We are currently witnessing some of the most critical environmental challenges of our time. Climate change, which is increasingly manifesting in extreme weather events, coupled with biodiversity loss, are an urgent call for intervention. These phenomena not only disrupt ecosystems but also pose significant threats to human survival, affecting our health, livelihoods, and global economies, thereby stressing the intertwined fate of humanity and the natural world. The degradation of our planet directly affects food security, exacerbates natural disasters, and heightens socio-economic disparities, making it imperative to recognize and respond to these changes as a matter of human welfare.

In light of these impending crises, we look towards the indispensable role of science and technology in conservation efforts. As we face escalating environmental challenges, the fusion of scientific rigour and innovative solutions emerges as our most potent ally. Through the lens of WWF-Pakistan’s pioneering endeavours, we uncover how technological advancements and scientific research are not just enhancing our understanding of nature but are also crafting novel pathways for its preservation. This issue celebrates the synergy between science and innovation, highlighting their collective impact in forging a sustainable future for our planet.

Through this edition of Natura, we advocate for the importance of ongoing dialogue and action on these issues. Engaging in conversations about science and innovation in conservation is not just about creating awareness—it is about fostering a collaborative environment where policymakers, scientists, conservationists, and the public can converge to create impactful solutions for the planet’s most pressing environmental challenges. This discourse is vital for mobilizing action, inspiring innovation, and shaping a sustainable future for all. Thank you for joining in on this. We hope you have an informed read.

By Sheheryar Khan, Coordinator Communications and Environmental and Social Safeguards, WWF-Pakistan.
How crucial is the role of science in the work of WWF, especially in the context of wildlife conservation?

Science plays an essential role in the work of WWF, particularly in wildlife conservation efforts. Through scientific research, we gather crucial data and insights about ecosystems, population trends and threats faced by species, and the impact of human activities on the environment. Scientific findings directly influence conservation strategies by providing evidence-based recommendations for habitat protection, species management, and policy development.

For instance, research on the declining populations of valuable and iconic species like vultures and the Indus dolphin informed targeted conservation interventions such as banning of harmful veterinary drugs for vultures and the initiation of captive breeding projects, and curbing of harmful fishing practices that are fatal to the dolphins. Additionally, climate change research drives initiatives like creating resilient habitats and promoting sustainable land use. By integrating science, WWF ensures informed decisions and effective strategies for biodiversity preservation and ecosystem conservation.

Are there any challenges that WWF faces in this regard?

WWF is often overlooked as a scientific organisation due to perceptions that our advocacy efforts outweigh scientific rigour. Balancing advocacy with scientific integrity is crucial. Science is at the core of all our interventions which is why our work has been successful for over 50 years.

Acknowledgment as a scientific entity enhances credibility and fosters collaboration with research institutions and governments. Such recognition enables WWF to access funding, data, and expertise, crucial for implementing evidence-based conservation strategies. Additionally, it strengthens partnerships, elevates policy influence, and facilitates the dissemination of research findings. By integrating rigorous science into its initiatives, WWF can bolster its effectiveness in addressing environmental challenges and achieving long-term conservation goals.
In an era dominated by technological advancements, how is WWF leveraging science and technology, such as AI, satellite imagery, or other innovations, to enhance its conservation efforts?

All these scientific innovations are crucial in elevating conservation efforts significantly. Artificial Intelligence (AI), satellite imagery, and other innovations play pivotal roles in monitoring ecosystems, tracking wildlife populations, and detecting illegal activities like poaching and deforestation. AI algorithms analyse vast amounts of data to identify patterns and trends, aiding in more targeted and efficient conservation strategies. Satellite images provide real-time and high-resolution data on habitat changes and biodiversity hotspots.

These technological integrations are important for WWF not only to make informed decisions but also to stay relevant with the changing times. Our end goal is to implement proactive measures, and engage stakeholders effectively in safeguarding biodiversity and preserving natural ecosystems for future generations.

How can the integration of science in conservation be effectively communicated to local communities? How does WWF ensure that the benefits of scientific approaches are understood and embraced at the grassroots level?

WWF employs various strategies such as community meetings, workshops, and educational programmes tailored to local contexts and languages. We use storytelling, visual aids, and practical demonstrations to explain scientific concepts in relatable ways.

The involvement of community members in research projects and conservation initiatives is paramount as it fosters a sense of ownership and pride in local biodiversity. A great example of this is WWF-Pakistan’s citizen science project, the Bhulan Dost Programme, where we are working with fisher folks living along the Indus river in monitoring the population of the Indus river dolphin. By demonstrating tangible benefits like improved livelihoods and sustainable resource management, we ensure that scientific approaches are embraced and integrated into grassroots efforts, promoting lasting conservation outcomes.

What is your vision for the future of scientific contributions by WWF? How do you see the organisation evolving to meet the growing challenges of wildlife conservation through the lens of science and technology?

