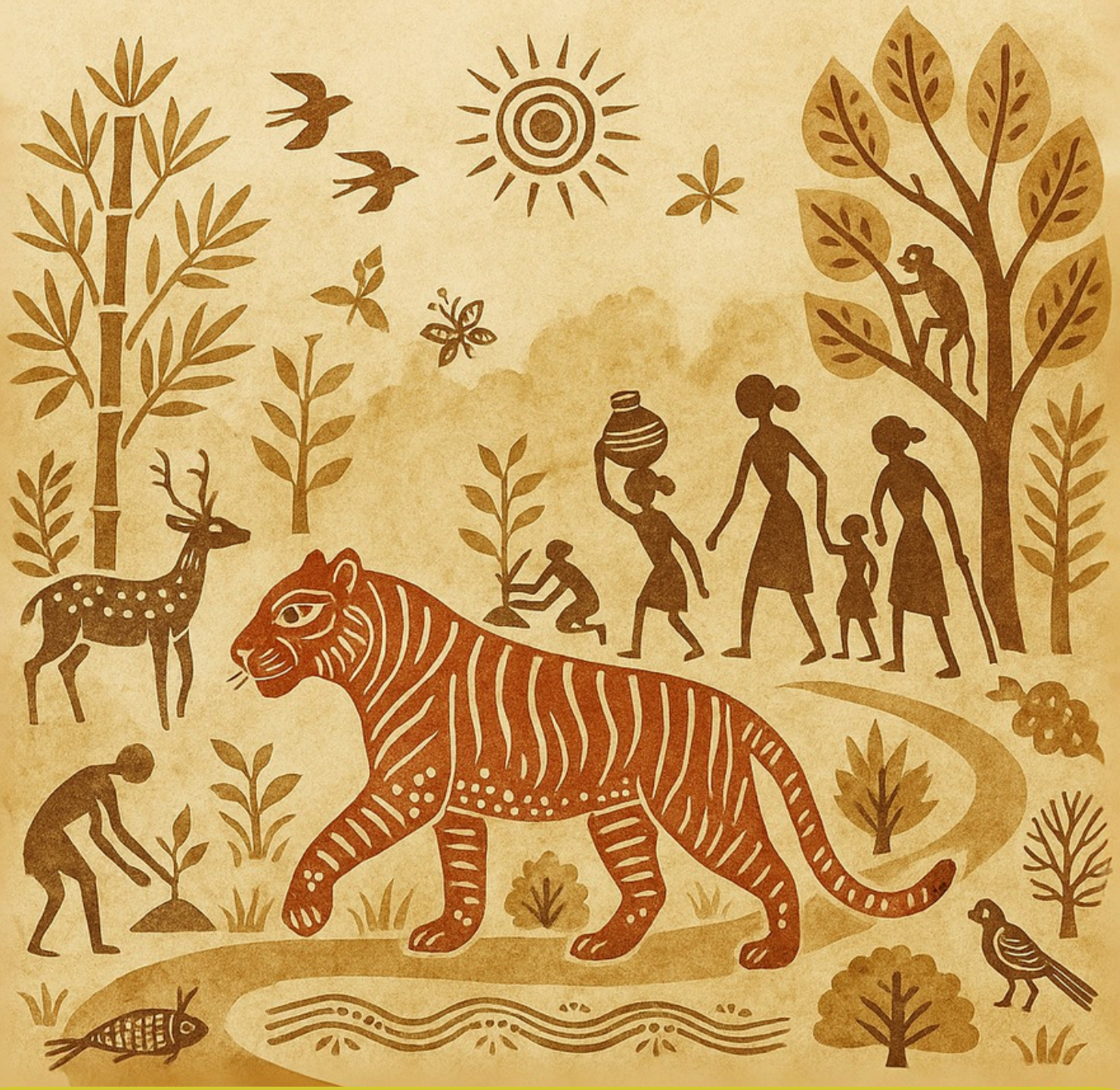
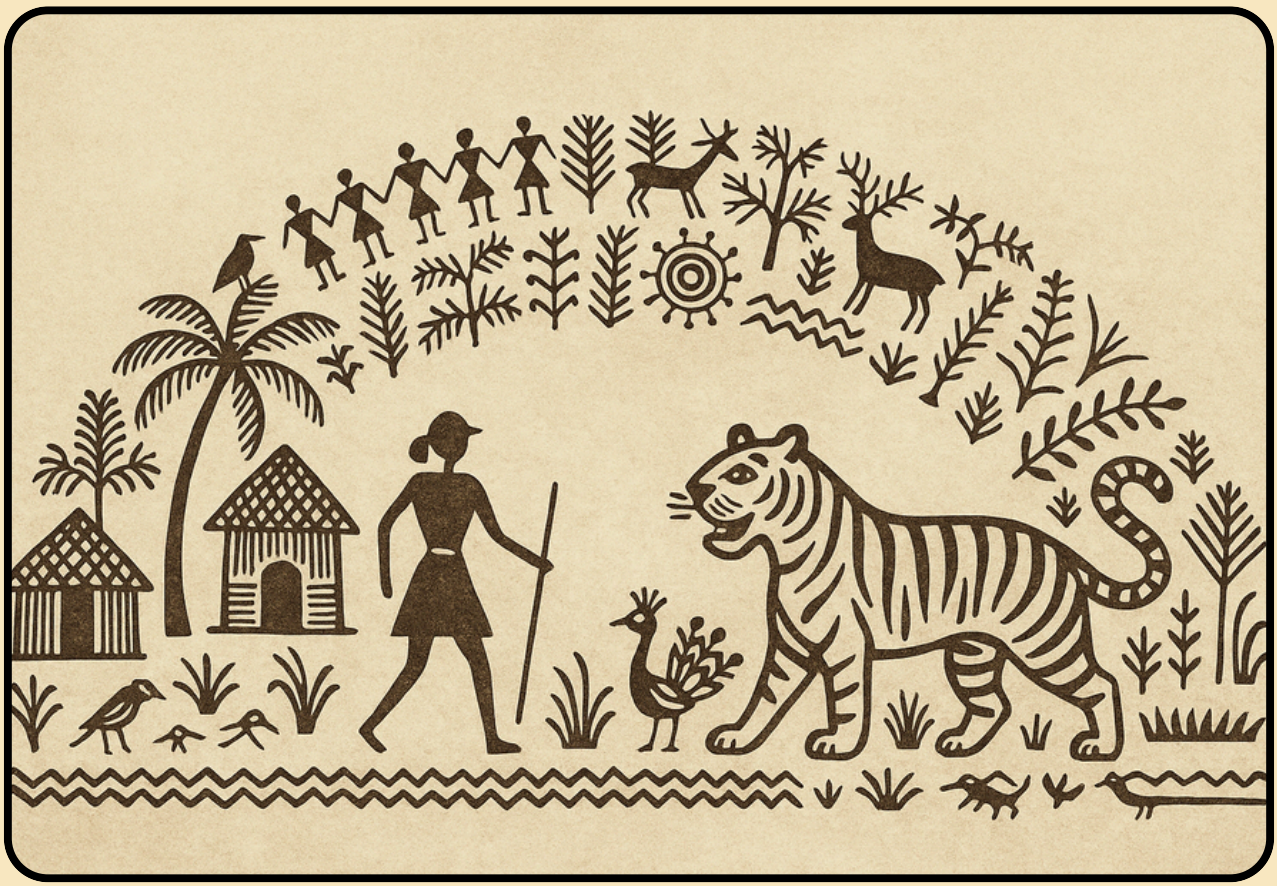
Strategies for Future Wildlife Management in Madhya Pradesh



Office of PCCF (Wildlife) & CWLW, M.P.

Proceedings of National Wildlife Workshop on "Strategies for Future Wildlife Management in Madhya Pradesh"



Pench Tiger Reserve, Seoni, Madhya Pradesh

7th - 8th March 2025

Proceedings of National Wildlife Workshop on 'Strategies for Future Wildlife Management in Madhya Pradesh'

Venue – Pench Tiger Reserve, Seoni, M.P.

7th March & 8th March 2025

Madhya Pradesh, often referred to as the "Tiger State of India," boasts rich biodiversity and a commendable track record in wildlife conservation and management. In recognition of the state's pivotal role in national conservation efforts, the Honourable Chief Minister of Madhya Pradesh, during the 27th meeting of the State Board for Wildlife (SBWL), directed the convening of a national-level wildlife workshop. The aim was to develop comprehensive strategies and a clear roadmap to strengthen wildlife management in the state in keeping with the emerging challenges in the field.

This initiative comes at a critical juncture, as the frequency and intensity of human-wildlife conflicts—particularly involving tigers and elephants—are on the rise in the state. These conflicts highlight the urgent need to reassess current conservation practices and adapt to emerging challenges through innovative approaches.

The primary objective of the workshop was to evaluate existing wildlife conservation practices, anticipate future challenges, and formulate effective strategies by integrating lessons from national and global best practices. A key focus was the application of cutting-edge tools and technologies, including Artificial Intelligence, for proactive, data-driven and scientific wildlife management.

Key Themes for Discussion:

1. **Habitat Management and Interventions**
   Strategies to enhance and restore habitats for long-term sustainability of wildlife populations.
2. **Human-Wildlife Conflict Mitigation**
   Innovative and participatory approaches to reduce conflict and promote coexistence.
3. **Landscape Management / Management of Wildlife Outside Protected Areas**
   Integrated planning and governance for wildlife conservation beyond traditional protected boundaries.
4. **Community Engagement**
   Strengthening the role of local communities as stakeholders and stewards of conservation efforts.

Day 1: 7th March 2025

Welcome address

Speaker: Shri. Subharanjan Sen, PCCF Wildlife & CWLW, Madhya Pradesh

- Highlighted the need to formulate strategies for future wildlife management in Madhya Pradesh.
- Emphasized that while Madhya Pradesh is a pioneer in wildlife conservation, challenges such as increasing wildlife population and human-wildlife conflict necessitate new management approaches.
- Assured that the workshop discussions would be compiled into actionable strategies.

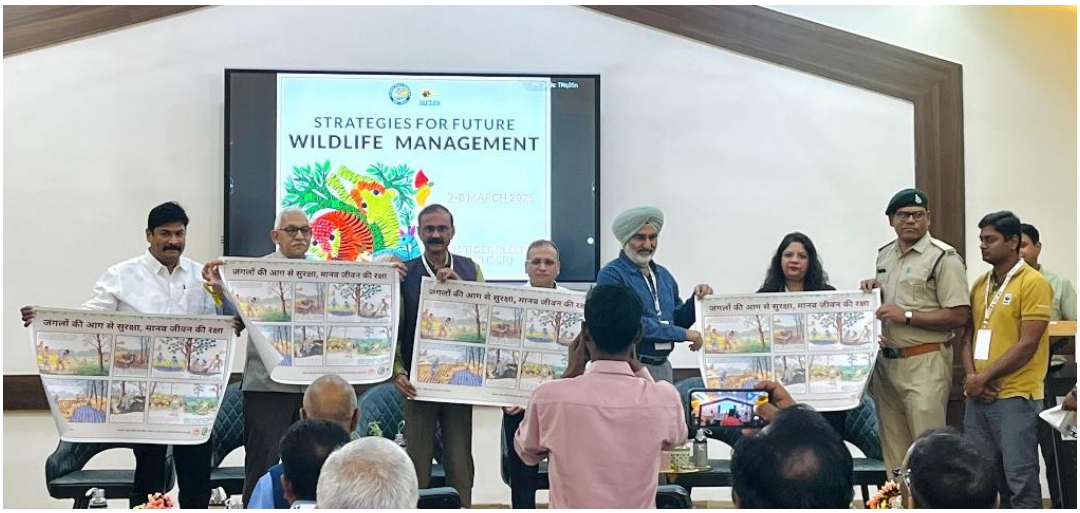
Keynote Address

Speaker: Shri. Aseem Shrivastava, PCCF & HoFF, Madhya Pradesh

- Focused on invasive species in Madhya Pradesh based on the latest NTCA-WII report.
- 4 major invasive species identified: *Lantana camara, Prosopis juliflora, Chromolaena odorata, and Hyptis & Pogostemon spp.*
- Noted the challenges in managing these species and proposed studying fire as a tool for control.
- Addressed fire management challenges in Madhya Pradesh, advocating for proactive fire control measures.
- Stressed the importance of continuous monitoring of wild elephants for effective management.

Launch of fire awareness posters

Designed by Shri. Rohit Shukla, Forest guard from Pench Tiger reserve in collaboration with WWF-India, in the presence of PCCF & HoFF, PCCF (Wildlife) & CWLW, PCCF Corporation, PCCF HRD & CEO-MPEDB, Ret. CWLW & PCCF (Wildlife) Shri. Jitendra Agarwal, and Ret. CWLW & PCCF (Wildlife) Dr. H.S. Pabla.



Presentations

Presentation 1: Overview of Wildlife Conservation in Madhya Pradesh

Speaker: Shri. Subharanjan Sen, PCCF (Wildlife) & CWLW, Madhya Pradesh

Introduction

The presentation provided a comprehensive overview of wildlife conservation efforts in Madhya Pradesh, highlighting the state's remarkable biodiversity, protected area network, proactive management initiatives over the last five decades, and conservation achievements. It also addressed ongoing challenges related to human-wildlife conflict and outlined future directions for strengthening conservation strategies.

Key Statistics

Madhya Pradesh continues to be the leader in harbouring and managing wildlife in the country. The state hosts over **785 tigers**, the highest in the country, along with a **leopard population exceeding 3,400**. It is home to **2,456 gharials**, **11,000 vultures**, and **772 wolves**. Notably, it remains the **only state in India with a cheetah population**, thanks to the successful reintroduction program in **Kuno National Park**.

Protected Area Network & Village Relocation

Madhya Pradesh boasts an extensive protected area network comprising **11 National Parks, 24 Wildlife Sanctuaries*, and 9 Tiger Reserves**, covering **11.6% of the state's forest area**. In a significant effort to enhance habitat conservation, over **2,500 km²** of new protected area proposals have been submitted. So far, **221 villages** have been relocated from forest areas, creating inviolate spaces essential for wildlife conservation and mitigating human-wildlife conflict.

