate with the diversity, quantity, and severity of its impacts.
- How to integrate all determinants of climate change risk in assessment of impacts on heritage.

- What are the essential climate change risk terms needed for alignment of climate change-heritage research and practice?
- How can large climate change assessments better assess impacts on and risks to heritage?
- What are the essential roles, responsibilities, and stakeholders necessary to assess climate change impacts, including those of Loss and Damage from climate change?
- What are the essential modalities and methods necessary to assess climate change impacts on and risks to heritage?

Breakout Room Four

The intersections of intergovernmental, national, and local interests and concerns in relation to culture, heritage, and climate change

The implications of climate change for heritage are diverse and complex due to the variety of global climate and environmental change, compounded with local anthropogenic factors (such as pollution and urbanisation) as well as the diversity of heritage, including its characteristics of value. Climate change impacts on heritage places and resources are not being studied as an interdisciplinary field consistently, nor systematically at a regional or country-specific level. This question builds off the fact that research is needed regarding the participation and co-production of knowledge between scientists and communities (including Indigenous peoples and local communities) on climate research and the use of Indigenous and local knowledge to inform climate change research in the region. Also, it is difficult to know if what we know about climate impacts on and risks to heritage is just a reflection of where the science is funded rather than where or when heritage is affected by climate change. The need for a deeper understanding of the local variation and phenology of hazards that are particularly relevant to heritage.

Discussion Prompters

- The intergovernmental frameworks address global issues through global frameworks, but they rely on national governments which vary greatly in the ways that they represent the interests and concerns of other stakeholders in society, including Indigenous Peoples and Local Communities, and those stakeholders themselves coordinated cross-nationally in organizations and movements. And these different groups may have different understandings of culture and heritage.
- Where have major definitions of heritage been made and how do these intersect with attention to (or lack of) climate impacts and response

Workshop Attendance Statistics

1am Workshop

Region	
Asia (WMO Region II)	4
South-West Pacific (WMO Region V)	7
TOTAL	11

Expertise	
Climate Change (without previous major focus on culture or heritage)	1
Culture or Heritage	9
Natural Heritage	1
Gender	
Female	8
Male	3
Indigenous/Knowledge Holders	
Total	1

Chair: Andrew Potts

Rapporteurs:

Kate Lim

Yolo Lucio

Monalisa Maharjan

Zoom Coordinator: Olufemi Adetunji

Participants:

Participants	Expertise	Region	Gender
Jon Day	Natural Heritage	South-West Pacific (WMO Region V)	M
Chrissy Grant	Culture or Heritage	South-West Pacific (WMO Region V)	F
Zhang Rouran	Culture or Heritage	Asia (WMO Region II)	M
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Jeong-eun Kim	Culture or Heritage	Asia (WMO Region II)	F
Sue Hodges	Culture or Heritage	South-West Pacific (WMO Region V)	F
Lauren Rickards	Climate Change (without previous major focus on culture or heritage)	South-West Pacific (WMO Region V)	F
Christopher Ballard	Culture or Heritage	South-West Pacific (WMO Region V)	M
Tomo Ishimura	Culture or Heritage	Asia (WMO Region II)	F
Ruth Morgan	Culture or Heritage	South-West Pacific (WMO Region V)	F

4pm Workshops

Region	
Africa (WMO Region I)	1
Asia (WMO Region II)	4
Europe and Great Britain (WMO Region VI)	19
North America, Central American and the Caribbean (WMO Region IV)	8
South America (WMO Region III)	1

TOTAL	33
Expertise	
Climate Change (without previous major focus on culture or heritage)	2
Culture or Heritage	28
Natural Heritage	3
Gender	
Female	19
Male	14
Indigenous/Knowledge Holders	
Total	0

Chair: Andrew Potts

Rapporteurs:

Süheyla Koç

Azad Thapa

Saranya Dharshini

Nityaa Lakshimi Iyer

Prajina Karmacharya

Zoe Leung

Zoom Coordinator: Sarah Forgesson

Participants

Participants	Expertise	Region	Gender
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Salma Sabour	Culture or Heritage	Africa (WMO Region I)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Poonam Verma	Culture or Heritage	Asia (WMO Region II)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cristina Sabbioni	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F

Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sarah Sutton	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elena Osipova	Natural Heritage	Europe and Great Britain (WMO Region VI)	F
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Oliver Martin	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Dario Camuffo	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Scott Allan Orr	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Dorian Fuller	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jordi Pascual	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Max Friesen	Culture or Heritage	North America (WMO Region IV)	M
Ben Orlove	Culture or Heritage	North America (WMO Region IV)	M
Christophe Rivet	Culture or Heritage	North America (WMO Region IV)	M
Chris Marrion	Culture or Heritage	North America (WMO Region IV)	M
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M
Alexey Butorin	Natural Heritage	Asia (WMO Region II)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M

Session 5a and 5b – 7am and 6pm Wednesday

Identifying common factors for vulnerability and resilience

Breakout Room One and Five

How to inspire and manage regional conversations?

This follows on the themes brought upon by breakout room 4, Session 4a and 4b, which sought to look at the intersections of intergovernmental, national, and local interests and concerns in relation to culture, heritage, and climate change. Continuing the conversation, this looks at means of inspiring and managing further regionally based communication and action, again looking at

how research is needed with the participation and co-production of knowledge between scientists and communities (including Indigenous peoples and local communities) on climate research and the use of Indigenous and local knowledge to inform climate change research in the region.

Discussion Prompters

- Understanding of transboundary risks, need for cooperation and governance responses
- Local policies impact vulnerability
- How to scale up adaptive capacity taking on board regional impact differences?
- Each country has also developed its own policies and options to prevent, cope with, mitigate, and utilize various environmental changes: what does that mean for thinking globally and does that matter?
- Local knowledge may fail to detect regional environmental changes while scientific regional or global scale analyses may miss local variation. What are the scales, are they effectively each working at, can they be scaled up or down?
- Knowing impacts on the socio-economic and natural systems of different sectors and regions differ, how might this affect understanding of climate change?

Breakout Room Two and Six

Resilience, tangible, and intangible heritage for relocated communities

Various

governments are presently engaged in planning to move settlements as part of adaptation strategies, either because of the assessment of new risks or to justify existing resettlement programs (de Sherbinin et al., 2011; Biermann, 2012). A growing understanding of the risk concerns how responses to climate change affect risk, vulnerability, exposure, and other response options (Reisinger et al., 2021). More broadly, there is a need to develop research that develops an understanding of the risk to heritage induced by climate-related migration, displacement, and relocation policies (Herrmann, 2017; Brooks et al., 2020). Relocation and the separation of communities and heritage places and contexts appears to present the most profound threat to the ongoing transmission and safeguarding of intangible cultural heritage.

In addition to direct climate change effects, secondary effects have been assessed on cultural heritage (more specifically in the Arctic), such as the relocation and migration of population from areas containing important archaeological resources given accelerated climate change, which made loss of territory and place attachment at the forefront of climate change impacts on cultural heritage (St Amand et al., 2020; Hermann, 2017). Therefore, this question looks at how systematic research and change in institutional structures of knowledge production, is needed regarding climate change impacts on urban heritage and Indigenous peoples' territories, to support communities to define their future in a climate-altered world. In turn, this also engages actively with how these communities define as resilience, as well as tangible and intangible heritage.

Discussion Prompters

- Traditional practices eroded when governments relocate communities
- Circumstances of inadequate entitlements, rights, and inequality

- Constraints to the transmission of language and knowledge between generations
- Are there instances in which cultural heritage has improved security or reduced stress?
- What are situations in which cultural heritage has been or may be used as a source or focus of stress?

Breakout Room Three and Seven

Uneven societal consequences related to climate change impacts

Climate change will exacerbate multidimensional poverty in most developing countries and will also create new poverty pockets in countries with increasing inequality, in both developed and developing countries. The types of heritage currently identified to be impacted by climate change, the range of climate hazards, the severity of observed impacts, and the inequitable distribution of their impacts are alarming, particularly on Indigenous communities. These observations indicate that heritage faces severe, immediate, increasing, and existential risks from future warming levels and necessitates the mobilisation of substantial resources for climate change-heritage assessment, with significant implications for Loss and Damage.

Knowledge inequality in the climate change heritage literature mirrors the attention to universal/cosmopolitan definitions of heritage in contrast to Indigenous and local perspectives and views on the heritage concept, which are harder to access, collect and compare. Climate change-heritage research is also affected by inequalities between and within countries. This question engages with these uneven societal consequences and in addition to addressing systemic inequities looks at the need to reduce spatial inequality by decentralising funding at global and local levels as it is crucial for effective heritage conservation in the climate change context, i.e., increasing ‘access relative to needs’ from climate change and extreme weather events (Meredith, Sloggett and Scott, 2019).