Our vision for WWF’s scientific contributions centres on continued innovation and integration of cutting-edge technologies to address evolving challenges in wildlife conservation. We are actively leveraging advancements in fields like AI, remote sensing, GIS, SMART, drones, camera trapping, radio and satellite tracking, and early warning systems to detect forest fires and combat human-wildlife conflicts.

From a strategic point of view, we hope to increase collaboration with research institutions, government departments, and technology firms to develop scalable solutions and predictive models for biodiversity conservation. Embracing interdisciplinary approaches and fostering open data sharing will be integral to WWF’s evolution, ensuring that scientific insights drive transformative actions to safeguard our precious ecosystems and wildlife.
Technology has become a valuable tool in the fight to protect our planet’s precious wildlife in the era of increasing environmental challenges and the urgent need for conservation. State of the art technologies are revolutionising the protection of species, from AI and machine learning to remote sensing and advanced data analytics. In this digital age, coalition work between technology and conservation has shown many times that a bright future is promised.

One of the most amazing overlaps of the technology and conservation sectors is AI. Different hardware devices like camera traps, drone imaging, acoustic recorders, tracking tags and others have been widely used by conservationists previously. However the data collected from these devices is more informative when it is compiled with purpose to provide intelligent information that can be put to diverse use.

Thermal images from a heat detecting camera, sounds from a recorder and areas where wildlife roams can be seen from aerial drones and satellite imaging. This, combined with machine learning, can work to predict patterns in the movement of species and lend insight into their migration patterns and behaviours.
Predictive modelling through AI can help foresee possible environmental changes in an area and determine the impact of climate change as well. This is done by analysing data from the past years (a large enough data set) and comparing it with the present day, hence providing the most probable output event. Natural disasters such as droughts, floods, and excessive heat waves can be predicted by studying these patterns.

Environmental change data can also be used in the study of monitoring of wildlife habitats and can be processed by AI. Habitat degradation is assessed and displayed with the help of maps and softwares like Geographic Information System (GIS). The environment and geography of the location can be studied and areas at risk are highlighted and identified. This enables conservationists to take appropriate measures beforehand to minimise damage. For example, Computational Animal Behavior Analysis (CABA) is an emerging field which aims to apply Artificial Intelligence techniques to support animal behaviour analysis. The latest CABA approaches mainly apply machine learning techniques, combining it with approaches from computer vision. This shift from conventional methods to modern techniques, solidified through empirical evidence and rooted in science, has led to a significant reduction in error, speeding up in complex tasks, easier analyses and improved predictions. Consequently, it is also helping conservationists make more informed decisions and implement targeted strategies in their respective fields.

AI also detects and monitors animal health and disease. These technologies can be used to detect outbreaks of disease, monitor their evolution and aid by taking suitable remedial measures. Animal health information from different studies and ecological factors with climate data are taken in as input data over the years. For example, in the US, an early detection system for diseases in marine birds on the California coast uses AI to analyse intake reports produced at various California veterinary centres, listing information such as the species, age, reason for admission, and diagnosis. The AI system then categorises the report and looks for patterns, generating alerts for upcoming predicted diseases and assuring wildlife rehabilitators.

Using technology to encourage a broad audience to engage can play an active part in wildlife conservation. This is the case with citizen science and data crowdsourcing, in which people capture photos and videos of species in their environment and this is contributed to wildlife data.

This kind of innovation is not possible without a strong basis in the organisation of data storage, management, analysis, calculation, and restitution. The major risk is that the demand for AI development inflates without being supported by available human resources. Here, it is imperative that governments, philanthropists and the private sector step in to facilitate the technological revolution in nature conservation.
Far over the misty mountains of Gilgit Baltistan resides the elusive snow leopard. The snow cloaked mountains and the bare rocky ridges speak of the harshness of the region, where only the fittest of life forms dare to tread. The snow leopard however, doesn’t just survive here, it thrives.

Below these peaks, in the Khyber village situated in the Hunza Gojal valley, resides a small agro and nomadic pastoral human population. A total of about a thousand people, spread across 168 households over an area 330 square kilometres. Despite the grandiose backdrop of the landscape, the life of these people is marked by sheer austerity.

These are no ordinary mountain people. They don’t just live along the mountain, they are defined by it. Everything that they possess is necessary and everything here has a purpose.
Among these necessities is the local wildlife of the region, which the local villagers are profoundly dedicated to conserving and protecting. Here, despite the limited resources, there is an inextricable bond between man and nature. A diverse ecosystem has carved out its existence in this rugged terrain. The region is home to the Himalayan ibex, the wolf, fox, the Himalayan lynx, and of course, the snow leopard. Of these, the ibex is of particular importance to the locals.

Since 1992, the Himalayan ibex’s population has flourished in this region due to the locals’ progressive approach towards wildlife conservation. Through the jurisdiction of a community managed protected area, the hunting of the ibex is controlled. Each year, three to four ibex are harvested legally through a trophy hunting programme to support the species’ conservation and social development.