*Dr B.R Ambedkar Wildlife Sanctuary, Sagar, declared as the 25th Wildlife Sanctuary in Madhya Pradesh

Active Management Initiatives

The state has undertaken several translocation initiatives to bolster both herbivore and carnivore populations.

- **Herbivore Translocations:**
    - **Gaur** have been successfully reintroduced in **Bandhavgarh (73), Sanjay (51),** from **Kanha and Satpura Tiger Reserves**, helping restore their populations.
    - The rare **Hard Ground Barasingha**, Madhya Pradesh's state animal, has been relocated to **Van Vihar National Park & Zoo (7)**, **Satpura (115)**, and **Bandhavgarh Tiger Reserves (48)**, aiding in their range expansion.
    - Large-scale **spotted deer translocations** over (9000) have been carried out, notably from **Kanha**, **Pench, Bandhavgarh Tiger Reserve to Kuno National Park** and **Satpura, Sanjay, Nauradehi Tiger** improving prey availability for carnivores.

- **Carnivore Translocations:**
    - Tigers and leopards are translocated/released in suitable locations as a part of active management strategies for population management, conflict minimisation, etc.
    - The state has successfully rewilded **orphaned tiger cubs** in **Kanha, Bandhavgarh, and Satpura Tiger Reserves**, ensuring their survival in the wild.
    - The landmark **tiger reintroduction in Panna Tiger Reserve** has been a major success story, with the population rebounding from **zero tigers in 2009** to over **65 by 2022**.
- **Gharial and turtle Conservation:**
    - The **Deori hatchery**, revived in **2003**, has played a pivotal role in gharial conservation, boosting their population in the **Chambal River**.
    - The in-situ protection of turtles in many areas is helping the recovery of the population of four endangered turtle species.
- **Cheetah Reintroduction:**
    - Madhya Pradesh made history with the **reintroduction of cheetahs in Kuno**, marking a significant step towards restoring the species in India.

Conservation Achievements

Madhya Pradesh's conservation efforts have yielded remarkable successes, including the recovery of the **Hard Ground Barasingha population**, which increased from **66 in 1967** to over **1,100 in Kanha**, with **240 individuals in Satpura** and **50 in Bandhavgarh**. The **Panna tiger reintroduction program** stands as a globally acclaimed success, with the reserve now hosting over **65 tigers**. The **gharial population in the Chambal River** has also seen a significant rise, growing from **514 individuals in 2003** to over **2,300**. The **Vulture Captive Breeding Centre** in **Kerwa, Bhopal**, established in **2013**, has played a crucial role in vulture conservation. Additionally, in **2018**, tigers were successfully reintroduced in **Nauradehi Wildlife Sanctuary**, contributing to the expansion of tiger habitats. Further tigers were reintroduced in **Madhav National Park** as well.

Challenges & Conflict Management

Despite these successes, Madhya Pradesh faces several challenges in wildlife conservation.

- **Human-Wildlife Conflict:**
    - Human fatalities due to wildlife encounters have increased from **50 per year (2009–2020)** to **80 per year (2021–2024)**.
    - Since **2019**, elephants have caused **23 human deaths**, highlighting the growing conflict with this species.

  - The entry and colonisation of elephants in the forest of Madhya Pradesh poses several challenges to the forest dependents, especially in the absence of an effective crop loss compensation system.
  - Crop raiding by wildlife, particularly by herbivores, continues to affect local communities.

- **Conservation Shortcomings:**
  - The **otter population in the Chambal Sanctuary** is witnessing a decline, posing a conservation concern.
  - The state is grappling with the challenges of the new locally extinct **Great Indian Bustards (GIB)** and dwindling **Lesser Floricans** population, both critically endangered species.

Future Directions

To strengthen its wildlife conservation framework, Madhya Pradesh has outlined several future strategies:

- **Expansion of Protected Areas:** Increasing the coverage of protected areas and buffer zones to provide larger, safer habitats for wildlife.
- **Enhanced Forensic and Veterinary Services:** Strengthening **wildlife forensic science** and veterinary capabilities to improve the management of wildlife health and crime investigations.
- **Mitigating Infrastructure Impact:** Developing strategies to minimise the adverse effects of **linear infrastructure** (e.g., roads, railways) on wildlife corridors, ensuring safe animal movement.
- **Village Relocations:** Continuing the relocation of villages from core areas to create inviolate spaces for tigers and other wildlife.

Expert Comments & Recommendations

Dr. R. Sukumar appreciated the detailed delineation of wildlife corridors in Madhya Pradesh, highlighting their significance in maintaining **gene flow** across regions. However, he cautioned that working in these sensitive areas requires **careful planning and execution** to avoid disrupting ecological balance.

Dr. H.S. Pabla, Retired CWLW & PCCF (WL), emphasised the need for prioritising **Protected Area (PA)** development in the **Chambal region** to safeguard its unique biodiversity. He pointed out that the Chambal ecosystem holds immense ecological importance and requires enhanced protection measures. In response, the **CWLW, Madhya Pradesh**, acknowledged the recommendation and assured that the **MP Forest Department** would explore potential conservation initiatives in the area.

Shri Jitendra Agarwal, Retired CWLW & PCCF (WL), highlighted the threats posed by **linear infrastructure projects** to wildlife corridors and habitat connectivity. He stressed the importance of implementing **mitigation measures** for such constructions, including the creation of **overpasses and underpasses**. He emphasised that these structures should be carefully planned and strategically placed to ensure the safe movement of wildlife.

Presentation 2: Futuristic Strategies for Wildlife Management

Speaker: Dr. Rajesh Gopal, Director General, Global Tiger Forum, New Delhi, India

Key Issues

Dr. Rajesh Gopal highlighted the challenges posed by **landscape changes** due to **agriculture, infrastructure, and mining**, which are significantly impacting **tiger habitats**. These changes are affecting the **movement ecology** and leading to behavioural adaptations of tigers under increasing environmental pressure.

To address these issues, he proposed the **3C Approach**: **Research Insights**, **Managerial Insights**, and **Landscape-Level Conservation**. Under **Research Insights**, he emphasised the need for **studying tiger behaviour, demographics, and ecology**, along with analysing **human-wildlife conflict dynamics** for more targeted conservation strategies. **Managerial Insights** focused on **strengthening anti-poaching efforts, habitat management**, and **mapping ecological and social carrying capacities**, while enhancing **policy frameworks** to integrate conservation with development. The **Landscape-Level Conservation** approach involves protecting **core areas** for breeding populations, ensuring **connectivity through wildlife corridors**, and managing **co-existence zones** where human and wildlife activities overlap.

Way Forward

Dr. Gopal emphasised the need to **promote community participation** in conservation efforts, ensuring that local communities are engaged and benefit from wildlife protection initiatives. He stressed the importance of **balancing development with ecological integrity** and advocated for the implementation of **science-driven policies** to maintain tiger population stability and protect their habitats.

Presentation 3: Human-Wildlife Symbiosis

Speaker: Dr. H.S. Pabla, Former PCCF (Wildlife) & CWLW, Madhya Pradesh.

Challenges in Wild Mammal Conservation

Dr. H.S. Pabla highlighted the pressing challenges in **wild mammal conservation**, emphasizing the increasing **human-wildlife conflict**. He noted that **1,200 to 1,500 human deaths** occur annually due to wildlife interactions, with incidents involving large carnivores and elephants being the primary cause. Additionally, **crop and property damage** by wild animals' results in significant **economic losses** for rural communities. He pointed out that current conservation models, which focus on strict preservation, often **disproportionately impact rural populations**, creating resentment toward wildlife conservation efforts.

Proposed Policy Reforms

To address these challenges, Dr. Pabla proposed **shifting the conservation approach** from mere **preservation** to sustainable, community-driven **conservation practices**. He stressed the

need to **prioritise human safety** in conservation laws and policies, ensuring that people are not secondary to wildlife protection. He also recommended **recognising wildlife as a community-managed natural resource**, which would give local populations a greater stake in conservation outcomes. By **empowering local communities** through conservation-linked economic benefits, he argued that wildlife could be seen as an asset rather than a threat.

Sustainable Use & Symbiosis Model

Dr. Pabla advocated for a **sustainable use and symbiosis model** to reduce conflict and promote coexistence. He suggested managing **Protected Areas (PAs)** for **maximum wildlife densities** to boost **eco-tourism** and generate revenue. Outside PAs, he proposed **regulating wildlife populations** to prevent overpopulation and reduce human-wildlife conflicts. Additionally, he highlighted the potential of **controlled hunting** programs, where the revenue generated could be used to **compensate local communities** for wildlife-related damages, creating a financial incentive for coexistence.

Way Forward

For the future, Dr. Pabla recommended **amending the Wildlife Protection Act (WLPA)** to incorporate **sustainable wildlife management** practices, allowing for adaptive conservation strategies. He emphasized the need for **science-based conflict mitigation strategies**, including the use of data and technology to predict and prevent human-wildlife conflicts. Finally, he stressed the importance of **aligning conservation policies with international commitments**, ensuring that India's wildlife conservation framework adheres to global standards and best practices.

Expert Comments & Recommendations

Dr. R. Sukumar emphasized that the concept of **conservation** presented during the workshop is extremely significant, as it lays the foundation for **future dialogues** aimed at improving both **wildlife preservation** and **human well-being**. He highlighted the importance of continuing such discussions to foster a balanced coexistence between humans and wildlife.

Dr. Sanjay Shukla remarked that **tolerance and coexistence** in India are remarkably high, especially when compared to other countries. Citing the example of **Asian elephant populations** and the incidence of **human deaths** due to elephant encounters in India and Sri Lanka, he pointed out that, despite the **high density of both humans and wildlife** in these regions, the number of **human fatalities** and **retaliatory killings of wildlife** is significantly lower than in many other parts of the world. He concluded by suggesting that India should **reassess its conservation efforts** and recognize its relatively successful model of human-wildlife coexistence.

Presentation 4: Wildlife Management Outside Protected Areas (Online)

Speaker: Dr. Suhas Kumar, Former PCCF (Wildlife) & CWLW, Madhya Pradesh.

PA Network and Wildlife Corridors

Dr. Suhas Kumar emphasized the importance of **Protected Area (PA) networks**, including **sanctuaries, national parks, and tiger reserves**, in maximizing **wildlife conservation**

efforts. He highlighted that the **primary aim** of this network is to facilitate **gene flow between PAs**, ensuring the long-term viability of wildlife populations. The foundation for this conservation effort was laid through the **National Wildlife Action Plan (1983)**, which initiated large-scale **wildlife conservation activities** across the country. Dr. Kumar stressed that **wildlife corridors** are critical for the **long-term conservation** of species, as they enable the safe movement of animals between fragmented habitats. However, he pointed out a significant gap: **Madhya Pradesh lacks a legal framework** specifically dedicated to the protection and management of wildlife corridors, leaving them vulnerable to fragmentation and encroachment.

Strengthening Investigative Agencies

To effectively manage wildlife outside PAs, Dr. Kumar emphasized the need to **strengthen investigative agencies**. He highlighted the role of the **State Tiger Strike Force** in combating wildlife crime and the importance of **revamping field units** to improve on-ground enforcement. He also stressed the need for **advanced surveillance systems** and **Call Data Record (CDR) facilities** to enhance monitoring and tracking of illegal activities.

Expert Comments & Recommendations

Mr. **V.N. Ambade** pointed out that **many corporation areas** overlap with **wildlife corridors**, citing the **Kanha-Pench corridor** as a prime example. He noted that the lack of **special funds** for managing wildlife in such areas hinders effective conservation efforts. Dr. Suhas Kumar further emphasized the importance of **strengthening corporation and territorial areas**, as they serve as key zones for **wildlife movement**. He highlighted the lack of **training and sensitization** among staff working in these areas, stressing the need for **capacity building** programs to enhance their skills and awareness in managing human-wildlife interactions and corridor conservation.

Presentation 5: Management of Dispersing Elephants in Conflict with People

Speaker: Dr Raman Sukumar, Honorary Professor, Centre for Ecological Sciences, IISc, Bangalore

Reasons for Elephant Dispersal

Dr. Raman Sukumar, an experienced elephant ecologist, highlighted the increasing dispersal of elephants in the 21st century due to various environmental and anthropogenic factors. He explained that **climate change**, specifically the **1982 El Niño event**, triggered severe droughts, forcing elephants to move in search of food and water. Additionally, **habitat degradation** caused by mining, industrial expansion, and deforestation has significantly reduced suitable elephant habitats, further pushing them into human-dominated landscapes. Another key factor is **crop raiding**, as elephants are increasingly attracted to cultivated crops due to their higher nutritional value and abundance compared to forest vegetation.

Major Elephant Dispersal Events in East-Central India

Dr. Sukumar traced significant elephant dispersal events over the past few decades, illustrating the growing range expansion. During **1986-87**, elephants from **Dalma Wildlife Sanctuary** in Jharkhand moved deeper into **South Bengal** and later into **Chhattisgarh**. In **1998**, elephants crossed the **Mahanadi River in Odisha**, marking a notable dispersal event. From **2001 onward**, Chhattisgarh saw a steady increase in **immigrant elephants**, with over **250 elephants** entering the state. By **2004-05**, elephants from **Jharkhand and Odisha** migrated further into **Bihar and Bangladesh**, demonstrating their expanding range. In **2007-08**, elephants began entering **Madhya Pradesh**, and by **2018**, they had settled in **Bandhavgarh Tiger Reserve**, signalling a major shift in their distribution.

Challenges in Managing Immigrant Elephants

Dr. Sukumar outlined several challenges associated with managing the dispersing elephant population. The primary issue is the **rise in human-elephant conflict**, with increased incidents of **crop raiding** and human fatalities, particularly between **2004 and 2015**. He emphasized the difficulties in **relocating immigrant elephants**, as sending them back to their native ranges is often unfeasible, and blocking their migration is impractical given their extensive movement patterns. Capturing **rogue elephants** for departmental use is an option, but it requires expert consultation and careful management. Furthermore, elephants are increasingly adapting to **new habitats**, preferring crops over forest food, which complicates their management outside protected areas.