Discussion Prompters

- Are there instances in which cultural heritage has improved security or reduced stress?
- What are situations in which cultural heritage has been or may be used as a source or focus of stress?
- Limits to adaptation are context-specific and closely linked to cultural norms and societal values.
- Privileged members of society can benefit from climate change impacts and response strategies, given their flexibility in mobilising and accessing resources and positions of power, often to the detriment of others.
- Differential impacts on men and women arise from distinct roles in society, the way these roles are enhanced or constrained by other dimensions of inequality, risk perceptions, and the nature of response to hazards.
- Impact is affected by socioeconomic disadvantage, occupation, and culturally imposed expectations to save lives. Although women are generally more sensitive to heat stress, more male workers are reported to have died largely because of responsibilities related to outdoor and indoor work.
- Level of education, cultural values, and tradition, as well as access to markets and technology, and the decision power of individuals and social groups, all influence the perception of potential impacts and opportunities from climate measures, and consequently have a great impact on local land management decisions

Breakout Room Four

Inclusive approaches to understanding impacts and resilience

Although heritage is present in IPCC literature (Assessment Reports and Special Reports), this inclusion is unsystematic, superficial, and not inclusive of the vast diversity of types of heritage and risks posed by climate change. Further, the impacts or risks that are identified are usually qualitatively described with little specificity, and only quantified in a handful of instances. One of the challenges for incorporating heritage into IPCC assessments is the diversity of terminology, the variety of use within heritage literature and practice, and the discrepancy of this terminology to that used by IPCC and broader climate risk literature.

This question engaged with the idea that in order holistically address heritage vulnerability, we need to rethink interdisciplinarity (Schipper, Dubash, and Mulugetta, 2021), moving beyond mixed methods toward plural and co-existing perspectives that build on multiple epistemologies. Against the backdrop of a need for robust evidence that is typically underpinned by fundamental and theoretical work, case studies practice-led research can help to achieve this ‘new paradigm’ for interdisciplinarity, especially when they are participatory, including citizen science (Davies, 2020) and crowd-sourced data (Kumar, 2020), and incorporating Indigenous and Local knowledge (Nakashima et al., 2012). To scale up our understanding of vulnerability requires an improvement in knowledge exchange, data sharing and digital literacy (Albuerne, Grau-Bove, and Strlic, 2018; Otero, 2021), and standardization of practice to enable comparability and build up a comprehensive understanding of vulnerability

Discussion Prompters

- Lack of involvement in formal, government decision making over resources decreases resilience
- While science can quantify climate change risks in a technical sense, based on the probability, magnitude, and nature of the potential consequences of climate change, determining what is dangerous is ultimately a judgment that depends on values and objectives.
- Level of education, cultural values, and tradition, as well as access to markets and technology, and the decision power of individuals and social groups, all influence the perception of potential impacts and opportunities from climate measures, and consequently have a great impact on local land management decisions

Workshop Attendance Statistics

7am Workshop

Region	
Africa (WMO Region I)	1
Asia (WMO Region II)	8
Europe and Great Britain (WMO Region VI)	10
South America (WMO Region III)	1
South-West Pacific (WMO Region V)	3
TOTAL	23
Expertise	

Climate Change (without previous major focus on culture or heritage)	5
Culture or Heritage	14
Natural Heritage	2
Gender	
Female	16
Male	8
Indigenous/Knowledge Holders	
Total	2

Chair: Yunus Arikan

Rapporteurs:

Süheyla Koç

Prajina Karmacharya

Olufemi Adetunji

Oliver Sukrow

Zoom Coordinator: Angelique Ploteau

Participants

Participants	Expertise	Region	Gender
Aseel Alharthi	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Malak Al-Nory	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Nourah AlSudairy	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	F
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Poonam V. Mascarenhas	Culture or Heritage	Asia (WMO Region II)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Prof Jane Downes	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Jyoti Hosagrahar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Rosario Carmona	Culture or Heritage	South America (WMO Region III)	F
Chrissy Grant	Culture or Heritage	South-West Pacific (WMO Region V)	F
Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Nick Simpson	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	M

Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Zhang Rouran	Culture or Heritage	Asia (WMO Region II)	M
Yunus Arikan	Culture or Heritage	Asia (WMO Region II)	M
Kh Mahfuz ud Darain	Culture or Heritage	Asia (WMO Region II)	M
Nick Shepherd	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M
Jon Day	Natural Heritage	South-West Pacific (WMO Region V)	M

6pm Workshop

Region		
Africa (WMO Region I)		1
Asia (WMO Region II)		4
North America, Central American and the Caribbean (WMO Region IV)		7
Europe and Great Britain (WMO Region VI)		6
South America (WMO Region III)		2
TOTAL		20
Expertise		
Climate Change (without previous major focus on culture or heritage)		3
Culture or Heritage		15
Natural Heritage		2
Gender		
Female		11
Male		9
Indigenous/Knowledge Holders		
Total		0

Chair: Yunus Arikan

Rapporteurs:

Süheyla Koç

Prajina Karmacharya

Olufemi Adetunji

Oliver Sukrow

Zoom Coordinator: Angelique Ploteau

Participants

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F

Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
A.R. Siders	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Deborah Coen	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV))	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Alexey Butorin	Natural Heritage	Asia (WMO Region II)	M
Aziz Ballouche	Culture or Heritage	Asia (WMO Region II)	M
Scott Allan Orr	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Tom Dawson	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Max Friesen	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Christophe Rivet	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Eduardo Brondizio	Natural Heritage	South America (WMO Region III)	M
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M

Session 6 – 2:15pm Wednesday

Impacts, Power, and Interpretations of Climate Change

Breakout Room One and Six:

What is known about impacts reflects science-funding bias rather than what is being impacted globally. What are the considerations/consequences that need to be addressed? How to change this?

In the last three decades, natural and technical sciences for research on climate change received 770% more funding (research grants) than the social sciences, with only 0.12% of all research funding allocated to the social sciences for climate mitigation (Overland and Sovacool, 2020). In climate change-heritage research, the social aspect (and social innovation) of climate change adaptation and mitigation measures is the least researched despite its importance for sustainable transitions (Whitmarsh et al., 2011).

Therefore, this question looked at how climate change-heritage research is affected by inequalities, not only from a funding sense but also between and within countries. In addition to addressing systemic inequities, reducing spatial inequality by decentralising funding at global and local levels is crucial for effective heritage conservation in the climate change context, i.e., increasing ‘access relative to needs’ from climate change and extreme weather events (Meredith, Sloggett and Scott, 2019).

Discussion Prompters

- Consideration of undocumented losses and regional disparity
- Research follows national policy concerns
- Lack of heritage awareness and coordinator among stakeholders plus inadequate funding
- What is the state of knowledge regarding types, diversity, and severity of effects and consequences of climate change?

Breakout Room Two and Seven

What are some of the broader (short-term) economic benefits that might hinder addressing climate change?

Social and cultural values and norms can constrain adaptation options for communities by limiting the range of acceptable responses and processes (e.g., place attachment, differing values relating to near-versus long-term, private versus public, and economic versus environmental or social costs and benefits, and perceived legitimacy of institutions).

While research on climate adaptation and mitigation strategies for the cultural heritage field has been growing since 2017, it is still relatively small in comparison to the extent of research on the physical impacts of climate change on individual buildings, monuments, or sites (Orr, Richards and Fatorić, 2021). This question therefore looked at how the impacts of climate change on the broader economic benefits (besides tourism), and social and cultural value of cultural heritage are not investigated nor reviewed globally and rarely explored regionally or locally.

Discussion Prompters

- Understanding the importance between the nexus of heritage sites, cultural industries, and tourism
- The need to empower and build capacity within communities to address dependencies on unsustainable livelihoods
- Questions/problems of (un)predictability
- Need to change lifestyles and behavioural changes
- Adaptation activities tend to be short term and reactive in nature
- Comprehensive adaptation planning must consider underlying social issues when addressing new challenges from climate and development
- Vulnerability of dependencies to: food, culture, way of life, health, location

Breakout Room Three

How to address the need for innovative methods to assess social and cultural vulnerability?

Social and cultural vulnerability are primarily assessed using qualitative methods and those primarily employed within the social sciences, including interviews, surveys, and questionnaires (Orr, Richards, and Fatorić, 2021). Despite being less frequent, mixed methods approaches combining data-driven computation with surveys of residents to understand community perspectives result in a nuanced understanding of non-economic barriers to characterising vulnerability (Kittipongvises et al., 2020). Similarly, value-based definitions of vulnerability must be understood through community-informed processes (Seekamp and Jo, 2020; Ghahramani, McArdle, and Fatorić, 2020) which can incorporate a range of qualitative, quantitative methods: which communities to engage with, and how, should be determined on a case basis. However, vulnerability should be considered in its broader context: it is important to recognise the ways in which local policy impacts vulnerability, especially for traditional communities in remote areas (Ford et al., 2007).

This question looked at how the alignment of climate change risk terms may facilitate collaboration between climate science and heritage research fields and enhance the likelihood of uptake by large climate change assessments like the IPCC. Innovative methods, especially those which are ideal for assessing social and cultural vulnerability, are needed to integrate the value of intangible cultural heritage with assessments of climate change risk.

Discussion Prompters

- Culture and social impacts often cannot be quantified.
- Direct and indirect impacts to social, cultural, and economic contexts
- What are the essential modalities and methods necessary to assess climate change impacts on and risks to heritage?
- The need of increasing sophistication in methods of recovery, analysis, and interpretation

Breakout Room Four

Should climate heritage strategies and considerations be government led or grassroots led? What are the pros and cons of both?

Grassroots organisations have a demonstrated ability to innovate and produce solutions that work and can be replicated. Networks of organisations produce, organise, and mobilise communities and, with the right support, are well placed to champion climate change processes that can rapidly increase community resilience and reduce vulnerability. Therefore, this question sought to further engage with the notion of grassroot led strategies, and the positives and negatives they may emerged from them.

