

Journal of
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and Sustainable Development**

The Climate-Culture Story: Community-led
Integrated Strategies for Heritage Safeguard,
Climate action, Disaster Risk Reduction and
Peacebuilding

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Guest editorial: Climate-culture stories of the Net Zero Project

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Declaring a “code red for humanity”, the Sixth Assessment Report (2021) of the Intergovernmental Panel on Climate Change (IPCC) warns that the impacts of climate change are widespread and intensifying (IPCC, 2021). These impacts may render significant portions of our planet unliveable, with wet regions becoming even wetter and dry areas becoming hotter and drier. Rising sea levels pose a severe threat to communities living in low lying and coastal areas, impacting some more severely than others. Historical cities such as Alexandria and Venice face the risk of extinction, while a severe shortage of food and freshwater resources due to cyclic floods and droughts will threaten lives, livelihoods and living cultures in various parts of the world.

The [Global Assessment Report on Disaster Risk Reduction, 2023 \(United Nations Office for Disaster Risk Reduction, 2023\)](#) further accentuates the complexity of the situation, highlighting the emergence of compound risk events or “poly-crisis,” wherein bio-climatic hazard events interact with other threats such as conflicts, financial crisis or epidemics to cause large-scale destruction.

It is essential to acknowledge that climate change is more than just an environmental issue; it is a multifaceted crisis, rooted in historical inequalities, unsustainable exploitation of natural resources, and an associated culture of overconsumption often dating back to colonial times. Consequently, culture and heritage have an important role in addressing the climate crisis, offering insights and solutions that extend beyond traditional environmental conservation approaches.

By closely analysing the life ways and traditional practices of Indigenous communities living in some of the last biodiverse regions, we can discover innovative solutions for preserving eco-systems, managing natural resources, and adapting to a changing climate. Through their worldviews and heritage, we can better understand the interdependencies between human climate and human cultures.

Paradoxically, Indigenous peoples and traditional knowledge bearers, such as artisans, farmers, pastoralists and fishing communities, find themselves disproportionately vulnerable to the impacts of climate change. Despite their deep-rooted commitment to living in harmony with nature and giving back to the environment rather than simply taking from it, these communities face heightened susceptibility to the effects of global warming and environmental degradation due to multiple factors including their dependence on natural resources, continued marginalisation as well as globalisation.

Thus, addressing social inequality and preserving the living heritage of the Indigenous and knowledge bearing communities most impacted by the climate crisis, are crucial components of global efforts to tackle climate change.

To document Indigenous and traditional knowledge, as well as practices, ICCROM launched Net Zero: Heritage for Climate Action (ICCROM, n.d.), a thirty month pioneering capacity development project generously supported by the Swedish Postcode Foundation.

Conceived within the framework of ICCROM’s FAR (First Aid and Resilience for Cultural Heritage in Times of Crisis) programme, the Net Zero: Heritage for Climate Action project was aimed at building a globally applicable foundation for assessing climate-related risks to



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heritage and people, as well as leveraging Indigenous and traditional knowledge to develop integrated strategies for heritage safeguarding, climate action, disaster risk reduction and peacebuilding.

Embracing a people-centred approach that emphasises the interconnectedness of climate and culture, the Net Zero Project teams actively engaged Indigenous and local communities – the old city dwellers and keepers of water bodies in Jodhpur, India; the Bakonzo in Kasese, Uganda; the Quilombolas in Ubatuba, Brazil; the fishermen and farmers of Rashid, Egypt; the Taya practitioners of Tuti Island, Sudan – to enhance their disaster resilience and coping capacities, while addressing the cross-cutting issues of heritage protection, decarbonisation, upholding cultural rights and promoting sustainable development of vulnerable population groups.

This special edition of the *Journal of Cultural Heritage Management and Sustainable Development* features summaries of case studies from the five ‘innovation sites’ of the Net Zero Project. Supported by robust research, these case studies clearly illustrate that by cross-linking place specific Indigenous knowledge, as well as lived experiences of local communities, with climate and disaster sciences, we can develop innovative and joint strategies for disaster risk reduction and climate action.

In Jodhpur, India, a culture-based heat action plan has been developed by incorporating traditional knowledge to cope with extreme heat events. In Kasese, Uganda, flood risk mitigation is achieved through the planting of native species. In Al Rashid, Egypt, traditional knowledge was used to develop an early warning system for storms and floods. While in Ubatuba, Brazil, seed banks have been set up to enhance food security. Finally at Tuti Island in Sudan, *Taya*, a traditional community led system for flood risk management, has been documented and disseminated online with the aim to reduce the risk of flood related disasters and enhance community’s resilience amidst the ongoing conflict.

The centrepiece of the publication is the story from Australia of Martuwarra and its people, narrated by Dr Anne Poelina which underscores the interconnectedness of people, place, culture and nature. It makes a case for using the learnings from Indigenous world view to “move away from I to we and develop and inclusive culture of care” to tackle the climate crisis.

To explain how climate change is increasing disaster risk an invited paper from Sanjaya Bhatia, an area expert, complements the climate-culture case studies of the Net Zero Project of ICCROM.

Aparna Tandon

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First Law a gift to healing and transforming climate and just us!

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Abstract

Purpose – These words of introduction locate me on my tribal ancestral lands, and centres me as belonging to the Martuwarra, Fitzroy River in the Kimberley region of Western Australia. My family and community's inter-generational lived experiences of colonisation are grounded in the characteristics and learnings of "conflict, manipulation, divide and rule" as invasive unjust strategies of oppression and anti-dialogic action. These characteristics of oppression reflect invasive and unjust developments, colonialism continues to impact on our daily lives and threaten our cultural heritage, lifeways and livelihoods (Freire, 2005).

Design/methodology/approach – I understand the Net Zero: Heritage for Climate Action is a first of its kind, a capacity development project that aims to use Indigenous knowledge to develop integrated strategies for disaster risk reduction, climate action and peacebuilding (Jarillo and Crivelli, 2024). Importantly, one of the aims of the Net Zero Project is to enhance risk reduction and coping capacities of vulnerable heritage communities. In this way, my video story speaking directly to the International Union for the Conservation of Nature (IUCN) highlights the interconnected issue of heritage safeguard, upholding cultural rights and sustainable development of our people who are vulnerable cultural bearers, importantly, how we are working to effect change locally, while strengthening efforts globally, as we see ourselves as planetary citizens with a duty of care to Mother Earth and humanity (Redvers *et al.*, 2020).

Findings – The opportunity for freedom is being created through the growing coalitions of hope (Poelina, 2020). Organisations with a regenerative focus are connecting, networking, collectively thinking and transforming our world by being brave and challenging legal systems to recognise "rivers" as the lifeblood of our planet and our survival co-dependent on "a declaration of peace with Indigenous Australians with nature laws and first law" (RiverOfLife *et al.*, 2024). Together we are decolonising our thinking; uniting and bringing together a pluriverse of ideas and actions to right size our planet and give humanity and Mother Earth a climate chance (RiverOfLife *et al.*, 2024).

Research limitations/implications – The final question, I ask my country and the world to sustain my culture, my home, my lifeways and my livelihood "can we achieve peace, harmony and balance"? Can we shift from business as usual, to the new economies, through intentional communities, through bicultural and bioregional planning and development? If the answer is yes, then there is hope for humanity, and the young ones yet to be born. Let us adopt the values, ethics and virtues found in First Law as a gift to healing our lands, our people and climate.

Practical implications – It is clear from the voices of Yi-Martuwarra people, "If [our] River Dies, We Die" (Moore *et al.*, 2023). When we stand united, we hold the dreaming time, from past, present and future, and we sing together a new "Martuwarra River Time" song. Through this moral and ethical partnership of hope the Net Zero Project Heritage for Climate Action ignites the opportunity to transform climate change, climate chaos and provide the climate chance through just us!

Social implications – Yi-Martuwarra people highlight the need for dialogue, unity, cooperation and multiple forms of evidence, to understand the cumulative impacts of development. It is clear from the voices of Yi-Martuwarra people, "If [our] River Dies, We Die" (Moore *et al.*, 2023). When we stand united, we hold the dreaming time, from past, present, and future, and we sing together a new "Martuwarra River Time" song. Through this moral and ethical partnership of hope the Net Zero Project Heritage for Climate Action



ignites the opportunity to transform climate change, climate chaos and provide the climate chance through just us!

Originality/value – As the impacts of climate change continue to intensify, it is imperative to centre Indigenous well-being in adaptation efforts by enabling bottom-up approaches via community-led solutions, promoting land rights, protecting traditional heritage and cultural practices and cultivating social connections. Given the increasing recognition of well-being as a fundamental marker of successful adaptation, it should be central to climate change research and policymaking, but for this to be of benefit to Indigenous Peoples and local communities context-specific understandings of health and well-being are necessary (Jarillo and Crivelli, 2024).

Keywords Climate change, Indigenous wisdom, Well-being, Peace

Paper type Research paper

Introduction

This introduction through place locates me as the storyteller across deep time. *Jaiyda Boorroo, Nyikina, Ngayoo yimardoowarra marnin*. Welcome to Nyikina Country, I am a woman who belongs to the Martuwarra, named Fitzroy River by early European settlers of what is now Australia. These words of introduction locate me on my tribal ancestral lands, and centres me as *belonging to* the Martuwarra, Fitzroy River in the Kimberley region of Western Australia. My family and community's inter-generational lived experiences of colonisation are grounded in the characteristics and learnings of "conflict, manipulation, dived and rule" as invasive unjust strategies of oppression and anti-dialogic action. These characteristics of oppression reflect invasive and unjust developments, colonialism continues to impact on our daily lives and threaten our cultural heritage, lifeways and livelihoods (Freire, 2005). Now more than ever, in the face of climate change, I have focussed on "cooperation, unity, organisation" as the strategies of dialogic action for our peoples' dreams for freedom and hope (Poelina, 2020). This decolonising approach calls for the raising of consciousness as critical to understanding and acting against the colonised world which we have inherited. In turn our people believe and hold the right to be "free" by engaging in dialogue and a transformative action for change (Freire, 2005).