The people of Khyber and its wildlife enjoy a symbiotic relationship to say the least. Along with this, the locals also partake in agriculture and livestock rearing which form the bedrock of the local economy. And yet, the locals at times feel a certain unease, for within these mountains lurks a ‘ghost’. The snow leopard, often referred to as the ghost of the mountains, is the apex predator of this vast land. Over the past few years, this elusive cat has come closer to the human population.

Therein lies the conflict. These elusive predators, whose presence in the region is both a blessing and a source of conflict, have been known to prey on the livestock that are the lifeblood of the Khyber villagers. Livestock depredation, often at the hands of the snow leopard, is the primary form of human-wildlife conflict. Snow leopards also have a greater segment in livestock killing cases in the valley in comparison with other wildlife species such as wolves, Himalayan lynx and fox. The growing specter of human-wildlife conflict poses an escalating danger to both the conservation efforts of the snow leopard and local community development.

To the villagers, the loss of livestock represents not only an economic blow but also a disruption to their way of life, often spurring anger and resentment as they struggle to protect their most precious resources in this extreme landscape.

When communities experience losses due to livestock depredation, they tend to look at wildlife and conservation efforts with a veil of cynicism which can undermine support for conservation initiatives and hinder efforts to protect endangered species. In an attempt to protect their livestock, they resort to either killing or trapping predators such as snow leopards, often in an unsustainable and unregulated manner.
“During a single predation incident, we would lose as many as 60-70 livestock, including our goats and sheep. This set us back years. These would destroy the foundations of our economy,” recounts Irfan Ali, a wildlife photographer by profession and a resident of the village. His views echo those of the rest of the villagers and their fear of snow leopard attacks.

“We used to be angry. We have great respect for the wildlife here and we even protect the ibex from poaching. But what more could we do when our livelihoods were at risk? We had to take matters into our own hands to protect our livestock.” explains Irfan, as the sun sets behind the towering peaks.

Addressing this very cynicism lies at the heart of the wildlife conservation work that is being carried out by organizations like WWF. It requires an understanding that a delicate balancing act must be played out between preserving a delicate ecosystem and respecting the needs and concerns of the people who live in its midst.

To this end, WWF-Pakistan sought the assistance of the National Centre of Robotics and Automation (NCRA) at the Lahore University of Management Sciences (LUMS) as a technological partner, and embarked on a mission to mitigate the human-wildlife conflict in the region and ensure the survival of the snow leopard. WWF-Pakistan leveraged its extensive field experience to ensure that the camera traps were made field-ready, and in 2022, the AI-based camera traps, which serve as a Predator Early Warning System (PEWS) were installed.

The solar powered camera traps are strategically placed in areas vulnerable to wildlife depredation where they capture images of the region’s wild residents. These traps are connected through the local 4G mobile network. Besides capturing images, they transmit real-time data to a central monitoring system, equipped with a sophisticated AI algorithm. The true innovation lies in this algorithm which analyzes the images and alerts field teams to potential depredation events. When a snow leopard, or any other predator ventures near human settlements, the AI-based system sends out automatic alerts. As a result, the villagers are able to secure their livestock before any possible attack.
Nishat Ali, a farmer residing in Khyber village, offers his insights into the transformative impact of the Predator Early Warning System. He speaks of the deep sense of security it has brought to their lives. “In the past,” he recalls, “we constantly worried about our livestock’s safety, especially due to the looming threat of snow leopard attacks.”

The gratitude in his voice is apparent. “This technological package has brought immense relief to our family.” He goes on to describe how they recently received notifications about a snow leopard’s presence in the valley. “We received messages on our mobile phones. The images showed very clearly that a snow leopard was nearby. When we received this information, one of our family members took on the responsibility of staying with the livestock for a week and we fortified our fences. Thank god, there was no attack, and no snow leopards were detected in the area afterwards.”

Ijlal Ahmed, Conservator Parks and Wildlife at the Forest, Wildlife and Environment Department Gilgit Baltistan, shared his thoughts on the intervention after a year of meticulous project monitoring. “This cutting-edge technology has yielded remarkable results by not only preserving the local community’s livelihood sources but also simplifying their responsibilities.” Following the resounding success in mitigating human-wildlife conflicts, the Department is now determined to extend this model project to other regions of Gilgit-Baltistan.

This intervention has accomplished more than a broader cultural shift towards harmony with this majestic creature. The ghost of the mountains is no longer haunting the locals.
INNOVATING FOR NATURE
TECHNOLOGICAL ADVANCEMENT AND RESEARCH ARE CRAFTING NOVEL PATHWAYS FOR NATURE CONSERVATION

FOREST HEALTH CALCULATOR APP
“Connecting Trees and Technology - Smart Solutions for Forest Health”

DOLPHIN PINGERS
“Sound of Safety - Acoustic Devices to Protect the Indus River Dolphin”

EARLY WARNING SYSTEM
“Fire No More: Forest Fire Detection”

AI CAMERA TRAPS
“Peek Into the World of the Snow Leopard”

PANGOLIN RADIO TRANSMITTER
“Tagging Radio Transmitter to Protect the Pangolins”

FISHING APP
“Enabling Small Scale Fisheries for Big Catch”

GEOGRAPHICAL INFORMATION SYSTEMS
“Aiding environmental data analysis and planning”
We engaged with Feryal Gauhar, author of the novel, ‘An Abundance of Wild Roses’, to uncover the inspiration behind her compelling story and the relationship between storytelling and conservation in protecting our planet’s precious heritage. This is Feryal’s third novel, and her previous novels The Scent of Wet Earth in August and No Space for Further Burials have both received critical and commercial success.

