RANGE STATES WORKSHOP ON HUMAN-ELEPHANT CONFLICT MITIGATION

REPORT

29/03/2024 – 31/03/2024

Kaziranga National Park, Assam, India

TABLE OF CONTENTS

INTRODUCTION

The Asian elephant (*Elephas maximus*) is an important umbrella and flagship species for biodiversity conservation in Asia. Known as "ecosystem engineers", elephants due to their large sizes and dispersal abilities aid in long-distance seed dispersal, nutrient mobilization, and forest pathway and microhabitat creation which then benefits other species. Historically, the Asian elephant has also been worshipped as a god and viewed as a symbol of pride, status, and cultural heritage throughout its geographical range.

Despite its ecological and cultural significance, the Asian elephant is now found in only 13 range countries and is globally endangered. Habitat loss and fragmentation due to the expansion of agricultural and built-up areas into elephant habitats are the primary causes of population decline. Elephants need large areas to meet their ecological requirements, but remaining native habitats might not be sufficient to provide resources year-round. As a consequence, elephants move across or into human-dominated areas to access other native habitat patches or alternative food resources respectively. Frequently cultivated crops such as rice, wheat, and sugarcane hold high nutritional value for elephants. This sharing of space and resources between humans and elephants paves the way for human-elephant conflict (HEC). Elephants frequently raid palatable crops, destroy houses to procure stored crops, and sometimes even cause injury and death of human lives on a chance encounter with humans when in human-dominated landscapes. The social and economic losses inflicted by elephants does erode the traditional respect for the species and local communities sometimes resort to retaliatory killing of elephants through the means of electrocution, poaching, and poisoning.

Between the years 2018-2023, more than 1680 elephants and 3651 humans lost their lives because of HEC in Asia. The majority of elephant and human deaths due to HEC occurred in the range countries of Sri Lanka, India, and Bangladesh (i.e. the South Asia region). The greater intensity of HEC in these countries is probability due to the higher density of humans and elephants, and the significantly higher proportion of agricultural land than forest cover- all these factors are considered to increase the probability of contact between humans and elephants. Therefore, HEC mitigation should be of high priority for the conservation of Asian elephants in the face of steady

population growth and strong reliance on agriculture for livelihood in most parts of Asia.

WORKSHOP AIMS

The Center for Species Survival: Asian Elephant (CSS: AsE) organized the Range States Workshop on Human-Elephant Conflict Mitigation from March 29th to 31st, 2024. The workshop brought together government officials from the 13 Asian elephant range states and the IUCN SSC Asian Elephant Specialist Group (AsESG) members to discuss the status of Asian elephants and HEC scenarios in their country and present case studies on the observed effectiveness of different HEC mitigation measures. The main aim of the workshop was to develop the IUCN SSC guidelines on human-elephant conflict and coexistence based on the discussions from the workshop. This guideline intends to provide information on essential research and policy required for HEC mitigation across all range states. In addition, the guideline will provide easy to follow flowcharts containing steps to execute for mitigating HEC under different scenarios.

This workshop by CSS: AsE was its first initiative towards fulfilling the agreed-upon range state commitments of the 2022 Kathmandu Declaration for Asian Elephant Conservation.

THE ASIAN ELEPHANT : STATUS, THREATS AND CONSERVATION ACTION PLANS

There are around 48,798 Asian elephants remaining in the wild, with India and Sri Lanka having the highest number of individuals (**Table 1**). The loss, fragmentation, and degradation of native habitats are the biggest threats to the species throughout its current geographical range. Habitat fragmentation creates several small habitat patches and the absence of suitable wildlife corridors to connect these patches can lead to elephants moving across human-dominated landscapes to access other patches. Threats such as deaths from HEC and reduced population viability also arise due to the lack of suitable elephant habitats and corridors. Poaching for ivory is also a significant threat in range countries from Southeast Asia. However, it is worth noting that poaching can occur in retaliation to elephant damage and not just for ivory procurement.

Table 1. Asian elephant population size and threats, and national-level action plans for elephant conservation in the 13 Asian elephant range states. (-) signifies that information was not provided during the country presentations.

Country	Wild elephant population (average)	Main threats for elephants	National-level Action plan for elephant conservation/ Human-elephant conflict mitgation
Bangladesh	268	Habitat loss and fragmentation, blockage of movement corridors, water and food scarcity in dry season, increased HEC	Elephant Conservation Action Plan 2018-2027 Protocol on Transboundary Elephant Conservation- signed between Bangladesh and India
Bhutan	678	Habitat loss and fragmentation, population isolation reducing genetic viability, increased HEC, occasional poaching for ivory	Elephant Conservation Action Plan for Bhutan 2018-2028
Cambodia	500	Habitat loss and fragmentation, blockage of movement corridors, illegal hunting, poaching for ivory	Action Plan for Asian Elephant Conservation in Cambodia (2020- 2029)
China	300	Very less habitat available for an elephant population of 300 individuals	-
India	29964	Habitat loss and fragmentation, blockage of movement corridors, high levels of HEC, occasional poaching for ivory	-
Indonesia	1794	Habitat loss, degradation, and fragmentation, HEC, poaching for ivory	Indonesia Strategy and Action Plan for the Conservation of Sumatra and Kalimantan Elephants (2007-2017) Decree of the Minister of Forestry Number: P.48/2008 concerning guidelines for handling conflicts between humans and wildlife
Lao PDR	350	Habitat loss and fragmentation, illegal hunting, increased HEC	National Elephant Action Plan Lao PDR 2022 To 2032 National Ivory Action Plan of the Ministry of Agriculture and forestry dated June 2020 A guide to resolving conflicts between people and wild elephants (WWF Laos) Handbook Monitoring of conflicts between humans and elephants (WCS Laos)
Malaysia	3490	Habitat loss and fragmentation, moderate levels of HEC, chronic poisoning from chemicals used in agricultural fields in Sabah Malaysia, infrastructure development	National Elephant Conservation Plan 2.0 Bornean Elephant Action Plan 2020-2029
Myanmar	2000	Habitat loss and fragmentation, illegal killing and capturing, moderate levels of HEC	No action plan
Nepal	227	Habitat loss and fragmentation from encroachment, forest fire, and infrastructure development, blockage of movement corridors, increased HEC	The Elephant Conservation Action Plan for Nepal (2009- 2018)
Sri Lanka	5879	Habitat loss and fragmentation, high levels of HEC	Wild Elephant Policy of Sri Lanka (requires to be updated)

| Thailand | 3234 | Habitat loss and fragmentation, poaching for ivory | - |
| Vietnam | 114 | No delegation | |

Data source: Based on country presentations given by government officials from the Asian elephant range states.