I understand the Net Zero: Heritage for Climate Action is a first of its kind, a capacity development project that aims to use Indigenous knowledge to develop integrated strategies for disaster risk reduction, climate action and peacebuilding (Jarillo and Crivelli, 2024). Importantly, one of the aims of the Net Zero Project is to enhance risk reduction and coping capacities of vulnerable heritage communities. In this way, my video story speaking directly to the International Union for the Conservation of Nature (IUCN) highlights the interconnected issue of heritage safeguard, upholding cultural rights and sustainable development of our people who are vulnerable cultural bearers [1]. Importantly, how we are working to effect change locally, while strengthening efforts globally, as we see ourselves as planetary citizens with a duty of care to Mother Earth and humanity (Redvers *et al.*, 2020).

My story defines First Law, Indigenous jurisprudence, as one part of the collective wisdom necessary to balance the planet away from extinction and protect our heritage through climate action. Together in a law of relationships between human and more-than-human beings, Indigenous people believe we can all take these learning of First Law to reframe legal regimes and an ethics of care, from individualism back to communityism, from the "I to the We"; by emphasising the interconnectedness of people, culture, nature and our well-being (Sangha *et al.*, 2024). I share examples of Indigenous knowledge and practices for resource use and demonstrate how such wisdom can be used to develop integrated strategies to reduce the risk of disasters, adapt to climate change and reduce greenhouse gases (Poelina *et al.*, 2023). The challenge is to take the gift of First Law offered by Australia's original peoples as a way of knowing to not only address planetary collapse but to consider healing and transforming must begin with "Just Us" (RiverOfLife *et al.*, 2024).

Martuwarra story and people

First Law is earth centred. Its objective is to maintain the balance, sustainable lifeways and sustainability of all life. First Law, philosophy, values and ethics have shaped our Indigenous worldview in the Kimberley, Western Australia, and in turn our actions and lived experiences, particularly our relationship with Country, living waters and our more-than-human kin. First Law focusses on building the individual to self-regulation through spiritual Law that informs moral, ethics, values, behaviour and connection. It is a framework for understanding the central role of water in all things, and its relationships to everything else. First Law and the interdependence of all things are necessary principles for building a hopeful future living with climate change, based on peace and justice (RiverOfLife *et al.*, 2024).

First Law underpins Yi-Martuwarra people's approach to justice. As one society, Yi-Martuwarra people, people who belong to the Martuwarra, Fitzroy River believe they have a legal and moral obligation – a responsibility-to maintain living waters, to prevent ecocide and the genocide (RiverOfLife *et al.*, 2023).

As Yi-Martuwarra people we come from a culture of oral history and storytelling through mixed methods of song, dance, paintings, carvings and message sticks. Today in modernity we are using multi-media, plays and films. In this story I include the voices and feelings of our people to convey the meaning of our stories. We share how we live in a time of this Anthropocene where the attempts of humans to dominate and control the natural environment through technological and economic advancement have altered earth systems. There is a strong international consciousness that human activity has induced climate change which is quickly spiralling into *climate chaos* (RiverOfLife *et al.*, 2024). As we move into 2024, the world earth systems are facing unprecedented risks that are pushing the planetary boundaries towards ultimate collapse. The intergovernmental partnership on climate change (Intergovernmental Panel on Climate Change, 2022) report contextualises the transformative changes needed to overcome the societal, economic, legal challenges and biodiversity threats associated with climate change.

Our co-existence and life and ability to adapt and be resilient in the face of climate change and growing uncertainty is totally reliant on our "River of Life". It is as real as "If the River dies", "we die", as told by Yi-Martuwarra people:

The Mardoowarra (Fitzroy) River is the lifeblood of the Kimberley region of Western Australia. The River is threatened by extensive development proposals from the agriculture and mining industries within the River's catchment area. This inspired the formation of the Martuwarra Fitzroy River Council, an alliance of Traditional Owners from the different language groups connected to the River . . . Nyikina Elder Linda Nardea, and her son Kimberley Watson speak of how their people read Country like a book. Since colonisation, they've witnessed extractive industries slowly rewrite the ancient stories of their land and waters . . . The Nyikina people refer to health and wellbeing as Marboo-joonoo Liyan. They understand that their Marboo-joonoo Liyan is intrinsically connected to Country. Linda says if "the land die, we die, the river die, we die" (Moore, Nardea, Watson and Martuwarra Fitzroy River Council, p. 3).

Over the past decade we have seen our river country changing from the impacts of unjust development and climate change. Climate impacts are threatening our lifeways and livelihoods and our capacity to live and thrive. The question, remains, "how are Yi-Martuwarra people and cultural heritage going to be resilient and adapt in the face of climate change and growing uncertainty"? How will we sustain our health and well-being, our sustainable lifeways and livelihoods? Our report, "Trail for Life", was provided to the Western Australian Government's Natural Resource Management (NRM) Programme. It describes building two-way science around climate change and the impacts of projects and the results of evidence base research to inform both policy and investment. To this end we need to generate the body of evidence to show how we can inform climate change policy and better practice (RiverOfLife *et al.*, 2024).

Indigenous cultural health and well-being

Health and well-being are terms increasingly used in climate change policy. Globally, Indigenous people are amongst the most vulnerable to the impacts of climate change and play a critical role in caring for land, biodiversity and traditional ecological knowledge (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019; Fa *et al.*, 2020). In the context of Indigenous Australians, these terms carry a culturally distinct meaning by connecting the state of Indigenous individuals to the health of their families, kin, community and their connection to country, cultural heritage, spirituality and ancestry. Indigenous concepts of well-being encompass more than just physical health; they are deeply intertwined with cultural identity, social relationships and environmental stewardship (Jarillo and Crivelli, 2024). However, studies do not always link specific climate drivers to core elements of well-being, which is necessary to evaluate risks and target adaptation goals, while research remains highly compartmentalised by discipline with different conceptualisations of well-being (Jarillo and Crivelli, 2024). To address the challenges posed by climate change to Indigenous health and well-being, culturally responsive approaches that prioritise Indigenous heritage, knowledge and values at local levels and place-based contexts are vital (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019; Jarillo and Crivelli, 2024).

Climate change threatens the health and well-being of Indigenous Australians in multifaceted ways by disrupting traditional practices, connection to place and resource security. Changes in meteorological factors, seasonality, biodiversity loss and exposure to acute and chronic weather events, have been linked to negative physical and mental health outcomes including strong emotional responses, suicide, depression and anxiety. Exacerbating the issues are a lack of engagement with cultural drivers of health, leading to inappropriate intervention models and a failure of markets to recognise the contribution of Indigenous heritage and practices that support ecological, economic and cultural function and resilience. As a result, chronic physiological and psychological stress has reduced the life-expectancy of Indigenous Australians by an average of 20 years compared to the national average (Burgess *et al.*, 2009).

Maintaining and sharing cultural traditions and time spent on country was consistently noted as a coping mechanism to experienced climate changes by decreasing climate related distress and increasing community resilience (Pearce *et al.*, 2015). Therefore, access and connection to country, including land rights, can be seen as both a health issue and a primary tool for well-being by providing physical, emotional, spiritual and mental sustenance (Berry *et al.*, 2010). In addition to promoting Indigenous well-being, connection and access to land provides a suite of environmental services of local, national and global significance including border protection, quarantine services, wildlife abatement, carbon sequestration, control of invasive weeds and feral animals, biodiversity conservation, fisheries management, water resource management, sustainable commercial use of wildlife and maintenance of cultural heritage (Burgess *et al.*, 2009).

As the impacts of climate change continue to intensify, it is imperative to centre Indigenous well-being in adaptation efforts by enabling bottom-up approaches via community-led solutions, promoting land rights, protecting traditional heritage and cultural practices and cultivating social connections. Given the increasing recognition of well-being as a fundamental marker of successful adaptation, it should be central to climate change research and policymaking, but for this to be of benefit to Indigenous Peoples and local communities' context-specific understandings of health and well-being are necessary (Jarillo and Crivelli, 2024).

Today, in Martuwarra time, deep time, we, our sacred ancestral serpent beings are waiting and watching with our "Friends of Martuwarra". The opportunity for freedom is being created through the growing coalitions of hope (Poelina, 2020). Organisations with a

regenerative focus are connecting, networking, collectively thinking and transforming our world by being brave and challenging legal systems to recognise, “rivers” as the lifeblood of our planet and our survival co-dependent on “a declaration of peace with Indigenous Australians with nature’s laws and first law” (RiverOfLife *et al.*, 2024). Together we are decolonising our thinking; uniting and bringing together a pluriverse of ideas and actions to right size our planet and give humanity and Mother Earth a climate chance (ibid). Through this coalition of hope we can dream and work hard to transform our circumstance whilst focused on freedom, justice and peace. The final question, I ask my country and the world to sustain my culture, my home, my lifeways and my livelihood “can we achieve peace, harmony and balance”? Can we shift from business as usual, to the new economies, through intentional communities, through bicultural and bioregional planning and development? If the answer is yes, then there is hope for humanity, and the young ones yet to come. Let us adopt the values, ethics and virtues found in First Law as a gift to healing our lands, our people and climate. Yi-Martuwarra people highlight the need for dialogue, unity, cooperation and multiple forms of evidence, to understand the cumulative impacts of development. It is clear from the voices of Yi-Martuwarra people, “*If [our] River Dies, We Die*” (Moore *et al.*, 2023). When we stand united, we hold the dreaming time, from past, present and future and we sing together a new “Martuwarra River Time” song. Through this moral and ethical partnership of hope the Net Zero Project Heritage for Climate Action ignites the opportunity to transform climate change, climate chaos and provide the climate chance through just us!

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Integrating traditional knowledge and cultural heritage with climate adaptation and disaster risk reduction: the role of training and tools

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Abstract

Purpose – This paper investigates potential solutions to the challenges governments and stakeholders face in applying climate change adaptation and disaster risk reduction actions in ways that will save lives and use funds efficiently. The paper examines how traditional knowledge and cultural heritage can improve resilience and assesses the potential impact of relevant tools and training. Successful examples of tools, and applications of traditional knowledge as an accelerator to enhanced resilience will be explored.