I have worked for many years in the northern areas, and as the daughter of an anthropologist, I have travelled with my late mother through mountain communities. I believe that the context is often the content of many things, whether it is social history, economics, or literature. Same is the case with this novel where the villagers try to find a way to co-exist with nature that doesn’t destroy either of them. The fact that boys often cannot access education as they are expected to take care of the livestock, taking it to greener grazing areas along the glacial streams, reflects the compulsions of the physical environment. Girls, however, are able to study, and once they get through school, they are often forced to marry uneducated young men back in the village as tradition still holds strong. The story of the soldiers facing imminent death in an avalanche, in this novel, is very much a part of the material reality of this region. The mountains cradle the lives of these people as much as they impede change of ancient mindsets.

What inspired you to set ‘An Abundance of Wild Roses’ in the mountains of Pakistan, and how does the setting influence the narrative?

I have worked for many years in the northern areas, and as the daughter of an anthropologist, I have travelled with my late mother through mountain communities. I believe that the context is often the content of many things, whether it is social history, economics, or literature. Same is the case with this novel where the villagers try to find a way to co-exist with nature that doesn’t destroy either of them. The fact that boys often cannot access education as they are expected to take care of the livestock, taking it to greener grazing areas along the glacial streams, reflects the compulsions of the physical environment. Girls, however, are able to study, and once they get through school, they are often forced to marry uneducated young men back in the village as tradition still holds strong. The story of the soldiers facing imminent death in an avalanche, in this novel, is very much a part of the material reality of this region. The mountains cradle the lives of these people as much as they impede change of ancient mindsets.
How do your experiences as an environmental activist inform your writing, particularly in depicting the relationship between humans and nature?

I have been a bit of a loner since my childhood, preferring the company of animals and of my own silent communion with nature. I grew up in a very large house on several acres of mango orchards, and fell in love with the natural environment of my home and of this varied country.

I first rescued a distressed animal when I was three, and started a hospital for animals when I was eight. As an activist, fighting for animal rights through the courts and through law, I gained a deeper insight into the lives of animals which are neglected and harmed by humans, and also into the lives of humans who look after animals. This is clearly invoked in the novel through the relationship of the Numberdar with his chakors, the Hoveldar with the dogs, and Lasnik with his goat. These relationships are symbolic of the symbiotic ties that make us dependent on nature and animals.

What are your views on the role of literature in raising awareness about environmental and conservation issues?

Literature has a very profound role in raising awareness about environmental and conservation issues. Writers of fiction feel deeply, and observe keenly. Their observation of nature goes beyond the ordinary recognition of a tree as a tree. For instance, in The Hidden Life of Trees, the author, Peter Wohlleben, describes how trees form a community, much like human families who nurture their young and watch over them as they grow. Once we acquire this kind of consciousness, we are able to see ourselves in nature, as part of it instead of as separate from it. That is when we begin to protect nature, for in harming it, we are only harming ourselves.

Could you share any personal anecdotes about your connection to nature and how it has shaped your worldview and artistic expression?

I began to rescue injured fledglings and homeless kittens and puppies when I was still a child myself. At that time, the summer in Lahore would bring a series of dust storms which were referred to as the “baad anshah.” Often, bird’s nests would be violently thrown out of trees, killing newly hatched chicks. Once, after such an “ansha,” I found a baby squirrel which had fallen out of its nest. I rescued it and nurtured it, feeding it with a doll’s milk bottle. I would take it to school in a tiny basket, and feed it during break time. Sadly, one night, the squirrel made its way out of the bed and was caught by one of the rescued cats.

I could not fault the cat, for it did what its nature compelled it to do. And I did what my nature compels me to do, speak out for those who cannot speak the languages we understand. This has informed my activism and my writing.

‘An Abundance of Wild Roses’ is an interesting and insightful read. The most compelling element of the novel is the interaction between humans and non-living entities such as spirits, wild animals, trees, and of course, the breathtaking natural landscape. The mountains serve as a fitting backdrop for the characters, Noor Hussein, Hassan Ali, Mousa Madad, and Fatima as the novel’s storyline traverses various themes such as the culture of the mountain people, entrenched patriarchy, and questions of education, health and hygiene. However, one of the key highlights of the novel is nature, mainly the wildlife. The novel portrays life in Saudukh Das village and speaks about how things have changed over time, particularly the environment and the landscape. It narrates the sad stories of “gushing streams” which dry up before winter and the unfortunate cows calved in autumn leading to the death of young ones in freezing cold.