Discussion Prompters

- Are there instances in which cultural heritage has improved security or reduced stress?
- What are situations in which cultural heritage has been or may be used as a source or focus of stress?

Breakout Room Five

Shifting understandings and expectations of loss based on pre-existing contexts and challenges

Climate change will exacerbate multidimensional poverty in most developing countries, including high mountain states, countries at risk from sea level rise, and countries with indigenous peoples. Climate change will also create new poverty pockets in countries with increasing inequality, in both developed and developing countries.

Vulnerability is often high among indigenous peoples, women, children, the elderly, and disabled people who experience multiple deprivations that inhibit them from managing daily risks and shocks (Eriksen and O'Brien, 2007; Ayers and Huq, 2009; Boyd and Juhola, 2009; Barnett and O'Neill, 2010; O'Brien et al., 2010; Petheram et al., 2010) and may present significant barriers to adaptation. Building from this understanding of differing socio-economic contexts and challenges, this question looked at how we will need to shift our understanding and expectation of heritage loss with regard to differing circumstances.

Discussion Prompts

- Pre-existing impacts brought upon by colonialism (etc) and how that changes the degree of impact
- How to shift understandings and expectations of loss based on these pre-existing challenges?
- Learning from the past requires asking questions of it. How well do questions that climate science, adaptation, and mitigation communities have for and about the human past, and the nature of human behaviour and society, align with pre-existing contexts (e.g. colonialism, inequalities, conflict)

Workshop Attendance Statistics

Region	
Africa (WMO Region I)	3
Asia (WMO Region II)	6
North America, Central American and the Caribbean (WMO Region IV)	5
Europe and Great Britain (WMO Region VI)	26
South America (WMO Region III)	3
TOTAL	43
Expertise	
Climate Change (without previous major focus on culture or heritage)	5
Culture or Heritage	36
Natural Heritage	2
Gender	
Female	28
Male	15
Indigenous/Knowledge Holders	
Total	1

Chair: Jyoti Hosograhar

Rapporteurs:

Priyanka Panjwani

Süheyla Koç
 Gül Aktürk
 Nityaa Lakshimi Iyer
 Yolo Lucio
 Saranya Dharshini
Zoom Coordinator: Silvia Coraiola

Participants

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	F
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Poonam Verma	Culture or Heritage	Asia (WMO Region II)	F
Gabriela Mora Navarro	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Mechtild Rössler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Jyoti Hosagrahar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sandra Fatoric	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F

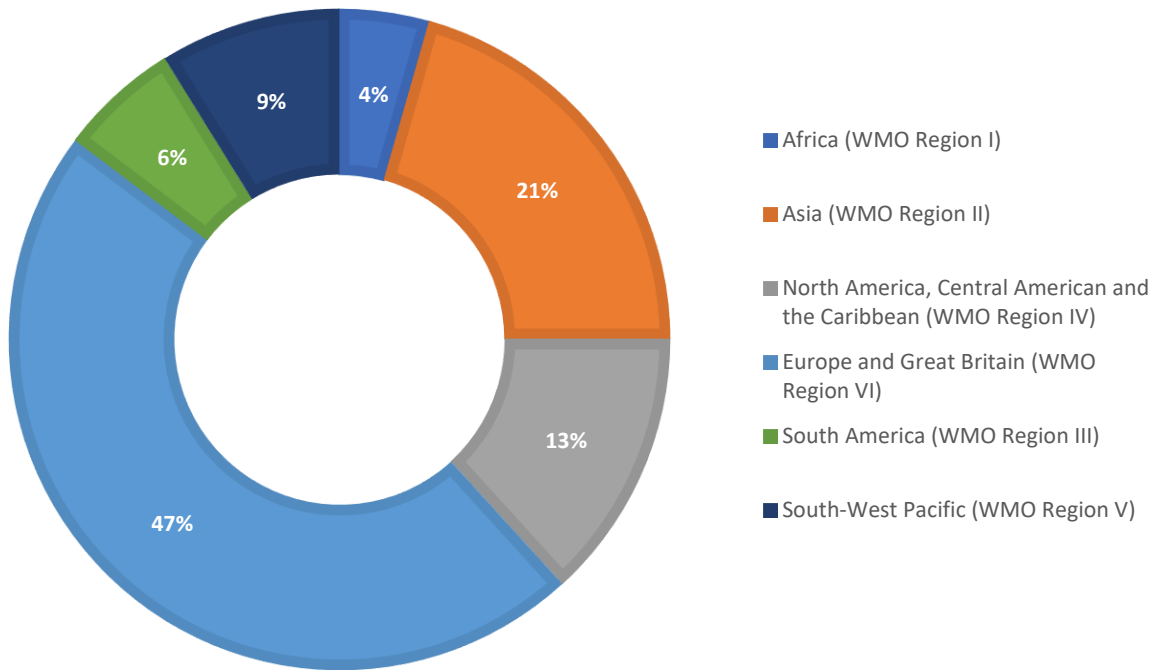
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cristina Sabbioni	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Paloma Guzmán	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sarah Sutton	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Rosario Carmona	Culture or Heritage	South America (WMO Region III)	F
Salma Sabour	Natural Heritage	Africa (WMO Region 1)	F
Nick Simpson	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	M
Sandeep Sengupta	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	M
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Kh Mahfuz ud Darain	Culture or Heritage	Asia (WMO Region II)	M
Oliver Martin	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jørgen Hollesen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Max Friesen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Scott Allan Orr	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jordi Pascual	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M

Tom D	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Neil Dawson	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Christophe Rivet	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M

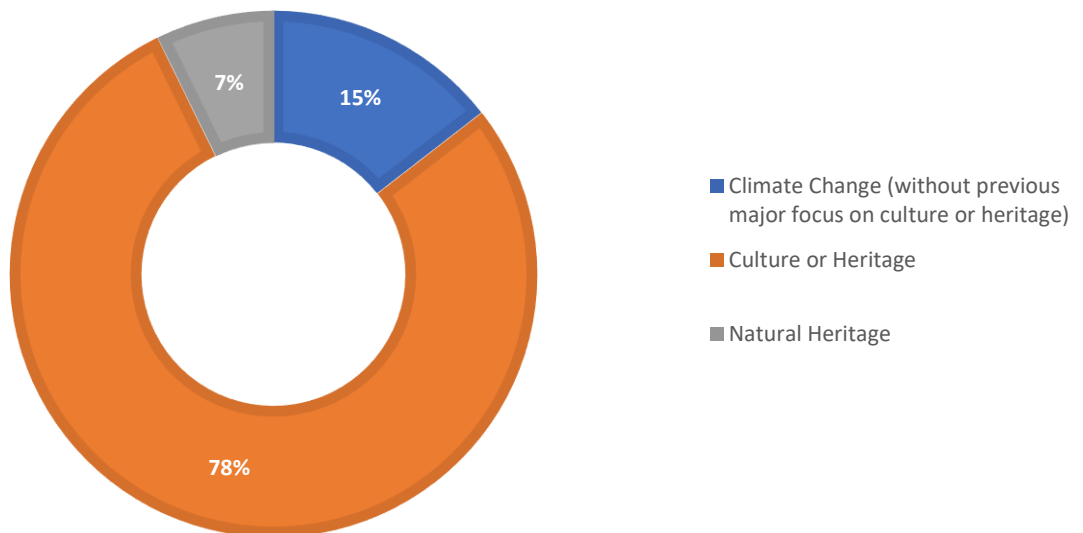
Overall Attendance – Impacts

TOTAL ATTENDEES FOR IMPACTS WORKSHOPS	
68	
Region	
Africa (WMO Region I)	3
Asia (WMO Region II)	14
Europe and Great Britain (WMO Region VI)	32
North America, Central American and the Caribbean (WMO Region IV)	9
South America (WMO Region III)	4
South-West Pacific (WMO Region V) - North (Indonesia, Malaysia, Oceania)	6
TOTAL	68
Expertise	
Climate Change (without previous major focus on culture or heritage)	10
Culture or Heritage	54
Natural Heritage	5
Indigenous/Knowledge Holders	
	2
Gender	
Female	43
Male	26

REGIONS REPRESENTED AT IMPACTS WORKSHOPS



EXPERTISE REPRESENTED AT KNOWLEDGE SYSTEMS WORKSHOPS



Panel Discussion – Wednesday 1pm – Impacts

Panellists:

May Cassar

Brenda Ekwurzel

Aziz Ballouche

Gabriela Mora Navarro

Chair: William Megarry

Summary:

This panel session included four expert panellists to discuss the issue of loss, damage and adaptation for culture and heritage. Once again, opening statements were made from three co-chairs outline their engagement with the topic of impact, and collectively how the three organisations approach issues raised.

The first question broadly looked at the notion of language and how we understand and approach the word impacts, but also hazard, risk, etc., and what may be done to ensure language is clear. Gabriela Mora Navarro spoke of the need for clarity of vocabulary amongst disciplines, not only to allow for the construction of effective instruments for scientific purposes, but also for legal economic and political means. This will mean the need to review meanings across disciplines and cultural perspectives. She also points out that from a semiotic perspective, adopting terms that already have very diffused semantic fields can have great difficulty in generating consensus, while on the flip side these different meanings and associated cultural nuances within different contexts and language provide more opportunities for finding common ground. May Cassar also echoes the difficulty with commonality amongst terms, noting how different fields can bring distinct things to the table, such as heritage's well-developed notion of value.