Design/methodology/approach – The paper studies the importance of integrating cultural heritage with climate and disaster risk reduction plans and examines why this has not been happening to the extent it should. While probing the barriers to such integration, the paper also explores examples of best practice drawn from experience gathered in ICCROM projects. Possible mechanisms to overcome common barriers through training are suggested, and the role that training and relevant tools could play in enabling and accelerating such integration are studied.

Findings – The conclusions demonstrate that training is a critical factor in facilitating the knowledge enhancement needed to understand how to integrate disaster and climate risks.

Originality/value – The research was conducted as part of a training program which the authors helped organize. The analysis is the original work of the authors.

Keywords Resilience, Disaster risk reduction, Climate change adaptation, Cultural heritage resilience, Traditional knowledge, Development plans

Paper type Research paper

Introduction

Research has demonstrated that there is a lack of awareness on how to reduce disaster risks, including climate risks, on heritage sites and insufficient access to the appropriate tools and methodologies which could address the issues (Durrant *et al.*, 2023). Cultural heritage offers an opportunity to bring people together through their shared principles and ideas, encouraging better community cohesion which in turn can help the community to tackle problems collectively, leading, overall, to greater community resilience.

The first step towards risk reduction is to carry out risk assessment (including both tangible and intangible heritage) and hazard mapping. Knowing the risk signifies an acknowledgment



of the problem, thus allowing measures to be taken in mitigation. Despite many challenges, there are examples of good practices and successful integration of risk reduction with cultural heritage and ICCROM has promoted research on this relationship. These examples demonstrate the importance of linking the narrative on vulnerabilities, the successful strategies employed, international initiatives and community engagement, to create a stronger understanding of how to protect cultural heritage – “every place has a climate-culture story”.

Case studies

Ubatuba, Brazil: Being primarily dependent on agriculture for livelihoods, the community decided to combat climate change through adaptation of existing agriculture practices. They established mechanisms to engage in traditional seed exchange fairs, with the Quilombola community procuring native seeds from neighboring communities and sharing insights on sustainable agricultural practices. The farmers learn from each other’s experiences, adding inputs from traditional knowledge and using native species of plants, which appear to be more adapted and hardier to a changing climate. Additionally, the community is identifying and mapping elevated areas to enhance existing response and evacuation plans. This work is coordinated with the local civil protection and disaster risk management department.

Rosetta, Egypt: The area is subject to increasing impacts of climate change, especially in the increase of salinity of the soil. The community tapped traditional knowledge to find a solution by planting native sycamore trees which are traditionally known to reduce salinity of agricultural lands. The community also developed an early warning system for the fishermen and farmers by using the information in the ancient Coptic calendar based on the water levels in the Nile.

Jodhpur, India: The traditional construction techniques and building materials used in Jodhpur’s distinctive blue houses were studied using laser scanning and 3D modeling to assess the thermal performance of these structures in extreme heat. It was found that traditional houses are much cooler than those built from modern materials. The blue color and whitewash help to reduce the temperature inside the house, proving to be an effective climate adaptation technique. Additionally, the community is establishing story circles to raise awareness about the importance of using old water infrastructure and developing a culturally sensitive climate action plan for the city.

Tuti Island, Sudan: The community on this island utilizes a traditional community-led flood management and early warning system known as Taya. To prevent the loss of traditional knowledge, the community is creating a network of “knowledge bearers” who will document and disseminate the methodology for managing the Taya system in order to ensure intergenerational transmission of knowledge to younger people.

Kasese, Uganda: Climate change is exacerbating the erosion of the riverbanks in this community, and it is impacting the entire river basin. The communities in the basin area have traditional knowledge on reading weather patterns, communicating early warnings, managing natural resources and conserving the forest. Utilizing traditional and indigenous knowledge, the community planted over 100 native species of plants identified by the indigenous leaders to maximize carbon sequestration, control riverbank erosion and improve biodiversity in the region. When cultural heritage is integrated into risk reduction plans, the results are significant.

Challenges and barriers to integration

Lack of awareness of the importance of cultural heritage in reducing risks and vulnerabilities and a lack of communication on the tools and methodologies available to mitigate are a great barrier to integration. As a result, easy to use tools can end up being left on the shelf. Another factor is securing adequate funding for preservation. Planners must understand that reduction of risks, in all sectors, including cultural heritage, is integral to the development process and cannot be siloed. A systems approach needs to be followed so that the funding

can be sourced from the development sectoral budgets. Again, enhanced training can help to address such a challenge.

Despite many challenges, there are examples of good practices and successful integration of risk reduction with cultural heritage and ICCROM has promoted research on this relationship. These examples demonstrate the importance of linking the narrative on vulnerabilities, the successful strategies employed, international initiatives and community engagement, to create a stronger understanding of how to protect cultural heritage – “every place has a climate-culture story”.

Tools to increase integration of cultural heritage and climate mitigation

Capacity building amongst the planners in government, civil society organizations and other stakeholders will also enhance community resilience. An effective means to develop capacity may be through training programs on the use of easily available tools and methodologies. A workshop-based approach builds consensus, enables results to be shared with all stakeholders and allows an action plan to be drafted. Scorecards can be used to identify the issues that need to be addressed and evaluate them with a numerical score so that the weakest ones can be addressed first. This should lead to an action plan covering the next 3–5 years which should then be endorsed by the mayor’s office or the city council, to ensure political buy-in and sustainability (UNISDR, 2024). The tools that can be used include:

- (1) *The Disaster Resilience Scorecard*. The action plan needs to address three questions – what, how and when? What are the problems and issues, what are their root causes? How should these actions be carried out and how should they be financed? When should these actions be carried out and which should be prioritized?
- (2) *The Climate Resilience Addendum*. Adaptation to climate and reduction of disaster risks are linked. Without integrating the two, governments cannot address the issues of gaps in resilience. While adaptation refers to threats of climatic origin with short, medium and long-term scenarios and projections, disaster risk reduction deals with all types of threats that can generate a risk and cause a disaster. There are many points in common between both and that is why all plans should integrate both. The Disaster Resilience Scorecard for Cities provides a set of indicators that allows governments to monitor and review progress and challenges in the implementation of the Sendai Framework for Disaster Risk Reduction and assess their disaster resilience. It is structured around the “Ten Essentials for Making Cities Resilient”.
- (3) *The Cultural Heritage Resilience Addendum* (UNDRR, 2024) was developed in 2021, as an extension to the Disaster Resilience Scorecard, it includes questions and indicators for the integration of cultural heritage issues, arranged around the Ten Essentials of the Making Cities Resilient initiative.

Outcomes from training with SAARC countries

Research was conducted to improve our understanding of how far training on the scorecards is adding to knowledge and helping planners and government officials. A sample training was conducted by the Secretariat of the South Asian Association for Regional Cooperation (SAARC) in collaboration with the United Nations Office for Disaster Risk Reduction (UNDRR) Global Education and Training Institute as a residential workshop on “Urban Resilience and Making Cities Resilient” from 5 to 8 December 2022 at SDMC, Gandhinagar, India. A total of 21 participants were surveyed on their knowledge of disaster risk reduction, the tools available and their knowledge of the methodology that can be applied to the tools to develop a strategy or action plan for disaster risk reduction and resilience. A total of 82%

reported greater knowledge after the workshop, a significant increase from the pre workshop measurement of 19%. The participants were surveyed as to whether training can address the gaps in knowledge, 95% of the participants agreed that training can address the gaps in their knowledge. Around 85% of the participants indicated a preference for training of a reasonably short duration in contrast to a full-term course. About 100% of the participants indicated a preference for training focusing on practical aspects of implementation rather than concepts.

The way forward

This research suggests that there are significant benefits for cities joining the global Make Cities Resilient initiative in terms of building capacity to integrate disaster and climate risk plans with cultural heritage. ICCROM is well positioned to provide training on the tools and the methodology, and act as a service provider, as well as a catalyst by orienting and activating its own network. ICCROM could organize capacity-building workshops, training programs and seminars for professionals and policymakers. These could include self-paced online courses, and an online knowledge platform to reach a broader audience.

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Cultivating resilience: Camburi Quilombo's role in preserving local knowledge amid climate change

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Abstract

Purpose – This paper examines how the Camburi Quilombo community in Ubatuba, Brazil, can be empowered to develop cultural resilience and conserve its Afro-Brazilian heritage in the face of challenges posed by climate change, urbanization and cultural erosion with the adverse consequences of tourism and inadequate infrastructure.

Design/methodology/approach – Emphasizing traditional knowledge, the project consisted of data collection, climate risk assessments and the development of an action plan in collaboration with academic institutions, governmental bodies and nongovernmental organizations (NGOs).

Findings – Aligned with sustainable development goals (SDGs), the project contributes to zero hunger, quality education, sustainable cities, climate action and life on land. Seed exchange fairs, decentralized seed banks and education initiatives foster environmental awareness and sustainable agriculture, impacting the community directly and over 1,000 individuals indirectly. While demonstrating short-term changes and mid-term viability, the project faced some challenges due to local communication complexities and overlapping jurisdiction.

Originality/value – Serving as a bridge between scientific research and local knowledge, the project aims to promote a paradigm shift toward recognizing, respecting and incorporating indigenous practices, so that a more environmentally aware future can be envisioned for these communities amidst climate challenges. Reflecting on achievements, the project underscores integrating diverse cultural knowledge for community resilience.

Keywords Camburi Quilombo, Climate resilience, Sustainable development, Cultural integration, Traditional knowledge

Paper type Case study

Introduction

Located in the south-eastern region of Brazil, in the city of Ubatuba, state of São Paulo, Camburi Quilombo serves as a shining example of resilience and the embodiment of Afro-



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Brazilian culture. The municipality in which it is situated is characterized by a landscape of steep, environmentally preserved mountain slopes that cascade down to the shores of the Atlantic Ocean. This territory is the home of Camburi Quilombola Community. Historically, Quilombos (or Maroons) emerged in Brazil during the Portuguese colonial period as settlements for enslaved individuals who managed to escape. These communities were often in relatively remote locations to ensure their protection, and they had a complex, and not always harmonious, relationship with the indigenous communities. The construction of the Rio-Santos highway and other infrastructure projects reshaped the region and resulted in an influx of tourists and new residents. It also led to the introduction of electricity, urban amenities such as refrigeration and processed foods and the possibility of new jobs away from traditional activities (Santos, 2004, 2014). The Quilombo community found themselves pushed to more marginal land and in an entirely new reality. With the advent of urban “modernity,” much of their local knowledge gradually faded into obscurity.