Proposed Management Strategies

To address the challenges of elephant dispersal, Dr. Sukumar proposed a series of management strategies. First, he recommended **encouraging natural settlement** by creating conditions that support the **long-term population viability** of elephants. This includes conducting **landscape-level habitat assessments** to identify suitable areas for elephant populations. He also advocated for a **zonal planning approach**, inspired by the **Karnataka Elephant Task Force model**, which could be adapted for Central India. This approach involves designating three zones: **Elephant Conservation Zones** (protected forests where 90% of the population resides under strict conservation measures), **Human-Elephant Coexistence Zones** (buffer areas with 9% of the population, requiring conflict-mitigation strategies), and **Elephant Removal Zones** (fragmented habitats with less than 1% of the population, where elephants are either relocated or managed differently). Finally, he stressed the need for **conflict mitigation measures**, such as increasing **compensation incentives** for crop losses to reduce local resentment and improving **community awareness and preparedness** through targeted engagement programs.

Expert Comments & Recommendations

During the session, experts shared their insights and recommendations on elephant management. **Dr. Bivash Pandav** emphasized the importance of **forest quality** in conflict mitigation. Using the example of **Chhattisgarh**, he pointed out that despite having larger forest areas, **Uttarakhand** experiences fewer human deaths due to elephants, highlighting that **forest integrity** is critical in reducing conflict. **Dr. R. Sukumar** called for **interstate collaboration** between **Chhattisgarh and Madhya Pradesh** to assess forest quality, resource availability, and corridor connectivity before formulating a comprehensive management plan.

Mr. R. Shrinivas Murthy raised concerns about whether **Madhya Pradesh's forests** could sustain a large elephant population in the long term. He questioned the potential impact on

prime tiger habitats like **Bandhavgarh** and stressed the need for **future-focused assessments** to determine the forest's carrying capacity. Dr. Sukumar agreed, highlighting the necessity of **scientific research** to evaluate the forest's ability to support elephants without negatively impacting other key species.

Mr. L. Krishnamoorthy highlighted the **challenges in monitoring elephants** due to their frequent and wide-ranging movements across states. He inquired about the best practices for continuous tracking. Dr. Sukumar recommended using **radio-collaring and advanced tracking technologies** to monitor elephant movements effectively. Finally, Dr. Sukumar emphasized that **elephant capture operations** should only be conducted after thorough consultation with **scientific experts** to ensure compliance with **judicial guidelines** and ethical practices.

Presentation 6: Landscape Approach to Biodiversity Conservation and People's Well-Being

Speaker: Shri. BMS Rathore, Former PCCF Madhya Pradesh

Defining Landscape

Sh. B.M.S. Rathore introduced the concept of landscapes as complex ecological units defined by **cultural, species-based, landform-based, and interacting ecosystems**. He explained that landscapes are dynamic and interconnected, requiring a holistic approach for their conservation. The speaker emphasized the importance of **transboundary conservation**, highlighting how ecological networks often extend beyond administrative borders, making collaboration across regions essential. He also underlined the growing role of **technology** in landscape management. Tools such as **GIS, artificial intelligence (AI), and machine learning** are increasingly being used for real-time monitoring, biodiversity assessment, and enhancing conservation effectiveness.

Challenges

The presentation highlighted several challenges hindering effective **landscape-level conservation**. One of the primary issues is **forest degradation**, with approximately **30 lakh hectares** of forest land lost due to deforestation, habitat fragmentation, and biodiversity depletion. This loss has significantly impacted wildlife corridors and ecosystem stability.

Another major challenge is the **rising human-wildlife conflict**, which has led to **1,200 to 1,500 human deaths annually**. Additionally, farmers face substantial crop losses, amounting to nearly **₹2,30,680 crores**. These conflicts undermine conservation efforts and foster hostility towards wildlife.

The speaker also pointed out **environmental pressures** such as water depletion, air pollution, and declining ecosystem services. These issues not only threaten biodiversity but also compromise the ecological integrity of landscapes. Lastly, **policy gaps** remain a significant challenge. The lack of coherent and integrated strategies for **sustainable landscape management** prevents effective conservation and community participation.

Opportunities for Landscape-Based Conservation

Sh. Rathore presented several **opportunities and success stories** from India that exemplify the potential of landscape-based conservation. He highlighted **species recovery programs**, such as the rewilding projects for **tigers and barasingha (swamp deer)**, which have successfully contributed to habitat regeneration and population stability.

He also emphasized the role of **community forest management** in promoting sustainable landscape practices. With over **5,000 micro-plans** in place, local communities are actively involved in forest management. Through **Joint Forest Management Committees (JFMCs)**, communities benefit from **revenue sharing**, generating approximately **₹200 crores annually** from forest-based resources. This model promotes both conservation and economic development.

The speaker highlighted **wildlife-friendly infrastructure** as another opportunity. Projects involving **underpasses and overpasses** have significantly reduced wildlife fatalities caused by road accidents, creating safer passage for animals.

Innovative approaches to **environmental education** were also showcased. By engaging school children in conservation awareness programs, the initiative fosters a deeper connection with nature from a young age, promoting long-term conservation values.

The presentation cited **Chilika Wetland Restoration** as a successful example of landscape-level conservation, driven by institutional support from the **Chilika Development Authority (CDA)**. This initiative has significantly improved biodiversity, local livelihoods, and wetland health.

Additionally, the **Kailash Transboundary Landscape** project was highlighted as a model of regional cooperation, spanning **30,000 sq. km** across **India, Nepal, and China**. This collaborative conservation effort aims to protect biodiversity while promoting sustainable livelihoods across borders.

Lastly, Sh. Rathore shared the **Harda Forest fringe case**, where a **multi-stakeholder partnership** implemented a sustainable grazing management program. The **Karo-Seekho-Karo model**, based on participatory learning, empowered local communities to adopt sustainable practices, ensuring both conservation and livelihood benefits.

Principles of Landscape-Based Conservation

The speaker outlined several **principles essential for effective landscape-based conservation**. First, he emphasized the need to shift from isolated conservation efforts to **integrated landscape management**, where ecological, social, and economic factors are collectively addressed.

He stressed the importance of **technology integration**, advocating for the use of **AI, GIS, and machine learning** to enhance conservation effectiveness. These tools enable accurate biodiversity mapping, real-time monitoring, and data-driven decision-making.

Community participation was highlighted as another key principle. Sh. Rathore stressed the need for **multi-stakeholder engagement**, involving local communities, government agencies, and conservation organizations in decision-making processes.

The speaker also called for influencing **policy reforms**, specifically revisiting the **30-year-old participatory forest management (PFM)** framework. He suggested that reviewing and updating this policy could better address contemporary conservation challenges.

Lastly, he emphasized the concept of **"landscape journeys"**, where conservation strategies evolve over time through continuous assessment, adaptation, and improvement, ensuring long-term sustainability.

Key Questions for Future Strategies

Sh. Rathore posed several **critical questions** to shape future landscape conservation strategies. He questioned the **effectiveness of existing institutional models**, such as **Eco-Development Committees (EDCs)** and **JFMCs**, in addressing the complexities of landscape conservation.

He also raised concerns about **impact monitoring**, specifically regarding initiatives like **eco-tourism and Anubhuti programs**. While these initiatives have positive impacts, there is a need for a **systematic monitoring framework** to assess their long-term effectiveness.

Empowering **local governance** was another key area of focus. Sh. Rathore questioned whether current **community-based forest management models** are adequately empowering local institutions to make meaningful conservation decisions.

He also highlighted the **economic cost of conservation**, questioning who bears the financial burden and who ultimately benefits. This raised the need for equitable benefit-sharing mechanisms to ensure local communities are fairly compensated for their conservation efforts.

Finally, the speaker addressed **legal frameworks**, specifically referencing the **Wildlife Protection Act**. He emphasized the need to interpret and implement the law in a way that balances the rights of both **wildlife and local communities**, especially in regions with frequent human-wildlife conflicts.

Expert Comments & Recommendations

During the discussion, **Adhar Gupta, DFO Balaghat**, highlighted the challenge of explaining the **landscape approach to local communities**. He stressed the importance of providing **economic benefits** to local populations in exchange for their conservation efforts. He suggested that the state could introduce a scheme where **funds are allocated to districts** based on their forest area. This would ensure that forest-rich districts receive proportionate financial support, incentivizing local conservation efforts.

In response, **Sh. B.M.S. Rathore** agreed that **benefit-sharing is crucial** for the success of landscape conservation. However, he clarified that **no formal scheme** currently exists to allocate funds based on forest area. Instead, he suggested that communities could benefit through **micro-plans, the Revolving Development Fund (RDF)**, and the sustainable harvesting of forest plantations. These mechanisms could provide **direct financial incentives** to local communities, promoting their active participation in conservation while supporting their livelihoods.

Presentation 7: Landscape Management Theme – Current State, Future Priorities, Challenges, and Possible Solutions

Speaker: Dr. Y.V. Jhala, - Former Dean, Wildlife Institute of India, Dehradun

Tiger Landscape Dynamics (2006-2018)

Dr. Y.V. Jhala presented findings from a recent study titled **"Tiger Recovery Amid People and Poverty,"** which analysed tiger population trends over 12 years. The study highlighted that **tiger persistence and colonization** are heavily influenced by factors such as **forest loss, railway and road networks, agricultural expansion, and human settlements**. Tigers show a **negative correlation** with these conditions, as habitat fragmentation and human encroachment restrict their movement and reduce viable breeding areas.

The presentation further noted that **armed conflicts and developmental activities** pose significant threats to tiger populations. These disturbances disrupt habitats and, in some cases, lead to **local extinction of tigers**. Dr. Jhala emphasized that conservation efforts must account for these socio-political and infrastructural challenges.

Factors Affecting Tigers & Biodiversity

Dr. Jhala elaborated on the broader ecological and socio-economic factors impacting **tigers and biodiversity**. He explained that **human density and poverty** significantly influence conservation outcomes. However, he noted that tigers can coexist in forests with **varied human densities**, provided conservation measures and habitat connectivity are maintained.

Interestingly, the presentation highlighted that **rural prosperity** has a positive influence on biodiversity recovery. When local communities experience economic stability, they are more likely to support conservation initiatives. Moreover, **corridor connectivity** was identified as a critical factor, enabling tigers to move between protected areas, which is essential for **genetic diversity and population viability**.

Land-Sparing vs. Land-Sharing Approach

Dr. Jhala discussed two key conservation models: **land-sparing** and **land-sharing** approaches. He emphasized that **tiger source populations** thrive in areas with **low or no human density**, making land-sparing more effective for core conservation zones. However, the **corridor areas** between protected zones require a **land-sharing approach**, where conservation efforts are balanced with the economic well-being of local communities.

To promote coexistence, Dr. Jhala recommended that **communities in corridor areas** should receive direct **economic benefits** from conservation initiatives. This could include eco-tourism, compensation schemes, and sustainable livelihood programs, fostering local support for conservation efforts.

Conservation Challenges & Management Needs

The presentation highlighted the **complex management needs** required to ensure sustainable tiger populations. Dr. Jhala explained that both **tigers and leopards** require **active management** to sustain population growth. He stressed the need for **continuous monitoring, habitat management, and conflict mitigation** to maintain stable populations.

Focusing on the **Central Indian landscape**, Dr. Jhala noted that the region supports a **metapopulation of over 1,200 tigers**, with a **minimum viable population (MVP)** requiring an **effective population size of approximately 500**. He underscored the importance of setting clear **population thresholds** for different areas to prevent overpopulation and ensure habitat sustainability.

Additionally, Dr. Jhala called for **conservation efforts beyond tigers**, advocating for **protection of other endangered species** that share the same landscapes, ensuring a balanced and inclusive conservation strategy.

Invasive Species Impact on Tiger Landscapes

A significant challenge highlighted in the presentation was the **invasion of alien plant species** in tiger habitats. Dr. Jhala pointed out that species such as **Lantana, Parthenium, Prosopis, and Mimosa** degrade native vegetation, reducing the availability of forage and shelter for prey species. This degradation ultimately impacts tiger populations by diminishing their prey base.

To combat this issue, Dr. Jhala emphasized the **urgent need for habitat restoration**. He proposed large-scale removal of invasive species, followed by **native vegetation restoration programs** to maintain biodiversity and sustain healthy tiger habitats.

Cheetah Reintroduction in India

The presentation also covered the **cheetah reintroduction project**, highlighting the potential for establishing viable cheetah populations in India. Dr. Jhala shared data on **cheetah-suitable habitats**, noting that:

- **Protected Areas (PAs)** cover approximately **102,046 sq. km**, offering secure habitats.
- Within these PAs, **71,395 sq. km** is deemed suitable for cheetahs.
- The total potential habitat, including non-PA areas, spans **697,472 sq. km**.
- Using a **managed metapopulation approach**, India could potentially accommodate over **500 cheetahs**.

He emphasized that this initiative aims to restore **grassland ecosystems** while promoting biodiversity conservation.

Reintroducing Wild Buffalo (*Bubalus arnee*) to MP

Dr. Jhala proposed the **reintroduction of wild buffalo (Bubalus arnee)** as a keystone species for **grassland restoration** in Madhya Pradesh. He explained that wild buffalo play a crucial role in **ecosystem engineering** by maintaining grassland dynamics, preventing encroachment by woody vegetation, and enhancing habitat diversity. Their presence would contribute to **restoring degraded landscapes** and improving biodiversity.

Solutions to Human-Wildlife Conflict

The presentation also addressed strategies for mitigating **human-wildlife conflicts**, which are increasingly common in tiger landscapes. Dr. Jhala recommended **mass capture and translocation** of conflict-prone herbivore species such as **nilgai, blackbuck, and wild pigs**.

By relocating these species to **underpopulated protected areas (PAs)**, authorities can rebalance ecosystems before introducing apex predators.

He also advocated for the **use of oral vaccines** to control diseases in wildlife and reduce conflicts. The proposed vaccines included:

- **Rabies control vaccines** for carnivores.
- **Canine Distemper Virus (CDV) vaccines** for vulnerable wildlife species.
- **Immunocontraceptive PZP vaccines** for population control of overabundant herbivores.

Dr. Jhala emphasized that **improving social tolerance** towards wildlife is key to conflict management. He explained that a **timely response to conflict situations** could reduce public resentment and prevent backlash against entire species. Addressing perceived and actual conflicts effectively would promote **human-wildlife coexistence**.

