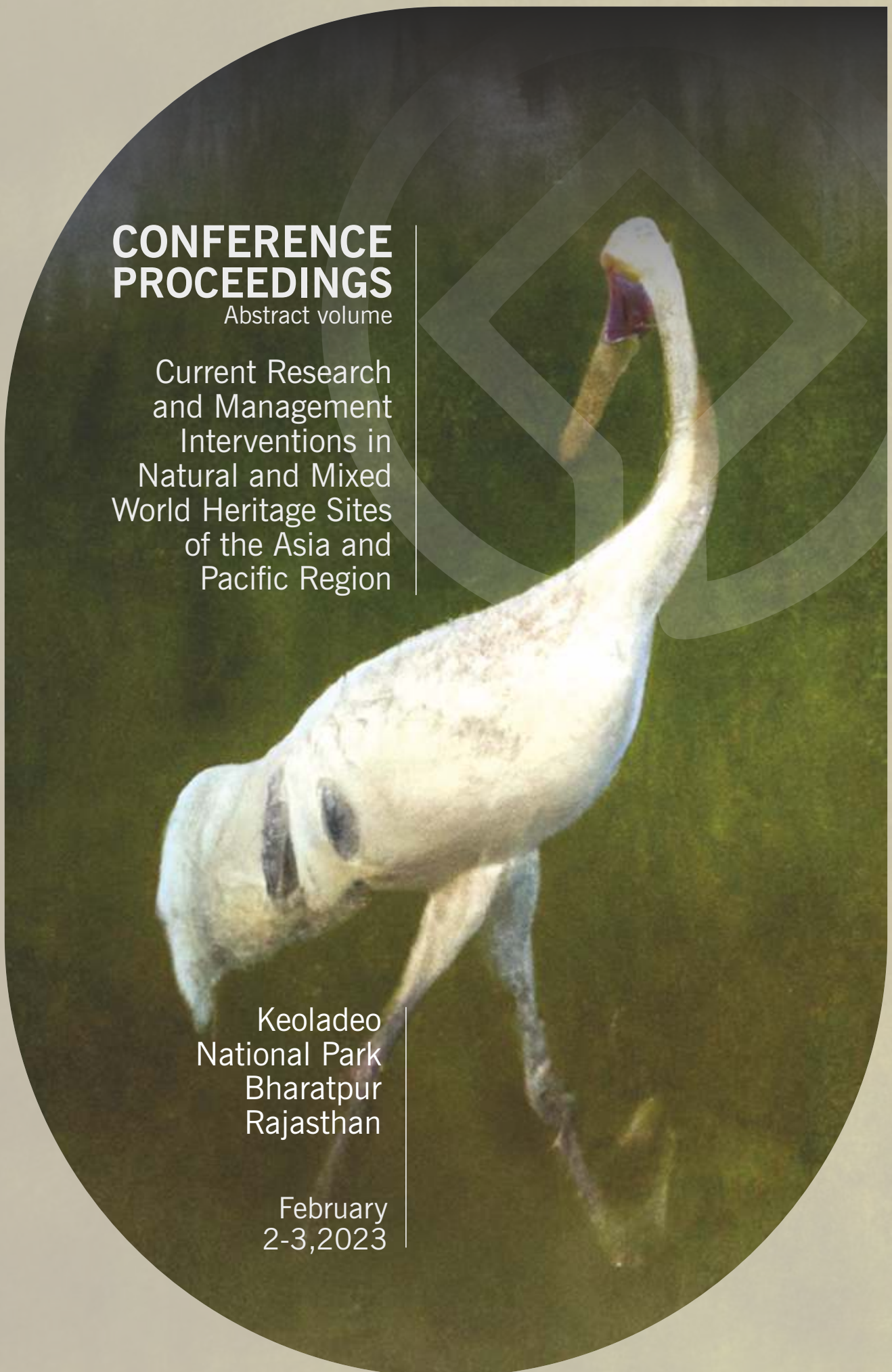


CONFERENCE PROCEEDINGS

Abstract volume

Current Research and Management Interventions in Natural and Mixed World Heritage Sites of the Asia and Pacific Region

Keoladeo
National Park
Bharatpur
Rajasthan

February
2-3,2023

United Nations Educational, Scientific and Cultural Organization

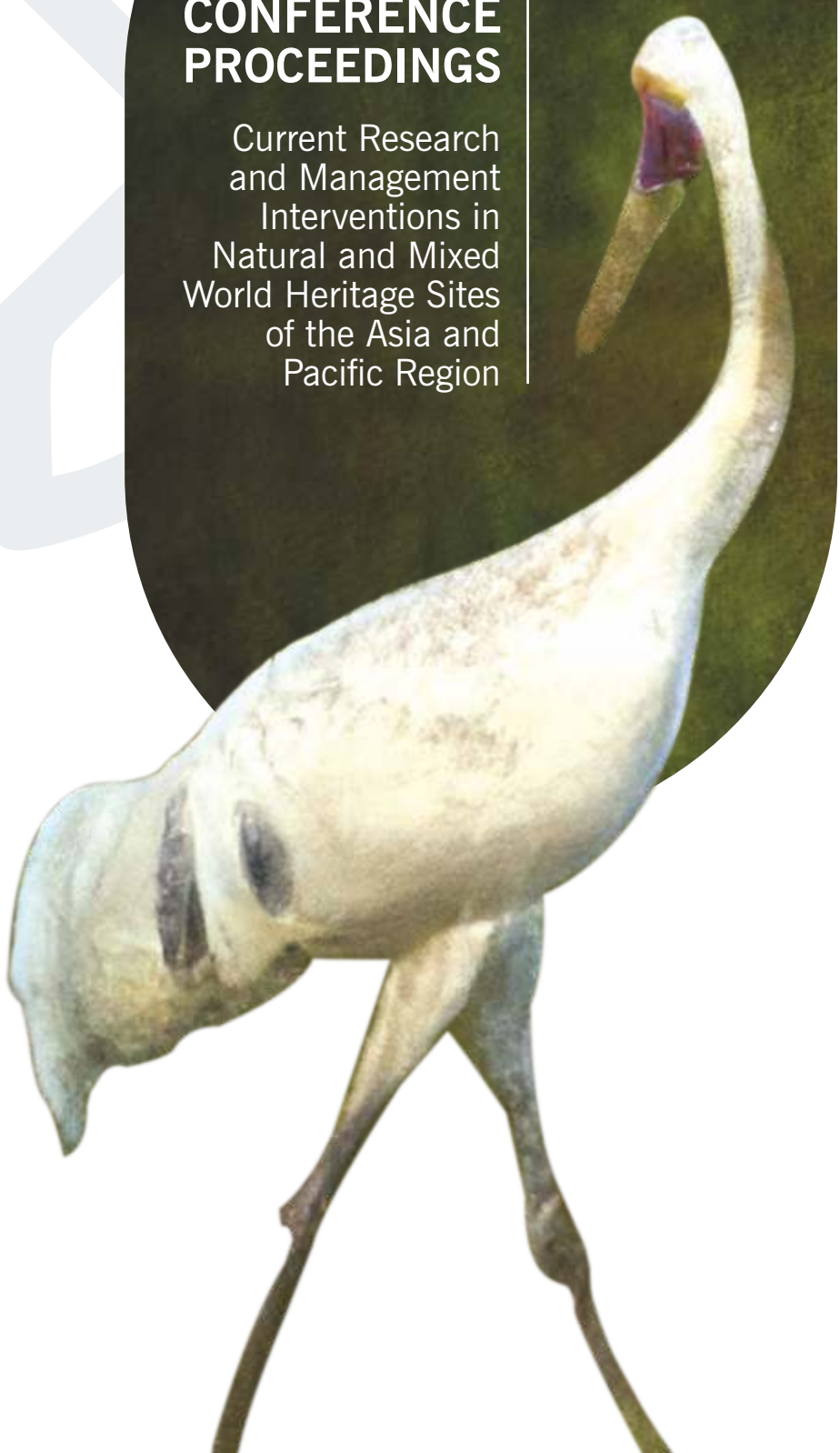
World Heritage Centre

Wildlife Institute of India - Category 2 Centre
World Natural Heritage Management and Training for Asia and the Pacific Region
Under the auspices of UNESCO