Added to the difficulties already mentioned, intensifying rainfall patterns pose a grave threat as indicated by both recurrent historical disasters and future climate projections. Climate scenarios suggest a trend toward erratic precipitation, with shorter periods of intense rainfall, heightening the community’s exposure to flooding and landslides. These environmental threats compound a host of existing vulnerabilities, encompassing factors such as saturated soil, a lack of demographic data, absence of local early warning systems, emergency preparedness and response plans, steep terrain and limited infrastructure and public investment. Today, this community, which once harmoniously coexisted with its natural surroundings, faces numerous challenges to its survival, ranging from community disintegration to the loss of traditional dietary practices and habits. There is also an escalating risk of floods and landslides, as well as the complete destruction of access routes to its territory, resulting in isolation. Within the territory, there is significant resistance to acknowledging climate change, largely due to the influence of neo-Pentecostal religions that actively propagate denialist ideologies.

The challenges faced by both the city and the community are substantial, as evidenced by data from the Brazilian Institute of Geography and Statistics (IBGE – Instituto Brasileiro De Geografia E Estatística, 2023). Approximately, 34.2% of Ubatuba’s population earns a monthly income of less than half the minimum wage, and only 25.8% of the population has access to formal employment. IBGE’s data reveal that a mere 60.3% of the population enjoys access to proper sanitation, while 4,678 individuals (5% of the city’s population) reside in areas at risk of flooding, flash floods and landslides. The Brazilian Government has carried out hazard vulnerability assessments in the light of recent disasters (Daunt *et al.*, 2021).

The Camburi Quilombo and climate changes

In this context, we developed our project “The Camburi Quilombo and Climate Changes.” The primary goal is to empower the community by bolstering its autonomy. Secondary aims include exploring traditional land cultivation and use methods, such as backyard spaces, nurturing and strengthening trust-based relationships within the community and fostering broader discussions on the impacts of climate change. Quilombolas possess a profound understanding of their territory. This traditional knowledge extends to observation and early warning to predict extreme weather events and facilitating swift and effective responses to extreme risk events. Sustainable agricultural practices are integral to their food security and environmental sustainability, with traditional methods tailored to local climates and soil management techniques. Notable among traditional practices are agroforestry backyards, serving as spaces for sustainable cultivation and empowering female autonomy.

Strategizing climate resilience

The project has been segmented into several phases. In the first phase, the team consolidated prior observations based on historical data, archival research, consultations with municipal and state government bodies and on-site visits to the territory. The second phase was an intensive three-week study in Rome, Italy, at the ICCROM headquarters, where the core team correlated the gathered data with a climate risk assessment to formulate an action plan. The primary climate-related hazard for the community was identified as intense rainfall in a short period of time, disproportionately affecting many residents, particularly children and the elderly.

The action plan encompassed several key actions. Initially, it involved closing the data gaps and initiating the production of a video documentary to document traditional knowledge and practices for adapting to a changing climate. Building partnerships with key stakeholders in the region and organizing a workshop for data validation with the residents were key activities. Finally, the project included field actions such as defining escape routes and safe places in case of landslides and floods, the creation of Community Nuclei for Protection and Civil Defense (NUPDEC) and the creation of decentralized seed banks for enrichment of residents' backyards. All these activities were accompanied by training for the community, along with the production of printed materials for information dissemination.

Achieving SDG targets: project activities in action

The project's initiatives have played a pivotal role in advancing multiple sustainable development goals (SDGs) (United Nations, 2024):

SDG 2 - Zero Hunger. Involvement in seed exchange fairs.

SDG 15 - Life on Land. Acquisition and propagation of diverse plant species and the establishment of seed banks, which serve as a repository of diverse plant species and promote agricultural biodiversity.

SDG 4 - Quality Education. Future plans that involve engaging schools to cultivate a profound understanding of environmental sustainability.

SDG 11 - Sustainable Cities and Communities. Building resilient communities by creating safe escape areas and preserving the heritage site of "Buraco da Máquina."

SDG 13 - Climate Action. Coordinated endeavors emphasizing tree planting, herbal garden preservation and disaster preparedness.

SDG 17 - Partnerships for the Goals. Effectiveness of partnerships is evident through joint action plans and shared resources, fostering common aspirations.

Impacts and achievements

The main goal for the community is to reinforce itself by creating tools and resources that align with their values while simultaneously seeking education and knowledge for self-empowerment. The research carried out engaged approximately 50 individuals and encompassed many aspects including foraging practices in traditional gardens and backyards; surveys focusing on plant species for medicinal, nutritional and cultural applications; exploration of territory and potential refuge spots; mapping of indigenous climate-related knowledge and educational initiatives like environmental awareness programs and heritage education. Indirectly, its influence extended to over 1,000 individuals through communication dissemination, engagement of partnering entities and documentary presentations, significantly expanding its outreach and relevance within the broader community. Immediate transformations include the establishment of flood refuge

strategies and safe point signs, all informed by traditional knowledge within the Quilombola community. In the short term, the project led to heightened visibility, educational advancements, internal coordination with local associations and crucial partnerships. Active participation in seed exchange fairs revitalized interest in indigenous agricultural practices, fostering the acquisition of diverse plant species and the establishment of NUPDEC, a civil defense response, which is the first of its kind, in the city of Ubatuba. Mid-term consequences were materialized through documentary usage in festivals, financial project registrations, the establishment of secure refuge areas and the proliferation of various plants, reinforcing food security, genetic diversity and ecosystem services.

In a broader context, the project anticipates implementing short-term changes in the community to enhance their autonomy and resilience, especially in addressing the potential challenges posed by upcoming heavy rains. Envisioning the long term, the project aimed at implementing sustainable initiatives supported by new national and international financing sources, ensuring continued development and the sustained progression of their endeavors.

Recognizing challenges and knowledge gaps hindering culture's integration at a broader level

At the local level, one significant hurdle arises from the complexities of communication and establishing harmonious relationships among diverse interest groups within the area. Overlapping jurisdiction often leads to bureaucratic complexities, slowing down decision-making processes critical for cultural integration and advancement. Expanding to a broader scale, despite substantial progress in acknowledging and valuing ancestral and indigenous knowledge on a national level, there persists reluctance among more conservative sectors to embrace the transformative potential inherent in this invaluable knowledge. This project served as a bridge between academic science and local wisdom, including ancestral knowledge. This initiative sought to catalyze a paradigm shift fostering a more inclusive and holistic approach.

Reflective analysis and future mapping – unveiling project insights

It is evident that the integration of diverse cultural knowledge systems can foster resilience and sustainability within communities. The dream mapping exercise has emphasized the importance of preserving Quilombo heritage while adapting to evolving environmental and societal dynamics. Moving forward, the project's sustainability hinges on strategic actions and collaborations. It envisions leveraging its tangible outputs, such as reports, documentaries and academic publications, to attract further funding and support for continuous initiatives. By embedding the project's outcomes and goals within academic research, there's a solid framework for continued advocacy, support and resource allocation.

In conclusion, the afterlife and sustainability of the project rest on a foundation of collaborative efforts, community engagement and knowledge dissemination. By integrating indigenous knowledge into actionable initiatives, seeking continuous funding avenues and intertwining project objectives with academic research, the endeavor aims to multiply impacts, ensuring the lasting resilience and prosperity of the Camburi Quilombola Community.

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Burj Rashid: a tale of two tides – rising waters and changing traditions

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Abstract

Purpose – This paper delves into the traditional ecological knowledge (TEK) and practices of Burj Rashid, an ancient historical city on Egypt's northern coast, which stands at the meeting point of the Nile's western branch and the Mediterranean Sea. Burj Rashid boasts a strategic location and rich natural resources and has a long history of relationships between land, people, river, sea and climate change, serving as a model for residents' adaptation to their ever-changing surroundings.

Design/methodology/approach – Climate studies have exposed the village's vulnerability to climate and topographical hazards such as rising temperatures, shifting weather patterns, decreasing precipitation, encroaching seas due to sea level rise, coastal erosion and high soil salinization. These factors pose a high risk of water scarcity, crop failure in the medium term, potential famine in the long term and declining fish populations, threatening fishing communities. To address these challenges, the *Net Zero: Heritage for Climate Action* project - launched by the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) and the *First Aid and Resilience for Culture in Times of Crisis* program, funded by Swedish Postcode - proposes a research and development methodology through a platform that weaves together heritage knowledge and climate science. The Egyptian Heritage Rescue Foundation has implemented a platform in Burj Rashid as an innovative site to study risks, vulnerabilities and capacities.

Findings – The project will explore root causes, identify risk scenarios and establish a stakeholder map to guide the development of mitigation strategies and resilience-building measures.

Originality/value – By harnessing the wisdom of TEK and integrating it with scientific knowledge, the project paves the way for innovative climate change adaptation strategies that ensure the long-term sustainability of Burj Rashid's unique cultural heritage.

Keywords Rashid-Rosetta, Climate change, Tangible heritage, Intangible heritage, Resilience, Risk, Mitigation, Sycamore, Early warning, Fishing, Agriculture, Nile delta

Paper type Research paper

Introduction

Rashid (Rosetta), also known as Markaz Rashid, is situated in the northeastern corner of Egypt's Beheira Governorate in the province of Alexandria. It occupies a strategic position at the Nile's mouth, where it seamlessly merges with the Mediterranean. This dynamic region has low-lying lands (sometimes dipping below sea level), intricate distributaries, prominent headlands and lagoons and a network of irrigation canals that reshape the drainage patterns (Woodward *et al.*, 2007; Youssef, 2021).