The next discussion went on to scale, more specifically the notion of long-term vs short term impacts. Brenda Ekwurzel started the discussion, noting that shorter term impacts are easier to dial in on with confidence, but the struggle starts with slower moving, longer term impacts such as sea level rise. There will be a need for clear and consistent communication with communities who have dealt and are continually dealing with these slow changes. Aziz Ballouche brought to attention how the concepts of long term and short term differ between policy makers and communities, but also questioned the notion of human time vs natural time, and the implications that has for developing adaptive strategies.

This led onto the discussion of the need to distinguish climate change variability from anthropogenic climate change. May Cassar spoke of heritage's long history of studying the impact of environmental change on cultural materials, but not always within the framework of climate change. There is little examination within literature of the relationship between climate variability and anthropogenic climate change with a need to better draw and engage with such. She noted that often the difference comes down to emphasis, with a difference between looking at human activity, vs natural variability. Aziz Ballouche further noted that the difference is assessed differently amongst academic domains with difficulty distinguishing, particularly in the long term, differences between climate change impact and human impact. Brenda also echoed that one of the hardest things to convey is that the variability in the past was natural. And with anthropogenic climate change that variability, the swinging between extremes is the hardest part for communities that were used to a tighter envelope of variability.

The next question looked at how we inspire and enable those regional conversations to take place. Gabriela Mora Navarro spoke of how in Latin America, in terms of heritage conservation, several initiatives have been undertaken by national and international organisations to promote cooperation, and the strengthening of professional networks for collaboration. Some of these climate spaces have been organised to address risk management experiences for cultural heritage agenda and intersectionality perspectives, which have allowed us to share good practices, theoretical and methodological approaches, challenges etc. May Cassar off the back of this question about how we define regions, and what could inspire creative conversations across regions., moving away from capturing evidence from a narrow segment of the world and from creating dichotomies. There also needs to be a question about how definitions serve us, or whether it is more important to address the interdependencies of complex systems across several dimensions, natural and cultural, tangible, and intangible, using qualitative and quantitative evidence across different scales, timescales and our understanding of vulnerabilities.

The final discussion was on regional imbalances, brought about normally by different funding resources and availability, and how that may be addressed to allow for a larger picture of impact. Brenda Ekwurzel spoke of needing to reposition where and how we are gathering for high level meetings to ensure these barriers no longer stay. Gabriela spoke of more research outside of academia, such as citizen science projects that allows better integration from actors that are traditionally marginalised. May finished by speaking on a need to rethink how climate science, heritage science and climate change research funding is distributed. There are disparities that are still evident due to income inequality, colonial legacy, the language of publication, and high-income countries, having a large portion of the pie. More time is needed, devoted to communicating engagement to allow for a more representative research product.

Day Two: Poster Sessions – Thursday

Sessions:

9-10am

Heather Viles

Title: Nature-based Solutions for cultural heritage sites: Review and prospect

Theme: Impacts

Mohamed Abdrabo

Title: Nature-based Solutions for cultural heritage sites: Review and prospect

Theme: Impacts

Siona O'Connell

Title: Nature-based Solutions for cultural heritage sites: Review and prospect

Theme: Impacts

1-2pm

Scott Ortman

Title: Archaeology, Urban Science, and Climate Adaptation

Theme: Solutions

Scott E. Ingram

Title: Human Securities, Sustainability, and Migration in the Ancient US Southwest and Mexican Northwest

Theme: Solutions

Elizabeth Brabec

Title: The Cultural Heritage of Place: Why it matters in the outcomes of migration and displacement

Theme: Impacts

Rouran Zhang

Title: World Heritage in China under Climate Change

Theme: Impacts

Gabriela Mora Navarro

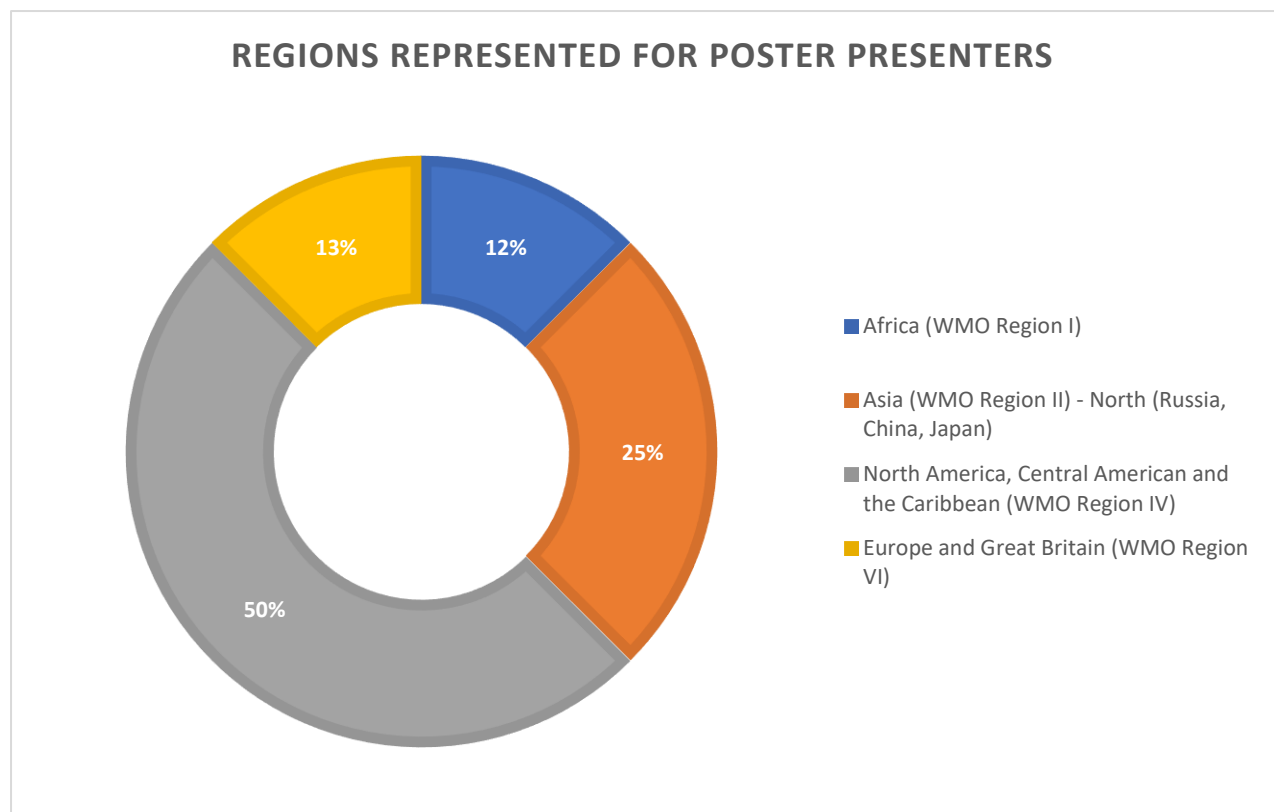
Title: Approaches to Climate Impacts on Heritage Conservation in Mexico

Theme: Impacts

Poster Presenter Analytics

Region	
Africa (WMO Region I)	1
Asia (WMO Region II)	2
North America, Central American and the Caribbean (WMO Region IV)	4
Europe and Great Britain (WMO Region VI)	1
TOTAL	8
Expertise	
Climate Change (without previous major focus on culture or heritage)	0
Culture or Heritage	8
Natural Heritage	0
Indigenous/Knowledge Holders	
	0
Gender	
Female	3
Male	5

Theme Coverage	
Impacts	6
Knowledge Systems	0
Solutions	2
TOTAL	8



Day Five - Solutions

Outline of Solutions Theme

The final day was focused around Solutions themes, or as titled in the adjacent White Paper ‘The Role of Cultural and Natural Heritage for Climate Action.’ It is suggested that science-based solutions are likely to be socially, economically, politically and culturally entangled’ and as such, ‘mobilizing the affective power of heritage becomes a potentially powerful tool in organizing for climate action – although this involves emphasizing a different version of heritage, less concerned with national pasts and more with collective human endeavour.’ (REF). Prioritizing change requires an understanding of the things people value: what they are willing to change and what they are not. Values are often implicit or unstated, and explicitly identifying values can improve adaptation.

This theme certainly overlaps and is very much related to knowledge systems as well as use of different methods, understanding of risk and impact, different technical languages, and different starting assumptions. Through this theme it was hoped to highlight how heritage primarily constitutes a resource towards resilience and adaptation, in the sense that learning how climate change affects sites and assets - and the people, industries and ecological processes related to them - offers insight on how best to respond and adapt. At the same time, analyses of the kinds of barriers heritage and culture might present has arguably become more specific and sophisticated, with increasing acknowledgement of the external and internal power dynamics which operate in every local context, including, quite extensive considerations of inequalities of gender, Indigeneity, wealth, race, age, and disability (e.g., Arneeth et al., 2019, pp. 80, 106; Pörtner et al., 2019, pp. 92, 373).