THE HUMAN-ELEPHANT CONFLICT SCENARIO IN ASIA

The highest number of human deaths due to HEC for the period 2018-2023 were reported in India followed by Sri Lanka, Thailand, and Bangladesh (**Table 2**). 90% of human deaths occurred in India and Sri Lanka. Majority of elephant deaths due to HEC for the period 2018- 2023 were reported in Sri Lanka, India, Malaysia (Peninsular Malaysia + Sabah Malaysia), and Thailand. 88% of the elephant deaths occurred in Sri Lanka and India.

Electrocution was a major cause of elephant deaths in India, Sri Lanka, and Nepal. Poisoning was more frequent in India, Indonesia, Sabah Malaysia, Sri Lanka, and Thailand. Cases of poaching were reported across all range states except China and Cambodia.

The development of linear infrastructure is a major threat to elephants in India and Sri Lanka, and to an extent in Thailand, Bangladesh, and Sabah Malaysia.

Table 2. Human and elephant deaths due to human-elephant conflict for the period 2018- 2023 across Asian elephant range states. (-) signifies that information was not provided during the presentations

Country	No. of human deaths	No. of elephant deaths	Cause of elephant death				
			Electrocution	Poisoning	Poaching	Train hit	Roadkill
Bangladesh	98	22	8	1	11	1	0
Bhutan	7	12	2	0	10	0	0
Cambodia	0	1	-	-	-	-	-
China	23	0	0	0	0	0	0
India	2657	512	379	21	47	75	0
Indonesia	11	14	3	11	0	0	0
Lao PDR	9	23	0	0	23	0	0
Peninsular Malaysia	9	30	-	-	-	-	-
Sabah Malaysia	1	23	1	13	8	0	1
Myanmar	4	7	2	0	5	0	0
Nepal	83	26	23	0	3	0	0
Sri Lanka	618	951	226	32	316	47	46
Thailand	118	42	1	18	20	3	0
Vietnam	No delegation						

Data source: Based on country presentations given by government officials from the Asian elephant range states and HEC scenario in Asia talk given by Dr. Prajna Paramita Panda

Table 3. Number of houses damaged and major crop types destroyed by elephants during the period 2018- 2023 across the different Asian elephant range states. (-) signifies that information was not provided during the country presentations

Country	No. of houses damaged	Major crops destroyed
Bangladesh	116	Paddy, wheat, corn, banana, jackfruit, papaya, mango, sugarcane, mustard, nuts, tomatoes, potatoes
Bhutan	60	Paddy, maize, cardamom, betelnut, potato
Cambodia	-	Coconut, bamboo shoot, mango, jackfruit, banana, durian, cassava, papaya, santol
China	-	-
India	-	Paddy, banana, jackfruit, coconut, maize, millet, areca nut, finger millet
Indonesia	-	-
Lao PDR	-	-
Peninsular Malaysia	-	Oil palm, banana
Sabah Malaysia	-	Oil palm, banana, coconut
Myanmar	-	-
Nepal	3080	Paddy, wheat, maize, sugarcane
Sri Lanka	2351	-
Thailand	-	-
Vietnam	No delegation	

Data source: Based on country presentations given by government officials from the Asian elephant range states.

COMMUNITY PERSPECTIVES ON HUMAN - ELEPHANT CONFLICT AND ITS MITIGATION

Question: What are the major concerns of the local community due to human-elephant conflict?

Respondent 1 ~ Tiken Chandra Ray (Assam)

"I live in the fringe areas of the Manas National Park in Assam and we have had elephants coming out of the park to damage our crops and sometimes houses. The community members know to live alongside elephants but the increase in HEC made us feel anxious about our lives and livelihood. Hence, we asked the Wildlife Trust of India (WTI) to help us place electric fences in the areas that were frequently damaged by elephants. The villagers are responsible for maintaing these fences and we are doing this for the past couple of years. Electric fences have reduced elephant caused damage and we feel safer. We have also learnt to safely chase away elephants in the past years. Damage at low intensity is not a major threat for us as we have become more reliant on agriculture than forest produce after fence installation. Some of us even feel that presence of elephants near our village reduces theft. Overall, we all like

elephants and we pray to them when harvest is good, and keep jackfruits for them to feed on too."

Respondent 2 ~ Shajan M. A (Kerela)

"The Kurumans are a tribal community which live near the forests of Wayanad. Previously, members of this community were hunter gatherers. After the 1970s, they settled down to practise agriculture. They understand elephant behavior and hence, aren't afraid to see elephants near their villages. Everyone holds a great respect for elephants and believe that if elephants feed on their paddy then the harvest will be better the next year."

CASE STUDIES ON HEC AND ITS MITIGATION STRATEGIES ACROSS THE RANGE STATES

This section provides a list of all the case studies on HEC and its mitigation that were discussed and shared during the workshop. All case studies have been grouped country wise.

BANGLADESH

HEC mitigation strategies currently being deployed in the country: solar-powered fencing, biofencing, watch towers, chilli rope, elephant response team, compensation policy, setting up of early warning systems, cultivation of crops less favored by elephants

Case Study 1: Training of elephant response teams (ERTs)
(Presented by ~ Sayad Mahmudur Rahman)
- On 25th May 2021, a female elephant had made her way to Thainkhali, Ukhiya- an area adjacent to the boundaries of the Rohingya Refugee camp in Cox's Bazar, Bangladesh.
- The elephant was successfully sent back to the forest after 16 hours with collaborative efforts from the Bangladesh Forest Department (BFD), Camp in Charge (CiC), IUCN, Upazilla (sub-district) Administration, Bangladesh Police and Rapid Action Battalion (RAB) team, local community members, and elephant response team (ERT) members.

- The trained ERT members were deployed to deal with such emergency situations.
- At present, there are 120 ERTs with 50 are placed in the Rohingya camp. Training of another 68 teams is planned.