The rich alluvial soil deposited by the Nile is very fertile with high agricultural potential. This has allowed a large green landscape to flourish along the Nile banks (Doyle, 1803;



Sonnini, 1789; Abdel-Messih, 1892). Palm trees are the dominant feature of the cultivated landscape of the city, but, in addition, until the end of the 19th century (CE), the sycamore was one of the most important plantation trees (Azam and Egyptian House for Architecture and Planning, 2008). The sycamore tree was vital to this area in several ways: its wood was economically important, its fruit was eaten and its leaves and plants were used in medicines. Also important was its large canopy, which provided shade in public places where the local community gathered. In recent years, the number of sycamore trees have declined, partly due to a misinterpretation of heritage stories, which has led to a belief that planting a sycamore tree can bring misfortune. One of the aims of the current project is to restore the sycamore and rewrite this narrative. As well as the qualities historically prized, the sycamore tree also has deep roots, which will be particularly advantageous in combatting the adverse impacts of climate change, such as soil erosion and retaining moisture.

As will be elaborated below, the area is uniquely tested by several contemporaneous environmental challenges related to recent development but exacerbated by increased storm activity and rising sea levels as a result of climate change (UNDP, 2018). By addressing these challenges holistically and collaboratively, Burj Rashid can transition to a more sustainable and resilient future, preserving its unique heritage and securing the well-being of its inhabitants. Crucial to the success of the plan is widespread support across the community. Potential conflicts of interest will need to be resolved not only through legislation but also with measures such as a peace reconciliation council formed from the trusted members of the community. The authors are members of the Egyptian Heritage Rescue Foundation working on this project.

A legacy at risk – the fight for survival

This area faces significant challenges as regards water regulation structures. Currently, the total amount of cultivated land is 359 hectares, equal to 3.591 km², and 70% of the population (about 7,000 people) are farmers (Muhammad and Aly, 2013; World Bank, n.d.; Environics organization, n.d.). Climate studies by the Intergovernmental Panel on Climate Change (IPCC) and the Integrated Coastal Zone Management (ICZM) in the Northern Coast of Egypt project predict that temperatures are likely to rise from 14.6 C° to 21 C° between 2020 CE and 2040 CE. In the dry season, precipitation will decrease from 2.4 mm to –3.00 mm between 2010 CE and 2040 CE, and in the wet season, it will decrease from 41.5 mm to 0 mm between 2030 CE and 2040 CE. This will lead to hydrological drought, which means that the river and lakes will have reduced levels owing to a lack of rain. This will affect everyone who relies on that water, both in the cities and on farms. Shallow groundwater, high temperatures and increased evaporation will suck the moisture out of the soil, damaging crops. In addition to a sea level rise of 0.4 meters, there will be land erosion and salinization damage. 25% of the total land cultivated with high-quality dates will be inundated or suffering from soil salinization. This will be in addition to 20% of other agricultural land that will experience a high risk of crop failure in the medium term and the risk of famine in the long term.

Since 1861, barrages like the Delta, Aswan Low Dam and the High Dam have been constructed. While these structures have served agricultural purposes, they also unintentionally disrupted the natural sediment flux (El-Gamal *et al.*, 2020; Abd-El Monsef *et al.*, 2015; Environics organization, n.d.). The High Dam alone traps 98% of sediment in Lake Nasser, starving downstream areas like Burj Rashid. This lack of sediment has led to alarming coastal erosion, with the Rashid promontory shoreline retreating by nearly 10 km between 1900 and 2003. Erosion rates have reached a staggering 50 meters per year in some areas (Mohamed, 2019; Fouda, 2001). The consequences for fishing are dire. With shrinking coastal zones and disrupted fish habitats, fish populations have dwindled, threatening the livelihoods and cultural traditions of fishing communities, as traditional fishing knowledge

and practices are deeply affected. Sediment starvation leads to severe coastal erosion, reducing fishing grounds and impacting fish populations. This threatens the cultural heritage and economic well-being of fishing communities (<https://climateknowledgeportal.worldbank.org/country/Egypt/climate-data-historical>).

There has been a high increase in population in the area, which has necessitated building a new urban area known as new Rashid city. Two new petroleum plants have been constructed, and consequently, the Nile and the Mediterranean Sea receive a heavy load of wastewater from the factories and the petroleum plants located in addition to agricultural and domestic waste. These factors are responsible for health problems, especially dysentery and hepatitis infections, which are common diseases in the delta area, as well as an aquatic ecosystem disorder (Taia *et al.*, 2019; UNDP, 2018; <https://environics.org/projects/integrated-coastal-zone-management-iczm-in-egypt-a-scoping-study/>).

Potential benefits of the sycamore tree

The majestic sycamore tree, once a cherished symbol of life and abundance in ancient Egypt, has declined in recent years. Our project's workshops with farmers aim to reconnect them with the true heritage of the sycamore: its ability to combat aridity and salinization, its eightfold fruit production and its significance as a family gathering place dating from ancient times. This historical understanding, coupled with the tangible benefits, can dispel unfounded fears and encourage replanting. Planting the first sycamore ourselves serves as a powerful symbol. It demonstrates our team's dedication and encourages others to follow suit. By strategically planting 45 trees across Burj Rashid, we can begin to reintroduce this asset, which is valuable to the land in several ways:

Environmental benefits: The sycamore's deep roots help retain moisture and reduce soil erosion, combating desertification and protecting the land from salinization. Its leaves provide shade, further minimizing evaporation.

Economic benefits: The fruit offers a reliable source of food and income, strengthening the local economy. Additionally, sycamore wood can be used for sustainable construction and craftwork.

Cultural benefits: Reconnecting with the sycamore's heritage fosters a sense of community and cultural pride. Its reintroduction honors ancestral traditions and creates a beautiful, life-sustaining element in the landscape.

Assessing the vulnerability and capacity of the Rashid community

To comprehensively assess the vulnerability and the capacity of the Rashid community to instigate this project, a two-level approach was implemented. Level 1 consisted of community-driven insight sessions using the Insight game tool developed by ICCROM. Through these interactive workshops, we identified key concerns to the local population such as a lack of infrastructure and the potential impact of the offshore gas project on fish populations. Level 2 focused on bridging the gap between the community and decision-makers and key leaders. This two-pronged approach not only identified vulnerabilities through the participation of over 80 fishermen and farmers but also created a platform for solutions by directly involving community members, decision-makers and potential partners.

To further empower the Rashid community and address identified challenges, we proposed an environmental micro-project focusing on supporting local women skilled in palm basketry. By combining local expertise with resources and support, we can create a sustainable and impactful initiative that empowers women, promotes environmental responsibility and strengthens the Rashid community.

Burj Rashid's silent threat: early warning needed for 5,000 lives at risk problem

Climate studies predict an increase in storms due to warmer sea temperatures and erratic weather patterns, yet 1,500 fishermen and 3,500 farmers in Burj Rashid currently lack early warning systems for extreme weather events. This results in 25 deaths and more than 350 injuries annually, pushing families into poverty. Injured fishermen lose their livelihood, forcing women to work on palm tree farms for significantly lower wages.

Practical solutions to tackle the risks include:

- (1) Collecting data on weather temperature, wave heights, sea level rise and storm surges in order to develop a local early warning system for the Rosetta fishermen syndicate.
- (2) Co-create illustrated guidebooks with the community, using icons and graphics for both literate and illiterate audiences.
- (3) Relate the information collected to the Coptic calendar in order to make it more understandable and more acceptable to the local population.

This initiative has the potential to save lives and reduce injuries among fishermen and farmers. Protecting livelihoods will also stop families from falling into poverty. In the long term, ensuring that the community is knowledgeable about climate change and empowering them to act will bring about greater community participation and build resilience to future climate change impacts.

Conclusion

The initial phases of the project have highlighted the need to develop an early warning system to alert the local community of impending extreme weather events and raise awareness in the local community concerning their vulnerability to the impacts of climate change. Integrating local knowledge into scientific analysis and using traditional calendars will significantly increase the effectiveness of these measures and gain greater acceptance. Using historic precedents, such as, for example, encouraging the planting of sycamore trees, is a potentially effective way to make longer term changes to the environment that will help mitigate the effects of climate change and, at the same time, can be seen as acceptable to the local community.

The project emphasizes the importance of studying and analyzing the history of culture, risk and climate in close connection to people's activities and livelihoods over time. By examining the interplay between these factors, we can identify gaps in our understanding and reconnect the present with the past through traditional knowledge, new tools and scientific data. Combining desk-based research and community-based fieldwork is crucial and effective for developing and implementing new mitigation strategies. This approach helps avoid misunderstandings regarding culture and knowledge, allows for monitoring potential impacts and prevents secondary hazards. It also facilitates parallel recovery efforts in both human and environmental sectors. The project in Burj Rashid village highlights the need to integrate traditional heritage with new technologies when planning mitigation and resilience strategies for climate-vulnerable sites, particularly historical ones.

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Culture for climate action in Jodhpur: reversing the trajectory from fragility to resilience

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Abstract

Purpose – This paper documents the outcomes of a year-long intervention designed to address climate challenges in Jodhpur, India. The intervention employed a phased approach that combined traditional knowledge, innovative communication strategies and youth engagement. The question guiding the interventions was: Can traditional knowledge, indigenous practices and place-based wisdom be used for risk-informed sustainable development?

Design/methodology/approach – The project utilised a mixed methods approach to achieve its goals. A documentary titled “Sanchay” was produced, capturing the perspectives of Jodhpur residents on climate risks. An architectural analysis of traditional houses was conducted to identify and understand their inherent climate-smart features. Immersive workshops engaged young minds in exploring climate change through creative expression, equipping them with the knowledge and skills to become agents of change.

Findings – “Sanchay” serves as a novel method for understanding risk through the lens of citizen narratives, offering a valuable complement to traditional top-down risk assessment methods. The architectural report provides evidence for integrating traditional knowledge into sustainable construction practices. The immersive workshops empowered young people to become agents of change within their communities. Finally, the capacity building initiatives strengthened the human resource base for future climate action efforts.