Conservation Strategy & Takeaways

Dr. Jhala outlined a comprehensive **conservation strategy** with actionable takeaways. He stressed the need to:

- **Create large inviolate spaces** for wildlife conservation, ensuring sufficient core areas free from human disturbances.
- **Maintain connectivity** between source populations through well-managed corridors, facilitating genetic exchange and population stability.
- Implement a **zonation approach**, separating people and wildlife wherever possible to reduce conflicts.
- Swiftly address **problem animals** to prevent the public from generalizing their grievances towards entire species.
- Recognize that **coexistence is necessary**, as most protected areas are too small to support viable tiger populations alone.

To ensure effective conflict mitigation, Dr. Jhala recommended:

- **Awareness programs** to educate local communities about wildlife behaviour and conservation benefits.
- **Economic incentives** to promote conservation-friendly practices and reduce hostility towards wildlife.
- **Site-specific strategies** tailored to the unique socio-ecological conditions of each region.

Final Thoughts

In his concluding remarks, Dr. Jhala emphasized the need for a **balanced approach** to wildlife conservation, integrating **ecological, economic, and social factors**. He called for the creation of **large inviolate spaces** with sustained connectivity to support long-term conservation goals.

He stressed the importance of **adaptive, science-based policies** that respond to changing ecological and socio-political conditions. Dr. Jhala argued that India must move beyond a **tiger-centric conservation model**, adopting a **multi-species approach** that considers the broader landscape and biodiversity.

Finally, he recommended the **timely removal of problem animals** to minimize public frustration and foster positive conservation outcomes.

Expert Comments & Recommendations

During the discussion, **Dr. Aseem Shrivastava** highlighted that **tigers actively use corridors in Madhya Pradesh**, many of which fall under **working plans** that include provisions for wildlife management. He suggested the need for an **umbrella framework** to integrate these plans into a **cohesive landscape-level conservation strategy**.

Dr. Y.V. Jhala agreed, noting that **MPFD has mapped corridors**, which offers a solid foundation for **future wildlife management** and conservation planning.

Dr. H.S. Pabla emphasized the need to prioritize **species preservation** while safeguarding human lives. He argued that if a species is **harmful to humans**, it should offer some form of **economic benefit** to justify its presence.

Dr. Jhala supported this view, citing the **lion conservation model in Gujarat** as a successful example of **coexistence and economic benefit-sharing**.

Lastly, **R. Shrinivas Murthy** recommended creating **stepping stones** between source populations by promoting **tree plantations and habitat conservation** to enhance connectivity and support dispersing wildlife.

Presentation 8: Catalysing Coexistence – Tigers, Forests, and Communities

Speaker: Dr. Anish Andheria, - President, Wildlife Conservation Trust

Human-Wildlife Conflict

The presentation highlighted the increasing human-wildlife conflict in Maharashtra, specifically in the Chandrapur district. Between 2020 and 2022, tiger-related human casualties fluctuated significantly. The Ghodazhari Wildlife Sanctuary reported 22-24 tiger-related deaths during this period. The primary cause of the conflict was identified as forest dependency, with local communities frequently venturing into forest areas for firewood collection and other livelihood needs. This dependency increased the likelihood of human-tiger encounters, leading to tragic incidents.

Intervention Strategy: Biomass-Fuel Water Heaters

To mitigate forest dependency and reduce human-wildlife conflict, the Wildlife Conservation Trust (WCT) introduced biomass-fuel water heaters as an alternative energy solution. The initiative aimed to minimize the need for firewood collection by offering a more efficient and sustainable heating method.

Key features of the intervention included:

- **Capacity and Functionality:** Each household received a 30-liter capacity water heater powered by crop residue instead of firewood, reducing forest resource exploitation.
- **Subsidy Model:** WCT provided a 75% subsidy for the water heaters, with households contributing 25% of the cost. This ensured a sense of ownership and responsibility among the beneficiaries.
- **Efficiency:** The biomass-fuel heaters were more energy-efficient than traditional chulhas (stoves), providing a practical and eco-friendly alternative.

The implementation strategy involved:

- **Village Resolutions:** Communities passed formal resolutions requesting the water heaters, demonstrating collective interest and commitment.
- **Community Outreach:** Awareness campaigns were conducted using banners, posters, WhatsApp announcements, and village meetings.
- **Demonstration and Distribution:** Heaters were demonstrated to the villagers to showcase their benefits, followed by mass distribution.

Outcomes and Impact

The intervention yielded significant positive results:

- **Scaling Up:** Over 16,000 households adopted the biomass-fuel water heaters, reducing forest dependency. The success of the initiative encouraged the Government of Maharashtra to support further expansion.
- **Conflict Reduction:** The tiger-related death toll in Bramhapuri decreased from 22-24 annually to 9-12, demonstrating the effectiveness of reducing human-tiger interactions.
- **Reduced Forest Dependency:** Forest visits by local communities decreased by 50%, lowering the chances of human-carnivore encounters.
- **Environmental Benefits:** Firewood consumption was reduced by 70%, preventing the burning of approximately 40,000 tonnes of fuelwood. This led to a reduction in carbon emissions by 65,000 tonnes.
- **Health Benefits:** Women experienced improved health due to reduced exposure to smoke and decreased physical strain from collecting firewood.

Key Takeaways

- **Identifying Root Causes:** The initiative effectively addressed the primary drivers of conflict, such as forest dependency, by introducing practical alternatives.
- **Site-Specific Conflict Resolution:** Tailored interventions, such as biomass-fuel water heaters, proved to be effective in mitigating human-wildlife conflict.
- **Incentivizing Communities:** Providing subsidies and involving communities in conservation efforts created a sense of ownership, ensuring the long-term success and sustainability of the initiative.

Presentation 9: Connecting the Dots… A Conservation Reserve Initiative of Maharashtra

Speaker: Dr. V. Clement Ben, APCCF (Wildlife), Maharashtra

Overview of Conservation Reserves (CRs)

Conservation Reserves (CRs) are protected areas designated under Section 36A of the Wildlife Protection Act, 1972. These reserves act as buffer zones, connecting National Parks (NPs), Wildlife Sanctuaries (WLSs), and other ecologically significant regions. The primary objective of CRs is to conserve landscapes, flora, fauna, and habitats while actively involving local communities in the conservation process. By promoting participatory management, CRs help strike a balance between biodiversity conservation and sustainable development. They play a crucial role in maintaining ecological connectivity, preventing habitat fragmentation, and safeguarding wildlife corridors.

Process of Establishing a Community Reserve

The creation of a Community Reserve involves a structured and multi-step process to ensure its ecological and administrative validity. It begins with an ecological significance assessment, where potential areas are identified based on their biodiversity value, wildlife movement patterns, and ecological importance. Following this, Geographic Information System (GIS) mapping is conducted to define the reserve's boundaries and assess its connectivity with nearby protected areas.

Once the area is identified, public consultations are held to engage local communities. Their consent is essential, as CRs often involve the participation and cooperation of those residing in and around the designated areas. A draft notification, prepared in both English and regional languages, is published to ensure accessibility and transparency. After this, the proposal is submitted for review and approval by the State Wildlife Board (SWLB). Upon approval, the State Government officially notifies the reserve in the Gazette, formally designating the area as a Conservation Reserve.

Existing Conservation Reserves in Maharashtra

Maharashtra has made notable progress in establishing Conservation Reserves, significantly enhancing its conservation landscape. The state currently has 20 officially declared CRs that contribute to biodiversity conservation and habitat protection. Additionally, 18 more CR proposals have been ratified and are awaiting final government approval.

Some of the prominent CRs in Maharashtra include Tillari CR, Chandgad CR, Dodamarg-Amboli CR, Panhalgad & Vishalgad CRs, Jor-Jambhali CR, and Raigad CR. These reserves play a vital role in preserving rich biodiversity and ensuring the ecological continuity of the Western Ghats, a region known for its exceptional biological diversity.

Western Ghats – A Conservation Priority

The Western Ghats, a globally recognized biodiversity hotspot, stretches over 1,600 kilometers across six Indian states, including Maharashtra. This ecologically sensitive region is home to a vast array of endemic flora and fauna, making its conservation a high priority. The presentation highlighted Karnataka's successful model, where 23 Protected Areas (PAs) have been

connected, expanding the state's PA coverage from 3.8% to 5.2%. This demonstrates the effectiveness of integrating Conservation Reserves into broader conservation landscapes to enhance habitat connectivity and biodiversity protection.

Benefits of Conservation Reserves

Conservation Reserves offer a range of ecological, social, and economic benefits. By providing a protective buffer around core protected areas, CRs strengthen wildlife corridors, enabling free movement of animals and promoting genetic diversity. For local communities, CRs offer sustainable livelihood opportunities through initiatives like eco-tourism, organic farming, and the collection of non-timber forest products. This reduces forest dependency and creates alternative income sources.

CRs also boost ecotourism by attracting nature enthusiasts and tourists, generating revenue for local economies. Moreover, by involving communities in wildlife management, CRs foster a sense of ownership and responsibility, making conservation efforts more effective. From an environmental perspective, CRs promote sustainable land-use practices, prevent habitat degradation, and contribute to long-term biodiversity conservation and climate resilience.

Challenges in CR Establishment

While CRs offer numerous benefits, their establishment is not without challenges. One of the primary obstacles is public resistance. Local communities often fear potential restrictions on forest access and resource use, which can lead to opposition. To address this, extensive consultations and awareness campaigns are necessary to highlight the socio-economic benefits of CRs.

Political hurdles and bureaucratic delays further slowdown the approval process. Inconsistent policies and lack of inter-departmental coordination also create institutional barriers that complicate CR implementation. Additionally, ensuring the long-term sustainability and institutionalization of CRs is a challenge. Dedicated management structures and continuous government support are essential for their effective functioning.

How Conservation Reserves Can Be Created in Madhya Pradesh for Better Conservation

The successful Conservation Reserve model from Maharashtra offers valuable insights that can be effectively implemented in Madhya Pradesh. To strengthen biodiversity conservation in the state, potential areas adjacent to major protected areas like Kanha, Pench, Satpura, Panna, and Bandhavgarh National Parks should be identified. Using GIS mapping, wildlife corridors, buffer zones, and ecologically sensitive landscapes can be pinpointed for CR designation. Regions with high human-wildlife conflict or critical biodiversity value should be prioritized.

From a legal and administrative perspective, amendments to the Madhya Pradesh State Wildlife Action Plan could be made to prioritize the creation of CRs. The formation of a dedicated CR Management Authority would streamline governance and ensure effective monitoring. Furthermore, involving local communities, NGOs, and Panchayats in the decision-making process would foster inclusivity and strengthen conservation efforts.

Community Engagement & Public Awareness

For CRs to be successful, proactive community engagement is essential. Village-level meetings and consultations should be organized to inform local residents about the ecological and socio-

economic benefits of CRs. Addressing their concerns and incorporating their inputs will help build trust and encourage participation.

To promote sustainable livelihoods, alternative income-generating activities such as eco-tourism, organic farming, and non-timber forest product collection should be introduced. Education programs highlighting the importance of conservation, sustainable resource management, and wildlife protection will also help build local capacity and support for CR initiatives.

Sustainable Management & Monitoring

Effective management and regular monitoring are key to ensuring the success of CRs. Forming Conservation Reserve Management Committees (CRMCs) with representation from the Forest Department, local Panchayats, wildlife NGOs, and relevant government departments (e.g., Agriculture and Animal Husbandry) would create a collaborative governance structure.

Periodic biodiversity surveys and habitat assessments should be conducted to monitor ecological health. Additionally, strict anti-poaching measures and habitat protection strategies must be implemented to safeguard wildlife. Regular community feedback and adaptive management approaches will further enhance the effectiveness of CR management.

Expected Benefits for Madhya Pradesh

The establishment of Conservation Reserves in Madhya Pradesh would offer several long-term benefits. By creating buffer zones and protecting wildlife corridors, CRs would enhance habitat connectivity, reducing fragmentation and strengthening tiger conservation efforts. This would also help mitigate human-wildlife conflict by reducing direct encounters with large carnivores.

From a socio-economic perspective, CRs would promote sustainable forest resource use and generate employment through ecotourism and conservation-based activities. The preservation of forest ecosystems would contribute to climate resilience by promoting carbon sequestration and water conservation. Overall, Conservation Reserves would significantly enhance Madhya Pradesh's biodiversity conservation framework while fostering community participation and sustainable development.

Presentation 10: Elephant Management Theme

Speaker: Shri. R. Gokul, Director General, EMPRI, Bangalore

Elephant Conflict Management

Effective elephant conflict management requires a comprehensive approach that combines monitoring, mapping, and strategic interventions. One of the primary steps is identifying suitable methods for tracking and monitoring elephant movements. This involves the use of Geographic Information System (GIS) mapping to delineate protected areas and assess connectivity with adjacent forests and corridors. By systematically recording the movement patterns of elephants, their frequently visited areas can be marked on maps, providing valuable insights into their range and behaviour.

To enhance monitoring accuracy, radio-collaring is employed on selected elephants. This technology allows wildlife managers to track the real-time movements of the animals, aiding in both conflict mitigation and conservation planning. The data collected through these methods helps in anticipating potential conflict zones and implementing timely interventions.

Strategies for Conflict Mitigation

Several strategies have been identified as effective tools for reducing human-elephant conflict. The use of thermal and night-vision drone cameras significantly enhances surveillance capabilities, especially in low-light conditions. These drones help in real-time tracking of elephant herds, enabling rapid response teams to take swift and precise actions.

Peripheral or boundary roads around protected areas are another effective strategy. These roads create clear demarcations between forested and human-inhabited areas, allowing better monitoring and reducing the chances of elephants straying into villages or agricultural fields. Satellite collars are also being deployed on select elephants, providing continuous location data and enabling forest officials to monitor their movements remotely.

To physically prevent elephant intrusions, concrete structures are sometimes used as barricades. In certain regions, railway barricades have also been implemented to deter elephants from crossing into human settlements or agricultural lands. However, the feasibility and effectiveness of these physical barriers depend on the local landscape and the scale of elephant movement.