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

CONFERENCE PROCEEDINGS

Current Research and Management Interventions in Natural and Mixed World Heritage Sites of the Asia and Pacific Region



Keoladeo
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CONTENTS

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PREFACE

Natural and Mixed World Heritage sites are inscribed because of their superlative (outstanding universal) values relating to scenery and other superb natural phenomenon, including geology, ecosystems, biodiversity, and cultural importance in the context of natural sites. The intention of inscribing WHS is to help managers understand and incorporate World Heritage concepts and processes into natural site management. Natural World Heritage sites are the most significant protected areas on Earth, having large intact land and seascapes. As of 2022, there are 218 natural sites inscribed, and 39 sites classified as “mixed” (natural and cultural). Although the number of these sites is comparatively small, these properties hold over 369 million hectares of land and sea, an area bigger than the extent of India. Their coverage corresponds to about 8% of the total area covered by more than 259,000 protected areas globally. Given their high profile and visibility on the international stage, natural and mixed World Heritage sites offer a window into the successes and challenges on the frontlines of conservation.

Natural World Heritage sites are not just iconic places with exceptional nature; they also provide benefits that add to human well-being, according to 'The Benefits of Natural World Heritage' study by IUCN and UNEP's World Conservation Monitoring Centre. Furthermore, Natural World Heritage sites contribute to global climate stability by storing a significant quantity of carbon. Forests found in World Heritage sites in the tropical regions stock 5.7 billion tons of carbon. Moreover, Two-thirds of natural sites on the UNESCO World Heritage List are vital to water resources, and about half help out to prevent natural disasters such as floods and landslides. Therefore, monitoring them is an important indicator of the effectiveness of the global community's overall endeavour to address conservation challenges. Natural and Mixed heritage sites in India have been facing many challenges in recent years due to extreme pressure exerted on natural ecosystems. These pressures are a consequence of the high density of the population, risk of catastrophic disasters, constant economic growth, and persistent poverty. World Heritage properties are exposed to Natural (flood, drought, earthquake, and Tsunami) and manmade (forest fires, arm conflicts, industrial accidents, mass refugee movements), threatening the integrity and may compromise natural values. Therefore, it is necessary to understand the current status and ongoing management interventions of WHSs in Asia and Pacific region.

This conference aims to bring knowledge and experience of site mangers, researchers, educational institutes, NGOs and various other stakeholders associated with the heritage site management and conservation of Natural and Mixed World Heritage Sites in the Asia and Pacific region. In addition, this workshop will also bring eminent National experts and agencies to discuss, deliberate strategies to be adopted for the long-term conservation of World Heritage Sites in the Asia and Pacific Region. The outcome of the conference shall be helpful for the scientists, policy makers, NGOs to work develop appropriate strategies to improve management of WHSs, save ecosystem and ensure ecosystem services.

INFORMATION ON WORLD HERITAGE

What is World Heritage?

The cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. World Heritage is the designation for places on Earth that are of outstanding universal value to humanity and as such, have been inscribed on the World Heritage List to be protected for future generations to appreciate and enjoy.

What is the World Heritage Convention?

The World Heritage Convention, adopted in 1972, is a legally binding instrument providing an intergovernmental framework for international cooperation for the identification and conservation of the world's most outstanding natural and cultural properties. The document developed from the merging of two separate movements: the first focusing on the preservation of cultural sites and the other dealing with the conservation of nature, defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List. It sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. Under the Convention, States Parties are obliged to report regularly to the World Heritage Committee on the state of conservation of their World Heritage properties.

What are Natural, Cultural and Mixed Heritage ?

Natural features consisting of physical and biological formations or groups of such formations; **Geological and physiographical formations** and precisely delineated areas which constitute the habitat of threatened species of animals and plants; **Natural sites** or precisely delineated natural areas of Outstanding Universal Value from the point of view of science, conservation or natural beauty- are considered as **natural heritage.**

Monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features; **Groups of buildings**: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape; **Sites**: works of man or the combined works of nature and of man, and areas including archaeological sites, which are of Outstanding Universal Value from the historical, aesthetic, ethnological or anthropological points of view- are considered as **cultural heritage**.

Properties shall be considered as "**mixed cultural and natural heritage**" if they satisfy a part or whole of the definitions of both cultural and natural heritage.

WHAT ARE THE CRITERIA FOR SELECTION OF WORLD HERITAGE SITES?

The World Heritage Committee considers a property as having Outstanding Universal Value, if the property meets one or more of the following criteria. Nominated properties shall therefore:

(i) represent a masterpiece of human creative genius;

(ii) exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

(iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

(iv) be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

(vi) be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);

(vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

(viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

(ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

(x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation.

- Criteria (i) to (vi) represents cultural heritage properties
- Criteria (vii) to (x) represents natural heritage properties