Feryal Gauhar, the author, poignantly penned, “Spring was no longer heralded with the distant haze of blossoms, fruit died on the stem before it could ripen.”

The novel depicts various activities which are performed with changes in the seasons such as the piling of apricots into sacks, the cracking and peeling of the walnuts, and the careful collection of the shells and harvesting of the corn with the first frost of the autumn. This shows deep insight and understanding of the author about various aspects of life in the valley.

The novel attempts to capture the scenic beauty of Pakistan, mainly its landscape and wildlife which includes threatened animals such as the snow leopard, markhor, wooly squirrel, ibex, and musk deer. This was a welcome surprise as these charismatic animals have received scant attention in contemporary literature in Pakistan.

The relationship between man and nature lies at the heart of the novel. It captures how the environment is succumbing to change brought about by man. “Nothing was the way it used to be, nothing was what it seemed to be.” Through the text, the author raises concerns on limiting the river flows through the constructions of dams, cutting of trees and hunting of the local wildlife.

Overall, the novel is a compelling read that not only tells the story of a village and its inhabitants but also invites readers to reflect on the broader questions of tradition, change, and the essence of community. It stands out for its rich narrative, depth of character, and the eloquent interplay of individual lives in the backdrop of mountain life, cultural heritage and societal norms.
The Spatial Monitoring and Reporting Tool, commonly known as SMART, represents an exciting and long-standing collaboration among nine of the world’s leading conservation organisations and was conceived by its conservation-focused founders in 2013. This partnership embodies a shared mandate and vision with all partners committed to the development and effective application of the same tool around the world.

SMART is a shining example of a true collaboration within the world of conservation and this collaboration is centred around a robust tool designed for conservationists operating on the ground. It is a GIS-based platform designed to facilitate data collection, storage, visualisation, and analysis.

Tailored to cater to a diverse array of users, with entirely customisable data structures, users include rangers, protected area managers, researchers, local communities, NGOs, and many others. SMART, from its humble beginnings as a concept scribbled on a flipchart during a meeting in Southeast Asia, has evolved into the most widely used tool of its kind. At its core, SMART empowers stakeholders to make informed decisions and enact effective measures to safeguard our planet’s precious biodiversity by enhancing the effectiveness of management efforts in biodiversity conservation.

The need for SMART emerged for the conservation community in response to a pressing challenge: the inadequate management of protected areas worldwide. With a majority of the world’s vital protected areas lacking sound management practices due to resource constraints, limited information about existing threats, and a lack of systematic patrolling, the need for a comprehensive solution became apparent.
Initially conceived to combat illegal activities threatening wildlife through enhanced monitoring and law enforcement management, SMART has since evolved into a multifaceted tool. Its applications now extend beyond wildlife protection to encompass a broad spectrum of spatial monitoring purposes. By harnessing technology and data-driven approaches, SMART equips conservationists with the means to address diverse conservation challenges effectively. From monitoring wildlife populations to assessing habitat integrity and mapping poaching hotspots, SMART serves as a versatile platform for informed decision-making and proactive conservation efforts.

Today SMART is utilised across the globe, with deployment in over 1,500 sites spanning more than 80 countries on every continent, except Antarctica. Remarkably, over 20 countries have embraced SMART with national mandates, cementing its status as the go-to tool for protected area monitoring.

The impact of SMART on conservation outcomes is exemplified through a series of notable achievements and case studies across diverse ecosystems. In Cambodia’s inaugural Marine Protected Area (MPA), SMART played a pivotal role in identifying illegal activity hotspots and optimising patrol times, leading to improved patrol planning and a notable 40 per cent reduction in fisheries infractions over a span of three years. Similarly, in Belize, SMART’s national adoption facilitated enhanced management and deployment of patrols in Marine Protected Areas, resulting in an impressive 85 per cent decline in MPA fisheries infractions.

WHAT ARE THE CHALLENGES IN APPLYING THE TOOL SUCCESSFULLY?

As with any other tool, SMART comes with a set of challenges. Firstly, it’s essential to recognize that SMART alone cannot guarantee improved conservation outcomes. It serves as a tool and must be integrated into a broader approach, such as the adaptive management approach, to ensure its effectiveness in protected area management or any other such deployments. Moreover, the success of SMART relies on various enabling conditions, including political will, adequate human resources, capacity building, and good governance. Without these foundational elements in place, the implementation of SMART will no doubt fall short in achieving its intended objectives. Therefore, addressing these challenges is crucial to harnessing the full potential of SMART in advancing conservation efforts worldwide.

WHAT DOES THE FUTURE HOLD?