Case Study 2: Compensation against elephant caused damages

(Presented by ~ Sayad Mahmudur Rahman)

- The Bangladesh Government has been providing compensation to HEC affected people since 2010.
- About 41.702 million Bangladeshi Taka has been provided to compensate for HEC related damages for the fiscal years 2018- 2019 to 2022- 2023.
- The very first compensation policy was adopted by the government in 2010, later the 'Compensation rule for wildlife attack, 2021' was formulated in 2021.
- According to the Compensation rule for wildlife attack, 2021; the stated amount needs to be provided against a given type of elephant caused damage
  1. Human deaths: Bangladeshi Taka 300000
  2. Human injury: Bangladeshi Taka 100000
  3. Crop or property damage: Bangladeshi Taka 50000

Case Study 3: The unsuccessful use of alternative crops

(Presented by ~ Sayad Mahmudur Rahman)

- The use of alternative crops to deter elephants from agricultural fields has been used in some areas but for only one season in Bangladesh.
- The result from this pilot use indicates that the use of chilli, turmeric, and ginger as alternative crops is quite useful in deterring elephants.
- However, farmers are not very keen on planting alternative crops because they do not want to change their usual cropping practise and feel that paddy cultivation is more profitable.
- If farmers are sensitized to practise alternative cropping for a few more years then it can become an effective HEC mitigation tool in the country.

BHUTAN

Case Study 1: A success for chain-linked electric fences

(Presented by ~ Kencho Rigzin)

- Electric fence of total length 7.5 km was installed in the project sites: 3500m at Phuntshothang, 1000m at Namchazor, and 3000m at Agurthang. A total area of 44 hectares benefitted from this fence installation.
- The fence comprised of a 3-stranded poly wire electric fence with a 1m high chain-linked fence with iron angle post fixed with concrete.
- Pole to pole distance was maintainted to be 4m.
- Along the fencing alignment, bush was cleared 3 meter wide. Staking was done to fix MS angle post.
- Elephant movement into these areas stopped after fence installation.

Case Study 2: An unsuccessful story of Animal Intrusion Detection and Repellent System (ANIDERS) "Smart light and sound alert system"

(Presented by ~ Kencho Rigzin)

- 30 PIRs and 2 AIRs installed in Sarpang (Gelephu, Samtenling, and Shompangkha). The ANIDERS were purchased from Kyari Innovation Private Limited (KIPL)- based in Uttar Pradesh, India.
- Based on observations over a year, the device was found to be effective in alerting people to wildlife presence.
- However, limitations of this were false alarms due to small insects and speeding vehicles, and the requirement for regular maintenance. The device was also found to be ineffective in areas with thick bush coverage.
- The success rate of the ANIDERS to scare away elephants from villages was reported to be 86% in study carried out India WWF- India. However, 22 out of 30 installed PIRs were damaged and 1 out of 2 installed AIR was damaged by elephants in the study sites.
- Elephants become adapted to the ANIDERS and they prove to be less effective over the time.
- ANIDERS could be used as an alerting device to alert people of elephant presence, rather than solely as a mean of deterring elephants.

CAMBODIA

(Presented by: Loeung Kesaro)

Successful HEC mitigation strategies: raising awareness among local communities that they are living in areas used by elephants, unpalatable crop farming close to elephant habitats, electric fences

Unsuccessful HEC mitigation strategies: large-scale training and involvement of HEC affected local communities on HEC mitigation strategies, establishment of guarding groups to guard against crop raiding elephants, preventing encroachment of elephant habitats

CHINA

Case Study 1: Elephant conservation and management initiatives by the National Forestry and Grassland Initiative of China

(Presented by ~ Dr. Sandeep Kumar Tiwari as no delegates from the country were present)

- Establishment of nature reserves: Xihuangbanna National Nature Reserve and eight other local level nature reserves have been established, covering an area of 4,253 ha. The long-term adherence to field patrols, habitat maintenance and monitoring work has effectively safeguarded the core elephant population and key habitat zones.

- Execution of long-term ecological projects: Major ecological projects such as the natural forests protection, the farmland to forests returning, the protection of wildlife, and the construction of nature reserves have been vigorously carried out in Asian elephant ranges. These have effectively curbed the trend of habitat shrinkage and gradually improved elephant habitats.

- Transboundary conservation: Inviting conservation management agencies and experts from Lao PDR and Myanmar to exchange information and discuss transboundary conservation actions for Asian elephants.

- Establishment of research centre: The Asian Elephant Research Centre of NFGA, was set up in 2019. It specialises in providing the necessary technology for research work.

- Habitat restoration and creation of corridors: Delineating the national park boundaries scientifically, reasonably and organizing pilot habitat restoration activities. Linking up key habitats through ecological corridors to effectively promote further expansion of elephant habitats. This is being done to not just satify the ecological needs of the growing elephant population in the country,

but to also ensure that other rare and engagered species are effectively protected.

- In response to HEC cases, several mitigation strategies have been tested out. (see below)

Case Study 2: HEC mitigation strategies adopted in China

- Compensations: Since 2010, the local government purchases public liability insurance for local people to compensate the loss and protect wildlife indirectly.

- Application of monitoring and early warning systems: Asian elephant monitoring and early-warning systems based on drones (thermal imaging and visible light cameras mounted), fixed infrared-triggered cameras, networks, computers, and broadcasting systems are currently being used to monitor elephant activities.

- Feeding ground construction and habitat restoration: Forestry departments and protected area authorities of elephant ranges have constructed Asian elephant feeding grounds and planted native species favoured by elephants. This has reduced elephant foraging activities outside of natural ecosystems and reduced damage to crops and threats against local communities.

Future plans to conserve Asian elephants in China

- Construction of Asian elephant National Park: National Parks in China are classified as the strictest category of protected area. In October 2021, the Government of Yunnan Province launched the Asian Elephant National Park to protect wildlife and tropical rainforest ecosystems inhabited by Asian elephants. Habitat restoration will also take place if needed.

- Use of science for conservation: Aim to strengthen scientific control and optimize elephant population structure by promoting gene exchange to increase the genetic diversity of Asian elephants.

INDIA

Case Study 1: Low cost electric fencing in Assam

(Presented by ~ Hiten Baishya)

- In Assam, electrocution is the primary cause of elephant deaths due to HEC. The use of well designed and erected electric fences is a reliable way to reduce

HEC. However, existing off the shelf electric fencing solutions are expensive (~ Rs 4000 per km). As a result of these expensive electric fences, farmers erect illegal electric fences which are connected to powelines and cause both human and elephant deaths. Hence, a low cost, solar powered fencing solution was developed by WWF- India North Bank Landscape.