Originality/value – This project introduces a novel method for understanding risk through participatory storytelling, centred on the lived experiences of community members. It demonstrates the efficacy of combining traditional knowledge with science and technology for climate action.

Keywords Traditional knowledge, Vernacular architecture, Place-based wisdom, Capacity building, Heritage-based solutions, Climate action

Paper type Case study

Introduction

Located at the edge of the Thar Desert, Jodhpur, Rajasthan, paints a vibrant tableau of history, culture and resilience. Founded in 1459 by Rao Jodha, the great Rathore king, the city’s identity is deeply connected to its strategic location and unique environmental challenges. The Mehrangarh Fort, perched on top of the hill, dominates the city, which was planned along the

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slopes and foothills in a network of narrow streets and lanes (Jain *et al.*, 2019a). These seemingly simple design elements reflect profound climatic wisdom. The narrow streets channel cool breezes and provide much-needed relief in the scorching desert heat. Houses are constructed using locally available materials like sandstone, creating passive cooling effects through thick walls and strategically placed ventilation (Jain *et al.*, 2019b).

Water scarcity is a constant reality in the desert landscape. Historically, rainwater was collected in a network of reservoirs and lakes (jheel and talaab), tanks (jhalara), stepwells (bavdi) and wells (kuan, beri and bera), interconnected by an intricate underground system (Meghal *et al.*, 2019). These over 100 water bodies were not merely functional entities; they were communal hubs, stimulating social interaction and shaping daily life (Sharad *et al.*, 2019). Food habits, festivals and even local deities reflected this reverence for water, a testament to the deep cultural adaptation to the desert environment (Jain *et al.*, 2019a, b).

As the city grew, newer, “modern” quarters developed and narrow streets and traditional houses, which gave way to wider roads and contemporary structures. The new city also witnessed a shift away from traditional water management practices to piped water supply, which led to the neglect of the historical water bodies. Even today, as local residents report, the issue of water unavailability has not been resolved; there are households which receive water only on alternate days. On the other hand, the lack of maintenance of the historical water bodies has led to a significant rise in the level of groundwater which, at times, causes severe waterlogging.

Jodhpur’s governance system also underwent significant transformations. Once the capital of the Marwar Kingdom ruled by the Rathore dynasty, the city now functions under the Municipal Corporation, as per the constitutional mandate of the country. Despite the abolition of the monarchy, the royal family continues to hold a revered position, with a certain “aura of kingship” still permeating the city’s social fabric. Understanding these historical and contemporary dynamics is crucial for navigating Jodhpur’s unique cultural landscape and its relationship with climate and sustainability.

Methodology

To assess the effects of climate change on Jodhpur, we focused on two key climate variables: temperature and precipitation:

Temperature projections till 2100: The projections offer a clear depiction of temperature trends across various months. February, March, April, May and November seem poised for temperature increases compared to historical records, with April emerging as the most significant rising trend. Conversely, the period spanning from June to October exhibits a consistent decrease in temperature, with September experiencing the most substantial negative trend. The analysis underscores the dynamic nature of temperature trends.

Precipitation variations from 1981–2021: Analysis of the data revealed distinct downward trends in January, February, April, July, October and November. Notably, the most substantial decrease occurred during July. Conversely, March, May, June, August, September and December exhibited upward trends. August had the highest positive trend with a change magnitude of 0.9201 mm.

Precipitation projections till 2100: Examining the data revealed notable shifts in the positive trend, particularly in August. Similarly, March, May, June, September and December exhibited positive trend changes. Conversely, certain months portrayed negative trend changes, including January, February, April, July, October and November.

The weather pattern has become, and will continue to be, erratic. The experiential outcome of this would be severe and frequent extreme temperature days, non-uniform rainfall distribution

and increased moisture content in the air (humidity). To understand the complex processes contributing to vulnerability in Jodhpur, we employed a layered approach adapted from the Forensic Investigation of Disasters (FORIN) framework (Smith *et al.*, 2016). We aimed to identify the root causes of vulnerability and unpack the interconnected nature of risks. This allows for proactive development of effective risk reduction and climate action strategies.

The layered approach involves:

Layer 1. Identifying the geo-climatic and physical changes.

Layer 2. Analysing demographic characteristics and their effects on the evolution and growth of the site to understand how the morphology of the site has changed.

Layer 3. Understanding place-specific knowledge including the social networks and the dynamics that have developed through different interactions to the context.

Layer 4. Understanding how the site functions economically including inequality, marginalisation, etc.

Layer 5. Tracking the growth and development of the site through different ways of governance.

Co-creating interventions with the Jodhpur community: Recognising the limitations of purely top-down or bottom-up interventions, the methodology employed a collaborative process that acknowledged the expertise of local communities as well as external experts. Over time, this facilitates increased engagement and capacity building, ultimately leading to co-created solutions and community ownership.

Our research identified the escalating threat of extreme heat in Jodhpur, as evidenced by our climate data analysis. To address this pressing challenge, we embarked on a collaborative journey with the Natural Resources Defense Council (NRDC), India, the Jodhpur Municipal Corporation (North), and the Mahila Housing Trust (MHT) to develop Jodhpur's first-ever heat action plan (HAP). An extensive engagement process enabled us to effectively advocate for the inclusion of culturally sensitive interventions within the HAP. This makes Jodhpur's HAP the first in India to officially recognise and utilise the potential of culture in mitigating extreme heat risks. The initiation of the HAP for Jodhpur was a predominantly top-down approach, necessitating the active involvement of the local government in policy adoption and implementation. This underscores the importance of local governance in climate policy execution (Marsden and Rye, 2010; Okereke *et al.*, 2009). Building a solid network with grassroots organisations, our team engaged with over 100 individuals in Jodhpur, particularly within the old city, ensuring diversity in gender, age and expertise. Two dedicated workshops were conducted: one with approximately 30 women, and the other was with about 50 children, aged between 12 and 21 years.

The culmination of our efforts resulted in the creation of a documentary titled "Sanchay" (GRRID Corps, 2023), which analyses Jodhpur's riskscape through the perspectives of both experts and locals. This innovative approach to communicating the riskscape through citizen voices aligns with the principles of participatory communication (Keeney and Winterfeldt, 1986).

The old city of Jodhpur is renowned for its distinctive traditional houses, believed by residents to maintain cooler indoor temperatures during scorching summers. Additionally, the city's vibrant blue-hued houses have encouraged the popular notion that the indigo colour itself possesses a cooling effect. We embarked on an investigation to discover the scientific basis behind these claims.

Initially, the indigo colour served as a social marker, specifically adopted by Brahmins (upper caste Hindus) in the Brahmapuri area to distinguish their dwellings. This preference

stemmed from the association of indigo with Hindu deities like Lord Shiva and Lord Krishna. Beyond its symbolic significance, eventually down the years, residents discovered the soothing and calming effect of the indigo paint, akin to a perceived cooling sensation. Additionally, the paint offered the benefit of repelling pests. These combined advantages led to the gradual adoption of the blue colour beyond the confines of Brahmपुरi, transcending social boundaries.

To empirically verify the claims regarding the indoor temperature regulation in traditional houses, we devised a prototype named the “tiffin box” (Kanji, 2023). Equipped with temperature and humidity sensors and an atomic clock, this device recorded environmental data at regular intervals. By deploying the tiffin box within various houses, we observed a distinct drop in temperature and humidity as we moved deeper into the dwellings. This reduction of at least 3°C compared to outdoor temperatures provided concrete evidence, supporting the lived experiences of residents. Notably, the same experiment yielded less significant differences in newer, contemporary houses.

Recognising the potential of traditional architecture for mitigating the ill-effects of urban heat, we conducted a detailed architectural analysis of two selected old, traditional houses. The findings of this analysis, documented in a comprehensive report (Saha *et al.*, 2023), hold significant implications for contemporary architectural practices. By incorporating these insights into modern building design, we can potentially reduce the urban heat island effect and enhance energy efficiency in future constructions.

The city’s historical water culture holds immense potential for climate action and cultural revitalisation. These traditional water bodies, once central to Jodhpur’s identity and ecosystem, offer a sustainable solution for mitigating the impacts of climate change. Recognising this potential, we embarked on a collaborative initiative to revive Jodhpur’s water culture and empower the youth to become agents of change.

With the invaluable support of Maharaja Gaj Singh II of Jodhpur, the Living Waters Museum and the East India Dastangos, we conducted a four-day immersive workshop – Ripples of Heritage – for 30 students from local institutions. The workshop emphasised storytelling, narrative exploration and creative expression. During the first three days, students engaged in intergenerational dialogues, listening to stories and narratives about Jodhpur’s rich water culture and its connection to climate change. Guided by experienced facilitators, they then translated their understanding into various artistic mediums, including songs, music, dance and dramatic performances.

Multifaceted outcomes: Presenting the results of Net Zero in India. This paper has documented the multifaceted outcomes of a year-long intervention, aimed at addressing climate challenges in Jodhpur. The intervention employed a phased approach, generating valuable outputs that contribute to risk communication, sustainable construction practices, youth empowerment and capacity building.

Sanchay: unveiling the climate-culture story

This innovative film utilises the voices and perspectives of Jodhpur residents to unpack the city’s risk scape. By communicating risk through the lived experiences of citizens, Sanchay aims to inspire risk reduction behaviour and action more effectively than traditional top-down approaches.

Rejuvenating traditional wisdom for sustainable construction

A detailed architectural analysis of traditional Jodhpur houses was undertaken and served two crucial purposes. Firstly, it provides evidence that elements of traditional construction can be adapted to create climate-smart buildings in contemporary contexts, and secondly, it serves as a valuable resource for local authorities to inform development plans that mitigate urban heat island effects and promote energy-efficient buildings.

Empowering youth through experiential learning

The immersive workshop engaged young minds in exploring the connections between culture and climate action through innovative approaches. The workshop utilised traditional knowledge, place-based wisdom and modern science to advance capacity building among participants.

Building capacity for transformative change

Young architects gained valuable insights into traditional climate-smart construction, and a young cinematographer deepened their understanding of climate science. This enhanced capacity strengthens the team's ability to contribute to future climate action initiatives.