Expert Comments & Recommendations

During the presentation, renowned experts Dr. R. Sukumar and Shri. L. Krishnamoorthy shared their insights on conflict management strategies. They highlighted that while barricades have proven highly effective in states like Karnataka, they may not be suitable for Central India. This is due to the transient nature of elephant movement in the region, where elephants cover vast areas, making large-scale barricading impractical.

Shri R. Gokul emphasized that in the Central Indian landscape, peripheral ring roads and thermal drone cameras are the most effective tools for conflict reduction. He stressed that integrating these technologies with the efforts of rapid response teams could significantly improve conflict management. The coordinated use of real-time monitoring, quick intervention, and adaptive strategies would ultimately reduce human-elephant conflicts while ensuring the safety of both people and elephants.

Presentation 11: Complex Situations, Pensive Consequences – Analysis of Human Casualties Due to Human-Elephant Conflict in Parts of Central India

Speaker: Dr. Bivash Pandav, -Scientist - G, Head, Department of Protected Area Network, Wildlife Management and Conservation Education, Wildlife Institute of India

Overview of Human-Elephant Conflict (HEC)

The conflict between humans and large herbivores, particularly elephants, has a long-standing history that dates back nearly 12,000 years. In the modern context, this conflict manifests in several forms, including crop destruction, damage to houses and property, and psychological distress caused by the fear and disruption of social life. However, the most severe impact of HEC is the loss of human lives, making it a significant social, legal, economic, and political issue.

Frequent encounters with elephants and the associated damages often foster hostility towards wildlife among local communities, which can undermine conservation efforts. As elephants increasingly venture into human settlements, retaliatory actions and habitat fragmentation further escalate the conflict, making coexistence a complex challenge.

Why Do Elephants Attack Humans?

The aggressive behaviour of elephants toward humans can be attributed to both proximate and ultimate causes.

- **Proximate causes** refer to immediate triggers that provoke aggression. When threatened, elephants exhibit a fight-or-flight response, especially when protecting calves. Young elephants lacking experience or social support may act unpredictably. During musth (a period of elevated testosterone in males), bulls become highly aggressive, which can lead to fatal encounters. In some cases, intra-species conflicts among elephants may result in redirected aggression toward humans.
- **Ultimate causes** are long-term factors shaped by repeated negative interactions with humans. Elephants, having experienced hostility in the form of crop protection measures or poaching attempts, begin to perceive humans as predators. Over time, this reinforces aggressive behaviour patterns, intensifying the conflict.

HEC in Chhattisgarh – A Case Study

Chhattisgarh has emerged as a hotspot for human-elephant conflict. Elephants, after years of absence, have reappeared in the region, leading to frequent and severe encounters with local communities. The primary drivers of conflict include the heavy dependence of local communities on forest resources and the significant overlap between elephant habitats and human settlements.

During the study period, 74 human deaths were reported, with 46 cases thoroughly analysed through primary investigations. The data revealed that the majority of victims were men and elderly individuals. Most fatalities occurred at night or during dusk, highlighting the vulnerability of people venturing out during these hours. Interestingly, male elephants were responsible for the majority of fatalities, emphasizing the need for targeted management of aggressive bulls.

Major Issues & Challenges

One of the growing challenges in Chhattisgarh is the increasing incidence of elephants breaking into houses. For example, between 2015 and 2017 in Surguja, elephants damaged over 4,234 houses, affecting around 320 villages and impacting approximately 14,000 km² of land. This form of conflict not only results in property damage but also instills widespread fear among villagers.

Another major issue is the dangerous practice of crop guarding by farmers, which often leads to fatal encounters. Road accidents involving elephants, especially in regions like Dharamjaigarh and Korba, add to the human casualty count. Managing dispersing male elephants is particularly difficult, as they tend to cover large distances and frequently venture into human-dominated landscapes. To address these challenges, the deployment of dedicated emergency response teams is essential.

Possible Solutions & Way Forward

To mitigate human-elephant conflict, several practical and long-term solutions have been proposed:

- **Identification and Tracking of Problem Elephants:** Tracking aggressive or high-risk elephants using radio collars can help predict their movement patterns, allowing forest officials to proactively warn communities and take preventive measures.
- **Community Fencing Trials:** Introducing community-managed fencing using solar or bio-fencing techniques (agave, thorny bushes, or beehive fences) can help deter elephants from entering human settlements.
- **App-Based Ex-Gratia System:** Developing a mobile application for the quick disbursal of ex-gratia compensation would streamline the process, ensuring timely financial support to victims.
- **Shifting from Firefighting to Proactive Habitat Conservation:** Reactive measures, such as chasing elephants away after incidents, are not sustainable. The focus should instead be on strengthening elephant corridors, which would reduce their movement into human settlements by providing them with safe passageways.
- **Strengthening Rapid Response Teams:** Deploying well-trained and equipped rapid response teams in conflict-prone areas can help manage emergencies effectively, reducing casualties and damage.

How Conservation Reserves Can Be Created in Madhya Pradesh to Reduce Human-Elephant Conflict

To address the growing HEC in Madhya Pradesh, establishing Conservation Reserves (CRs) specifically designed for elephants can be an effective strategy. Potential areas for these reserves include Sidhi, Shahdol, Umaria, Singrauli, and Anuppur districts, which frequently experience elephant movements. Declaring elephant movement corridors as Conservation Reserves under the Wildlife Protection Act, 1972, would provide them with legal protection and help conserve these vital migration pathways.

Community-managed buffer zones around forests could also reduce direct interactions between humans and elephants. Encouraging the cultivation of alternative crops, such as chili, ginger, or medicinal plants, which elephants avoid, would further minimize crop raiding.

Technological interventions, such as solar and bio-fencing, could serve as effective physical deterrents. Additionally, real-time monitoring of migratory elephants through radio-collaring,

combined with SMS alerts and WhatsApp groups, could warn villagers of elephant movements, allowing them to take precautionary measures.

To address the economic impacts, a quick-response compensation mechanism for crop and property damage should be established. Furthermore, promoting eco-tourism, handicrafts, and sustainable forest-based livelihoods would reduce the dependency of local communities on forest resources, decreasing the chances of conflict.

Finally, strengthening forest connectivity between Madhya Pradesh and Chhattisgarh would facilitate natural elephant migration, reducing their tendency to stray into human settlements.

Expert Comments & Recommendations

The presentation included valuable insights and recommendations from various experts:

- **Dr. Y.V. Jhala** emphasized the need for the Madhya Pradesh Forest Department (MPFD) to first determine the suitable regions and elephant density that the state can sustainably support. Defining these parameters would form the foundation for future management strategies.
- **Dr. H.S. Pabla** warned that elephants, if not properly managed, could transform forest areas into open lands, similar to the scenario in Kruger National Park, South Africa. Given the vulnerability of Central Indian forests, he stressed the need for cautious population management.
- **Sh. Subharanjan Sen** highlighted that the elephant population in Madhya Pradesh is still in transition. While most elephants are migratory, except for those in Bandhavgarh, their increasing settlement periods are intensifying the conflict.
- **Sh. Tejas Karmarkar** suggested utilizing abandoned farmlands near Bandhavgarh Tiger Reserve's core boundary for buffer cropping. Developing these lands into grasslands with wild and traditional crops could reduce actual crop raiding incidents.
- **Dr. Bivash Pandav** supported the buffer crop concept but advised careful selection of crops, favouring grasslands, which are less likely to attract elephants.
- **Dr. R. Sukumar** offered a contradictory view, cautioning that buffer crops could potentially alter the behaviour of young elephants, making them more accustomed to human presence and thereby creating future management challenges.
- **Sh. Aseem Shrivastava** expressed concern that the rising elephant movement and conflict were diverting attention from the core concept of wildlife management in Madhya Pradesh. He warned that the increasing elephant population could potentially compromise tiger habitats, highlighting the need for thoughtful population control measures.

Presentation 12: Technological Options for Wildlife Management in Madhya Pradesh

Speaker: Dr. K. Ramesh, Scientist – F, Head, Department of Landscape Level Planning and Management, Wildlife Institute of India

Introduction

Dr. K Ramesh emphasized the growing significance of integrating advanced technology in wildlife conservation and management. He highlighted how technological interventions can enhance protection, monitoring, and research efforts. The presentation gained added relevance as it was featured in **Prime Minister Narendra Modi's "Mann Ki Baat" Episode 110**, showcasing its importance at the national level. Dr. Ramesh stressed that adopting modern technology is not only a step towards efficient wildlife management but also a means to strengthen conservation policies through data-driven decision-making.

Spatial Technologies (Remote Sensing & GIS)

The use of remote sensing and Geographic Information Systems (GIS) has revolutionized habitat monitoring and conservation planning. By leveraging **high-resolution satellite imagery**, forest managers can monitor habitat conditions in real time. This technology enables the accurate mapping of **Protected Areas (PAs)**, buffer zones, and wildlife corridors, offering valuable insights into landscape changes and forest health. GIS-based mapping also aids in identifying conflict-prone areas by analysing patterns of human-wildlife interactions. Moreover, remote sensing plays a critical role in **land-use planning**, helping authorities make informed decisions on forest management, encroachment control, and the protection of vital wildlife corridors.

Tracking & Surveillance Technologies

The use of advanced tracking and surveillance technologies has significantly improved wildlife monitoring and anti-poaching efforts. **GPS and satellite collars** are used to track the movement and behaviour of big cats and other key species, providing crucial data for research and conflict mitigation. AI-powered **camera traps** have further enhanced monitoring by automatically identifying and classifying species based on visual data, reducing the need for manual intervention.

One of the most effective surveillance tools introduced is the **E-Eye system**, an electronic surveillance network. Equipped with **thermal cameras**, it offers **24x7 live monitoring** of protected areas. The system not only provides real-time footage but also includes crime alert features, enabling enforcement teams to respond promptly to potential poaching or illegal activities. Additionally, **Acoustic Threat Detection (ATD)** technology is being deployed to identify suspicious sounds such as gunshots, glass breaking, or abnormal movements. These AI-powered systems can trigger instant alerts, helping enforcement agencies act swiftly.

To prevent human-wildlife conflict, **carnivore alert systems** are being implemented. These community-based early warning systems notify villagers about the presence of large carnivores, minimizing the risk of fatal encounters. Another innovative tool is **Environmental DNA (eDNA)** technology, which detects traces of animal DNA from water or soil samples, making it possible to identify elusive or migratory species without direct sightings. This non-invasive technique is particularly useful for monitoring aquatic and cryptic species.

UAV (Drone) Technology

Drones, or Unmanned Aerial Vehicles (UAVs), are becoming increasingly vital in wildlife management due to their versatility and efficiency. There are three main types of UAVs in use: **rotary-wing UAVs**, suitable for short-range operations due to their manoeuvrability; **fixed-**

wing UAVs, ideal for covering large areas over extended periods; and **hybrid UAVs**, which combine the advantages of both types for enhanced performance.

In wildlife management, drones are used for **near real-time habitat mapping**, providing detailed aerial imagery for conservation planning. They play a significant role in **forest surveillance**, especially during night operations, by using **thermal imaging cameras** to detect illegal activities such as poaching or timber theft. Additionally, UAVs equipped with **Ground Penetrating Radar (GPR)** are being tested for forensic investigations, helping locate buried carcasses, hidden animal parts, or poacher traps. This technology significantly improves the efficiency of enforcement operations and aids in wildlife crime investigations.

Crime Detection & Anti-Poaching Technologies

To combat poaching and wildlife crime, a range of forensic and detection technologies is being deployed. **Portable DNA analysers** have proven particularly effective, allowing field teams to rapidly identify wildlife samples such as blood, tissue, or hair. These portable kits, such as the **iBOL (International Barcode of Life)**, can identify species within hours, enabling swift legal action.

Additionally, **forensic investigation kits** have become standard tools for wildlife crime units. These kits help collect and analyse biological evidence, including scat, tissue, and blood samples, which are examined using **digital microscopes** to detect traces of illegal wildlife trade.

Artificial intelligence (AI) is also being applied for **species identification**. Deep learning models can analyse the unique stripe or spot patterns of big cats, enabling researchers to identify individual animals with high accuracy. The **Wildlife Insights platform**, powered by AI, processes large volumes of camera trap data, automating the identification of species and reducing the time required for analysis. These technological interventions are proving invaluable in combating wildlife crime by providing faster and more accurate evidence collection.

Knowledge Management for Wildlife Conservation

Effective wildlife management requires robust data collection and analysis. To achieve this, platforms such as **SMART (Spatial Monitoring and Reporting Tool)** and **MSTRIPE** are being used for patrol and protection monitoring. These tools help track field patrols, document incidents, and generate reports that improve decision-making. The data collected allows authorities to map wildlife movements, detect poaching hotspots, and plan conservation interventions more effectively.

In the tourism sector, technology is also playing a role. The **Bagheera App**, a mobile-based application, is being used to **monitor tourist vehicle movement** in protected areas. By tracking vehicle routes and timings, the app helps reduce human disturbance to wildlife while ensuring responsible tourism practices.

Additionally, efforts are underway to develop **interoperable wildlife databases** that integrate information on topography, habitat conditions, climate variables, and socio-economic trends. This comprehensive database system will provide a holistic view of wildlife conservation challenges and help develop data-driven policies.

One Health Approach (Wildlife, Human & Environmental Health)

Dr. Ramesh stressed the importance of adopting a **One Health approach** that considers the interconnectedness of wildlife, human, and environmental health. The presence of apex predators, such as big cats, plays a vital role in regulating herbivore populations, preventing overgrazing, and maintaining ecosystem balance. Healthy scavenger populations, including **vultures and hyenas**, further contribute by efficiently disposing of carcasses, reducing the spread of diseases.

The One Health framework promotes the **integrated management of wildlife, livestock, and public health**, helping prevent the spillover of zoonotic diseases. This approach encourages multi-sector collaboration to address wildlife health challenges, habitat degradation, and human-wildlife interactions in a holistic manner.

Key Takeaways & Recommendations:
Dr. Ramesh concluded the presentation by emphasizing the need to scale up the use of **technological solutions** for efficient wildlife management in Madhya Pradesh. Real-time monitoring using **drones, thermal cameras, and acoustic sensors** can significantly improve the detection of illegal activities and human-wildlife conflicts. AI-based analytics and **eDNA technology** offer innovative ways to monitor species populations and biodiversity.