- In Assam's Buroi area, 20 villages from the area were severely affected by HEC which resulted in more than 2000 bighas (270 Ha) of crop damage within a span of three years. Three elephants and humans died during 2012- 2014 due to HEC. One person died due to electrocution from an illegal electric fence and one due to gunshot during an elephant drive operation.

- The Buroi low cost, solar powered fence was erected in 2015 along the southern periphery of the Singlijan Reserve Forest in Sonitpur district. The fence was 6.5 km long. It was a single stranded fence with wooden or bamboo posts. A person was trained by WWF- India and engaged by the Forest Department and Boroi Tea Estate Authority to maintain the fence regularly.

- The fence was installed in a position which would not imped the natural movement of elephants.

- It was observed that the single stranded fence was enough to prevent the elephants from coming into the human- dominated area. This is more likely because the elephants were previously unexposed to electric fences.

- The fence was also successful because it did not restrict movement of people to access resources, and the local community helped during fence installation.

Case Study 2: Innovative HEC mitigation measures in Karnataka

(Presented by ~ Manoj R)

- Barricade installation**:** railway barriacades, solar tentacle fences (difficult to maintain as area of damage cannot be identified easily), elephant trenches (dimension: 3 'top base' x 3 'height' x 1.5 'bottom base' m)

- Wildlife habitat management**:** removal of invasive species, desilting of waterholes in elephant habitats, installation of solar powered borewells to augment water round the year

- Community awareness programs: community outreach programs, street plays on HEC, radio talks, and television programs

- Monitoring of approaching elephants: establishment of rapid respose teams (notified about elephant presence through elephant detection systems, and they then inform local people and deploy detterents), elephant radio- collaring (indigenously developed, cheaper GSM collars are used), thermal drones, E-surveillance system (AI plugins have been developed that can integrate with existing CCTV systems. This allows for the analysis of movements and the receivement of real-time alerts from multiple devices without the need for human interventions)

- Early warning system: centralized wireless early broadcasting at vulnerable gram panchayats. In these systems, the messages have been pre- recorded. They comprise of laser based detection systems (Laser-based systems use sensors to detect the presence of elephants as they approach fields or settlements. The sensors trigger alarms to warn people, allowing them to take measures to protect their crops and property before elephants arrive.)

- Timely compensations: The e- PARIHARA application is an online system for processing and sanctioning of ex- gratia claims for HEC cases. It is an Android app which captures field data (people can upload images of the damage inflicted by elephants). Sanction orders are auto generated and funds to beneficiary are transferred online.

Case Study 3: The radio-collaring and translocation of problem elephants in Wayanad, Kerela

(Presented by ~ Shajna Karim)

- In Kerela, problematic elephants which frequently move into human-dominated areas and cause significant damage are radio-collared to understand their movement patterns and predict conflict occurrence. If the animals are observed to be in human- dominated areas all the time then they are captured and translocated to a different location (sometimes even to an elephant camp). However, in all of the three cases where the elephants were mentioned to be translocated to a different area and not an elephant camp, the elephants either moved back to their previous area and caused conflict or they caused conflict in the new areas.

- Other key measures used to reduce HEC in the state include the installation of physical barriers such as solar fencing, elephant-proof trench, elephant-

proof wall, hanging power fence, crash guard fence, and bio fencing. In addition to these structural interventions, successful initiatives involve the deployment of rapid response teams and elephant scaring watchers, habitat management activities such as maintenance of waterholes, vayals, grasslands, and removal of invasive species.

- Local communities have also been relocated to different regions when they live in high conflict prone areas.

Case Study 4: HEC mitigation strategies deployed under the Comprehensive Action Plan for Conservation of Elephants in Odisha

(Presented by ~ Lade Gajanan Dayanand)

- Technology based monitoring and early warning:
- Integrated Wildlife Management System (iWLMS), web GIS portal, and drones are widely used for tracking elephant movements in various divisions. State Wildlife Head Quater is monitoring the elephant movement regularly through web GIS.
- Early warning system in the form of bulk SMS through the OSDMA platform have been launched to give advance information to villagers.
- Light and sensor based warning systems have been installed on pilot basis at 12 locations in 4 Forest divisions.
- Radio bulletin on presence of elephants is also broadcasted in 3 Forest divisions.
- Timely compensations: The AKUKAMPA portal has been developed to obtain quick information on damage inflicted by elephants and send compensations to beneficiary accounts. ANUKAMPA has a web portal and also an Android app using which community members can fill up their applications for ex- gratia claims.
- Prevention of elephant electrocution:
- Vulnerable points of electrocution in each division have been identified and appropriate mitigation measures are undertaken.
- Regular co-ordination meetings are conducted with Energy departments at all levels.

- Mapping of transmission lines and joint patrolling by Forest and Energy Department staff along vulnerable stretches of transmission lines in elephant movement areas by GPS mounted vehicles is being done regularly.
- Tripping data is being shared by Energy Department staff to forest officials for analysis to identify illegal hooking locations.
- Cabling of open cables in transmission lines and strengthening of electrical infrastructure are being done on priority by DISCOMs in identified areas.

- <u>Prevention of railway accidents</u>**:**
- Regular co-ordination meetings are carried out at State Headquarter level and also at Division level.
- Railway authorities have been requested for the provision of overpass and underpass to facilitate elephant movement in upcoming projects as well as in existing railway lines at identified points. 35 locations have been identified along railway tracks for construction of animal underpasses/overpasses.
- Signages have been installed at vulnerable locations along railway tracks.
- Capacity of elephant squads have been strengthened with provision of GPS mounted motorcycles and red lights (as emergency measure) to patrol along the railway tracks and stop the trains in emergency cases.
- The SMS/WhatsApp communication system between Forest and Railway Department regarding movement of elephants near railway tracks has been created.
- Wireless communication between Forest and Railway staff established with pairing of VHF sets.
- Solar fencing is being installed along railway line at vulnerable locations to check crossing of railway line by elephants in Rourkela division and watch tower is being constructed along vulnerable areas of railway line in Bamra Division.

- <u>Facilitate paddy harvest and storage:</u>
- Mechanical paddy harvesters have been provided to villagers in most conflict prone villages in Athmallik and Baripada Division for early and quick paddy harvest before crop raiding begins
- Similarly, Mini rice mills have been provided in identified villages in Athmallik Division to facilitate early milling of paddy and storage to protect from raiding elephants.