Questions can be asked, such as, instead of asking if a landscape is vulnerable to climate change - and by how much - can we think instead about how much climate adaptation is needed? What are the guiding principles in adapting to a changing climate? What do those patterns suggest about future pathways of influence? This learning process in climate and natural heritage management raises an approach that is fundamentally different, that is, how to plan a proactive climate adaptation agenda rather than whether heritage is vulnerable to climate change. In these questions is the need to adjust both the planning instruments and the measurement of management effectiveness of heritage.

Finally, this theme also turned to learning from the past, with numerous modelling techniques already been applied to understand climate-human relations (see d’Alpoim Guedes *et al.*, 2016). Archaeological heritage facilitates an understanding of how climate change and extremes affected past societies. Underwritten by a detailed understanding of how human decision-making relates to ecological and social cues as well as to inherited traditions (Richerson and Boyd, 2005; Henrich, 2018), these analyses highlight that human communities can be highly resilient to rapid climate change, but also that the pace of change and the inertia inherent in many cultural systems may constrain adaptability to such a degree that major societal stress can result. Critically, many past societal transformations entailed demographic and social consequences (migration, loss of life-quality, mortality, political coercion and religious extremism) that are undesirable or outright unacceptable. For instance, there are uncanny parallels between many well-documented episodes of extreme and prolonged drought that negatively affected human societies (Kennett *et al.*, 2012; Schwindt *et al.*, 2016; Weiss, 2017) and the recent compound effects of drought on forest fires, air pollution, human health, economy and socio-political instability (Reichstein, Riede and Frank, 2021).

Session 7a and 7b – 1am and 4pm

‘Climate Justice’

Breakout Room One and Five

Ethics, International Property and Terms of Engagement

This drew from the need to consider an encompassing view of heritage that draws from both the fields of Heritage Studies and heritage management. The archive of Local and Indigenous knowledge and practice offers many potential solutions, but raises key questions around ethics, intellectual property, and terms of engagement. Climate change itself needs to be understood as an historically situated phenomenon that has involved and implicated populations and territories differently, especially across the Global North/ Global South divide. Recognizing this, it becomes imperative to foreground a climate justice perspective in the search for solutions.

Discussion Prompters

- How, why and in relation to what kinds of social processes and power to be regarded as heritage, to be worthy of protection, and transmission to subsequent generations
- What is purposely altered in ways that do not privilege groups or perpetuate inequalities?
- Implementing infrastructural, institutional, and ecosystem-based solutions: does it demonstrate how different knowledge systems privilege certain solutions? Every sustainability pathway involves trade-offs for certain people.

Breakout Room Two and Six

Understanding the scope and scale of loss and damage

A common theme throughout the meeting, and again reflected in this question/theme is the notion one thing not found in IPCC reports are ways of differently conceiving of loss itself. A new view of heritage, serving society in times of rapid climate change, embraces loss, alternative forms of knowledge and uncertain futures. ‘Such uncertainty provides a space for creativity ... [This] is not a fatalist sense of acceptance or a call to ‘do nothing’. Indeed, the threat we perceive is an approach that seeks to ‘mitigate’ without challenging the essentialist notions of stability that lie behind so many dreams of sustaining the status quo.’ (Harvey and Perry, 2016 pp. 4, 14, 271). Comparable conceptions of creatively embracing loss and change are put forward by other scholars (e.g. DeSilvey, 2012; DeSilvey, 2017; DeSilvey & Harrison, 2020; Rico, 2020; Venture, DeSilvey, Onciul, & Fluck, 2021). Holtorf (2018) argues that “cultural resilience, risk preparedness, post-disaster recovery and mutual understanding between people will be best enhanced by an increased ability to accept loss and transformation” (p. 639). Similar notions are also found in more heritage management-focused literature.

Discussion Prompters

- Loss of cultural heritage, including Indigenous knowledge - "threatened by acculturation, dispossession of land rights and land grabbing, rapid environmental changes, colonisation

and social change" is taken as being synonymous with a diminution of communities' ability to respond effectively to climate change related changes

- Understanding climate change as a cultural phenomenon (Ghosh 2017)
- Heritage and place attachment make places and ecosystems, and buildings non-substitutable and irreplaceable, meaning that their loss is truly a loss

Breakout Room Three

Giving a voice to Marginalised Communities

The methods we choose to assess vulnerability and adaptation outcomes hold power and inform adaptation funding and prioritisation, making and unmaking peoples' agency in the process (Singh *et al.*, 2019, 2021). Linked to this is the inequity in knowledge production for climate action. Climate change research replicates existing unequal and often extractive knowledge hierarchies based on geography, gender, race and ethnicity, language, and funding (Nagendra *et al.*, 2018; Bronen and Cochran, 2021; Overland *et al.*, 2021; Trisos, Auerbach and Katti, 2021). This question looked at how addressing these asymmetries is a foundational step towards restoration (for those marginalised by histories of exclusion and extraction); inclusion (of multiple knowledge systems beyond the technocratic/ Western/Anglophone); and transformational change (that is forward-looking and fit to meet the challenge of climate change).

Discussion Prompts

- The role of theatre and performance.
- Arts-based research methods have generated insights into the sensory, social and cultural dimensions of climate change invisible to more traditional methods
- Challenging stereotypes
- How to provoke productive discussion and empowerment
- Fighting for recognition, sovereignty (i.e., food), and use of traditional knowledge and practices
- A mutualist rather than exploitative relationship with nature is the key.
- Importance of education
- Focusing on societal change across generations highlights the importance of education
- Implementing infrastructural, institutional, and ecosystem-based solutions: does it demonstrate how different knowledge systems privilege certain solutions? every sustainability pathway involves trade-offs for certain people, which can ameliorate or entrench inequities

Breakout Room Four

Climate Migration or Relocation

Future climates will likely result in (a) threatening declines in agricultural output (Ramankutty *et al.*, 2002), (b) rising needs for costly technological and governance adaptations (Lyon *et al.*, 2021) and (c) large-scale migration (Black *et al.*, 2011). Many past societal transformations entailed demographic and social consequences (migration, loss of life-quality, mortality, political coercion and religious extremism) that need more consideration.

Again, this question follows on from discussion brought out earlier in the meeting, which looked at the impact of climate migration and relocation in terms of impacts on heritage. This looks at it from the angle of solutions, looking at how heritage may provide pockets of security and resilience in the face of these movements, and more broadly the role in particular on intangible heritage allow for communities forging new forms and resilience and paths of adaption within new host communities.

Discussion Prompts

- Does heritage and place attachment make places and ecosystems and buildings non-substitutable and irreplaceable, meaning that their loss is truly a loss?
- Traditional practices eroded when communities are relocated
- Circumstances of inadequate entitlements, rights, and inequality
- Constraints to the transmission of language and knowledge between generations
- Are there instances in which cultural heritage has improved security or reduced stress?
- What are situations in which cultural heritage has been or may be used as a source or focus of stress?
- Aktürk and Merski (2021) have advocated for the resiliency benefits for displaced persons of their ‘intangible heritage’ – songs, ritual, and forms of sociality that would previously have been practiced in lost place-based ‘tangible heritage’ of homes, neighbourhoods and landscapes. Its ‘ephemerality’ and ‘flexibility’, they argue, means that it can help forge new meanings and community in and with new host communities.
- Relocation and maintaining identity and place attachment after relocation

Workshop Attendance Statistics

1am Workshop

Region	
Asia (WMO Region II)	3
South-West Pacific (WMO Region V)	5
TOTAL	8
Expertise	
Climate Change (without previous major focus on culture or heritage)	0
Culture or Heritage	7
Natural Heritage	1
Gender	
Female	6
Male	2
Indigenous/Knowledge Holders	
Total	1

Chair: Pasang Dolma Sherpa

Rapporteurs:

Kate Lim

Yazan Alghouaimi
 Saranya Dharshini
Zoom Coordinator: Nader Alnouri

Participants

Participants	Expertise	Region	Gender
Jon Day	Natural Heritage	South-West Pacific (WMO Region V)	M
Chrissy Grant	Culture or Heritage	South-West Pacific (WMO Region V)	F
Zhang Rouran	Culture or Heritage	Asia (WMO Region II)	M
Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Jeong-eun Kim	Culture or Heritage	Asia (WMO Region II)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Ariadne	Culture or Heritage	South-West Pacific (WMO Region V)	F
Sue Hodges	Culture or Heritage	South-West Pacific (WMO Region V)	F

4pm Workshop

Region	
Africa (WMO Region I)	3
Asia (WMO Region II) - North (Russia, China, Japan)	4
North America, Central American and the Caribbean (WMO Region IV)	6
Europe and Great Britain (WMO Region VI)	15
South America (WMO Region III)	1
TOTAL	29
Expertise	
Climate Change (without previous major focus on culture or heritage)	2
Culture or Heritage	24
Natural Heritage	3
Gender	
Female	20
Male	9
Indigenous/Knowledge Holders	
Total	0

Chair: Sarah Forgeson

Rapporteurs:

Priyanka Panjwani

Süheyla Koç

Gül Aktürk

Yolo Lucio

Saranya Dharshini

Monalisa Maharjan

Zoom Coordinator: Laure Marique

Participants

Participants	Expertise	Region	Gender
Salma Sabour	Natural Heritage	Africa (WMO Region II)	F
Moses Chundu	Culture or Heritage	Africa (WMO Region II)	M
Ibidun Adelekan	Culture or Heritage	Africa (WMO Region II)	F
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Alexey Butorin	Natural Heritage	Asia (WMO Region II)	M
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Aziz Ballouche	Culture or Heritage	Asia (WMO Region II)	M
Cristina Sabboini	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cathy Daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Prof Jane Downes	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorian Fuller	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sarah Sutton (Sarah Sutton)	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
A.R. Siders	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M

Session 8a and 8b – 7am and 6pm Friday

Impacts and Capacity Building

Breakout Room One and Five

Challenges and opportunities of scaling up/scoping out

Taking the lessons learned from previous years, and the ongoing negotiation dynamics of the Paris Agreement, it was possible to scale the results obtained in some protected areas and advance in an ambitious process of political influence. The advocacy work pointed to two processes: 1) the construction of national commitments - NDC - to the Paris Agreement; and 2) the formulation of a new policy for the national system of protected areas, including its management planning systems, and the management effectiveness assessment tools. Therefore, this question looks at this notion of scaling up or scoping out and our need to reflect on instances where solutions have *already* scaled beyond the local.