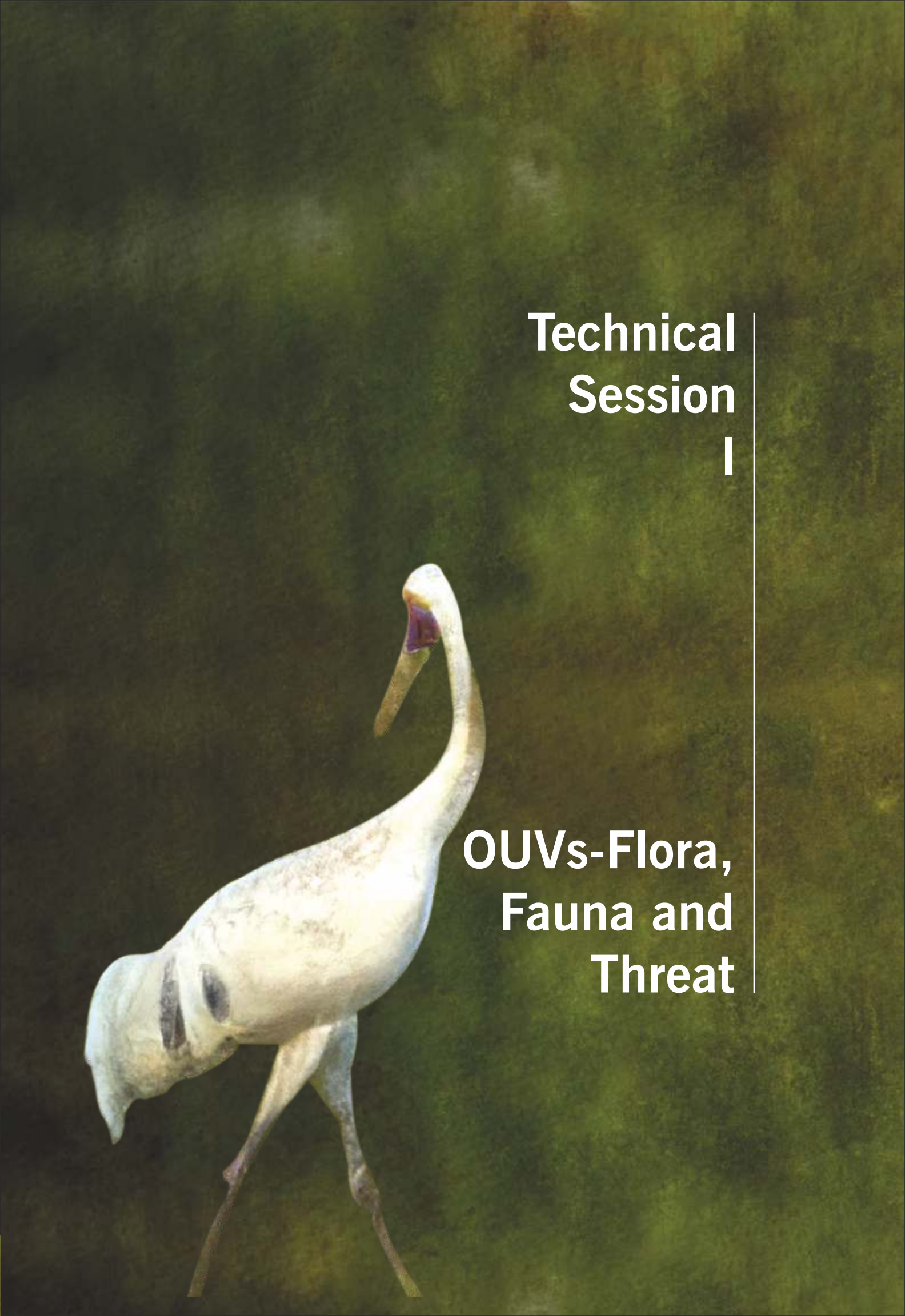
To be deemed of Outstanding Universal Value, a property must also meet the conditions of integrity and/or authenticity and must have an adequate protection and management system to ensure its safeguarding.

HOW MANY WORLD HERITAGE SITES ARE THERE?

As of 2022, there are a total of 1154 World Heritage properties present around the globe. Out of which 897 are cultural, 218 are natural and 39 sites are mixed.

In India, there are 40 sites inscribed as World Heritage Property. Out of which 32 are cultural heritage sites, 7 natural heritage sites and 1 mixed heritage site.

Technical Session I



OUVs-Flora, Fauna and Threat

Assessment of certain Insect Groups in Keoladeo National Park, Bharatpur, Rajasthan

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Abstract

Keoladeo National Park (KNP) is famous for birds and many of them are insectivorous. Hence, the management interventions are required to provide the suitable condition for the growth of insects which consequently will help in attracting the insectivorous birds. In the current study, we prepared a checklist of two orders of class insecta viz. Odonata and Coleoptera. To conduct the study in the field, firstly sites were identified after that samples were collected through Mark Telfer's Pitfall Trap Method. After collection, samples were identified through specimens. Odonata includes Dragonflies and Damselflies. Our study revealed 41 species from 24 genera and 3 families of Dragonflies (Damselflies are excluded in the present communication). Coleoptera reflected 91 species from 62 genera and 22 families. Diversity indices were also calculated for Beetle fauna that signifies good diversity ratio. The results of this study will help in preparing the baseline data of insects species found in the KNP. Which further will help to the park management to manage these species. Management interventions are required to provide the suitable condition for the growth of insects which consequently will help in attracting the insectivorous birds. Other biological importance of this work includes the crucial role of beetles in mineral recycling of the park, facts to understand biological control mechanism prevailing in agricultural lands around national parks.

Keywords: Insects, World Heritage, Park Management, Coleoptera, Dragonflies

Elusive denizens of Khangchendzonga National Park: The Red Panda

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Abstract

Khangchendzonga National Park, India's first "mixed heritage" site, harbors elusive species across its habitat. Red panda, amongst them, is spread across the Khangchendzonga Biosphere Reserve (KBR), covering an area of 2,620 km^2 (National Park = 1,784 km^2 and Buffer Zone = 836 km^2). Knowledge of the species' occurrence is reported only in seven protected areas, but the species' biology, ecology and threats are still largely unknown in Sikkim. The talk mostly focuses on the current status of red pandas in the landscape, potential suitable habitats there and relevantly influencing bio-climatic variables, species-habitat associations, anthropogenic factors and the needed recommendations for the priority zones within KBR. We completed transects to collect direct and indirect encounter data from protected areas, habitat monitoring to understand their preferences and completed questionnaire-based community surveys in the fringe villages of KBR, such as Labdang (West), and Lachen (North). We generated habitat prioritisation using the Zonal statistics and multi statistics analysis. These approaches allowed us to determine hotspots by knowing the current status, distribution, habitat, and threats to red pandas across KBR. We completed transects to collect direct and indirect encounter data from protected areas, habitat monitoring to understand their preferences and completed questionnaire-based community surveys in the fringe villages of KBR, such as Labdang (West), and Lachen (North). We generated habitat prioritization in two prior locations i.e. Tsoka and Lachen, using the Zonal statistics and multi statistics analysis. These approaches allowed us to determine hotspots by knowing the current status, distribution, habitat, and threats to red pandas across KBR. Besides creating a comprehensive baseline in one of the strongholds of Red Panda in India, the identified conservation priority areas will be crucial for landscape-level management planning for the species and its landscape. Although the KBR is mostly highlighted by its pristine landscape and diverse flora and fauna, but there is still no management plan for its state elusive animals, the red panda. These broad findings not only help KBR/KNP, it truly have implications for the entire landscape.

Keywords: Red Panda, Conservation, Sikkim, EDGE species, Eastern Himalayas

The Siberian Crane Memory Project

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Abstract

The last pair of Siberian Cranes left after wintering in 2001-2002 to never return. Keoladeo lost it's Kohinoor. While the Indian bird watching community has exploded and Keoladeo with its easy access and rich bird diversity has become one of the most popular birding sites, the Siberian Cranes are all but forgotten. What is the role of memory? Can the memory of Siberian Cranes and their extinction serve any purpose, especially as we are seeking ways of addressing potential extinction of other species. Field work, desk research, discussions with people who have seen the Siberian Crane, photographed it, worked on its conservation, researched on it. For now, I have created an online space, basically a simple Facebook page "The Siberian Crane Memory Project" which is crowd sourcing images, anecdotes, articles from the larger community of bird watchers. Memory has an important role in heritage and heritage conservation even more so when the actual living manifestation of it ceases to exist. Extinction is a sad, soul crushing reality, but by remembering it, it gives us an opportunity to understand, reflect, honour and cherish what we have lost, what we still have. An easily accessible platform like a Facebook page provides for crowd sourcing of memories that are otherwise lost, forgotten and gives them life and space. It is an important tool for conservation and we should actively engage with it. Heritage by its very nature is unfortunately at risk of disparition. By remembering the extinction of the Siberian Crane through a Memory Project using easily accessible social media platforms one is able to highlight this risk amongst the broader stakeholder groups and create a stronger case, especially when it comes to the protection of critically endangered species.