The strength of SMART lies in its enduring partnership, forged among leading conservation organisations. This collaborative framework ensures continuity in the development and refinement of the SMART tool, enabling it to remain at the forefront of conservation technology. Moreover, SMART’s commitment to being user-driven ensures that it evolves in line with the needs and feedback of those on the ground, enhancing its effectiveness and relevance in addressing conservation challenges. By expanding on existing innovative tools like SMART’s own AI plugin - Protection Assistant for Wildlife Security (PAWS), SMART endeavours to stay ahead of the curve and meet the evolving demands of the conservation community. However, the next hurdle lies in taking SMART to the next level and ensuring it remains a cutting-edge technology befitting of the global conservation community.

As a partnership, SMART is committed not only to technological enhancements but also to providing users with comprehensive guidance on utilising the tool effectively. With the agreed global target of the Convention on Biological Diversity (CBD) to expand protected areas to cover 30 per cent of the world, we need a tool to effectively monitor these areas and the efforts being made to protect them. Achieving this requires continuous innovation, collaboration, resource mobilisation, and ongoing support from partner organisations. With its existing footprint around the world and the ambitious goal of protected area expansion, SMART has the potential to significantly impact conservation efforts on a global scale.
Pakistan, having unique geographical location and landscape, is home to diverse climate zones bearing scorching hot plains and deserts to bone chilling ice caps. It is blessed with unique flora and fauna. Despite this, it is unfortunate that Pakistan has scarce forest resources, and only about 5.2 per cent of its area is under forest cover, which is below the United Nations Food and Agriculture Organization’s (FAO) guideline, where at least 10 per cent of a country’s land area should be forested. The existing forest resources are prone to both forest fires and overexploitation, which are leading to the mass degradation and depletion of these valuable assets.

A few years ago, during the implementation of a forest conservation project in the western Himalayas, we noted a marked increase in forest fire incidences. Two community activists lost their lives, along with Abdullah, a young local boy. Abdullah’s parents and siblings were badly injured and required multiple surgeries and treatments.

As a conservationist I was of the opinion that the early detection of such incidents can significantly reduce the spread of forest fires and help in responding in a timely manner to save precious lives and biodiversity. So, I started to research the forest fire management techniques used in other countries. While I came across a few interesting initiatives, I felt that implementing those would be difficult in Pakistan due to certain limitations, including cost, satellite, security, etc.

I started to think of local solutions and shared the idea with local engineers to develop a similar system, albeit without a satellite. My colleagues at WWF-Pakistan and I worked together to secure an innovation grant from the Foreign Commonwealth and Development Office (FCDO, UK) for a forest fire detection early warning system.

The grassroot level work for this project started with interaction with local communities back in June 2022, after the identification of forest fire prone hotspots in Khyber Pakhtunkhwa (Palm Gali and Danna Gulfam). This was done through consultation with the KP Forest Department and community sessions, and meetings and surveys to assess the reasons behind these destructive forest fires.

We found that forest fires were almost always caused by human activity.

People set fire to forest areas to enhance the growth of grass for cattle grazing. One community elder said to us, “If we do not set fire, pine needles accumulate and prevent grass from growing. This decreases the availability of fodder and our livestock suffers.” Also, enclosures were made in local forests under the Billion Tree Afforestation Project (BTAP), restricting local communities from exploiting these resources. In order to abolish these, people set fire to the forest.
During WWF-Pakistan’s community sessions, we also aimed to resolve disputes with the forest department and raise awareness regarding the destruction that forest fires can cause. We did all this so that no one had to endure such pain of losing their beloved family members.

After the community sessions, we targeted influential personalities of the local region as their voices are powerful enough to guide their communities. Several school sessions were also conducted to raise awareness in the future generations about the devastation that forest fires bring about.

Subsequently, in March 2022, in collaboration with the Lahore University of Management Sciences (LUMS) we began work on the designing and preparation of the forest fire sensors which were subsequently installed. This system detects a forest fire event and informs relevant stakeholders for immediate and appropriate measures. With the help of LUMS we installed several Forest Fire Detection - Early Warning System (FFD-EWS) towers at various locations which covered miles of forest area, ensuring timely detection and preventing loss of precious forest resources.

After the installations, we held discussions with senior forest management officials regarding potential capabilities of this system besides wildfire detection which will also help in improving the scientific management of the forest resources such as biomass estimation, determination of species composition, crown cover and forest area boundaries, etc. Most recently, in March 2024, a meeting was conducted with Forest Department representatives in the presence of Chief Conservator of Forests, where the system was discussed in detail and it was agreed to make it a part of the Forest Management Policy, and expand it to several other locations under the Chief Conservator’s jurisdiction.

This signifies that this system has huge potential to conserve and manage natural resources and can be expanded and implemented in other provinces of Pakistan, especially the likes of the Juniper forest in Balochistan, the Margalla Hills National Park and Sherani forests (famous for chilgoza/pine) which have also been in the news in recent years for forest fires.