Conclusion

Our approach acknowledges that culture is not static but rather evolving. We emphasise the need to adopt older ways of life with a critical lens, adapting them to contemporary contexts and challenges. Long-term sustainability ultimately depends on the continued engagement and ownership of the Jodhpur community members.

In conclusion, the Jodhpur intervention serves as a valuable model for addressing climate challenges in a way that is both effective and culturally sensitive. By developing novel methods for understanding and communicating risk, balancing culture with science and technology, employing a blend of top-down and bottom-up strategies, recognising the evolving nature of culture and emphasising community ownership, this project offers valuable insights for building resilient and sustainable futures for communities around the world.

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Sudan's climate-culture story: a project with HEART – Heritage Empowered Action for Risk in Tuti

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Abstract

Purpose – Located at the confluence of the White and Blue Niles, in the core of Sudan's capital, the small island of Tuti has been affected by flooding events throughout its history. To protect it, the Tuti people (Tawatas) developed the Taya, a traditional early warning, community-based flood management system. However, several challenges, including climate change impacts, demographic variations, a fluctuating economy and, more recently, an ongoing armed conflict, are increasing the risks associated with the annual flooding, threatening this traditional knowledge and other local community practices.

Design/methodology/approach – In the framework of International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)'s Net Zero: Heritage for Climate Action project Tuti Island was presented as an innovation site, aiming to deepen on Tuti's traditional knowledge as an efficient heritage-based adaptation strategy to reduce the impacts of climate change. Unfortunately, the implementation of the project faced more challenges and constraints than initially foreseen when the conflict broke out in the capital of Sudan in April 2023. The project activities, methodology and approach had to be redesigned in light of the new situation.

Findings – The Taya traditional system plays a key role in reducing vulnerabilities and enhancing the community's capacity to address the impacts of climate change, as well as to cope with other crises, including armed conflict, due to its deep connection with the Tawata's identity.

Originality/value – The project, which was originally planned to focus on climate action through heritage, became a representative case of the disaster–conflict nexus, reminding us that overlapping crises may occur in

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the same area, putting additional pressure on the population, their cultural heritage and the measures to tackle specific issues.

Keywords Sudan, Traditional knowledge, Community resilience, Early warning system, Floods, Climate change, Conflict

Paper type Case study

The island at the heart of the two Niles: the story of the Taya

Tuti Island was formed at the confluence of the Blue and White Niles, at the core of Sudan's capital, Khartoum, where the two rivers merge into the main Nile. Throughout the years, the island's population increased, embracing different ethnic groups. In the 1980s, Sudan faced "the four horsemen of the Apocalypse — Pestilence, War, Famine and Death" (Collins, 2008), which contributed to a high rate of rural-urban immigration from the affected areas to places like the island (Mudawi, 1989). However, all these did not change the status of Tuti as the "rural eye of the Capital" (Davies, 1994), until more recently, when the rapid urbanisation process came at the expenses of its fertile agriculture lands (Bahreldin and Eisa, 2016).

Climate change has altered the seasonal flooding cycle of the Nile, causing remarkable flood disasters such as those recorded in 1878, 1924, 1946 1964, 1977 and 1988 (Davies, 1994). Likewise, as presented by Ahmed and Abd Alla (2019), from 1972 to 2018, Tuti Island witnessed several environmental changes and shifts due to climate change and human impact, including desertification and flood-related disasters. There is, indeed, a clear change in the climate patterns visible on the island, where the local communities are already experiencing extreme weather conditions, such as severe droughts and increased floods (Tambal *et al.*, 2024).

The Taya system

As the location of Tuti made it susceptible to floods, in the mid-1940s, the community utilised their traditional knowledge to develop their own flood management system, named *al-Taya*. Tuti residents erected tents in selected locations around the island (Tayas) and stayed in them for three weeks to monitor the flood and alert the residents using drums and barrels when the situation got serious.

Afterwards, these lookout points and the Taya system became a fixed mechanism for early warning during the flood season, with some alterations, such as replacing drums with mobile phones, to alert the people, and relocating some of the lookout points according to changes in the Island shape throughout the years. Throughout decades, *Tawatats* have "accumulated their own indigenous knowledge and skills, developing early warning systems based on different tones of drums, horns and whistles that alerted the community of an upcoming flooding" (UNDRR, 2015). The Taya system has proved to be very efficient and effective over time. During the floods in 2020 that affected around 875,000 people in Sudan and caused damage and loss estimated at USD 4.4bn (Government of Sudan, 2021), there were no casualties in the island of Tuti, and only few houses were affected. This traditional knowledge and practice are therefore increasing its relevance and international interest in the face of climate change.

The HEART project: Heritage Empowered Action for Risk in Tuti

The original field-project idea had envisioned activities in the field to strengthen the Taya system, to identify and develop physical measures to reduce the impacts of future floods and other climate-related impacts and to carry out further climate change risk assessments and projections to increase climate-related data. Unfortunately, the armed conflict that broke out in Sudan in April 2023 forced the team to reconsider the whole plan, objective and strategy.

The redesigned field-project was titled *HEART – Heritage Empowered Action for Resilience in Tuti: Strengthening heritage-based and community-led climate resilience during conflict through joint action*. The initial action plan shifted towards a community-focused strategy,

aiming to first understand how the current situation on the ground was evolving and particularly how it was affecting the local community and the Taya system. This specifically concerned the capacity to respond to the upcoming flood season. The main project objectives focused on (1) strengthening social cohesion in the face of both the ongoing conflict and the seasonal floods and (2) gathering information and documenting the Tuti community's knowledge of the Taya system in a pedagogic format to pass on to future generations.

Analysis and knowledge development

All the information gathered through the initial research and the social and community engagement allowed the team to develop the analysis of the Taya System following three phases:

Phase One – Preparedness: Enhancing flood preparedness is one of the key steps to mitigate the effects of the seasonal floods for Tuti residents. The Tuti flood mitigation committee organised strengthening the embankments and mobilising volunteers. *Tawatas* have accumulated knowledge about the island's terrain throughout the years, and this allows them to identify areas of vulnerability, prepare an action plan and organise fundraising.

Phase Two – Response: *Al-Tayas* are erected during each annual flood season and managed by a group of eight members from the closest neighbourhood. The early warning response starts when the watchmen of a *Taya* alert the principal flood mitigation committee about a breach of flood water in an area connected to their *Taya*. The flood committee contacts the nearest mosque to announce and launch the flood alert. During a flood emergency, erecting new embankments can take too much time, and, in order to respond faster, the *Tawatas* often use their own bodies to barricade and break the water force until reinforcements arrive. This act of bravery has been practised by the youth of Tuti in many major flood events such as the floods of 1946 and the flood of 2020 and has been commemorated in many poems and folklore songs.

One of the first actions for early recovery is to conduct a survey of the affected areas to evaluate the extent of the damage caused by the floods. Based on this evaluation, the committees decide on the appropriate strategy and the necessary resources required to assist the evacuated people and the actions to allow moving them back to their homes.

Phase three – Recovery: One of the earliest indications that the island is entering the recovery phase is seeing farmers prepare for the upcoming agricultural season. As the flood season ends, the flood committee surveys the affected areas to evaluate the damage caused by the floods. Based on this evaluation, the committee decides on the appropriate strategy and allocates the necessary resources to support recovery efforts. Priority is given to assisting evacuated individuals in returning to their homes, repairing power and water supply lines, reopening and repairing affected roads, cleaning debris and spraying pesticides to control waterborne diseases. The extent of damage is calculated by recording the loss for all residents, businesses and livelihoods affected by the floods, and this is then converted into currency for an accurate evaluation.

The recovery actions are not only limited to rebuilding, but it also serves to mitigate and prevent future risk and enhance better preparedness, following the *build back better* principle. *Tawatas* have earned a reputation for their fierce independence and strong self-reliance over the years.

Project results and lessons learned

This analysis is being used to develop the *Lessons from Tayas—Guidelines on Community-led Flood Mitigation Model* (currently under finalisation for publication), a guide which aims to reflect the Taya traditional knowledge and practices, to be applied in multi-crisis environment. Its main purpose is to help the Taya members train further future members and share this

learning with other communities who are in similar situations. In addition to these guidelines, the HEART team has connected with a filmmaker from Tuti Island to develop a video to feature the story of Tuti and the Taya system. Finally, the HEART team organised and delivered an online international webinar to present the challenges and progress of their project.

Among the projects' outcomes, the highlight was the interactions with the local community in Tuti, which has helped to consolidate the sense of network between the participants of the online activities. They committed to share details about any current community initiatives taking place on the island. They were also motivated to expand this initial group in the future by integrating other members, particularly youth groups, to transfer the knowledge and build capacity to prepare and respond to floods using their traditional practices adapted to the potential climate change impacts. The project had a very positive impact in the community, increasing their awareness and preparedness to protect themselves and their heritage in the context of compounding risks.

This community-heritage-based practice aims to serve as a basis to strengthen further collaboration with Tuti community members, both inside and outside the island. Since the current conflict situation is causing displacements, this can lead to loss of knowledge and cultural heritage. Additionally, the previously mentioned climate change impacts and desertification might contribute to further population displacements. A virtual community may help to keep their members connected even if located in different countries. Likewise, this initiative has ambitions to reach the younger generations from Tuti and even to be expanded to a broader audience from other communities that could benefit from a Taya-based model in building resilience and adapting to climate change.

Conclusion: looking into an uncertain future

The current situation in Sudan unfortunately represents a clear example of overlapping crises. Recurrent natural hazards, such as floods, have an intensified negative impact due to climate change; at the same time, its effects are aggravated by an armed conflict, severely affecting the lives and the livelihoods of the local community. The damage caused by the conflict may reduce the capacity of the community to prepare and respond to other threats. Since disasters and violent conflicts often happen at the same time, enhancing our understanding of how they are related may contribute to efforts to strengthen social cohesion and conflict resolution mechanisms in these areas, particularly considering climate change and the increasing prevalence of disasters linked to it (Caso *et al.*, 2023).