Keywords: Extinction, Siberian Cranes, Memory, crowdsourcing, social media

Monitoring OUVs of GHNPCA using large carnivores (model species) and its comparison with Gangotri landscape

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Abstract

We attempted to understand how anthropogenic and ecological factors impact the co-occurrence pattern of two large carnivore species the Himalayan brown Bear (*Ursus arctos isabellinus*) and Asiatic Black Bear (*Ursus thibetanus*) in Great Himalayan National Park and Conservation Area (GHNPCA) and Gangotri landscape in Western Himalaya of India. We were able to assess management interventions in the study areas by comparing the habitat use of species in two geographically similar areas with varying human pressures. Both of these species have a large home range, and human-bear conflict in the Himalaya has increased in recent years. As a result, it is critical for site managers to understand the habitat requirements and assess impact of anthropogenic pressure in plan management interventions. Camera trapping (2017-2019) was conducted using camera traps following grid wise sampling by dividing the study area into 2×2 km grids for GHNPCA and 3×3 km for Gangotri basin. We applied two-species occupancy models to assess the co-occurrence of paired sympatric carnivores in the study areas). Further, to understand the influence of anthropogenic activity, we also looked at the (i) daily activity patterns of species with the anthropogenic disturbances (ii) coefficient of temporal overlap between species and anthropogenic disturbances. We applied kernel density estimation techniques to measure the overlap between the two bear species and their overlap with the anthropogenic elements. We found (i) a prominent association between two bear species (98%) indicating spatial overlap in GHNPCA but found the two species spatially segregated (91%) in Gangotri landscape (ii) the spatially co-occurring bear species were found to be temporarily segregated in GHNPCA and in the absence of spatial overlap in Gangotri landscape both the bear species displayed similar activity patterns. The comparative study revealed that the brown bear uses the forested habitats of GHNPCA, most likely due to high anthropogenic disturbances in alpine areas, whereas no spatial association was observed in the Gangotri landscape basin with comparatively low anthropogenic disturbances. Our results provide insights into the spatiotemporal behavior of two large carnivores and reveal their sympatric and allopatric relationships in two different anthropogenic environments. We found that, in addition to biological factors, anthropogenic pressures may also influence interspecific competition. As large carnivores are pushed into smaller, more fragmented areas, conservation of the carnivores' guilds in protected areas requires consideration of interspecies interactions. The GHNPCA faces an alarming human presence compared to Gangotri landscape, especially at higher elevations where medicinal plants are collected. In the GHNPCA, establishing an adjacent buffer zone appears arbitrary; increasing human pressure in the core area requires management attention. Human encroachment and high grazing pressure, particularly in the alpine areas of GHNPCA, push animals such as Himalayan brown bears to suboptimal habitats. We recommend developing pockets of disturbance-free areas in the alpine habitats accompanied by awareness programs, effective compensation schemes, and local communities support.

Keywords: World heritage site, Himalayan brown bear, Asiatic black bear, anthropogenic pressures, temporal activity

Technical Session II

Climate Change and Disaster Risk Reduction

Thematic methodology to strategically apply Climate Vulnerability Index assessments for World Heritage properties

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Abstract

The CVI (Climate Vulnerability Index) addresses the need for rapid and systematic climate vulnerability assessments of World Heritage properties, a need that is urgent given that climate impacts are already occurring. However, completing a full CVI for over 1100 properties globally in a timely manner is difficult given the number of properties. A thematic approach has been developed to address this problem by helping prioritise properties for a CVI analysis based on the most important values contained within them. The thematic matrix can also promote strategic networking amongst the managers of properties with common values to share CVI outcomes. The methodology uses the property values and attributes contained in each property's Statement of Outstanding Universal Value and, where available, other official heritage documentation (e.g., IUCN Outlook Reports). These values are clustered into broad thematic groups, which are then scored according to their contribution to each property's OUV using a bespoke Score Guide. The matrix analysis is presented in an easy-to-use spreadsheet format to allow for ease of interpretation across different levels of expertise. Our pilot study considered natural properties in the UNESCO Africa region. We are currently applying the same methodology to analyse cultural properties in the Indian subcontinent. The assessment also contains a level of unavoidable subjectivity due to the use of the descriptive texts in the source documents. The interpretation of these documents is dependent on assessors' expertise and subjectivity of language. However, the Score Guide (along with a table of key words identified) helped to remove much of this subjectivity by providing a more rigid scoring structure. Most aspects of the methodology can be extrapolated to cultural properties, some with minor modifications, for application in the Indian subcontinent. The CVI is a tried-and-tested tool for rapid climate vulnerability assessment that brings together managers and other stakeholders in a productive, interactive and facilitated workshop setting. The thematic methodology allows for easy and quick visualisation of the key values contributing to a property's OUV. The approach is systematic and readily applicable across various heritage types. It can also prompt strategic networking amongst site managers of properties within thematic groups. The results of the Africa natural thematic study have already led to two successful CVI applications in collaboration with UNESCO; candidate properties for the cultural analogue are being sought.

Keywords: World Heritage; Thematic analysis, Climate vulnerability, Adaptive management, Strategic networking, OUV

Vulnerability of Natural and Mixed World Heritage Sites of India to Climate change

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Abstract

Climate change is increasingly being considered as a threat to natural and cultural World Heritage sites (WHS). Climate change also accelerates existing threats by interacting with other stressors. A stronger emphasis is required in both research and practice to investigate measures for combating climate change related threats. Impact of changing climatic condition might be more severe to Natural WHS, as these sites heritage value lies upon its already threatened biodiversity and ecosystem. India has seven natural and one mixed heritage sites and seven of them located in three biodiversity hotspots. Till date, limited studies have been conducted to understand the impact of climate change on India's natural and mixed WHS. In this study, Using Climate and Ecological Niche Factor Analysis (CENFA) we identified the climatic vulnerability of India's natural and mixed heritage sites. We used CENFA approach, implemented by Rinnan and Lawler (2019). This approach derives two metrics: (i) Sensitivity and (ii) Exposure to climate change. Sensitivity and exposure are then combined to calculate vulnerability. The analysis was performed within the boundaries of heritage sites. We used Worldclim2.1 Near present and Shared socioeconomic pathway (SSP) based future bioclimatic variables. SSP245 and SSP585 of the respective biogeographic zones of the WHS was used as reference area for the analysis. We prepared sensitivity, exposure, and vulnerability maps to show the most vulnerable areas within each site. All vulnerability analyses were carried out using the "CENFA" package in R and in ArcGIS. Among the three WHS in Himalayan biogeographic zone, Nanda Devi and valley of flowers National Park (NP) will have higher climate exposure and vulnerability, followed by Great Himalayan NP. In Northeast, Kaziranga NP will have higher vulnerability than Manas NP. Two climate exposure hotspots were found within Western ghats WHS, i.e., in Northern portion and in the hill regions of Kannur, Kasaragarh and Dakshina Kannada districts. Higher sensitivity was found in the Nilgiris and in the Hills of Idukki, Dindigul and Udupi. Natural heritage sites comprise habitat of already threatened species and climate change potentially amplify these threats in future. This study identifies climatically vulnerable areas within each natural and mixed WHS of India. Output of the study can be used to supplement the existing management strategies to safeguard the species habitat and ecosystem for future and building a climate resilient landscape.