Discussion Prompts

- Past stories cannot provide straight-forward solutions due to the scale and unprecedented nature of climate change.
- Climate adaptation efforts reported on at present are often piecemeal and fragmented approaches, dealing with partial solutions and approaches to climate adaptation, rather than more full-scale implementation

Breakout Room Two and Six

Empowering people for Climate Action

Every adaptation pathway contains path dependencies and inherent trade-offs, which can ameliorate or entrench inequities (Burnham et al., 2013; Forsyth, 2014; Gajjar, Singh and Deshpande, 2019). The climate justice literature argues that poor attention to distributional, procedural, and recognitional justice; and inadequate mechanisms to address knowledge and funding asymmetries can lead to potentially maladaptive solutions (Magnan, Schipper and Duvat, 2020; Malloy and Ashcraft, 2020; Schipper, 2020; Byskov et al., 2021). Thus, adaptation planners must acknowledge how certain development trajectories and climate solutions acquire dominance, and then empower normative alternatives that are more inclusive. Therefore this question looks at how in practice this means that when reading and encountering different solutions and visions of our cities and neighbourhoods, homes, and research institutions, we need to ask: Whose vision is this? Who is getting excluded? And how can we pluralize this dialogue?

Discussion Prompts

- Decision-making is strongly linked to socio-cultural dynamics and socio-processes
- What is known regarding the capacity for cultural and natural heritage sites to act as resources for physical and/or tools for psychological resilience during and after disasters or conflicts
- What is known regarding how tangible/intangible heritage, cultural institutions and cultural actors have inspired individual and collective climate action?
- Importance of education
- Climate action is not a scientific problem
- Focusing on societal change across generations highlights the importance of education
- What is purposely altered in ways that do not privilege groups or perpetuate inequalities?
- Implementing infrastructural, institutional, and ecosystem-based solutions: does it demonstrate how different knowledge systems privilege certain solutions? Every sustainability pathway involves trade-offs for certain people.

Breakout Room Three

Rethinking heritage, climate, and policy frameworks

This question was built of the pressing need to revise and rethink some of the grand narratives through which histories of modernity are taught. Narratives around industrialization, modernization, progress, and development need to be revised to take account of the social and environmental costs of such developments over the last 500-years and more. Many commentators have argued that discussions of climate change should not be left to climate scientists alone. The ramifying effects of climate change will affect every aspect of human endeavour. Curricula in the Arts, literature and philosophy need to be rethought, as much as those in Engineering and the Sciences. Attention might turn not only to *what* we teach, but *how* we teach. Arguably, distanced, and dispassionate approaches to knowledge, premised on an essential distance between subject and object, are part of the core problem of climate change – a problem in which we become passive bystanders to a catastrophe. Arguably too, the “white cube” of the seminar room is not the best environment through which to evolve more personally and materially implicated understandings of the world. Conversations might be had around “ways of knowing”: around those moments when a distant and objective approach to knowledge serves us well, and the moments when we need a more intimate, subjective, and “feeling” approach. Equally, conversations might focus on the relationship between science, knowledge, and wisdom. Are there forms of knowledge and wisdom that do not grow out of empirically-based scientific methods, but out of other sources – for example, experience? And does this help us to rethink the conventional distinction between science, local knowledge, and Indigenous Knowledge Systems?

Revising our understanding of culture and heritage accordingly has several implications. First, it suggests that the debate on heritage and climate change might pivot, from heritage as a source of resilience, to heritage as a source of adaptation. We might ask what new forms of heritage are currently in emergence, and what forms of heritage do we need to potentially transform due to the Anthropocene. Second, we need to evolve methodologies able to account for the complexity of motivations and responses in particular, local settings.

Discussion Prompters

- Challenges and barriers to implementation remain - lack of resources for what are often expensive interventions, the need to balance heritage values, cost effectiveness, durability and environmental concerns, the question of who decides such values, and restrictive policy frameworks
- Adjusting planning instruments and the measurement of management effectiveness
- Prioritise rather than prevent?
- Where have major definitions of heritage been made and how do these intersect with attention to (or lack of) climate impacts and responses?

Breakout Room Four

Collaborative solutions, education, and literacies

Focusing on societal change across generations highlights the importance of education. As we exit the Holocene and enter the Anthropocene, we need to revisit curricula, and consider the kind of education that will be useful and relevant to future generations. In an immediate way, there is a need for “Anthropocene literacies”, an understanding of core concepts and basic scientific processes connected to researching the climate emergency (like tipping points, planetary boundaries, and the notion of “the Anthropocene” itself). Such literacies become important for active, informed citizenship, and for bringing to bear the kinds of public, political pressures that translate into policy changes. Values and worldviews are in part constructed with stories of our pasts in mind. Bringing the “archives of nature” and the “archives of society” together, we can tell empirically-grounded stories of past resilience and impact and, on this basis, tell similar stories of the future. Such evidence-based story-lining will boost the societal relevance of climate change science across different publics (e.g., Bloomfield and Manktelow, 2021), while also cultivating forms of “deep-time climate literacy” that would, in turn, impact personal and political decision-making. Here, formal and informal education in classrooms (Riede *et al.*, 2016; Leichenko and O’Brien, 2020) and museums act as interfaces between the scientific community and the public at large, with the potential to catalyse climate action and support sustainable development (Cameron, Hodge and Salazar, 2013; Rees, 2017).

Therefore, this question looked at how revising our understanding of culture and heritage accordingly has several implications. First, it suggests that the debate on heritage and climate change might pivot, from heritage as a source of resilience, to heritage as a source of adaptation. We might ask what new forms of heritage are currently in emergence, and what forms of heritage do we need to potentially transform due to the Anthropocene. Second, we need to evolve methodologies able to account for the complexity of motivations and responses in particular, local settings.

Discussion Prompters

- Governance speaks to the management of scientific and climate-relevant information and creation and maintenance of collaborative frameworks. What examples are there of where this has productively and effectively linked nature and culture approaches?
- How can we proactively think of climate adaptation rather than focus on vulnerability?
- What literacies are needed for public/political pressures that translate to policy change?

- Are some types of heritage sites better able to engage with mitigation and adaptation actions than others?

Workshop Attendance Statistics

7am Workshop

Region	
Africa (WMO Region I)	2
Asia (WMO Region II)	4
Europe and Great Britain (WMO Region VI)	11
South America (WMO Region III)	1
South-West Pacific (WMO Region V)	3
TOTAL	21
Expertise	
Climate Change (without previous major focus on culture or heritage)	1
Culture or Heritage	18
Natural Heritage	2
Gender	
Female	15
Male	6
Indigenous/Knowledge Holders	
Total	2

Chair: Will Megarry

Rapporteurs:

Oliver Sukrow

Priyanka Panjwani

Olufemi Adetunji

Nityaa Lakshimi Iyer

Zoom Coordinator: Angelique Ploteau

Participants

Participants	Expertise	Region	Gender
Salma Sabour	Natural Heritage	Africa (WMO Region 1)	F
Nick Simpson	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region 1)	M
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Jiyoung Kim	Culture or Heritage	Asia (WMO Region II)	F
Poonam Verma	Culture or Heritage	Asia (WMO Region II)	F
May Cassar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Nick Shepherd	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M

Prof Jane Downes	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	
Sue Hodges	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Scott Allan Orr	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Jon Day	Natural Heritage	South-West Pacific (WMO Region V)	M
Helen McCracken	Culture or Heritage	South-West Pacific (WMO Region V)	F
Chrissy Grant	Culture or Heritage	South-West Pacific (WMO Region V)	F
Rosario Carmona	Culture or Heritage	South America (WMO Region III)	F

6pm Workshop

Region	
Africa (WMO Region I)	1
Asia (WMO Region II)	2
North America, Central American and the Caribbean (WMO Region IV)	6
Europe and Great Britain (WMO Region VI)	7
TOTAL	16
Expertise	
Climate Change (without previous major focus on culture or heritage)	1
Culture or Heritage	13
Natural Heritage	2
Gender	
Female	10
Male	6
Indigenous/Knowledge Holders	
Total	0

Chair: Hana Morel

Rapporteurs:

Laure Marique

Yazan Alghounaimi

Azad Thapa

Stacy Vallis

Priyanka Panjwani

Gül Aktürk

Zoom Coordinator: Nader Alnouri

Participants

Participants	Expertise	Region	Gender
Moses Chundu	Culture or Heritage	Africa (WMO Region I)	M
Salah El-Ekhfifi	Natural Heritage	Asia (WMO Region II) - South (Middle East, Indian subcontinent, SE Asia)	M
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II) - South (Middle East, Indian subcontinent, SE Asia)	F
Jon Kohl	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Christophe Rivet	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Joanne Clarke	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F

Session 9 – 2:15pm Friday

The Power of Heritage in Climate Thinking

Breakout Room One and Four

Constructing Narrative for Resilience

We need to evolve narratives, frameworks and images that enable us to imagine viable futures in the context of anthropogenic climate change. The power of arts-based approaches lies in producing work that appeals on an intellectual, emotional, and affective level, and that produces resonance, believability, and hope. Arguably, in seeking solutions we need to set in play a new

vocabulary of dreams, aspirations, hopes and fears. Far from being abstract or empty concepts, these are drivers of human behaviour, and will determine our ability to adapt and change.