An enormous forest fire in the Sherani region destroyed forest resources worth billions of rupees and also claimed the lives of people who were fighting these fires not so long ago. An efficient forest fire detection system would certainly aid in controlling the spread of such fires and that is what we have aimed for in our system.
Anyone who grew up in Lahore over the past 30 years remembers Suzi the elephant. She was the majestic star, and the face of the zoo. Hundreds and thousands of visitors marvelled at her daily. But Suzi’s sad passing should remind us all that her main purpose was not to entertain, but to educate us.

Zoos, after all, serve as an educational platform for the visitors as they provide opportunities where people can connect and find interest in animals. While digital media can provide a substitute, it is a poor one, as individuals long for the human-animal interaction and crave something more tangible that provides them much needed engagement. And as zoos in principle rightly emphasise animal comfort, safety, and privacy, this is also leading to people losing interest in zoos that no longer offer the same “animal experience” as they once used to. In fact, alternatives have been created to replace the thrill of zoos. The average Lahori child would much rather go to large malls or play arenas.

This problem is not just restricted to Lahore, but is universal. In the United States, the San Diego Zoo gets far less visitors than LegoLand and Disneyland; even when their tickets are a fraction of the price of the latter. Who wants to wait outside a lovely enclosure that replicates the natural habitat of a Giant Panda, when most of the time the shy animal is nowhere to be seen?

In a world where countless wildlife species are on the verge of extinction, zoos not only provide ex-situ conservation but also raise public awareness about how unique and beautiful species should thrive in their own environments. While it is the zoos’ responsibility to take care of each animal, they do so in the hope that the public builds sensitivity and empathy towards animals. There is a need to redefine the relationship of the wildlife in zoos with the visitors which puts the animals at the centre of the experience and where their needs (social and physical) are paramount.
The Lahore Zoo offers an amazing opportunity to do so. With up to 4 million visitors a year and a modest entry fee PKR 80 for an adult and PKR 50 for a child — the Lahore Zoo is a public institution, welcoming people from all over the nation and from all walks of life.

But observing the visitors shows that while they are indeed really excited to be there and engage with the animals, they do so in a way that suggests a need for reeducation. Despite signs saying otherwise and Zoo staff trying to regulate visitors, people tend to feed animals snacks, approach the exhibits closely, bang loudly on the enclosure’s walls and sometimes, even climb over the metal bars between the enclosures and the walkways.

The desire to connect, and to have them and the animal acknowledge each other is not just ignorance, but such insensitive behaviour can really affect animal behaviour and health. It is not acceptable or condonable in any way and it poses risks to both the visitors and the well-being and health of the animals.

Importantly, these actions can have unintended and harmful consequences. While sharing a bag of chips at the Olive Baboon enclosure seems like a gesture of generosity or kindness, it can have devastating effects on these animals. It results in the baboons not only eating the chips - which can itself cause illness as that is not part of their natural diet - but chewing and even swallowing the plastic bag to taste the salty residue of the chips which can cause serious harm to the animals.

People who feed them do not realise that in reality, the animals end up consuming plastic and food that causes potential harm and can even be fatal for many. Some years ago a visitor threw a water bottle into the Ostrich exhibit, leading to one of them swallowing, choking and perishing from its bottle cap. It also affects how the animals interact with the visitors, with at times overly aggressive behaviour as animals get used to and demand such harmful but addictive food.

People want to connect with the animal, they want to see it react and feel, and do that by feeding or provoking it. This raises the real underlying problem at hand: people have increasingly few opportunities to experience the beauty of the wild and this loss of connection with nature itself can lead to waning interest in animal protection, conservation and rehabilitation.

Is there a solution that can still allow us to engage with and form emotional connections with animals while also minimising our intrusion into their lives? Can we still make the most of what we have and enhance the connectivity people feel with animals, while still improving animal safety and protecting their future?

A powerful solution is utilising art to communicate science and conservation at the zoo, and allowing people to connect more deeply and emotionally and learning to appreciate why our wild needs to be preserved.
Art is a powerful tool. People of different ages, economic backgrounds or education can all understand what art is and the message that it conveys. Art will help us break the language barrier that other solutions struggle with. But using art requires thought and effort; we have to find a way to make appealing art without overwhelming people with information. Currently, the Lahore Zoo utilises bright, colourful signs full of drawings; but often still has a hard time attracting people perhaps because the signs have dry facts and information. This suggests that we need to actually create something appealing through new approaches rather than converting the same facts and information into a more fun font.

Very rarely do people take the time to look at signage unless it’s eye-catching, which is where art comes into play. Art can be seen and interpreted by almost anyone and can help to communicate a message to the people. And most importantly art, along with storytelling, can provide a sensory window into the animal’s lives that allows us to see them as individuals with their own personalities, families and friends, and happy and sad moments.

For example, the brown bear at the zoo has a story. He was rescued years ago from a political rally where he was found with broken nails, rotten teeth and a rapidly declining vision. But most visitors to the zoo do not know his story.

