Human Elephant Conflict Task Force Workshop
Beijing, China, July 10-11th, 2009

INTRODUCTION:

<250 words on why this "Living Document" is important and its purpose>

DIRECTIONS:

< This is to describe how to use the document. This will be written last and will describe how people can utilize this document and contribute to it>

CONTRIBUTIONS:

<200 words on why input from everyone interested in HEC Mitigation is important and why they should continue to contribute>

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CONTENTS:

<List to be written once draft is complete>

I. PRINCIPLES of Human-Elephant Conflict[1][2]

1. The AsESG recommends prioritizing conservation-based approaches for mitigation of Human-Elephant Conflict over animal rights based approaches (i.e. those approaches that prioritize individuals to the detriment of population survival). An Example is killing/removing frequent raiding males to reduce animosity and therefore threats to whole population and its habitat.

2. In each HEC situation the AsESG recommends use of the mitigation technique that is the least detrimental to the elephant population.

3. Need to be deal with the causes of HEC rather than the symptoms.

4. We recommend that HEC mitigation is always conducted using an evidence-based/adaptive management approach (i.e. one based on monitoring of the effects of the method(s) on HEC rates and elephants).

5. Addressing HEC requires a landscape-level approach.

6. HEC mitigation is not only responsibility of the States' wildlife/conservation authorities (e.g. Forest or Wildlife Depts.) but also the private sector, donor agencies, banks, communities/individual farmers.

7. There is no permanent solution to HEC, instead human-elephant coexistence requires long-term commitment to managing elephant populations, human land use, and human behavior/attitudes.

8. There is no single mitigation technique that will be applicable in all HEC situations.

9. The resolution of HEC should not always be perceived as a problem that needs mitigation – it should also be perceived as a problem that can be managed through adaptive and preemptive strategies

10. Some additional comments in regard to linking HEC with disaster risk management: When taken from the context that the cumulative impact of HEC in all of the 13 Asian elephant range countries is an ongoing and continuous process, the impacts of HEC in terms of loss of human life, elephant deaths, environmental degradation, quality of life, property, crops and livelihood losses and opportunity costs is staggering and it equals or even surpasses the magnitude of onetime or infrequent events such as earthquakes, tsunamis, floods, hurricanes and volcanic eruptions. Therefore it would tremendously benefit the efforts to address HEC if it could be categorized as a disaster risk management priority. This would ensure that international bi and multilateral aid agencies treat mitigation of HEC as a priority in any development work they support in elephant areas.

There are several top level issues that need to be addressed if we need elephants to survive in the long term;

1. National Elephant policy (Ex. Project Elephant in India, Sri Lanka PA network, Bangladesh Action Plan, Example of Indonesia Action Plan – need for more stakeholder buy in etc.)

2. Governance issues and development agenda – need to engage with investors. Our vision for elephant conservation needs to be sold to other stakeholders.

3. Human Population increase – Need to make links with UNFPA and foundations like Gates Foundation. The idea is to attract them to our priority areas and have them implement their programmes.

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[1] There should be a clear and succinct definition of human elephant conflict prior t o laying out a set of "principals" of Human Elephant Conflict. For example today human elephant conflict has transcendent from being a purely wildlife management problem to one of the biggest socio-economic issues faced by rural communities in elephant areas in the Asian elephant range countries. This fact needs to be encapsulated within the context of the current definition of HEC.

[2] Note: In setting up the review publication it is also important to identify the linkages between HEC, poverty, human health, disaster management[2] and the environment.

II. Classification of HEC types

II.a. Types of HEC situations

Four aspects – habitat/population, elephant behavior, interface area and intensity of HEC all determine the type of HEC mitigation approaches we need to take. The constraints these situations impose and the mitigation actions needed for each need to be identified and a land use based classification needs to be adopted. This is becuase HEC does not always result because the human or the elephant population has increased in an area, Cultivating crops such as sugar cane, corn and bananas in large plantations can increase HEC tremendously in low human population areas.

II.b. Habitat and population based classification

II.b.1. What are the implications of habitat/population size for conflict mitigation and long-term conservation?

Adequate and reasonably intact habitat (with low/moderate/high elephant densities)

This area would be an intact habitat patch of varying size (Large = 1000+ km2; medium = 500 – 1000 km2 and small = 250 – 500 km2). These numbers would need to be discussed and their implications to HEC and its management understood. This scale is important for prevention tool for future HEC (include for the policy lobbying).

II.b.2. What needed?

Classification is ecosystem , management and landscape dependent e.g. Sri Lanka/India (grassland-dry deciduous with many small holder), Sumatra/Borneo/Thailand (Rainforest with many large scale owners)

II.b.3. What other characteristic? Density vs Habitat for the HEC?

Two important thing: The remaining habitat (occupied habitat) and where is the changing and how is changing (for park manager).

Level of HEC in that local site

II.c. Methods:

1. Satellite images and GIS database
2. Field surveys
3. Location of hotspots (HEC and Forest loss)
4. Sampling based collection methods (refer to African Elephant Specialist Protocols, WCS HEC collection protocol)
5. GPS Location of ad-hoc reports and reports of conflict (as opposed to actual damage)
6. If resources are available;
7. Radio Tracking to establish elephant home ranges in that site.
8. Fragmented patches (with low/moderate/high elephant densities)

These could be areas where elephants move between patches of habitat. Individual patches may not be greater than 250 km2 (see above for sizes greater than that) but the cumulative the area (as elephants use them) is greater than 250 km2. Need to identify a minimum size for individual patches and the total area of all patches used by elephants.