He recommended strengthening **inter-agency collaboration** and enhancing data-sharing platforms to improve conservation effectiveness. Lastly, he advocated for the widespread adoption of **One Health principles**, ensuring that wildlife conservation efforts are aligned with broader environmental and public health goals.

Day 2: 8th March 2025 – Group Discussions

The second day of the National Wildlife Workshop 2025 witnessed in-depth deliberations on four critical themes, each addressing key aspects of wildlife conservation and management. The thematic discussions were structured into dedicated groups, fostering collaborative dialogue and exchange of expertise among forest officials, wildlife experts, conservationists, and other stakeholders.

The four themes covered during the day included:

1. Habitat Management
2. Human-Wildlife Conflict
3. Landscape Management/Management of Wildlife Outside Protected Areas
4. Community Engagement

Group I: Habitat Management

Chair: Sh. Subharanjan Sen, PCCF (Wildlife) & CWLW, Madhya Pradesh
Co-chair: Sh. B.S. Annigeri, APCCF (IT), Madhya Pradesh

1.1 Management of Grasslands and Niche Habitats

The discussion on **grassland and niche habitat management** emphasized the need for dedicated **state-level funding** to support habitat management initiatives in **Protected Areas (PAs)**. It was recommended that **invasive species control plans** should be formulated for each PA, involving the identification and mapping of threatening invasive species. A **watershed-level planning** approach was suggested, with a five-year implementation strategy backed by funding from multiple schemes to ensure effectiveness.

In terms of **grassland management**, the group highlighted the importance of **preserving and managing grasslands** both inside and outside PAs. Measures to **prevent woodland ingression** into grasslands were discussed, along with the need for systematic **weed management and regular grassland monitoring**. It was recommended that identified grasslands should be incorporated into **forest working plans** to ensure their protection and management. The composition and health of these grasslands should be regularly monitored to maintain ecological balance.

The **preservation of niche habitats** was also emphasized. The group advocated for the **identification, documentation, and preservation** of all niche habitats at a landscape level. This would ensure that even smaller, ecologically significant areas receive adequate attention and protection.

1.2 Conservation Strategies for Key Species

The group discussed targeted **conservation strategies** for key species, including the **Lesser Florican** and the **Great Indian Bustard (GIB)**. It was suggested that suitable Florican habitats in Madhya Pradesh, specifically in districts such as **Neemuch, Ratlam, Jhabua, Dhar, Barwani, and Sendhwa**, should be identified and protected. Rather than designating these areas as PAs, the group recommended **scientific habitat interventions** to promote conservation without altering the land-use status. Engaging **local communities** in habitat development through **participatory conservation efforts** was seen as vital. Additionally, the group emphasized the need for **studying migration patterns** of these birds from the **Deccan grasslands** to Central India during the monsoon season. Collaboration with **NGOs** was suggested to raise community awareness and strengthen conservation efforts.

For **Caracal conservation**, the group proposed conducting **rapid surveys** to assess the current status and identify potential habitats in Madhya Pradesh, particularly in the **Chambal Ravines**. A **scientific biodiversity assessment** of the Chambal Ravines, with the involvement of the **Wildlife Institute of India (WII)**, was recommended. Additionally, the group proposed establishing a **Caracal Breeding and Rewilding Centre** at **Deori, Morena**, to support conservation efforts for this elusive species.

1.3 Human Resource and Capacity Building in Wildlife Management

The group stressed the need to strengthen **human resources and capacity building** in wildlife management. It was recommended that a **permanent cadre of Research Ecologists and Sociologists** be created for all PAs and territorial circles. Additionally, the **recruitment of second-line Wildlife Health Officers (WHOs)** was deemed essential. To enhance capacity, it was suggested that each **Tiger Reserve (TR)** and **Rescue Centre** should have at least **two WHOs**, while **Regional Rescue Squads** should have at least one.

Further human resource enhancements included appointing **two para-veterinarians** per TR and Rescue Centre. The group also highlighted the need to fill vacant **Research Officer** positions, specifically in **Kanha National Park**, and proposed **incentivizing Field Biologists** to improve retention. Additionally, it was recommended that **Mahavats and Chara Cutters** be hired in all PAs to support elephant management and care. To improve on-ground protection, it was suggested that there should be a **minimum of two protection watchers per forest camp**.

Improving the **welfare and working conditions** of frontline staff was also discussed. The group advocated for a **hardship allowance** for staff working in remote camps, **mobile medical units** for emergencies, and the appointment of **Public Relations Officers (PROs)** in all PAs to strengthen communication and outreach.

The group emphasized the importance of **capacity-building initiatives** for wildlife management. It was proposed to **revive wildlife training courses** for Forest Guards at **Tala, Bandhavgarh Tiger Reserve**. Regular **training programs**, including **Train-the-Trainer courses** in collaboration with **WII and other institutes**, were recommended. The group also suggested conducting **annual refresher courses** for frontline staff, organizing **exposure visits** within and outside Madhya Pradesh, and introducing a **15-day training capsule** for new PA managers. To ensure continuity, the group proposed a **minimum three-year tenure** for PA managers, ranging from **Range Officers (RO)** to **Field Directors (FD)**.

1.4 Wildlife Research

The group highlighted the need for **strengthening wildlife research** in Madhya Pradesh. It was recommended that all **past wildlife research** in the state be compiled, updated, and digitized for easy access and reference. **Regular disease monitoring and surveillance** in all PAs was deemed necessary to detect and control potential outbreaks. Additionally, the group emphasized the importance of **monitoring past Preservation/Research Plots** across PAs to assess long-term ecological changes.

To address **climate change impacts on wildlife**, the group proposed establishing **climate change monitoring alerts** and using **modern technology** for wildlife tracking and conservation. It was suggested that **automated weather monitoring systems** be installed in PAs for real-time ecological assessments. The group also recommended monitoring **habitat changes** using the **M-STRIPES Ecological App** to enhance conservation effectiveness. Strengthening the **State Forest Research Institute (SFRI)** was seen as a crucial step toward promoting research and innovation in wildlife management.

1.5 Fire as a Habitat Management Tool

The group discussed the use of **fire as a controlled management tool** for forest and habitat conservation. It was recommended that **proper fire protocols** be developed to ensure controlled burns are effectively managed and monitored. The group suggested organizing **skill development programs** with **overseas fire ecologists** to train local staff on the best practices for controlled burns.

An **annual fire protection plan** was proposed, with a focus on **timely approval and execution**. It was recommended that PAs be equipped with **modern firefighting equipment** and staff be provided with **first aid training**. Strengthening **fire squads** was also highlighted

as a priority. The group stressed the need to address the **impact of climate change on forest fires**, emphasizing that rising temperatures and changing weather patterns could increase the frequency and severity of fires.

Expert Opinions

The experts participating in the discussion shared several insightful recommendations. It was suggested that **fire management** should be explored as a valuable tool for habitat conservation. The establishment of **automated weather stations** was recommended for real-time ecological monitoring and climate assessment. The group commended the initiative to create **Permanent Habitat Plots**, considering it a highly commendable step for **long-term ecosystem studies**.

The experts also recommended reviewing and updating the **old incentive scheme** for **Florican conservation** to incorporate it into current conservation efforts. The **revamping of the Tala Training School** was seen as a crucial step toward strengthening capacity-building programs for wildlife management professionals.

It was suggested that the **moisture regime** should be integrated into the habitat management framework to enhance ecosystem resilience. The **MP Forest Department (MPFD)** was advised to exercise caution before initiating **breeding programs for GIB and Caracal**, ensuring that such programs are based on **scientific viability and long-term sustainability**.

The experts stressed the need to **prioritize riparian habitats** for conservation, not only within PAs but also in **unprotected landscapes** to maintain ecological connectivity. **Sustainable livestock grazing** was recommended as a potential habitat management tool to maintain grassland ecosystems. The group also highlighted the rising threat of **feral dog populations** to wildlife, recommending the implementation of **effective control measures**.

Finally, the experts emphasized that **riverine habitats and catchment areas** must be given **high conservation priority** to safeguard water security and biodiversity. They recommended **hydrological mapping** and the conservation of **spring areas and small water channels** to ensure effective **moisture retention** and habitat sustainability.

Group II: Human-Wildlife Conflict

Chair: Dr. Sanjay Shukla, PCCF (Working Plan), Madhya Pradesh
Co-chair: Shri L. Krishnamoorthy, APCCF (Wildlife), Madhya Pradesh

2.1 Conflict Species in India

Human-wildlife conflict (HWC) in India involves a range of species, each posing unique challenges. Among the carnivores, tigers, leopards, and sloth bears frequently come into conflict with humans, often resulting in livestock depredation and human casualties. Herbivores such as blackbuck, nilgai, and wild pigs are responsible for significant crop damage, especially in agricultural zones bordering forests. Large mammals, notably elephants, contribute to extensive damage due to their migratory nature and tendency to raid crops. Reptiles, particularly crocodiles, are also involved in HWC, with incidents occurring near water bodies. Managing these species requires tailored strategies to mitigate conflict and ensure human and wildlife safety.

2.2 Priority Actions & Strategies for Conflict Management

2.2.1 Conflict Mapping & Prevention

To effectively manage HWC, mapping conflict hotspots based on species-specific incidents is essential. Developing a conflict calendar to monitor seasonal trends can help in predicting high-risk periods and preparing mitigation measures accordingly. Habitat improvement inside Protected Areas (PAs) is crucial to minimize wildlife movement into human settlements. This includes removing weeds and invasive species near village boundaries to reduce wildlife attraction. Strategic fencing, such as chain-link and solar-powered barriers, should be installed in sensitive areas prone to recurring conflict. Additionally, comprehensive crop damage studies should be conducted to develop targeted mitigation strategies and identify compensation patterns.

2.2.2 Managing Prey Populations in Protected Areas

Human-wildlife conflict is often exacerbated by an imbalance in prey populations. To address this, translocating prey species to low-density zones within PAs, based on the area's carrying capacity, can help distribute wildlife more evenly and reduce competition-driven movement into human habitats. This ecological management approach can mitigate carnivore movement outside protected areas, thereby reducing conflict incidents.

2.2.3 Strengthening Rescue & Response Teams

Timely intervention during conflict incidents is essential, necessitating the formation of dedicated rapid response teams (PRT/QRT/RRT) with adequate funding and resources. Rescue squads need to be enhanced with better mobility, advanced equipment, and quicker response capabilities. Well-equipped rescue centres and tiger safaris should be established in all Tiger Reserves (TRs) to handle problematic animals efficiently. Strengthening the State Wildlife Health Service Cadre by including para-veterinarians and conducting regular veterinary training programs near PAs is vital for effective rescue and rehabilitation efforts.

2.2.4 Conflict Resolution Measures

Legal provisions under Section 11(b) of the Wildlife Protection Act (WPA), 1972, should be utilized when necessary to remove problematic Schedule-2 animals, ensuring public safety. Community engagement programs play a significant role in conflict mitigation. The "Bagh Choupal" initiative from Pench Tiger Reserve serves as a successful model of dialogue and awareness between forest officials and local communities. Similar initiatives, including the formation of "Bagh Mitra" (Tiger Friends) groups, should be promoted in conflict-prone villages. Field staff and villagers should receive training on animal behaviour and safety measures. Additionally, media workshops should be conducted to promote responsible and factual conflict reporting.

2.2.5 Human Safety & Infrastructure Measures

Enhancing infrastructure in conflict zones can reduce the frequency and severity of encounters. Improved garbage disposal practices can prevent wildlife from being attracted to human settlements. Installing proper lighting in villages can deter nocturnal wildlife movements. Animal Birth Control (ABC) programs for stray dogs should be implemented to prevent attacks on wildlife. Advanced technologies such as AI-based monitoring systems, radio-collaring for

tracking animals, and drone surveillance can significantly improve conflict management capabilities. Microchipping rescued animals before their release can aid in future identification and monitoring. Additionally, including human-wildlife conflict under the Disaster Management category, as done in Uttar Pradesh and Kerala, will ensure government intervention, swift action, and efficient compensation mechanisms.

2.3 Elephant-Specific Conflict Management

2.3.1 Landscape Planning & Habitat Improvement

Given the increasing elephant-related conflicts, landscape-level planning is necessary to manage their movement and minimize human interaction. Habitat improvement within PAs is essential to retain elephant populations in forested areas and reduce their migration towards human settlements. Soft-release enclosures should be developed for rehabilitated elephants to gradually reintroduce them into the wild. Radio-collaring programs should be implemented to track elephant movements and issue timely alerts. To secure human settlements, incorporating elephant corridor housing under the PM Awas Yojana is recommended, ensuring that people living near conflict zones have safe and protected housing.

2.3.2 Early Warning & Community Engagement

Early warning systems can significantly reduce human casualties and property damage. SMS alerts, WhatsApp messages, sirens, and radio broadcasts should be used to notify villagers of elephant movements in real-time. Establishing "Hathi Mitra Dal" (Elephant Friends Groups) in vulnerable villages will enhance community preparedness and facilitate rapid response during elephant encounters. Regular inter-state coordination meetings are necessary to ensure better management of elephant populations across state borders.

2.3.3 Physical Barriers & Safety Measures

Physical barriers, including solar-powered fences and traditional barriers, should be installed in high-conflict zones to prevent elephant incursions. Constructing peripheral roads around forests can reduce human-elephant interactions by providing buffer zones. Capacity-building programs for forest staff should be conducted to enhance their skills in managing elephant-related conflicts. Procurement of specialized transportation vehicles, equipment, and tranquilizers is necessary for handling elephant emergencies efficiently. Establishing a State-level Elephant Task Force will ensure dedicated management, coordination, and monitoring of elephant conservation efforts.

Expert Opinions

Experts emphasized that a landscape-based approach should be central to conflict management efforts. It was recommended that fencing methods be carefully planned to avoid posing risks to wildlife. For conflict-prone regions, a low-cost tiger safari could be introduced as an alternative to expensive safaris, utilizing only problematic or rescued tigers under the strict guidelines of the National Tiger Conservation Authority (NTCA).