- To avoid attraction of elephants to stored paddy in the village houses, grain bins made of tin for storage purpose are being introduced.

- Other mitigation methods adopted in the state include phycial barriers, community capacity building, creation of rapid response teams, installation of solar street lights in conflict prone villages so that villages can see approaching herds at night.

Case Study 5: Early warning system in Valparai, South India by the Anamalai Elephant Program

(Presented by ~ M. Anand)

- In the Valaparai plateau, elephants frequently destroyed ration shops, noon – meal centres, and residential places. The loss of human lives from HEC was also a major cause of concern.

- Around 60% of human death incidents occurred on roads and men between the ages of 40- 60 years were the main victims. In 35 of the 48 (73%) incidents of human deaths reported in the region between 1994- 2023, an unexpected accidental encounter with elephants was the cause of the death.

- Hence, an SMS based early warning system was created to reduce deaths from unexpected encounters with elephants in this region. Upon receiving these SMS alerts the local communities tend to enquire about approaching elephants and convey the message to others. This increased the number of people alerted about approaching elephants. The Tamil Nadu Forest Department officials quickly respond to people's queries on approaching elephants and otherwise.

- The SMS alerts are sent using information obtained through daily tracking of elephants by rapid response teams.

- The Anamalai Elephant Program was initiated in 2002 and since its initiation there has been a steep decrease in human deaths per year in this region. There have been zero incidents of human deaths in this region between 2021- 2023.

Case Study 6: Mapping the connectivity-conflict interface to inform conservation

(Presented by ~ Varun Goswami)

- Case study was based on the journal article:
  Vasudev, D., Fletcher Jr, R.J., Srinivas, N., Marx, A.J and Goswami, V. 2023. Mapping the connectivity-conflict interface to inform conservation. *PNAS.* **120**(1), Article no: e2211482119

INDONESIA

Case Study 1: The use of elephant radio- collaring for early warning

(Presented by ~ Andri Hansen Siregar)

- In Indonesia, especially in the Riau Province early warning systems are used to mitigate HEC. The system is based on GPS data of elephant movements from radio-collars that the servers receiver at 6-hour intervals. The information is shared to the task force responsible for monitoring and driving away the herds from human- dominated landscapes. The task force comprises of members from the local community.

LAO PDR

Case Study 1: HEC mitigation in Nampoui National Protected Area

(Presented by ~ Phuthone Komkieng)

- <u>Strategies used against HEC in this area:</u> land use management, electric fencing, crop guarding use noise and light.
- <u>Human-elephant coexistence schemes</u>: elephant conservation tour development, elephant conservation action plan at community level.

MYANMAR

Case Study 1: Actions taken against HEC mitigation in Myanmar

(Presented by ~ Zaw Min oo and Myint Soe)

- Under Myanma Timber Enterprise (MTE), 8 Units are working for wild elephant and human property protection. They are called Emergency Elephant Response Units (EERUs.). EERU units chase away and relocate wild elephants that come closer to villages and destroy property.
- Projecting migratory elephant routes using radio-collaring data.
- Use of fences, patrolling, and emergency evacuation based on local community information on HEC.
- In collaboration with Grow back for Posterity (GBP), EERU rangers participate in training courses for electric fence installation in HEC hotspots.
- Peace and coexistence programs to raise awareness among local communities.

Requirements in Myanmar to mitigate HEC

- Local and international collaboration
- Sustainable funding for conservation
- Action plan for elephant conservation (short and long term)
- Research and technical support.

NEPAL

(Presented by ~ Shyam Kumar Shah)

<u>Successful HEC mitigation strategies</u>: solar- powered fences, alternative crop farming (mustard, bee keeping, supari, and beetle nut), awareness programs, rapid response teams, concrete walls (high rising areas that elephants can't pass through), biofencing with cactus.

<u>Unsuccessful HEC mitigation strategies:</u> use of deterrents such as drum beating, fire crackers, search lights.

PENINSULAR MALAYSIA

Case Study 1: Community electric fencing system (SPEGKOM)

(Presented by ~ Mohamad Khairul Adha bin and Mat Amin)

- By protecting agricultural production from elephant damage, this fencing system helps in ensuring the stability of income and socio-economic life of the community, as well as promoting sustainable agriculture.
- SPEGKOM features:
- Portable fence: farmers can move it from one place to another based on their convenience and information on approaching elephants.
- No concrete footing for poles.
- 2 line of wire rope (6 mm stranded steel electric wire or 12 mm wire tape)
- Maximum 1 Power Station = 5 Joule energizer
- Maximum wire length = 5 km
- Costs: 1 km = RM2500.00
- Government through the DWNP provide the budget for implementing the 1st phase of SPEGKOM.

- The first step of SPEGKOM project is area selection. Area selection criteria: small agriculture, permitted area by law (it cannot be an illegal farmland), local farmers that consistently manage the farming areas, HEC hotspot, age of trees in plantations is 3-4 years.

- Site selection and initial fence installation is done by the forest department and local community members. Whereas, minor repairs and reporting of fence condition are done by local community members. The department only does major fence repairs.

- Advantages of SPEGKOM:

- Portable basis, moveable (practical for seasonal HEC area)

- Suitable and practical for small holder farmers

- Cheaper compared to permanent electric fences

- Coverage and accessibility for monitoring and maintenance works is easier compared to permanent electric fences

- Local community as a dedicated team to help in managing inspection and routine maintenance of electric fence

- Within a farm, fence installation is done on a plot-by-plot basis. This is because at initial stages the farmers are a bit apprehensive about engaging with the process. But with positive results after a year or two they are comfortable with fencing more plots.

- The fences do not have current passing through them during the morning. This keeps humans safe.

- Level of acceptance against elephants has improved after fence installation as crop loss has reduced significantly.

Case Study 2: Increasing willingness of plantations to coexist with elephants
(Presented by ~ Ee Phin Wong)

- The Management and Ecology of Malaysia Elephants (MEME) is trying to mitigate HEC through knowledge and capacity building, shifting mindsets on elephants, collaboration, and on-ground implementation of HEC mitigation strategies.

- Achieving coexistence with elephants (ACE) program

- MEME acts as the secretariat, involves large oil palm plantations: Sime Darby Plantation, FELDA, FGV, IOI Plantation, Aramijaya, and Kulim Plantation and two non-profits Earthworm Foundation and WCS- Malaysia.
- Covering 19 estates on the ground across the district of Kluang, Mersing & Kota Tinggi.
- Engagement started in 2020. The Memorandum of Cooperation between six stakeholders and MEME was publicised in June 2022.
- A total of three workshops have been held till date with plantation members to increase their knowledge and capacity to collectively mitigate HEC.