Keywords: Heritage sites, Climate vulnerability, CENFA

Impacts of Climate Change on World Heritage Properties: Exploring its Policy Implementation Gap

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Abstract

According to the IUCN World Heritage (WH) Outlook 3, climate change is the biggest threat to Natural World Heritage. It is impacting their Outstanding Universal Value, including their integrity and authenticity, and their potential for economic and social development. Addressing World Heritage values in climate change decision-making processes thus becomes crucial. Even though climate change is a well-identified threat, there is a lack of reporting in the WH monitoring system. This paper explores the extent of identifying, monitoring and reporting climate change as a potential threat within the WH monitoring system in India. It offers an overview of practice based on the extent to which WH properties (natural and mixed) implement landscape-based approaches alongside conservation and management of their OUVs with respect to climate change. In this study, we focused on Climate change as a key term. The State of Conservation (SOC) reports and periodic reports of all natural and mixed properties of India were consulted from the UNESCO website. Data was collated in varying formats from diverse sources, including questionnaire, websites and information gathered from research articles pertaining to monitoring and management of natural and mixed heritage sites. Through directed content analysis, we sought to explore insights on the situational and management context in which climate change was documented in these reports. The aim was to understand how these sites are addressing the global phenomenon of climate change. We consulted online reports up to 2022. This study provides an overview of how climate change is discussed and documented within the WH monitoring system. The politicized disputes between state parties, the WH centre, and advisory bodies frequently cast doubt on the validity of this monitoring mechanism. Despite these restrictions, the study found that there has been improvement in identifying climate change as a threat to WH properties. However, the monitoring system has not yet been properly integrated to address this problem. Our investigation also revealed that a clarification is necessary regarding what is being monitored and reported as "climate change". Developing a common understanding of what constitutes anthropogenic climate change and its associated impacts, including how these can be reduced through feasible adaptation and mitigation measures for WH properties, may serve as a crucial first step in improving the monitoring of these properties. Policymakers can strengthen WH multi-scale governance systems by investigating and putting into practise landscape-based management methods. In addition to fostering effective governance practices, this may help achieve sustainable goals locally by incorporating heritage values. Additionally, for effective policy implementation on the ground, it is crucial to disseminate all relevant knowledge on climate change, related policies, and feasible mitigation measures. World heritage sites are affected by climate change at present and in the future, which also impacts their outstanding universal values. An immediate response to the impacts of this global phenomenon on these sites thus becomes imminent. These properties serve as observatories and provide options for society to mitigate and adapt to climate change through ecosystem benefits. On consulting the SOC and periodic reports of all natural and mixed heritage sites of India, a gap in policy-implementation was observed. Despite being one of the topmost threats to WHS, impact of climate change was not acknowledged and documented satisfactorily. The WH monitoring system reporting thus needs a revamping for efficient identification, monitoring and reporting of climate change and its potential impacts on world heritage properties.

Keywords: World Heritage (WH) properties, Governance, Adaptation measures, Mitigation measures

Pandemic, preparedness, and parks: a case study from the PAs of Uttarakhand, Western Himalaya

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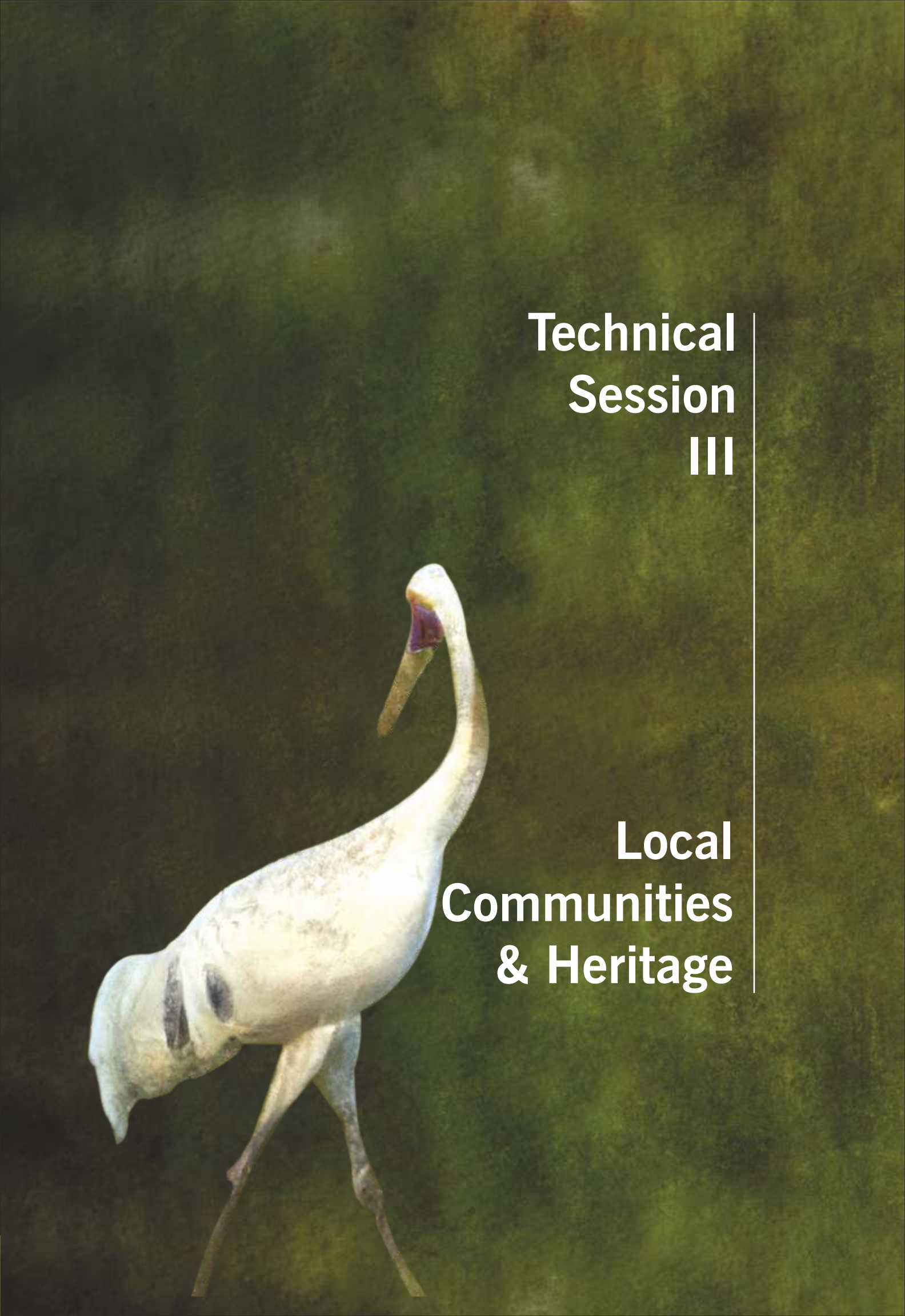
Abstract

The study addresses disaster risk preparedness and reduction in the 12 national parks and sanctuaries across Uttarakhand. The survey right after the pandemic has captured the problems faced in field by staff which should be incorporated at both policy and management levels. The personal interviews go beyond COVID 19 and look at other disasters that the state is at risk due to climate change and other factors. The research methods were both qualitative and quantitative. Data was collected through a bilingual questionnaire and followed by structured telephonic conversations. An integrated disaster management plan is required for each PA of Uttarakhand, as each has it's own uniqueness. In the absence of such plans and training the PA managers depend on the state machinery for all support in case of disasters. This planning process and plan should be inclusive, involving the community which opens up a process of dialogue with the managers of the protected site and the community. It brings together a collective force to address disasters and be prepared for it with the latest technology and skillsets. The WHS of Nandadevi national Park and Valley of Flowers national Park do not have a disaster management plan inspite of its location being so remote and having a good footfall of visitors. The idea of having an integrated management plan will incorporate issues of sustainability, technology and biodiversity conservation of the WHS.