To manage elephant-related conflicts, experts suggested planting fruit-bearing trees along forest peripheries, as elephants are primarily browsers rather than grazers. This strategy could help retain them within forest boundaries. Additionally, the importance of sustainable conflict

management practices, such as promoting responsible tourism, was highlighted to balance conservation with community interests.

Group III: Landscape Management/Management of Wildlife Outside Protected Areas

Chair: Shri. V.N. Ambade, M.D. Corporation, M.P.
Co-chair: Shri. Ajay Yadav, APCCF (Vigilance), M.P.

3.1 Landscape-Level Wildlife Management & Protected Area Expansion

3.1.1 Addressing Wildlife Conservation Challenges at the Landscape Level

Landscape-level wildlife management faces several pressing challenges, including human-wildlife conflict (HWC), land-use and land-cover (LULC) changes, developmental pressures, invasive alien species, and disease transmission. To tackle these issues, mapping of key landscapes and wildlife corridors for all major species is essential. A comprehensive landscape-level conservation plan should be developed and integrated into existing planning frameworks such as District Development Plans (DDPs), Gram Panchayat Development Plans (GPDPs), and Zonal Master Plans. Additionally, legal mechanisms need to be employed to secure critical corridors by designating them as Community Reserves, Conservation Reserves, or Eco-Sensitive Zones (ESZs), ensuring long-term habitat connectivity and protection.

3.1.2 Identifying Potential Areas for New Protected Areas & Corridors

Expanding the network of protected areas requires identifying and securing stepping stones, wildlife corridors, and buffer zones. Strengthening connectivity between fragmented habitats is vital for ensuring species mobility and genetic diversity. To address the financial burden caused by wildlife-related crop damage, it is recommended that such incidents be recognized as national disasters, allowing for better financial support. Additionally, funds from the Compensatory Afforestation Management and Planning Authority (CAMPA) should be utilized to subsidize crop insurance schemes specifically for wildlife-related damages. The management of invasive alien species should be prioritized by categorizing areas into uninvaded, less-invaded, and heavily-invaded zones. Experimental use of invasive plants like Lantana for bio-energy production in thermal power plants can be explored as an eco-friendly mitigation measure.

3.1.3 Integrating Landscape Planning with Urban & Developmental Projects

Effective landscape-level conservation requires integrating wildlife management with urban and developmental projects. Models such as the Satpura-Maikal Landscape and the Greater Panna Landscape serve as exemplary frameworks for such integrated planning. Multi-stakeholder coordination is necessary, involving the formation of three-tier committees comprising all relevant line departments. Expanding the scope of existing committees to cover broader landscape conservation issues is recommended. Furthermore, the creation of a Wetland, Grassland, and Riparian Atlas will serve as a valuable tool for guiding conservation efforts. It is emphasized that buffer zones should be managed as multiple-use areas rather than being treated as extensions of core zones. Under the MP Wildlife Action Plan (2023-2043), 23 wildlife corridors have already been delineated using least-cost pathway models and circuit scape analysis. Additionally, corridor and buffer zone proposals should be included in the Gati

Shakti infrastructure planning portal to ensure their consideration during developmental projects. The presence of wildlife in revenue areas should be assessed to explore their potential declaration as Community Reserves or Conservation Reserves, enhancing protection outside traditional PAs.

3.1.4 Carrying Capacity & Relocation for Wildlife Conservation

Assessing both the biological and social carrying capacities is critical for effective wildlife conservation. While biological carrying capacity refers to the habitat's ability to sustain a population, social carrying capacity reflects human tolerance for conflict species. Wildlife conservation efforts in revenue lands should include assessments of their biological capacity to host wildlife populations sustainably. In areas prone to human-wildlife conflict, relocation of revenue villages should be prioritized, with the responsibility placed on agencies proposing forest diversions. To control the overpopulation of conflict-prone species, exploring animal contraception techniques is suggested as a non-lethal management strategy.

3.2 Wildlife Protection Strategies & Technological Advancements

3.2.1 Overcoming Protection Challenges Inside & Outside Protected Areas

Ensuring the protection of wildlife beyond Protected Areas (PAs) requires strengthening conservation efforts in territorial and corporation-managed forests. Standardizing patrolling methods across all forest divisions will enhance monitoring efficiency. To improve wildlife crime investigations, deploying mobile forensic units and authorizing the use of Call Data Records (CDR) and other digital technologies is necessary. These technological interventions will help track and dismantle wildlife crime networks more effectively.

3.2.2 Standardizing Patrolling & Monitoring Systems

Efficient monitoring and patrolling are critical for safeguarding wildlife in both PAs and landscape-level areas. Adopting a customized M-STrIPES (Monitoring System for Tigers - Intensive Protection and Ecological Status) module for territorial and corporation forests will strengthen monitoring protocols. Establishing permanent patrolling camps, similar to those in PAs, will ensure regular surveillance and rapid response to threats. The State Tiger Strike Force should be tasked with leading the implementation of new protection technologies. Furthermore, the development of a Detailed Project Report (DPR) for emerging wildlife monitoring technologies is recommended, with provisions for regular updates to stay abreast of technological advancements.

3.2.3 Capacity Building & Skill Development

Continuous capacity building is vital for enhancing the skills of forest officers and frontline staff. Institutionalizing skill-based training programs in collaboration with leading wildlife research institutions, such as the Wildlife Institute of India, State Forest Research Institute, and Forest Training Institutes, will equip forest personnel with the latest techniques in wildlife management, conflict mitigation, and conservation practices.

Expert Opinions

Experts emphasized the need for joint crop damage assessments by both Forest and Revenue officials, reviving the previous practice to ensure accuracy and transparency. The Forest Department should be responsible for processing compensation payments based on these assessments. To promote coexistence and reduce retaliatory killings of wildlife, it was suggested that farmers with fields adjacent to PA boundaries should receive a fixed compensation amount up to a certain distance from the PA. This proactive measure aims to alleviate the financial burden on farmers, foster positive perceptions of wildlife conservation, and promote harmonious human-wildlife coexistence.

Group IV: Community Engagement

Chair: Dr. Sameeta Rajora, PCCF (HRD) & CEO, M.P. Ecotourism Development Board
Co-chair: Shri. H.S. Mohanta, APCCF (Land Management), M.P.

1. Community Engagement in Conservation

Community engagement plays a vital role in wildlife conservation, encompassing the active involvement of local communities who are directly impacted by forests and wildlife. It emphasizes participatory approaches that foster cooperation, build trust, and enhance conservation efforts.

Outreach Program Design:

Effective outreach programs require systematic data collection on vulnerable areas, such as poaching hotspots, to guide intervention strategies. Regular community interactions, including Aam Sabhas, serve as platforms for dialogue and addressing local concerns. Integrating conservation goals into Micro Plans ensures that wildlife protection becomes part of the broader rural development agenda. Addressing traditional practices that contribute to habitat degradation or wildlife conflict is also crucial for long-term conservation success.

EDC (Eco-Development Committee) Against Poaching:

Eco-development committees play a significant role in preventing poaching by employing local youth for patrolling activities. This not only enhances protection but also fosters trust and cooperation with marginalized communities. Initiatives such as forming Mitra Dal groups and using WhatsApp for real-time communication help in monitoring and reporting illegal activities promptly.

Traditional Methods for Conservation:

Leveraging cultural traditions is an effective means of spreading conservation awareness. Initiatives such as Charwaha Sammelans engage traditional herding communities, while local dance forms like the Baiga Dance in Kanha Tiger Reserve serve as cultural ambassadors promoting conservation values.

Modern Techniques for Engagement:

Contemporary methods of community engagement include organizing park visits for relocated villagers to foster a sense of connection with conservation areas. Celebrating Green Days and hosting sports meets in tiger reserves foster community participation and environmental

awareness. Initiatives like Mowgli Gardens (inspired by the Pench model) and certifying schools as "green schools" promote conservation values among children. Community radio and folk songs effectively disseminate conservation messages, while medical and eye camps in reserves like Kanha address local healthcare needs, building goodwill and cooperation.

Incentive-Based Programs:

To encourage community participation, creative incentive programs have been introduced. The "Green Rewards" campaign, with slogans like *"Free Mitthu, Free Kitthu,"* promotes environmental stewardship. The Plant Adoption Campaign in Rewa encourages local participation in afforestation efforts.

Snake Rescuer Support (सर्प मित्र प्रोत्साहन योजना):

Given the approximately 3,000 snakebite-related deaths reported annually in Madhya Pradesh, the Forest Department has introduced a support scheme for trained snake rescuers. Under this program, rescuers receive a monthly stipend of ₹1,500 to ₹3,000. To qualify, they must ensure safe snake releases, maintain proper records, monitor anti-venom stocks, and actively raise public awareness about snake safety and conservation.

2. Alternative Livelihood Opportunities

Diversifying livelihood options for forest-dependent communities is essential for reducing their reliance on forest resources. Skill development programs and eco-enterprises provide sustainable economic alternatives.

Skill Development & Eco-Enterprises:

The Forest Department is facilitating skill-based training programs under the National Skills Qualification Framework (NSQF) to equip locals with marketable skills. Soft loans are offered to promote small businesses, reducing the need for migration. Exposure visits are organized to help community members explore new livelihood avenues without the fear of migration. Women's inclusion in livelihood projects is encouraged to promote gender equality and economic empowerment. Additionally, initiatives such as wildlife-friendly agriculture certification promote sustainable farming practices.

Specific Initiatives:

In several tiger reserves, innovative eco-enterprises have been launched. The *Dona Pattal* (leaf plate making) initiative provides income opportunities by employing local people for two hours daily. The *Khapa Zone Breakfast Point* in Kanha Tiger Reserve was established with a ₹50,000 loan from the EDC, enabling the purchase of utensils and generating income for local communities. Furthermore, eco-friendly enterprises, including resort collaborations and battery-operated equipment for EDC members, are promoted to reduce environmental impact.

Community-Led Ecotourism:

To promote sustainable tourism, local communities are actively involved in nature camps, guiding services, and handicraft production. Safari and adventure tourism activities provide employment and revenue. Women-led storytelling tours are introduced as part of nature education programs, blending conservation with cultural heritage.

3. Strengthening Buffer Village Infrastructure

Enhancing infrastructure in buffer villages is key to improving the quality of life for local communities and promoting their participation in conservation efforts. Eco-Development Committees are empowered to manage funds independently, ensuring effective utilization. Training sessions on account keeping and audits are conducted to build financial management capacity. Exposure visits are organized to provide insights into best practices from other regions. Women-friendly infrastructure is prioritized to ensure safety and inclusivity.

Expected Outcomes

Reduced Human-Wildlife Conflicts:

Increased participation of local communities in conservation activities and the promotion of alternative livelihood opportunities will significantly reduce human-wildlife conflicts. By involving villagers in habitat protection efforts and offering them sustainable income sources, the frequency of negative encounters with wildlife will decline. Initiatives such as community patrolling, real-time reporting networks, and buffer zone development will contribute to better coexistence strategies.

Enhanced Community Income:

The expansion of ecotourism and eco-enterprises will provide additional income streams for local communities. By promoting sustainable tourism, creating local handicraft markets, and facilitating skill-based livelihood programs, the financial stability of forest-dependent households will improve. The inclusion of women and marginalized groups in income-generating activities will further strengthen community resilience and reduce dependency on forest resources.

Greater Community Involvement:

Active community participation in conservation programs will foster a sense of ownership and responsibility for protecting wildlife and natural habitats. Regular engagement through Eco-Development Committees (EDCs), cultural awareness events, and capacity-building workshops will strengthen trust between forest authorities and local populations. This collaborative approach will enhance the effectiveness of conservation interventions.

Improved Biodiversity Conservation:

Participatory habitat restoration efforts, coupled with community-driven eco-friendly practices, will contribute to overall biodiversity conservation. By involving local stakeholders in afforestation, soil conservation, and anti-poaching initiatives, degraded habitats will be restored, creating healthier ecosystems. This will also promote wildlife protection and sustainable land-use practices, benefiting both the environment and local livelihoods.

Expert Opinions

Experts recommend that EDC funds should be fully utilized for employment generation through skill development programs and eco-friendly enterprises. Instead of allocating a portion of the funds as loans, the entire amount should be dedicated to developmental activities, ensuring maximum benefit to the community.

It is also suggested that the 50% loan provision in the EDC framework be removed as it limits the effectiveness of the funds. By directing the full fund towards community welfare and skill enhancement, greater positive outcomes can be achieved.

Finally, experts emphasize the need to launch ecotourism initiatives in the Cheetah Landscape at the earliest. This will boost conservation efforts by generating employment opportunities, promoting sustainable tourism, and creating economic incentives for local communities to support wildlife protection.

Closing Remarks by Shri. Ashok Barnwal, ACS, Forest Department, Madhya Pradesh

After the participation in all the group discussions, he appreciated the brainstorming sessions and opinions by experts. Highlighted the major issues with the recommendations-

1. CAMPA fund is adequate for habitat management in Protected Areas (Pas); no need for a separate budget.
2. Emphasis on soft components over hard components is commendable. Need for more focused work on conflict mitigation measures, such as fencing, habitat management are needed. Exemplified by leopard conflict mitigation in Sanjay Tiger Reserve.
3. Establish tiger safaris in all tiger reserves to generate revenue and local employment.
4. Crop loss assessment is crucial but requires caution in method adoption. Prevent misuse of crop compensation before implementing changes.
5. Corridor planning should involve consultations with all stakeholders.
6. Implement expert recommendations on the use of fire as a management tool at the earliest.
7. Instead of park-wise recruitment, a centralized system for ecologists/sociologists should be adopted for better resource utilization.
8. Explore opportunities for ecotourism development in the Cheetah landscape soon.
9. Workshop was well-diversified with ideas and solutions for major issues. The takeaways from the workshop will definitely help in managing wildlife in Madhya Pradesh.

Final Recommendations

Landscape Management/Management of Wildlife Outside Protected Area:

- Extend and strengthen wildlife protection to territorial and corporation-managed forests.
- Conservation efforts should go beyond tigers, advocating for the protection of other endangered species that share the same landscapes.