This topic engaged with the notion that in order to work towards viable futures, we need, first, to imagine them into being. Arguably, we stand at a precarious point in human history where, for many, the grand narratives of the twentieth century – nationalism, modernization, communism, capitalism – have been called into question, but have yet to be replaced by compelling alternatives.

Discussion Prompters

- Constructing collective post-disaster narratives can create a recollection which is less likely to produce the same anxiety and allows individuals to incorporate disaster events into personal and community history
- Collections of photographs
- How to proactively think of climate adaptation rather than focus on vulnerability
- How to mobilise the affective power of heritage in support of open, creative, and inclusive futures.

Breakout Room Two and Five

How to learn from the past?

Learning from the past requires asking questions of it. Therefore this questions looks at how assessment is needed of questions that climate science, adaptation, and mitigation communities have for and about the human past and concepts of human behaviour and society.

Discussion Prompters

- Human communities can be highly resilient to rapid climate change, but also that the pace of change and the inertia inherent in many cultural systems may constrain adaptability to such a degree that major societal stress can result.
- Critically, many past societal transformations entailed demographic and social consequences (migration, loss of life-quality, mortality, political coercion, and religious extremism) which need to be considered.
- Deep past “archives of society” provide warnings about the risks associated with rapid climate change as well as pointers as to how to be able to adapt to them
- How to learn from the past? Can we?
- Use of data and knowledge from the past in climate models and policy
- Finding common ground between climate and heritage approaches to research questions
- What is the balance of current and needed methods for translating insights from centuries or millennia of human-environment experiences into meaningful approaches to contemporary climate science and response?"
- Learning from the past requires asking questions of it: How well do questions that climate science, adaptation, and mitigation communities have for and about the human past, and the nature of human behaviour and society, align with questions that researchers who focus on the past ask about these topics?

Breakout Room Three and Six

Culture and Heritage intersections with mitigation

This topic looked at mitigation which includes measures such as energy efficiency, considerations of embodied carbon, carbon sequestration, carbon reduction and the move towards renewable energy. Culture and heritage intersect with mitigation measures through the built environment and exploring the possibilities of retrofitting and adaptive reuse; understanding sources of embodied carbon; nature or culture-based solutions for carbon sequestration and carbon reduction; and what moving towards renewable energy sources might look like. Despite some appropriate technological being available, there are challenges and barriers to implementation that remain. These include lack of resources for what are often expensive interventions (Bosone et al., 2021), the need to balance heritage values, cost effectiveness, durability, and environmental concerns (Garzulino, 2020), the question of who decides such values (Lidelöw, Örn, Luciani, & Rizzo, 2019), and restrictive policy frameworks (Jahed et al., 2020). They also include socio-cultural or value-based barriers.

Discussion Prompters

- What roles culture and heritage have in decarbonisation and mitigation?
- Alternative ways of living and emphasis on non-material measures of wellbeing
- Green creative economies
- Adaptive reuse of the historic built environment that avoids the carbon costs of new construction, and vernacular architecture's support towards energy efficiency.
- Implementing infrastructural, institutional, and ecosystem-based solutions: does it demonstrate how different knowledge systems privilege certain solutions? Every sustainability pathway involves trade-offs for certain people.

Workshop Attendance Statistics

Region	
Africa (WMO Region I)	2
Asia (WMO Region II)	8
Europe and Great Britain (WMO Region VI)	22
North America, Central American and the Caribbean (WMO Region IV)	10
South America (WMO Region III)	2
TOTAL	44
Expertise	
Climate Change (without previous major focus on culture or heritage)	6
Culture or Heritage	34
Natural Heritage	4
Gender	
Female	29
Male	15
Indigenous/Knowledge Holders	
Total	1

Chair: May Cassar

Rapporteurs:

Süheyla Koç

Yolo Lucio

Priyanka Panjwani

Gül Aktürk

Monalisa Maharjan

Saranya Dharshini

Zoom Coordinator: Silvia Coraiola

Participants

Participants	Expertise	Region	Gender
Debra Roberts	Climate Change (without previous major focus on culture or heritage)	Africa (WMO Region I)	F
Chiara Bertolin	Climate Change (without previous major focus on culture or heritage)	Europe and Great Britain (WMO Region VI)	F
Melinda Tignor	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Brenda Ekwurzel	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Deborah Coen	Climate Change (without previous major focus on culture or heritage)	North America, Central American and the Caribbean (WMO Region IV)	F
Dulma Karunarathna	Culture or Heritage	Asia (WMO Region II)	F
Poonam Verma	Culture or Heritage	Asia (WMO Region II)	F
Kin Ip	Culture or Heritage	Asia (WMO Region II)	F
Jeong-eun Kim	Culture or Heritage	Asia (WMO Region II)	F
Jyoti Hosagrahar	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Cristina Sabboini	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
cathy daly	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Victoria Reyes García	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Heather Viles	Culture or Heritage	Europe and Great Britain (WMO Region VI)	
Nathalie Vernimme	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Alexandra Troi	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dorothee Boesler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Johanna Leissner	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Hannah Fluck	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Prof Jane Downes	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Franziska Haas	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Dr Mechtild Rössler	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F

Cecilie Smith-Christensen	Culture or Heritage	Europe and Great Britain (WMO Region VI)	F
Sarah Sutton	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Lori Ferriss	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Elizabeth Brabec	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	F
Rosario Carmona	Culture or Heritage	South America (WMO Region III)	F
Salma Sabour	Natural Heritage	Africa (WMO Region I)	F
Sandeep Sengupta	Climate Change (without previous major focus on culture or heritage)	Asia (WMO Region II)	M
Akifumi Iwabuchi	Culture or Heritage	Asia (WMO Region II)	M
Kh Mahfuz ud Darain	Culture or Heritage	Asia (WMO Region II)	M
Oliver Martin	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Cornelius Holtorf	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Nick Shepherd	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Scott Allan Orr	Culture or Heritage	Europe and Great Britain (WMO Region VI)	M
Chris Marrion	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Max Friesen	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Ben Orlove	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Christophe Rivet	Culture or Heritage	North America, Central American and the Caribbean (WMO Region IV)	M
Chris Underwood	Culture or Heritage	South America (WMO Region III)	M
Salah El-Ekhfifi	Natural Heritage	Asia (WMO Region II)	M
Richard Veillon	Natural Heritage	Europe and Great Britain (WMO Region VI)	M
Jordi Pascual	Natural Heritage	Europe and Great Britain (WMO Region VI)	M

Panel Discussion – Friday 1pm – Solutions

Panellists:

Adradne Gorrington
Robin Coningham
Samir Abdulac
Rohit Jigyasu
Chandni Singh

Chair: Debra Roberts

Summary:

The ICSM CHC Panel Discussion ‘Roles of culture and heritage in transformative change and alternative sustainable futures’, held on Friday 10 December, was Chaired by IPCC Co-Chair Debra Roberts with panellists Robin Cunningham, Rohit Jigyasu, Samir Abdullah, Ariadne Goring and Chandni Singh.

The discussion focused on the potential to interpret different kinds of knowledge and experiences that are available to us from culture and heritage, so that we can better respond to the challenge of anthropogenic climate change. Debra kicks off the discussion by highlighting the relevance of enhancing our understanding of culture and heritage, and how it might be an untapped source of vital information for the IPCC moving forward. Jyoti Hosagrahar presented next, outlining a range of ongoing contributions across the world that inform adaptation strategies for climate action. She also highlighted culture as a bridge between global ambitions and locally adapted solutions at the regional and national and community level, and called for synergies between culture and other policy areas for more comprehensive and effective policy action.

William Megarry followed, raising the need to be more critical about culture and its wider role in the climate crisis, and the reality of living in a carbon era for hundreds of years following the Industrial Revolution, with many of our traditions, cultures and beliefs deeply entangled with carbon-reliant practices. He pointed out that while culture may have played a role in the current situation it also has a key role in addressing it.