Keywords: World heritage, disaster, community, sustainability, management

Technical Session III



Local Communities & Heritage

Understanding the Role of Forest-based Ecosystem Services in Livelihoods Security of the Forest Dependent People in the Western Ghats

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Abstract

The study examines the co-dependency between forest management and the livelihoods of forest dependent communities (FDCs) of Sindhudurg and Ratnagiri districts, which form a part of the Western Ghats in Maharashtra. Additionally, the study identifies essential forest products and their role in the food and income security of the FDCs. The study is based on a Need assessment survey, and Participatory Rural Appraisal (PRA) methods were used for data collection among the FDCs in these districts. People residing near forest fringe areas are co-dependent on the forests for their livelihood activities and well-being. Forest-based ecosystem services (FESs) provide wild edible plants (WEPs), fruits, honey, and other Non-Timber Forest Products (NTFPs) and play a crucial role in income and food security for forest dependent communities (FDCs). Identification of forest products and their utility and functionality in everyday life requires specific skills, and their procurement requires local knowledge. Locally available forest products are commonly included in the traditional dietary practices of these FDCs. These products are primarily consumed by the FDCs at the household level, while the surplus products are traded in the local market for additional income. The availability of these products is primarily seasonal, and due to rapid deforestation and the ever-increasing development activities leading to lesser vegetation. Also, the need for more efforts and a sense of urgency to protect the common pool resources is exacerbating the rapid reduction in availability across various locations in Maharashtra. The study was conducted in the Sindhudurg and Ratnagiri districts of Maharashtra, which is part of the Western Ghats. UNESCO declared the Western Ghats a natural world heritage site in 2012. The Western Ghat is among the biodiversity hotspots known for its diversified culture and ecological landscape.

Keywords: Forest Products, Forest Management, Livelihoods Security, Western Ghats

Conservation Livelihood approach for fringe villagers- case study from Manas World Heritage Site

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Abstract

Our talk mainly focuses on reducing anthropogenic pressure on the MWHS through conservation livelihood approach where major interventions were focused on farm-based and non-farm-based sectors. The fringe villages of MWHS are severely affected by more than two decade long civil agitation and remain isolated from good road network, higher education, health facility and people need to face issues of HWC. Hence villagers are heavy depend upon natural resources of the park. Aaranyak has been trying to empower people to be self sustain and reduce dependency on natural resources of the park. The Conservation livelihood around MWHS was designed based on the participatory planning with family centric model, where 1400 marginalized Households (HH) categorized landless, agricultural landless, wage-earning families and women headed families. Beneficiaries were selected through FGD, PRA and followed by that willingness assessment was carried out to find out interested livelihood intervention. Once beneficiaries registered under a particular farm based or non-farm-based intervention, they were given training and then raw materials, tools, equipment to start initiative. Regular handholding carried out along with conservation education to make them understand about importance of conservation, marketing linkage provided once products were ready.

The Conservation livelihood interventions positively impacted 90% of the 1400 HH. The HH income increased by 75% compared to baseline of INR2500 per month as in 2015. Over 70% of beneficiaries are not going inside the park since we started our interventions. The experiments reveal that homestead agroforestry, handloom and piggery are potential areas in the context of fringe villages of MNP to provide sustainable livelihoods to the families where existing traditional knowledge plays a crucial role in people mobilization, application of skills and continuation of livelihood endeavor. Manas WHS is 'in danger' for almost two decade and still Manas in the revival stage. Our livelihood works have been directly helping the management and conservation of MWHS as people living in fringe villages are understanding about importance of MWHS and also reducing pressure on the park resources.

Keywords: Manas, Conservation, Livelihood, Anthropogenic pressure

Sacred Groves: A win-win for nature and culture conservation in Khangchendzonga Biosphere

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Abstract

The conservation and the sustainable utilization of the forest resources by the fringe communities needs to be balanced. It is made possible through governmental policies and locale support. At the time when forest and other natural resources are seen as a commodity for earning and business, it is difficult for policy enforcement agencies and environmentalist to make balance between conservation and resource use. This study highlights the cultural practice of the Lepcha community of keeping sacred groves. This way they not only conserves the traditional and cultural values but also the natural resource of the area. This truly signifies the mixed heritage value of KBR. The study is done in the villages of Dzongu, a Lepcha Community Reserve in North Sikkim, comprising the areas under the transition and buffer zones of KBR. The Sacred Groves (SGs) and its cultural significance were assessed through questionnaire survey with 40 elder members of the villages. Altogether 20 SGs were considered, covering an area of 2 ha, with groves as small as a single tree to more than 0.36 ha are identified. In each of the SGs, vegetation analyze through quadrat method was done and the tree species richness, density, and IVI was calculated to understand the phyto-sociological setup of trees.

The sacred grove are identified by the Lepcha shaman (mun and bungthings) of the village, as a place where deities resides and are thereafter kept sacred and undisturbed. The groves are associated with various taboos and stories of past incidences. It is believed that any kind of activities, including the felling of trees, loud noises, soiling the area, fodder and fuel-wood collection etc. may disturb the deities and thus bring ill fate and hazards to the individual responsible or to the villagers. 98 tree species including 2 varieties, under 69 genera and 38 families are found. Lauraceae is the dominant family with the highest number of species (10), followed by Moraceae (9), Euphorbiaceae (8), Anacardiaceae and Magnoliaceae with 5 species each. Ficus with 8 species, Magnolia (5), Castanopsis (4), are the most represented genera. Density of adult trees in SGs were found to be 680 stem/ha. Species with the higher density in the SGs are *Schima wallichii* (36 individual/ha) and *Ostodes paniculata* (31 individual/ha) and Ficus benghalensis (28 individual/ha). *Ficus benghalensis* was found to be most dominant with species IVI of 31, followed by *Ficus elastica* (28), and *Schima wallichii* (11). *Ficus elastica*, *Engelhardia spicata*, *Schima wallichii*, *Ficus benghalensis* are some of the sacred trees identified. Both natural and cultural elements are well safeguarded in Sacred Groves by the local belief system of the Lepchas, without the enforcement of any laws and policies. These patches of SGs are truly a miniature mixed heritage sites within a larger one. Our understanding of the traditional knowledge regarding the plant resources conservation practices is still in infancy. Under the prevailing conditions the Lepcha tribe with their rich cultural and traditional knowledge and being the endangered tribe gets the ultimate priority and importance for such studies in KBR.