The Taya system holds a heritage value that comes from a history of resilience and continues to strengthen Tuti Island's capacity for flood monitoring, preparedness and response. This knowledge could be of great help and benefit if applied in other areas of Sudan. Therefore, its preservation and transfer to new generations is critical for the local community and beyond.

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Indigenous knowledge for climate action at the Ekyisalhalha kya Karoro sacred site, adjacent to Rwenzori mountains national park in Kasese

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Abstract

Purpose – This case study examines the contribution of Indigenous knowledge (IK) and practices to climate action at Ekyisalhalha kya Kororo sacred site, adjacent to Rwenzori Mountains National Park in the Kasese district of Western Uganda. This paper is intended to make a case for IK as an important component of climate change mitigation strategies especially if the knowledge is profiled and publicised. The paper presents aspects of traditional knowledge in terms of ceremonies, rituals, norms and customs that can be re-energised for climate change.

Design/methodology/approach – The authors employed mainly a participatory and qualitative data collection methodology. The data were collected in Kasese district largely from the local government officials, cultural leaders, civil society actors and representatives of indigenous minority communities such as the Basongora. Data were collected from both primary and secondary sources, at the desk and through community interactions to collect various narratives based on IK. Primary data were collected during individual interviews, by administering a semi-structured questionnaire and holding focus group discussions with different stakeholders in Kasese, Uganda. The respondents were carefully identified and included cultural leaders, young people, local government authorities and representatives of civil society organisations responsible for implementing climate change mitigation strategies.

Findings – Climate change effects are manifest in rising temperatures, flooding, desertification and other natural hazards. The Kasese district, in particular, has faced several climatic change catastrophes and there has been limited use or mainstreaming of the existing IK of the communities in the region in different climate action interventions. Amongst the key research findings was that IK can be utilised to address or mitigate climate change risks/hazards and provide valuable insights into climate adaptation strategies, including rain-water harvesting, weather forecasting and preparedness, and sustainable farming practices. In addition, it is easily accessible, especially in areas that modern science has not reached.

Research limitations/implications – Few elders with IK related to climate change mitigation and the disconnect between young people and IK bearers were limitations encountered during data collection.

Originality/value – The information in the article is an original compilation by the authors based on previous published work from the NetZero Heritage for Climate Action research project.

Keywords Climate change, Indigenous knowledge, Natural disasters, Cultural leaders, Mitigation, Knowledge bearers, Ritual cleansing, Indigenous minority communities, Ekyisalhalha kya Kororo, Kasese Uganda

Paper type Research paper

Location of the site

The site is located at the confluence of the Kabiri and Kithangetse rivers in Kyondo sub-county, Kasese district, in the Muyina Chiefdom of the Obusinga Bwa Rwenzururu, a cultural



institution of the Bakonzo community. The two rivers flow from the top of the Rwenzori Mountain ranges part of the Rwenzori Mountains National Park, a World Heritage Site. The site became a traditional court where different disputes and conflicts related to land, marriage, witchcraft and other injustices were resolved.

Floods in Kasese are a regular occurrence. Since 2014 Kasese has experienced four major floods in 2014, 2016, 2020 and 2022. During this time the number of people affected by floods and induced landslides has increased exponentially from 15,000 to 120,000. The cause of the floods can be traced to melting glaciers and intense rainfall. The glaciers are projected to melt by 2050. However, the State of Climate in Africa report from the World Meteorological Organisation and other agencies, released ahead of the UN climate conference which took place in Scotland in October 2021, predicted that at current rates all glaciers on Mt. Kenya, Tanzania's Kilimanjaro and Uganda's Rwenzoris, would be gone by the 2040s. This would certainly lead to an exponential increase in the volume of water in River Kabiri. The annual precipitation anomaly, according to Coupled Model Intercomparison Project 5 (CMIP5) ensemble for the near future (2050), is expected to increase which would intensify due to the micro-climate of the Rwenzori Mountains National Park. These extreme events have induced massive landslides, the last one was in 2022 which led to the loss of 15 people. The indirect impacts (displacement and loss of farm crops) will affect the total population of the district, more than 702,029 people, inevitably leading to land conflicts and increased food insecurity. The impacts are expected to be more intense than in the past because of increased deforestation, inadequate early warning systems and the lack of integration of IK in flood risk prevention and mitigation programmes. Additionally, such incidents could further reduce social cohesion amongst ethnic groups living along the river upstream and downstream, and, in particular, enhance the tensions over land use choices. Climate change-induced disasters such as floods and landslides threaten to widen river banks causing displacement of people, loss of lives, farmlands, property and livelihoods as well as infrastructure, amongst other effects.

Key aims and objectives of the project

The project aimed at enhancing the resilience and adaptation of the Ekisalhalha kya Kororo sacred cultural site and its surrounding areas to the effects of climate variability by utilising the traditional knowledge of the Indigenous communities in Kasese. The specific objectives of the project included:

- (1) Generating information on existing oral traditions and knowledge, cultural practices and beliefs and norms that can contribute to mitigating the impact of climate on cultural heritage.
- (2) Strengthening the capacity of the caretakers of cultural heritage sites to apply oral traditions, knowledge and cultural practices to reduce the effects of climate change.
- (3) Trial-testing the inclusion of Indigenous cultural practices in the management principles for the sacred cultural heritage site.

Method of data collection

The authors employed mainly a participatory and qualitative methodology to collect the data. The data were collected in Kasese district largely from the local government officials, cultural leaders, civil society actors and representatives of Indigenous minority communities such as the Basongora. Data were gathered from both primary and secondary sources, as part of a desk top survey and through community interactions to collect various narratives on IK. The data collection exercise was constrained by factors such as limited documentation of the IK, few elders with the relevant information, and not much literature about climate

change that is specific to the Rwenzori region. The challenge of limited documentation of IK was addressed through interactions with several members of the community, especially the clan leaders and ridge leaders in Kasese.

Strategies used to reduce the risks of climate change-related disasters and conflicts

During the project period, several strategies were developed and implemented to reduce risks from climate change disasters including:

- (1) Capacity-building to mainstream IK in climate change interventions. More than 25 stakeholders drawn from the Kasese Local Government district, civil society organisations, cultural institutions, parastatals and Indigenous minority communities were involved in capacity-building. The main objectives included introducing the participants to the notion of climate change, its associated risks, mitigation measures and adaptation and enhancing the capacity of key stakeholders to appreciate the role of IK in climate change mitigation.
- (2) Engaging young people. Given that more than 77% of Uganda's population is made up of people below the age of 30, it was essential to engage them during the project implementation to sustain the project interventions.
- (3) Indigenous tree planting. The planting of 2,000 Indigenous tree species, such as ficus natalis (locally known as mitooha), and bamboo in Kasese was carried out. The planted trees will remove carbon dioxide from the air, store it in the trees and soil and release oxygen into the atmosphere. The trees will help protect the Kabiri river banks against the effects of flooding and help communities along the river banks adapt to the changing climate changes.
- (4) Establishment of the River Kabiri Valley Climate Change Mitigation Committee. Towards the end of the project, a climate change committee with representatives drawn from eight villages along the river valley was established.
- (5) Cross-generational dialogue. During the project implementation, a dialogue meeting between young people and elders was held in Kasese to provide an opportunity for young people to acquire information related to IK for climate change from the elders.

Outcomes and outputs – qualitative and quantitative

A total of 150 copies of a publication profiling IK for climate action were produced and disseminated during an event in the Kasese district, as well as 50 T-shirts for the River Kabiri Valley Climate Change Mitigation Committee. About 120 participants carried out participatory mapping of areas for tree planting and 30 community members participated in the capacity-building training on how to utilise IK to address climate change variations. A total of 60 young people from schools had an opportunity to interact with elders to learn about the existence of IK. The commitment by climate change actors such as the Red Cross and UWA to mainstream cultural approaches during the design of climate change interventions was amongst the most significant outcomes of the project. This will, however, require continuous follow-up and engagement with such agencies. The IK of the Bakonzo was documented. Considerable environmental knowledge has been accumulated and is transmitted through cultural practices and norms related to the management of the site and forecasting climate changes.

Community-based early warning systems

During the project implementation, which involved collecting IK for climate action, ridge leaders and traditional healers were interviewed. During the interviews, it was mentioned

that there was a god called Nyabingi or Omughole in people's homes. She would appear in the open and speak and the ridge leaders would translate her message. She predicted weather conditions or long droughts and warned people to keep food in granaries. The ridge leaders further mentioned that traditionally, there were special people locally known as abalaghauili (prophets) or abakumukali (prophetesses) who informed people about impending disasters, especially flooding and droughts. Bird species locally called ekyipipi predict both the onset of a rainy season and the dry season. In case of any impending flooding, the smell of the river waters changes and several birds and snakes start migrating from the areas that are likely to be affected by the floods.

Governance and leadership

Many villages are situated on the ridges of the mountain slopes. Each ridge is traditionally governed by a ridge leader (Mukulu wa Bulhambu). Whenever there are calamities such as floods, drought, or famine, the ridge leaders mobilise their people to bring items such as animals (goats, sheep) that are used as sacrifices to the water god.

Traditional worship, taboos and ritual cleansing ceremony

The ridge leaders carry out ritual cleansing of the mountain ridges and rivers, however, in the past five years, they have not carried out any cleansing rituals because their King was incarcerated in Kampala and the churches have campaigned against the rituals. The recent flooding of rivers in Kasese is largely attributed to the non-performance of the rituals and the lack of respect for the ridge leaders. Most of the interventions to mitigate climate change effects in the area are externally driven and use top-down approaches where clan and ridge leaders are brought on board at the implementation stage rather than during the planning/strategy development stages.

Conclusions

During and after the documentation exercise, it was clear that IK could be used to address the effects of climate change particularly in Kasese, and that the Bakonzo still value and use cultural ceremonies, rituals and norms to safeguard riverbanks and other water bodies, albeit seldomly. The belief system attached to river confluences was seen to be appreciated mostly by elders and ridge leaders. The existence and utilisation of this knowledge are threatened due to several factors such as the influence of Christianity, the disconnect between young people and the knowledge bearers and the tendency to focus on modern scientific approaches rather than incorporating indigenous knowledge (IK).

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