- Shift from reactive conflict measures to proactive habitat conservation, strengthening elephant corridors to reduce movement into human settlements.
- Increasing the coverage of protected areas and buffer zones to provide larger, safer habitats for wildlife and maintain connectivity between source populations through well-managed corridors to facilitate genetic exchange and population stability.
- Develop strategies to minimize the adverse effects of linear infrastructure (e.g., roads, railways) on wildlife corridors, ensuring safe animal movement.
- Implement corridor management strategies in consultation with stakeholders to balance conservation and local livelihoods.

Human Wildlife Conflict:

- Mass capture and translocation of conflict-prone herbivore species such as nilgai, blackbuck, and wild pigs to underpopulated protected areas (PAs) to rebalance ecosystems before introducing apex predators.
- Implement systematic conflict mapping and species-specific incident tracking to predict and mitigate human-wildlife interactions.
- Utilize AI-based monitoring, radio-collaring, drone surveillance, and microchipping for improved conflict management.
- Develop a conflict calendar to track seasonal trends and improve preparedness.
- Use selective fencing (chain-link, solar) in sensitive areas also explore Community fencing trials with bio-fencing techniques (agave, thorny bushes, beehive fences).
- Establish well-equipped rapid response teams (PRT/QRT/RRT) with proper funding for conflict resolution.
- Recognize human-wildlife conflict under the Disaster Management category for better governmental intervention and compensation.
- Declare wildlife-related crop damage as a National Disaster for better financial support.
- Reinstating joint crop damage assessments by the Forest and Revenue Departments.
- Increase compensation incentives for crop losses to reduce local resentment and improve community awareness.
- Organize media workshops to encourage responsible reporting on human-wildlife conflict.
- Expand Animal Birth Control programs to manage stray dog populations.
- Develop a landscape-based approach with zonation to regulate elephant movements and minimize human interactions:
    - Elephant Habitat Areas: Protected zones where elephants can be safely conserved.
    - Corridor Areas: Identified movement pathways essential for elephant dispersal and seasonal migration.
    - Exclusion/Removal Areas: Human-dominated zones where elephant presence poses significant risk; movement should be actively restricted through management interventions.
- Integrate human settlements in elephant corridors into PM Awas Yojana while maintaining ecological connectivity.
- Develop peripheral roads around forested areas to monitor wildlife presence, regulate human movement, and reduce encounters.
- Establish a state-level Elephant Task Force for dedicated conflict management.

- Explore tiger safaris under NTCA guidelines for rescued or problematic tigers.
- Identifying and addressing the primary drivers of conflict, such as forest dependency, by introducing practical alternatives.
- Continuing the relocation of villages from core areas to create inviolate spaces for tigers and other wildlife.

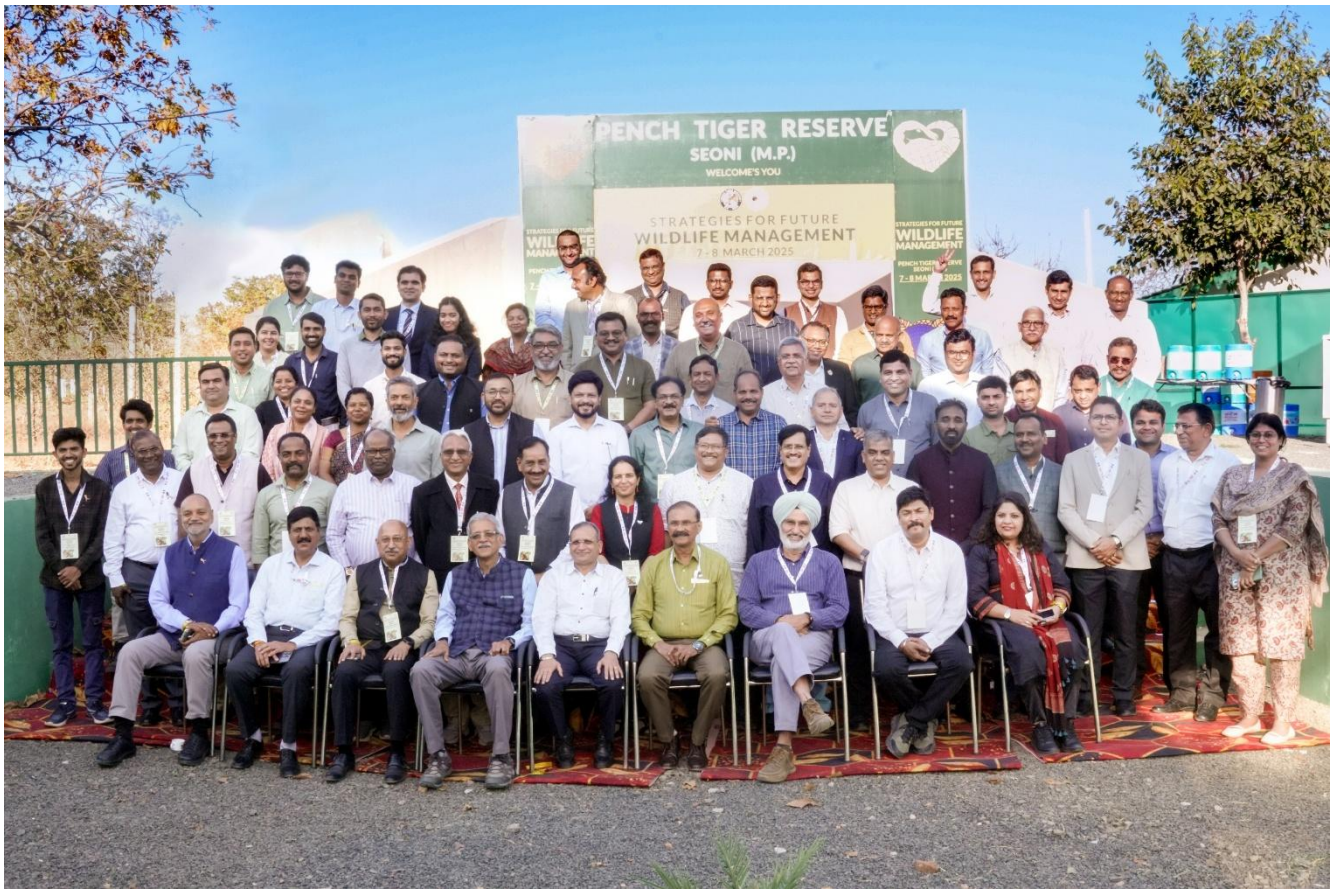
Habitat Management:

- Utilize existing CAMPA funds for habitat management in Protected Areas (PAs) without additional budget allocations.
- Urgent need for habitat restoration through large-scale removal of invasive species, followed by native vegetation restoration programs.
- Develop and implement invasive species control plans with systematic eradication over five years.
- Restore grassland ecosystems while promoting biodiversity conservation.
- Establish a long-term grassland monitoring framework for adaptive conservation.
- Develop Wetland, Grassland, and Riparian Atlases for better habitat management.
- Prioritize riparian habitat conservation in both protected and unprotected areas for ecological connectivity.
- Integrate moisture regime assessments into habitat management, including hydrological mapping and spring conservation.
- Conduct pilot studies for Lesser Florican and Great Indian Bustard (GIB) habitat conservation in important areas.
- Review and reinstate incentive schemes for farmers supporting Lesser Florican conservation.
- Avoid initiating GIB breeding programs unless scientifically viable.
- Conduct rapid surveys to assess Caracal habitats, especially in Chambal Ravines.
- Establish a permanent cadre of Research Ecologists and Sociologists in Madhya Pradesh.
- Incentivize and enhance the capacity of existing field biologists.
- Strengthen veterinary capacity by recruiting Wildlife Health Officers and para-veterinarians.
- Improve frontline staff welfare with hardship allowances, mobile medical units, and better working conditions.
- Implement structured training programs, including wildlife courses, exposure visits, and refresher training.
- Emphasized the need for prioritizing Protected Area (PA) development in the Chambal region to safeguard its unique biodiversity.
- Ensure a minimum tenure of three years for PA managers for effective conservation efforts.
- Digitize past and ongoing wildlife research, creating a dedicated research portal.
- Strengthen the State Forest Research Institute (SFRI) for long-term research initiatives.
- Develop standardized fire management protocols based on scientific research.
- Promote knowledge exchange with international fire ecologists for skill enhancement.
- Implement skill-based training programs for forest officers and frontline staff in collaboration with WII, SFRI, and other institutes.

Community Engagement:

- Expand community engagement initiatives like Bagh Choupal and form Bagh Mitra (Tiger Friends) groups to promote conservation participation.
- Immediate launch of ecotourism in the Cheetah Landscape for conservation and livelihood generation.
- Implement incentive-based conservation campaigns.
- Develop eco-business, community-led ecotourism with nature camps, local guides,
- Emphasized the need to promote community participation in conservation efforts, ensuring that local communities are engaged and benefit from wildlife protection initiatives.

Group Photo



List of Participants in the Workshop

MPFD Headquarters (Bhopal)

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3 Shri. Subharanjan Sen, CWLW & PCCF (WL) MP
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20 Shri. Naresh Kumar Yadav, CCF Chhatarpur
21 Shri. Madhu V. Raj, CCF Chhindwara/Seoni
22 Shri. Ramesh Ganava, CCF Khandwa
23 Shri. Kamal Arora, CCF, Jabalpur
24 Shri. Rajesh Kumar Rai, CCF Rewa
25 Shri. Ajay Kumar Pandey, CCF Shahdol
26 Shri. M.R. Bhagel, CCF Ujjain

Field Director, Tiger Reserves, MP:

27 Shri. Deva Prasad, CCF & FD, Pench Tiger Reserve
28 Ms. Rakhi Nanda, CCF & FD, Satpura Tiger Reserve
29 Ms. Anjana Tirkey, CF & FD, Panna Tiger Reserve
30 Shri. Amit Kumar Dubey, CCF & FD, Sanjay Tiger Reserve
31 Dr. Anupam Sahay, CF & FD, Bandhavgarh Tiger Reserve
32 Shri. Ravindramani Tripathi, CF & FD, Kanha Tiger Reserve

Deputy Director, Tiger Reserves, MP:

33 Shri. Hemant Raikwar, DFO Obedullaganj
34 Shri. Sanjay Raikhere, DFO Mandsaur
35 Shri. Rajnish Kumar Singh, Deputy Director, Pench Tiger Reserve
36 Ms. Priyanshi Singh, Director, Madhav National Park
37 Shri. Punit Goyal, Deputy Director, Kanha Tiger Reserve (Core)
38 Shri. Prakash Kumar Verma, Bandhavgarh Tiger Reserve
39 Ms. Amitha K. B., Deputy Director, Kanha Tiger Reserve (Buffer)

Divisional Forest Officers, MP:

40 Shri. Vejayanantham T. R., DFO Betul South (T)
41 Shri. Gaurav Sharma, DFO Katni (T)
42 Shri, Vijay Kumar, DFO Raisen (T)
43 Shri, Anupam Sharma, DFO Panna South (T)
44 Shri. Sujeet Patil, DFO Morena (T)
45 Shri. Naveen Garg, DFO Betul North (T)
46 Ms. Pratibha Ahirwar, DFO, Ashoknagar (T)
47 Shri. Rishi Mishra, DFO Jabalpur (T)
48 Shri. Gaurav Mishra, DFO South Seoni (T)
49 Shri. MS Uikey, DFO North Seoni (T)
50 Ms. Bharti Thakre, DFO Seoni (Coorporation)
51 Shri. L K Vasnik, DFO South Chhindwara (T)
52 Shri. Sahil Garg, DFO Chhindwara West (T)
53 Shri. Adhar Gupta, DFO Balaghat South (T)
54 Ms. Neha Shrivastava, DFO Balaghat North (T)
55 Shri. Chanap Devid Vyakatrao - DFO Balaghat (Corporation)
56 Shri. Shreyas Shrivastava - DFO Seoni (Production)
57 Shri. Arihant Kocher, DFO, Balaghat (Production)
58 Shri. Amit Nikam, DFO, Chhindwara (Production)

List of the Govt. of India officials:

59 Shri. Nandkishor Kale, AIG, NTCA, Nagpur

List of the Retired Officers, MP:

60 Dr. S.P. Yadav, Director General, International Big Cat Alliance New Delhi
61 Dr. Rajesh Gopal, Director General, Global Tiger Forum, New Delhi
62 Mr. Jitendra Agrawal, Former CWLW & PCCF (WL), Madhya Pradesh
63 Dr. H.S. Pabla, - Former CWLW & PCCF (WL) Madhya Pradesh
64 Dr Suhas Kumar, Former PCCF, (WL) Madhya Pradesh
65 Shri. BMS Rathore, Former PCCF Madhya Pradesh
66 Shri. R. Sreenivasa Murthy, Former APCCF, Madhya Pradesh
67 Dr. A.B. Shrivastav, Former Director, School of Wildlife Forensics and Health

Other State Officers:

68 Shri. Srinivasa Rao, CWLW Maharashtra
69 Dr. V. Clement Ben, APCCF (WL), Maharashtra
70 Shri. R. Gokul, Director General, EMPRI, Bangalore

NGOs/Institutional Delegates:

71 Dr. Y.V. Jhala, - Former Dean, Wildlife Institute of India, Dehradun
72 Mr. Ratul Saha, WWF-India
73 Shri. Sanket Bhale, WWF-India
74 Dr. Anish Andheria, President, Wildlife Conservation Trust,
75 Dr. Ujjwal Kumar, Research Scientist, NTCA Tigercell, Wildlife Institute of India,
76 Dr Raman Sukumar, Honorary Professor, Centre for Ecological Sciences, IISc, Bangalore
77 Dr. K. Ramesh, Scientist – F, Head, Department of Landscape Level Planning and
78 Dr. Bivash Pandav, -Scientist - G, Head, Department of Protected Area Network, Wildlife
79 Dr. Anirudhha Majumder, Scientists B, SFRI Jabalpur

Field Biologists

80 Shri. Animesh Vishwas Chauhan, Pench Tiger Reserve, MP
81 Shri. Ajinkya Vijavrao Deshmukh, Kanha Tiger Reserve, MP
82 Ms. Sangita Kewat, Sanjay Tiger Reserve, MP
83 Shri. Vijaybabu Nandvanshi, Van Vihar National Park, MP

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