Keywords: Conservation, Culture, Indigenous, Mixed-heritage site, Sacred Grove

Interdisciplinary approaches in sustaining complex 'lived' landscapes: Bridging theory and practise through praxis

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Abstract

Based on in-depth engagement with WH Sites, we note that management plans aim to be inclusive, an aspect that is not sufficiently acknowledged by overarching frameworks, such as the Authorised Heritage Discourse. We simultaneously observe that these well-intended plans end up circumscribing sites through reductive categories. The outcome is a rigid boundary and the site being comprehended as an isolated entity rather than as part of a complex network that is more than just nature or culture. The unintended consequence, we often observe, is both environmental and social disjunctures. The key concern is how can policies and plans reduce conflict? A systematic interdisciplinary methodology drawing on the sciences, social sciences and humanities, involving: Understanding the social geographies of the landscape; Historicizing these relationships to recognise the ways in which they continue to sustain the landscape; and Developing geographically appropriate conservation and management strategies that draw on the cultural memories and lived experiences of the residents. The methods are multidisciplinary, including: Qualitative methods, specifically ethnography to understand the social geographies; Historical methods of studying archives, including old maps, government and inscription records to trace the socio-political histories; and RS-GIS applications to visualise the morphological transformations of the landscape. From the interdisciplinary ethnographic study of Hampi WHS we derived a community-centric perspective and its methodological outcomes were ways to: a) foreground the dynamic relationship between social and spatial morphology of the site and, b) perceive underlying social tensions and conflicts. From the multidisciplinary geo-morphological, archaeological and historical data compiled on Pattadakal WHS we derived a landscape perspective and its methodological outcomes were ways to: comprehend the protected site as part and parcel of a complex network that includes historic settlements, water features and sacred groves, as necessary and underlying pre-conditions that made the monumental architecture possible (Both sets of results have been published). From both approaches the key outcome that emerged was for policies and plans to necessarily account for protected sites as dynamic landscapes with imbricated cultural, social, ecological and economic values. We are in the midst of a pilot project to test ways and means to account for this prerequisite to sustainable site management, in the historical irrigated landscape of River Tamirabarani that is popularly acknowledged as the Porunai River Valley civilization (Rajangam and Suganya, forthcoming). Our attempts to bridge theory and practice through grounded insights, by blending multi-disciplinary data, is relevant as we argue for more balanced theorisation and more informed practice of conservation and heritage. Presenting perspectives from heritage conservation that bring together a landscape and community-centric perspective may appear atypical and novel but is required to comprehend the on-ground complexities in sustainably managing WH Sites. Since communities are one of the five strategic objectives of the WH Convention, we demonstrate that tracing and historicizing social geographies of protected sites enables practice and policy to develop strategies that are both environmentally and socially just.

Keywords: World Heritage, sustainable-management, resilience, local communities, nature-culture

Technical Session IV

World Heritage Site-Management Practices

Revival of sub-Himalayan grassland habitat by managing invasive alien plants in Manas World Heritage Site

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Abstract

The Manas World Heritage site has a vital grassland ecosystem that provides excellent wildlife habitat and ensure availability of potable water in the region. However, the invasive alien plants (IAP) are impinging threats to the OUVs of the site leading to habitat destruction, and negative impact on faunal species. The threat from invasion was repeatedly highlighted by the UNESCO World Heritage Convention since 2005, but IAP management to safeguard habitat and its dependent fauna remain unaddressed. To address this crucial gap, we built scientific evidences by conducting surveys, carried-out experiments, and evaluated the efficacy of management methods to reverse invasion and restore grassland habitat. We conducted systematic grid-based (1 × 1 km) surveys and quantified the presence of IAP through ocular estimation, using circles of different size-class. The IAP presence data and 19 bioclimatic variables were used to model the distribution of IAP using a suite of algorithms (MaxENT and Random Forest), to develop invasion risk maps. Further we set-up three 1-ha experimental plots to test efficacy of three different treatments- manual uproot, cut, cut & burned, and monitored for three years. Using quadrats, we monitored the recovery of native grass species by recording species richness and abundance. Through our study, we found that approximately 30% of the existing grasslands were invaded, primarily by two IAP- *Chromolaena odorata* and *Mikania micrantha*. The invasion risk maps indicated the invisibility of prime grassland habitat sans any management intervention, and can serve as an early detection tool for the management of IAPs. Based on the experiments we found that the species richness, density and cover of native grasses increased significantly by the third year (t2) in the manually uprooted treatment plot, as compared to other two treatments. The density and cover of *C. odorata* decreased. This highlighted that manual uprooting is an ecologically-effective strategy to aid in recovery of grassland. Through this tried and tested method, we have revived 2 square km of grassland. Manas World Heritage site with nearly 40% of the total area as grassland provides excellent habitat and ensure human well-being through potable water, and other ecosystem services. With invasion affecting 30% of existing grasslands, there is a lot at stake for the various beneficiaries including grassland-dependent faunal species and local communities. The finding of our study is highly relevant, and will aid the forest managers to devise a comprehensive and pragmatic invasive species management plan in order to ensure long-term conservation of grassland habitat, securing its dependent fauna and safeguarding human well being.

Keywords: Invasive Alien Plant, Manas World Heritage Site, Grassland, Manual Uprooting, Restoration

Girdling a habitat management technique: A case study from Manas World Heritage Site

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Abstract:

The Grassland of Manas is facing several threats such as succession by woody species, encroachment by invasive alien species, indiscriminate fire, cattle grazing, other NTFP collection. Out of those most prominent threats to the grassland is the succession of woody species mainly Bombax. Control and preventing the successional rate of this woody species is very challenging because the species has a high recruitment and dispersal capacity. Earlier forest department tried to remove Bombax by manually cutting the stem. But two to three coppices appeared after the cutting treatment. Therefore, proper management practice is very essential for maintaining viable patches of grassland. The experiment is being carried out from the beginning of the dry season. Circumference at Breast Height (CBH) was measured and tree above 60 cm CBH were classed as large-girth and considered for girdling. Tree above 40 cm to 60 cm CBH were classed as mid-girth and also considered girdling. Tree bark removed up to 1m below from the point of the CBH. Each girdling tree was tagged with a unique ID for future evaluation. Following observation are recorded: dead and live tree, presence and absence of coppice, canopy cover, presence and absence of sap in hard wood and reconnection of bark through the girdled area. A total of 1548 trees were identified for girdling trial of which 943 were mid-girth trees and the rest 605 were large girth trees. Out of which 1427 trees belong to Bombax (*Bombax ceiba*) and the rest 121 trees belong to other deciduous trees such as *Lagerstroemia parviflora* and *Butea monosperma*. All identified trees were debarked between December 2020 and February 2021 and assessed between April and May 2022. Within the one year of intervention, 394 trees (25%) died of which 137 were mid-girth and 257 were large-girth trees. All live mid-girth trees (806) produced at least one coppice stem. At the same time, out of 348 live large girth trees, 266 trees were coppiced. We are planning to monitor the intervention again in coming session. Onsite management is critical imperative to management of the World heritage sites. This intervention is being carried out in Manas-which is suffering from this specific issue. We collaborated with different stake holders, primarily park management and local community. The present intervention can be an answer for the other unsuccessful treatment like cutting etc. In MNP, If certain amount of grassland patches not remain intact then change will happen with the habitat resulting detrimental effect to rare and endangered animals. Hence, developing a proper management technique to restrict the succession of the grassland habitat is a priority for grassland management.

Keywords: Girdling, Grassland habitat, Succession, Bombax ceiba and Manas National Park.