SABAH MALAYSIA

HEC mitigation strategies deployed in the region: HEC Meeting task Force - Collaboratively implement joint options through a working group, establishment of Community Elephant Ranger Team (CERTS), electric fencing around young palm trees and housing settlements (SSB), LED early warning systems, radio- collars to monitor elephant movements, napier grass cultivation in Tabin Wildlife Reserve, placement of oil lamp or ship emergency lamps

Case Study 1: Successful use of LED warning systems established by WWF- Malaysia
(Presented by ~ Primus Lambut)

- The prototype of LED early warning system for plantation workers were deployed in SSB at three locations where workers can assure to alert others when they encounter any signs of elephant presence nearby.
- The LED systems are portable and can be moved to any location by plantation workers where they think is more strategic and appropriate for them to be more vigilant.
- The LED systems have short batteries. Hence, solar power is used as an alternative method to energize the lights.

Challenges against HEC mitigation in Sabah Malaysia

- Electric fences are not regularly maintained by plantation companies.
- The LED lights, including their color become barely visible when it is too bright during the day.

SRI LANKA

HEC mitigation measures deployed in the country: habitat enrichment activities inside protected areas, electric fences (including handing electric fences), bio fences, seasonal elephant drives, capture and translocation of marauding elephants, GPS radio-collaring and monitoring, implementation of elephant transit homes, construction of elephant-proof trenches, community awareness programs, establishment of elephant control units, compensation payments, mapping and declaration of corridors (16 corridors proposed and land use survey being done for 7 corridors).

Case Study 1: Implementation of elephant holding grounds
(Presented by ~ W.M.K.S Chandrarathne)

- To overcome the backtracking of translocated elephants, holding ground of 2400ha has been established in Horowpotana (NCP). Out of 76 elephants that were placed in the holding grounds, 20 died due diseases and breakdown of fences. Hence, the holding grounds are not very successful.

- There were around 31 elephants per square km in these holding grounds. Whereas, in natural environments you will find 1-2 elephants per square km. Hence, naturally there was not enough space and resources within these holding grounds for 76 elephants. In a way these holding grounds have led to the mortality of wild elephants in the country.

- Yet holding grounds are currently under use and attemps are being made to strengthen the structure of these. A second holding ground will be established in Lunugamvehera NP(UP).

Case Study 2: The failure of large scale elephant drives in Sri Lanka
(Presented by ~ Varuan Goswami following discussions with W.M.K.S Chandrarathne)

- The largest ever elephant drive was implemented between 1983 – 1985 when pocketed herds from Mahaweli H2 area were driven to Wilpattu National Park (i.e elephants were driven out of human-dominated areas into its natural habitat). The elephant drive route was about 90 km in length. This drive was done without proper habitat enrichment in the new area (Wilpattu NP) for elephants. The drive was successfully done but all the driven elephants back tracked due to non-availability of fodder in the new area. In addition, there was

a shortage of staff to prevent the elephants from moving back into the human-dominated areas.

THAILAND

Case Study 1: Types of HEC mitigation strategies used in Thailand

(Presented by ~ A Somying Thunhikorn)

- <u>Physical barriers</u>: electric fence, elephant- ditch, semi- permanent fence
- <u>Smart early warning systems</u>: including tracking of approaching elephants using radio- collars
- <u>Rapid response teams</u>: these teams are equipped with cars, drones, wirless, flash lights, GPS device
- <u>Community network for monitoring wild elephants</u>: present- 246 networks, target- 342 networks
- <u>Compensation schemes</u>: compensation is provided for funerals, human injury, and crop and property damage.
- Building capacity and awareness in the local community

Case Study 2: HEC and its mitigation in Kui Buri National Park

(Presented by ~ Rachel Crouthers following discussions with A Somying Thunhikorn)

- During the 1990s, big land use changes, supported by the King of Thailand occurred around the boundaries of the Kui Buri National Park. The land use changes involved the setting up of pineapple plantations, and consequently led to the migration of people into the area as plantation workers.
- The elephants from the National Park were attracted to the pineapples and started entering the farms located near the National Park.
- To reduce this conflict, the government firstly discussed potential mitigation solutions with the community members who were affected by HEC. They discussed mitigation measured that could be implemented together by the government and local community members.
- The first step taken was the enrichment of habitats in the protected areas in an attempt to keep elephants within the park boundaries. This included the improvement of grasslands and water sources. This had mix success because

the elephants were staying inside the park but they also did come out into the farms.

- The second approach was to ask people to resort to livestock farming instead of pineapples. However, even this wasn't a long term solution because people stuck to pineapple cropping as it was more profitable.

- So, the next step was community run tourism. The locals acted as guides for visitors and were also able to sell their crops to visitors. This was very successful as there was economical benefit for the community.

- They have also implemented good early warning systems to make community members aware of approaching elephants.

- This is a good examples of adapting strategies based on effectiveness.

THE IUCN SSC GUIDELINES ON HUMAN-ELEPHANT CONFLICT AND COEXISTENCE – Draft outline

The guideline on human-elephant conflict and coexistence will be an adaptation of the IUCN SSC guidelines on human-wildlife conflict and coexistence. It will contain elements from the human-wildlife conflict and coexistence guideline that are most relevant and applicable for HEC mitigation. In addition, it will carry further information on research and policies required for HEC mitigation specifically.

To create the guideline, delegates at the workshop were advised to suggest ideas to resolve or manage human-elephant conflict whilst considering the promotion of coexistence between humans and elephants. Based on these suggestions, a draft outline for the 4 sections of the guideline was created during the workshop.

SECTION 1: Asian elephant ecology and behaviour relevant for human-elephant conflict mitigation

(Discussions for this section were facilitated by ~ Heidi Riddle and Kaushik Barua)

To develop effective HEC mitigation strategies, the first step is to understand the underlying causes of HEC and obtain insights on the ecology and behaviour of elephants in a particular area of interest. Elephant behaviour can differ across areas and hence, the effectiveness of various HEC mitigation strategies can differ in an area. An understanding of ecology and behavior will also allow us to predict the potential consequences of HEC mitigation strategies on a big, social, intelliegent animal such as the elephant.