Seeing that animals too have lives that are not too dissimilar from ours may be the compromise we need to internalize the beauty of the wild. In doing so we can highlight the stories of conservation and the situation these animals face and especially the conditions of their species who may be struggling to roam the wild. Using art to convey these stories can help people understand why animals are disappearing in their country and why. This can help us eventually develop an understanding within the visitors that they can make a difference and allows us to guide them towards ways they can help. Incorporating digital solutions like social media and interactive displays can help us develop a greater outreach and reach education goals.

With the ongoing redesign at the Lahore Zoo, now is the best time to take this opportunity and improve engagement at the zoo and help educate zoo visitors. For the past year, a team of student volunteers, including the authors, with expertise in art and science have been working with the Zoo leadership so visitors can appreciate how unique each animal is and build greater sensitivity towards their needs and to conversation more broadly.

The goal of the project is to use visually engaging and detailed illustrations, photographs, digital media, and evocative and highly personalised story-telling to show everyday visitors the vibrant lives our animal friends live.

By including educational material that highlights the importance of animal welfare and conservation in more visually appealing ways, one can help bolster the zoo’s educational programming and borrowing successful efforts from and award winning programmes across Zoos globally. The hope is that instead of bothering animals and hoping to get some kind of reaction, our visitors see them as living beings and not objects, and by doing so, care more for the animals needs and feelings.

By enhancing exhibits with digital interaction and physical storyboards, we can create a more healthy, caring, and lasting engagement towards the animals and enable us all to better connect with our wild side and appreciate and protect theirs.

The authors are students at Lexington High School (Massachusetts, USA) and The New School (Punjab, Pakistan). They are part of a team of students including others from the National College of Arts and the University of the Punjab (Zoology department) that is leading a project with the support of Lahore Zoo to effectively tell animal stories and communicate them to the millions of visitors the zoo gets every year. If you are interesting in joining this project or have helpful suggestions please email them at zoostorieslahore@gmail.com
Have you ever imagined a dolphin trapped in fishing nets, struggling for survival in a river? This distressing imagery represents one of the leading causes of river dolphin loss worldwide. Among the numerous challenges faced by Asian river dolphins, entanglement in fishing nets ranks as one of the most prominent causes of mortality. In fact, the loss of the Baiji dolphin, once abundant in the Yangtze river of China, serves as a stark reminder of the devastating consequences of unchecked fishing activities. Baiji dolphins were declared functionally extinct in 2006, primarily due to extensive fishing-induced mortalities and habitat degradation.

The Indus river dolphin, also known locally as Bhulan, is an endangered species endemic to the Indus river system. The Indus river in Pakistan is home to the only viable population of this dolphin, and at the same time, it supports the lives and livelihoods of millions of humans through sustained fishing activities. In Pakistan, fishing-induced mortalities account for over 50 per cent of recorded dolphin deaths, particularly in Sindh, a region that hosts the highest global population of this endangered river cetacean. Despite conservation efforts and legislative measures aimed at protecting these gentle creatures, the pressures of human activity continue to threaten their survival.

While the scale of the fishing-induced threats to the survival of the Indus River dolphin and other river dolphin species is huge, there is no easy or singular solution to address this persistent and daunting problem given the diversity of riverscapes and associated challenges.

Pingers, a technology-based innovation, are among the many solutions being assessed as potential saviors of dolphins. The working behind these is fairly simple, pingers are small acoustic devices that emit noise under water to deter dolphins and other aquatic mammals from approaching fishing nets, ultimately protecting them from becoming trapped. The noise they generate acts as an alarm or warning signal, advising dolphins to steer clear of the fishing nets. If effective, pingers have the potential to significantly contribute to the conservation of these precious dolphins.

As fishing nets are used by fishers, the crucial aspect of experimenting with this technological innovation is to involve fishers from the outset when testing such innovative and technology-oriented solutions. This approach has dual benefits: it builds community stewardship by involving and training fishers to protect dolphins, and it generates visible evidence that is easy for communities and other stakeholders to understand. Alongside pingers generating noise, data on dolphin surfacing and movement is recorded using another device called F-Pods.

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This solution, which is being implemented in Pakistan since 2023 with the support of the Darwin Initiative and the Engro Foundation, helps us understand the responses of the Indus river dolphin to pingers. Pinger trials have been conducted for two fishing seasons thus far exploring various dimensions of pinger use and effectiveness to generate strong and concrete evidence for their adoption on a larger scale.

This hopeful outcome of the work is supporting us in building the foundation for transforming the relationship between dolphins and fishing nets, potentially modifying fishing practices and ensuring a safer coexistence between humans and these remarkable creatures.

Trained fishermen and women who collect observations on dolphin surfacing records during and after the experiments make a significant contribution to validating the behavioral responses of dolphins to pingers.

Pingers are deployed on the fishing nets. Fishers attach pingers to the fishing nets or lines so that dolphins can hear the noise and avoid swimming into the nets accidentally. This helps to keep the dolphins safe and ensures they don't get caught unintentionally while fishermen are catching fish.