Following the above brief comments from the ICSM CHC Co-Chairs, the discussion turned to the panellists. Robin Coningham noted how we are ‘straddling disciplines as well as different knowledge systems’, and how researching the past allows us to observe interdependencies between cultures, communities and civilizations, but also provide the opportunity to look at a ‘very deep and rich and slightly contested past at times’. Samir Abdullah turned to the nuances of the past, and the importance to ‘safeguard existing settlements as living examples of how to adapt to a climate.’ He also brought up the critical point of supporting the sustainability of skills and knowledge in people who carry vital information and can provide and implement their relevant expertise towards adaptive measures. Rohit Jigyasu continued with a fundamental point, that it is not about just taking lessons from the past but rather ensuring that knowledge can be made relevant today. He added that governance is also central to the mobilization of power of culture. Ariadne Gorrington followed with a powerful message on colonisation and how to move forward, advocating that ‘when we get the policy in the legal settings and frameworks right we can actually really start to unlock some amazing solutions, and that we need to be creative and be rethinking

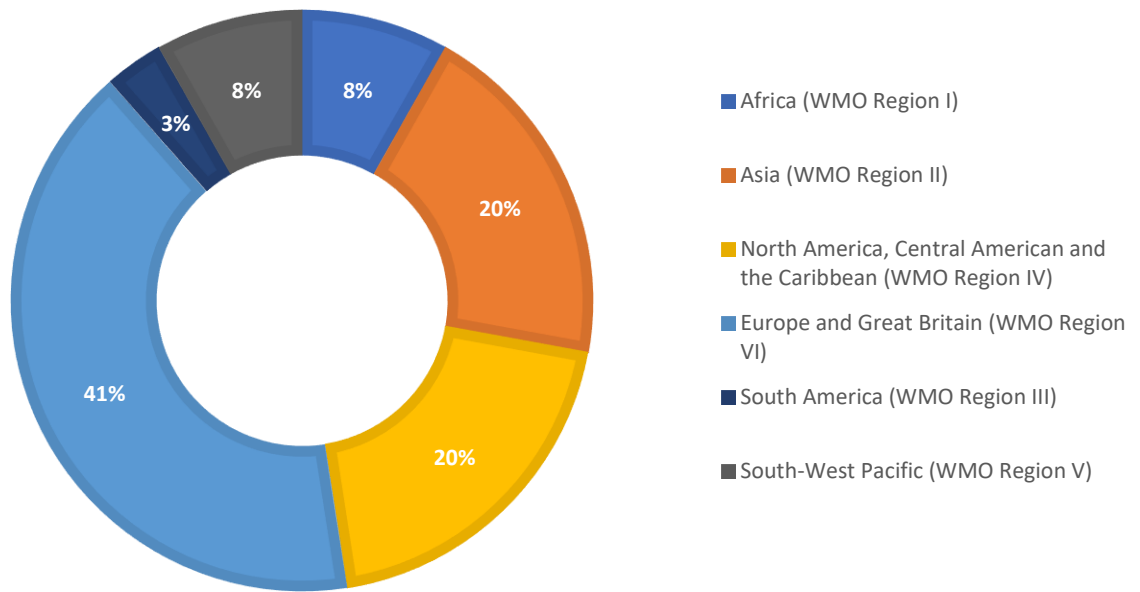
how we co-design and how we bring together our community and government and scientists to be learning while doing’. Lastly, Chandni Singh brought the discussion back to basics, reminding us that ‘culture is dynamic and that people’s ideas, what they want from their life, their assets, their aspirations’, and so on, change. These behavioural cultures also affect the kind of solutions that people are willing to invest in.

Debra Roberts closed the discussion, echoing that ‘where people are coming from sharply determines where people go so just an eye to histories of people and that of course leads us to understanding that there's certain parts of the world that are underprivileged and marginalized because of their histories’, which is central ‘when we think about solutions for the future’. There was also a powerful message to join conversations ‘with humility to recognize that the knowledge systems that we are wedded to of course are important and they hold certain meaning but to just come in with humility to understand that another discipline or another way of meaning making in the world also holds value and meaning’.

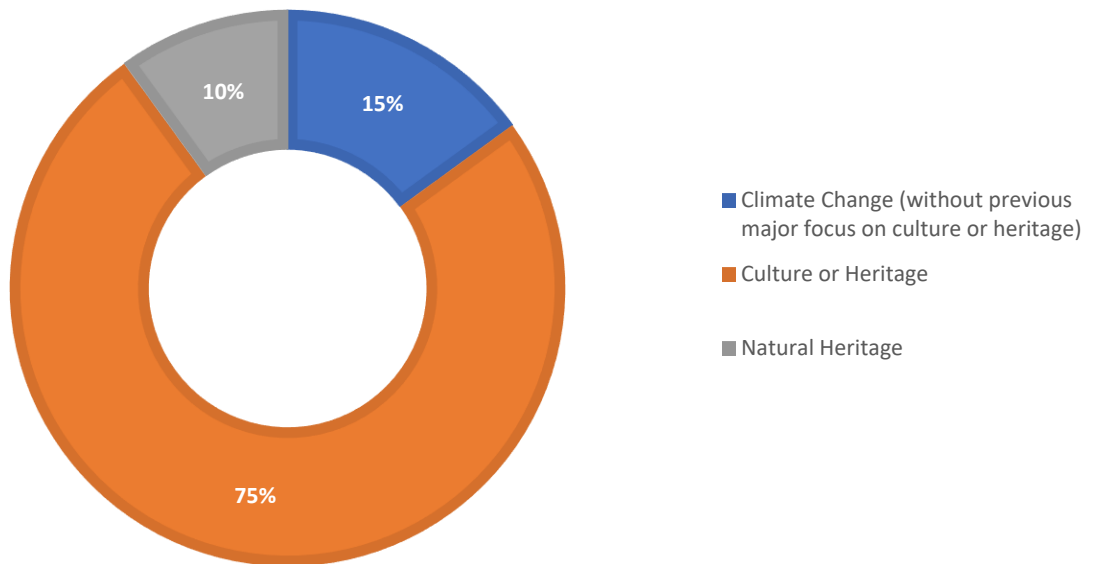
Overall Attendance – Solutions

TOTAL ATTENDEES FOR SOLUTIONS WORKSHOPS	
61	
Region	
Africa (WMO Region I)	5
Asia (WMO Region II)	12
North America, Central American and the Caribbean (WMO Region IV)	12
Europe and Great Britain (WMO Region VI)	25
South America (WMO Region III)	2
South-West Pacific (WMO Region V)	5
TOTAL	61
Expertise	
Climate Change (without previous major focus on culture or heritage)	9
Culture or Heritage	45
Natural Heritage	6
Indigenous/Knowledge Holders	3
Gender	
Female	38
Male	23

REGIONS REPRESENTED AT SOLUTIONS WORKSHOPS

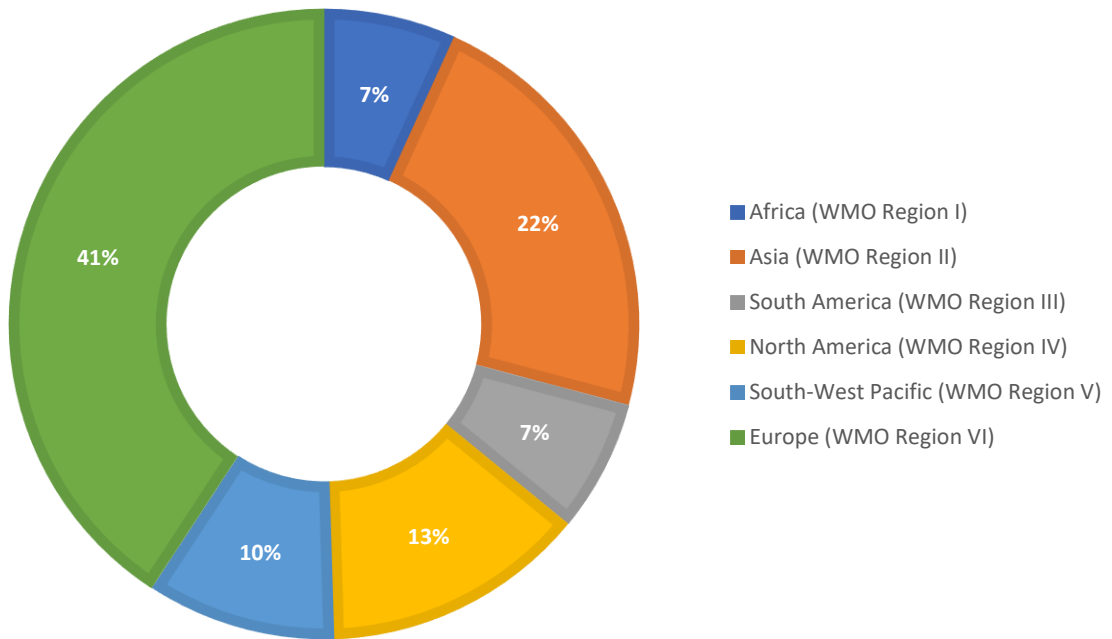


EXPERTISE REPRESENTED AT SOLUTIONS WORKSHOP



TOTAL PARTICIPANTS IN ATTENDANCE	
Region	
Africa (WMO Region I)	7
Asia (WMO Region II)	23
South America (WMO Region III)	7
North America (WMO Region IV)	14
South-West Pacific (WMO Region V)	10
Europe (WMO Region VI)	42
TOTAL	103
Expertise	
Climate Change (without previous major focus on culture or heritage)	17
Culture or Heritage	79
Natural Heritage	7
Indigenous/Knowledge Holders	
	4
Gender	
Female	65
Male	38

OVERALL ATTENDANCE BY REGION



OVERALL ATTENDANCE BY GENDER