This section of the guideline will provide recommendations for research that should be performed before the implementation on long term HEC mitigation strategies. From the working group discussions, the following research themes were proposed:

1. *Landscapes- understanding how different factors act as drivers of human-elephant conflict*
   - Mapping potential micro-hotspots for conflict (example: areas of waste disposal, granaries, and liquor storage)
   - Examining connectivity within and across the landscape
   - Dynamics of landscape changes (example: the occurrence and intensity of habitat loss, degradation, fragmentation, and restoration; presence of climate change effects on the landscape)
   - Land use planning of the landscape (example: map out the land use and land cover of the area, socio- economic status and activities to correlate it with elephant movement and occupancy. This will allow in understanding why HEC occurs more in certain areas)
2. *Asian elephant population*
- Identifying population status based on updated population data obtained within the last 5 years
- Understanding whether resource needs elephants are met (example: by mapping water sources, vegetation, and salt licks)
- Meta population dynamics and demographic changes over time (long-term studies required)
3. *Asian elephant behavior*
   - Associations/ social dynamics between individuals
   - Cultural transmission (i.e how elephants learn from one another)
   - Elephant response to various stimuli
   - Human and elephant interactions- reciprocal influence of human and elephant behaviour on each other
   - Impact of HEC mitigation measures on elephants

SECTION 2: Principles and policies for human-elephant conflict

(Discussions for this section were facilitated by ~ TNC Vidya and Prachi Mehta)

Principles for human-elephant conflict mitigation (adapted from the IUCN SSC guidelines on human-wildlife conflict and coexistence):

1. Do not harm
2. Understand issues and context
3. Work together
4. Integrate science and policy
5. Enable sustainable pathways

When following these principles it is important to keep in mind that elephants are large, need large spaces, are long-lived, and have long term memories.

Policies based on the principles:

1. *Do no harm:*
   - Need to consider the intensity of conflict, elephant density, human density when selecting HEC mitigation strategies
   - Corridors and critical habitats should be secured to reduce sharing of space between humans and elephants
   - Additional areas (buffer/ESZ) have to be kept in mind early on to prevent future conflict
   - The long-term outcomes of "solutions" need to be considered before deciding on policies
   - Understand whether a solution is short-term or long-term. Phyical barriers are a short-term solution and cannot be used to mitigate HEC in the longer term.
   - Consequences of barrier development on elephant movement and deflection of problems should be thought out well in advance
   - Unintended long-term consequences of policy on elephant population viability and human well-being should be considered
2. *Understand issues and context:*
   - Site-specific solutions based on local contexts, taking into account intensity of conflict, history of conflict, drivers of conflict, people's attitudes, etc should be used
   - Pilot studies on ecology of elephants and understand issues around conflict

- Identify and engage with all stakeholders, including all the indigenous communities
- Stress on the long-term solutions most suitable for an area

3. *Work together*
   - Interdepartmental coordination and cooperation is essential at all levels of the government. Responsibilites should be shared or clearly delineated.
   - Coperatration between various transboundary agencies
   - Action plans need to be be created at landscape levels and by keeping in mind the home ranges of elephants
   - A portal for disseminating information regarding processes/practises related to HEC should be created. It should be noted that all solutions might not be transferable.
   - Sensitizing media about reporting

4. *Integrating science and policy*
   - Policies need to be evidence based
   - If there are problems of interia in government policies (i.e takes long time to create policies) then public or private partherships maybe considered
   - Opportunities for joint discussions between scientists and managers should be increased
   - Long-term monitoring of elephant population and behaviour should be done
   - Social science studies are needed to understand the behaviour and perception of local communities towards elephants
   - Tourism needs to be managed such that negative interactions are minimised; tourism and forest departments need to have coordination
   - Enforcement of punishment for teasing elephants

5. *Enable sustainable pathways*
   - Governments need to build rapport with local communities and various stakeholders
   - Green livelihoods should be promoted to increase the likelihood for coexistence

- Translocation and lethal control should be last resorts, depending on the context
- Project planning at different timescales (both short and long term projects need to be executed)

SECTION 3: Case studies on human-elephant conflict

(Discussions for this section were facilitated by ~ Varun Goswami and Rachel Crouthers)

This section will contain example case studies on HEC and its mitigation conducted across the range states. If found suitable and appropriate then the case studies presented during the workshop will be incorporated into this section.

The working discussions highlighted a few gaps for the case studies:

- Understanding the efficacy of transboundary agreements in permitting elephant movements
- The effectiveness of inclusive community multistakeholder approaches to alleviate poverty and promote coexistence
- Develop understanding on the ecology and behaviour of elephants and how those changes with the implementation of HEC mitigation strategies

SECTION 4: Flow chart on the modus operandi of HEC mitigation that can be easily followed by range states Governments

(Discussions for this section were facilitated by ~ Vivek Menon and Abhishek Ghoshal)

HEC Scenrios for which flow charts will be created:

- Crop/agricultural field/plantation damage
- Property damage
- Human death/injury
- Elephant in human settlemet- either they are just present or passing through
- Captive elephant conflict (it will be discussed later whether this should be incorporated)

(Important note: The flowcharts for the different scenarios mentioned above will be created within the next few months by consulting the workshop delegates)

Stakeholders list:

- Plantations- management workers, government agencies

- Farmers

- Local people (non- farmers)

- Village heads and elderly

- Forest departments

- Civil society organizations

- Media

- Police/paramilitary

- Agriculture department

- Fire and rescue department (Malaysia)

- District officers/ local administrators

- Politician/public representatives

- Scientific community/ Academics

- Civil defence force (Malaysia)

- Malaysian volunteer department (Malaysia)

- Army (Cambodia, Nepal, and Malaysia)

- Disaster management department

- Judiciary

- Linear infrastructure department (rail, roads)

- Department of social welfare (Malaysia)

- Private sector (factory, industry, mills)

- Provincial Department of Environment (Cambodia)

- Central Environmental Authority (Sri Lanka)

- Tribal department (India and Malaysia)

- Local self-government department

- Religious instituitions

- Captive elephant owners and care takers (mahouts)

- Human health workers (doctors, paramedics, nurses, ambulances, etc)

- Funding donors

(Important note: more stakeholders might be added to this list later)

Ministries and Departments associated with HEC mitigation in each range country:

- Sabah Malaysia: Ministry of Tourism (Sabah Wildlife Department)
- Peninsular Malaysia: Ministry of Natural Resources, Environment, and Climate Change
- Cambodia: Ministry of Environment/ Minsitry of Agriculture, Forest and Fisheries (Foresty Adminstration)/ Ministry of Finance
- Sri Lanka: Ministry of Wildlife and Forest Resources (Department of Wildlife)
- Indonesia: Ministry of Environment and Forestry of Indonesia/ Directorate General of Conservation of Natural Resources and Ecosystems/ Conservation of Natural Resources Bureau
- Bangladesh: Ministry of Environment, Forests and Climate Change (Forest Department)/ Ministry of Finance
- Thailand: Ministry of Interior (Department of Disaster Prevention and Mitigation)/ Ministry of Environment and Natural Resources (Department of National Parks, Wildlife and Plant Conservation)/ Office of the Prime Minister
- Myanmar: Ministry of Natural Resources and Environmental Conservation- (Department of Environmental Conservation, Forest Department, Timber Enterprise)/ Ministry of Agriculture/ Ministry of Home Affairs (Police Department, Department of General Administration)
- India: Ministry of Environment, Forests and Climate Change- Wildlife Division- State Forest Departments)

(Important note: Need to obtain list of Ministries and Departments for Nepal, Bhutan, Vietnam, Lao PDR, and China)

TASKS TO COMPLETE POST WORKSHOP

- Work collectively and complete the IUCN SSC Guidelines on Human-Elephant Conflict and Coexistence – the broad guideline that can be used across all range states
- Tailor the broad guideline for a specific range state if required
- Translate the guideline to local languages
- Create a list of dealers for energizers and solar powered fences and place this list in the IUCN SSC Asian Elephant Specialist Group Website (as

recommended by Sonali Ghosh- Field Director, Kaziranga National Park and agreed by Vivek Menon)

ACRONYMS AND ABBREVIATIONS

AsESG- Asian Elephant Specialist group

CSS:AsE- Center for Species Survival: Asian Elephant

HEC- Human-elephant conflict

IUCN- International Union for Conservation of Nature

SSC – Species Survival Commission (of IUCN)

POST WORKSHOP SURVEY

After the Workshop, the following survey was sent to all the range country delegates:

Survey Questions
Range States Workshop on Human Elephant Conflict Mitigation
Assam, India – March 29-31, 2024

1. *Was your participation in the Range States Workshop on Human Elephant Conflict Mitigation useful for your work?*
Yes _____ No _____ Don't know _____

2. D*id you learn new skills/topics about Human-elephant conflict mitigation during this Range States Workshop on Human Elephant Conflict Mitigation?*
A lot_____ Some _____ None _____

3. *Did the Range States Workshop on Human Elephant Conflict Mitigation provide enough opportunities to network with colleagues from other range countries?*

Yes _____ No _____ Don't know _____

4. *Does your participation in the Range States Workshop on Human Elephant Conflict Mitigation make you feel more confident to assist with conservation activities?*

Yes _____ No _____ Don't know _____

5. W*hich topics covered during the Range States Workshop on Human Elephant Conflict Mitigation have you applied the most in your work?*

a)
_____

b)

_____

c)

_____

6. *Which topics would you like to see addressed at future Range States Workshop on Human Elephant Conflict Mitigation?*

a)

_____

b)

_____

c)

_____

Additional comments:

Post Workshop Survey Results:

Following the Workshop, range country delegates were asked to complete a survey) in order to evaluate if the Workshop changed behaviour of the delegates who attended. Eleven (11) Workshop participants filled out the post-Workshop evaluation survey. One hundred (100) percent of participants who responded to the post-Workshop evaluation survey said they found the Range States Workshop on Human Elephant Conflict Mitigation useful to their work, and more than half acquired new skills during the Workshop. Almost all survey participants said the opportunity to connect with colleagues from other range countries was an invaluable part of the Workshop. All respondents indicated that the Workshop made them feel more confident to assist with conservation and HEC activities.

There were many topics covered at the Workshop that survey participants felt were useful to their work. For example, the topics the respondents learned about at the Workshop and apply the most in their work are: principles of HEC mitigation; electric and bio fencing; habitat management and enrichment; waterhole management interventions; leveraging technology in HEC management; community and plantation perspectives and involvement in HEC management; compensation policies; and early warning systems for HEC.

There were a wide variety of topics that the respondents wish to see covered in future Range States Workshops on Human Elephant Conflict Mitigation. These topics include: elephant survey techniques; more successful examples of alternative crop practices; linear infrastructure and maintaining elephant movement routes and corridors; best practices for compensation mechanisms; HEC management by or in cooperation with plantations; proper way to apply technology in HEC management; HEC mitigation guidelines; successful cases of wildlife ecotourism; and information on wild elephant habitat, population and distribution.

Many respondents provided additional comments on the surveys and noted that the sessions provided much needed information about sites where early warning systems for HEC have been effective. Additionally, field visits to green linear infrastructure sites would be useful, as well as sharing techniques on elephant surveys and radio collaring. Emphasizing the importance of ongoing dialogue and collaboration among stakeholders is needed, highlighting the need for adaptive management strategies that evolve with changing circumstances, and stressing the significance of long-term commitment to conservation efforts to ensure sustainable outcomes for both communities and wildlife. Respondents also requested that future Workshops provide more days to discuss successful and failed HEC mitigation methods trialed by countries (lessons learned). Every country has their own systems for HEC mitigation but not all systems are 100% effective so there is a need to continually share experiences within range countries.

WORKSHOP PARTICIPANTS

Sl. No	Name	Organisation/Country
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2	Michael Kreger	Columbus Zoo
3	Adam Felts	AZA SAFE
4	Sayad Mahmud Rahman	Bangladesh
5	Kencho Rigzin	Bhutan
6	Loeung Kesaro	Cambodia
7	Andri Hansen Siregar	Indonesia
8	Mohamad Khairul Adha bin Mat Amin	Malaysia (Peninsular)
9	Primus Lambut	Malaysia (Sabah)
10	Zaw Min Oo	Myanmar
11	Myint Soe	Myanmar
12	Shyam Kumar Shah	Nepal
13	W.M.K.S.Chandrarathne	Sri Lanka
14	Somying Thunhikorn	Thailand
15	Phouthone K K	Lao PDR
16	Bhaskar Choudhury	IUCN SSC AsESG
17	Kaushik Barua	IUCN SSC AsESG
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