Management Planning for Khangchendzonga National Park: A World Heritage Policy Perspective

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Abstract:

The World Heritage Operational Guidelines, WHS Reporting and Monitoring Process, and the Asia-Pacific Periodic Reporting Regional Action Plan 2012 emphasise the need for an appropriate management plan that include strategies for preserving the Outstanding Universal Values of the site. Thus, it ensures effective protection of the nominated property for present and future generations. This management plan seeks to fulfil those requirements and address the gap by prescribing management recommendations for Khangchendzonga National Park through participatory approach. It also brings attention to potential threats, assesses vulnerabilities of the property to social, environmental, and other pressures/changes, including disasters and climate change. Participatory group discussions & questionnaire surveys were conducted to collect information pertaining to the socio-economic condition, natural resources dependency of locals, functioning of the Eco-Development Committee (EDC) and people's perception of the park's OUV. Consultation with the Forest Department ascertained current management challenges. Intensive review of scientific & policy documents was performed to compile important information about various management themes. The plan adheres to the framework as prescribed in the book titled "A guide to Planning Wildlife Management in PAs by V.B. Sawarkar", IUCN Guidelines for Planning and Management of Mountain PAs, and Management Planning for Natural World Heritage properties. The management plan for KNP is the final output of this study. The plan fulfils the technical requirement in terms of protection and management of the WH property. It includes the OUV component of the site with special reference to its unique landscape, diverse flora & fauna associated with criteria (vii) & (x) and sacred religious belief & cultural tradition with criteria (iii) & (vi). To ensure efficient management practice the plan classifies the park into six zones - High altitude zone, Wilderness zone, Habitat improvement zone, Eco-tourism & Cultural zone, Buffer zone and Eco-sensitive zone. The management plan includes the buffer and eco-sensitive zone along with the NP boundary that creates a wider setting to ensure the integrity of the property is maintained. In addition to the zone plan, eight theme plans have been suggested that majorly focuses on protection and management of conservation of biodiversity and strategies to deal with stressors like wildlife diseases, disaster risk, human-wildlife conflict etc. The sacred caves and lakes falling inside the core/ buffer area of the park are prone to anthropogenic pressures, but the overall size of the property ensures its ability to withstand pressures from inside as well as fringe areas. In general condition the protected area status of Khangchendzonga National Park under the Wildlife (Protection) Act, 1972 of India would ensure the park is managed as a conventional national park. But the World Heritage designation offers a more wholistic perspective where socio-economic, cultural values are equally important along with biodiversity and natural attributes of the park. Addition of cultural heritage aids in managing the site beyond the ecology realm, emphasizes the nature-culture linkage of the property, helps in reflecting the OUV and contributes to effective management and conservation of the site.

Keywords: Khangchendzonga, Mixed heritage, Management plan, Conservation, Cultural value, India

Identifying strengths and gaps in the management of Keoladeo National Park, Rajasthan: an MEE approach

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Abstract

Keoladeo National Park (KNP) is a man-made wetland site and requires sustained and intensive management in order to maintain its ecological characteristics. It was designated as a UNESCO World Heritage Site (WHS) in 1985 under criterion (X). Inclusion of sites on the World Heritage list is an important step in ensuring their protection but does not, on its own, guarantee that the sites will meet their commitment to protection and conservation to future generations. Since KNP is facing some serious threats, UNESCO's reactive monitoring process is proposed to ensure effective and active measures are taken for its protection, conservation and presentation. In response to this, exercises such as Enhancing our Heritage (EoH) and Management Effectiveness Evaluation (MEE) become crucial in constructive management of natural heritage sites worldwide. This study will help managers of WHS to build a comprehensive system of management effectiveness assessment. In this study, we focused on governance and management efforts being practiced in KNP. All the MEE reports along with EoH toolkit were consulted. Data was collated in varying formats from diverse sources, including questionnaire, websites and information gathered from research articles pertaining to the management of the site. An in-depth analysis was done to identify strengths and gaps of existing assessment of framework and process. Our study intends to help in indicating where additional activities are needed in the evaluation framework, e.g., developing new monitoring requirements, capacity building of working staff, management and governance practices etc. Natural World Heritage sites, like all protected areas, face plenty of challenges to their integrity which, unless addressed can erode the outstanding universal value for which they were put on the list of World Heritage. Those responsible for the conservation and management of World Heritage properties have the complex task of anticipating and dealing with these challenges, most often in an environment of limited financial and organizational capacity. Under these circumstances, it is incumbent upon them to invest their efforts in the most critical areas, ensuring that available resources are judiciously utilised. This highlights the need to identify appropriate assessment framework to be carried out internally by site managers regularly. Assessments are most useful if repeated regularly to track changes to threats and help identify progress and improvements. Intervals can vary depending on the management component being assessed. Since, MEE is an action-oriented, objective exercise, it is proposed that a regular, annual MEE exercise may be conducted by the stakeholders involved in the direct management of the site. In addition, EoH assessment, which is a reasonably subjective, analytical and exhaustive process may be conducted in periodic intervals. MEE being an integral component of EoH needs to be brought into regular practice. This approach will promote an efficient and adaptive management strategy of WHS. Incorporating MEE tools will also allow improvement to the site's management. Assessment of management effectiveness has emerged as a key tool for protected area managers and is increasingly being required by governments and international bodies. This study involves an in-depth analysis of the existing assessments of current status and management of WHS, in order to better comprehend what is and what is not working for them, and to plan any necessary actions to be undertaken. As important as reporting requirements are, the assessment of management effectiveness should primarily be used to assist site managers to work effectively.

Keywords: World heritage site, management, effectiveness, evaluation, Enhancing our Heritage

Assessing the impact of roads on wildlife corridors and mitigation measures in Kaziranga National Park

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Abstract

Kaziranga National Park is known to represent one of the last unmodified natural areas in the north-eastern region of India. It is situated in the heart of Assam where it is located within three districts namely; the Kaliabor subdivision of Nagaon district, Bokajan subdivision of Karbi Anglong and the Bokakhat subdivision of Golaghat district. Covering 42,996 ha of land and it is the single largest undisturbed and representative area in the Brahmaputra valley floodplain. The seasonal fluctuation of the river Brahmaputra results spectacular examples of riverine and fluvial processes. These natural processes create complexes of habitats which are also responsible for a diverse range of predator/prey relationships. Therefore these unique features and phenomenon gives rise to the more diverse flora and fauna. Furthermore, Kaziranga National Park is inscribed as a UNESCO World Heritage Site in the year 1985 and later in the year 2006, it was declared as a Tiger Reserve. However, being a globally important area of interest and concern, the national park is being divided by the national highway 37, which posses the potential threat to the Outstanding Universal Value to the World Heritage site. Therefore, this study was carried out as a part of master's dissertation work to assess and understand the impact of road on the potential wildlife corridors present in the national park which are bifurcated by the NH-37. However, Protected Area Networks (PA) and Conservation Areas (CA) are very essential for ensuring the conservation of wildlife. And, the connectivity among these protected areas is much more important to ensure the viable population of species. The objective of the study is to evaluate the present status of corridor portion bifurcated by the existing road network. Where few question are being addressed such as; what are the land use pattern near the corridor bifurcated by the road? And, characterize the current status of the corridor sites impacted by road network.

Keywords: World Heritage Site, Kaziranga National Park, Wildlife Corridors, Road traffic, Anthropogenic activity

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