Elephant survival will be dependent on government policy, a kind of land-use in larger matrix (tea garden, palm oil plantation) and other development activity, community support. While the aim should be to maintain at least the minimum intact patch sizes (to be defined), specifying a minimum patch size could end up being counterproductive in some countries (eg. Indonesia, Malaysia).

Examples are India and Indonesia;

1. India : North Bengal – 200 elephants kill over 40-50 people/year and there is a lot of governmental effort in stopping the elephants from being killed in retaliation. It includes setting up of crop insurance and anti-depredation squads etc... Sri Lanka similar situation with Government will to ensure elephant survival in the long-term.

2. Indonesia: Sumatra: There were 12 populations in 1985 and due to conversion of habitat to plantations (coffee, palm oil etc...) and no governmental overarching policy, it is today reduced to 2 populations.

Habitat patch (<250 km2 [3] i.e. pocketed populations) (with low/moderate/high elephant densities)

Note: habitat and national park are not interchangeable terms. A national park does not necessarily provide the best habitat for elephants. Habitat can be inclusive of national parks but not the other way around.

Where elephants are confined to a single patch or several patches that are less than 250 km2 and where the habitat may be inadequate to support the existing or a viable elephant population.

II.c.1

Elephant population dependent and country specific characteristics. *The following questions need to be considered to make this decision;*

1. How isolated? (defined in terms of distance and characteristics of the intervening habitat).
2. The size of the elephant population relative to the total population country?
3. How severe is the conflict?
4. The tolerance for conflict in that local situation?

II.c.2 Elephant behavior-ecology based classification: [4]

This would help decide what type of mitigation action is needed. One or more or all these situations could be prevailing in an area. Need more clarification about the detail definition. The most important thing is the model of HEC for mitigation effort.

1. Opportunistic crop raiding: Where crop protection is absent or very poor and any elephant with access to unprotected crops will raid
2. Habitual raiders: When opportunistic raiders get used to ineffective/ poor or to routine crop protection measures become habitual raiders.
    a. Decision for habitual crop raiders => move to problem elephant.
3. Obligatory crop raiding: These elephants have inadequate or no resources in their home ranges and are dependent on raiding for much of their food needs. These are difficult to contain and even if we contain them then we need to fully understand the conservation implications of confining such populations using barriers? And how best to deal with such animals?
4. Dispersing populations (herds/bulls): There is a need to address this issue in terms of allowing re-colonization of past ranges where possible or in terms of stopping it where it is not practicable.

II.c.3. Interface area based classification

What are the implications of various types of interface/boundary areas?

1. Hard and clear boundaries
2. Diffuse boundaries

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[3] Some parks in SL are less than this…can/should we define numerically what is considered only a patch? Even musth males in SL in the CCR study have ranges less than 100km2
[4] There was agreement at the workshop to drop these categories because defining habitual raiders and obligatory raiders for example is too difficult.

II.c.4. Intensity based classification

An important component to HEC is measuring and understanding the severity in its various dimensions.

1. Impact on the quality of life
2. People's perceptions
3. Economic impact
4. Physical intensity - Frequencies or area damaged

II.d. Assessing HEC mitigation needs and monitoring of HEC mitigation

Identify and list standard assessment/monitoring methods/protocols that would allow a proper assessment of HEC in all its dimensions. This would allow us to identify the best mitigation approaches that would address HEC is holistic manner.

Assessing HEC mitigation needs: Elephant habitat, population and behavior related factors

How to assess these and identify what role they play in generating/sustaining/escalating HEC: Interface related factors

Evaluating the interface so as to identify its role in generating/sustaining and escalating HEC. Also its implications for HEC mitigation – is it conducive to HEC mitigation or does it create situations detrimental to HEC mitigation.

II.e.Type of HEC situation and its implication for HEC mitigation tool(s) selection

1. Assessing HEC mitigation methods currently used
2. Assessing HEC intensity and its implication to the affected people
3. Conservation implications of HEC and its mitigation
4. Development of an analytical process that allows identification of all causes and factors that need to be considered when deciding on the best HEC mitigation method(s) suitable to a given site.

II.e.1. WHAT TYPES OF HEC CAN AND SHOULD BE COLLECTED UNDER WHAT CIRCUMSTANCES

Type of Data	Circumstance in which it is needed
Location (and forest cover land use at the location)	a. Basic data, needed for an initial assessment of whether HEC occurs. b. Habitat based classification (about extent, fragmentation and isolated populations)
Frequency of HEC incidents	Elephant behavioral ecology based HEC incidents Intensity of HEC
Crop type Type of Damage Area of damage Response questionnaires	Economic level of damage People's tolerance level for the damage
Number of elephants involved Sex/age (raiding by tuskers) ID of elephants Radio Tracking	Need for Identifying the type of raiding (whether opportunistic raiders, habitual, obligatory, dispersing populations)

1. Identify location
2. Assess/collect data
3. Analyze data/situation/type HEC
4. Classification system => match HEC type & mitigation

HEC Assessment

1 Crop/Property
- 1.1 One time
- 1.2 Repeated (seasonal)
  - 1.2.1 Individual
    - 1.2.1.1 Male
      - 1.2.1.1.1 Identification
      - 1.2.1.1.2 No Identification
    - 1.2.1.2 Female
  - 1.2.2 Groups
- 1.3 All the time

2 Killing/Injured
- 2.1 One time
  - 2.1.1 Individual
    - 2.1.1.1 Male
      - 2.1.1.1.1 Identification
      - 2.1.1.1.2 No Identification
    - 2.1.1.2 Female
  - 2.1.2 Groups
- 2.2 Repeated
  - 2.2.1 Individual
    - 2.2.1.1 Male
      - 2.2.1.1.1 Identification
      - 2.2.1.1.2 No Identification
    - 2.2.1.2 Female
  - 2.2.2 Groups
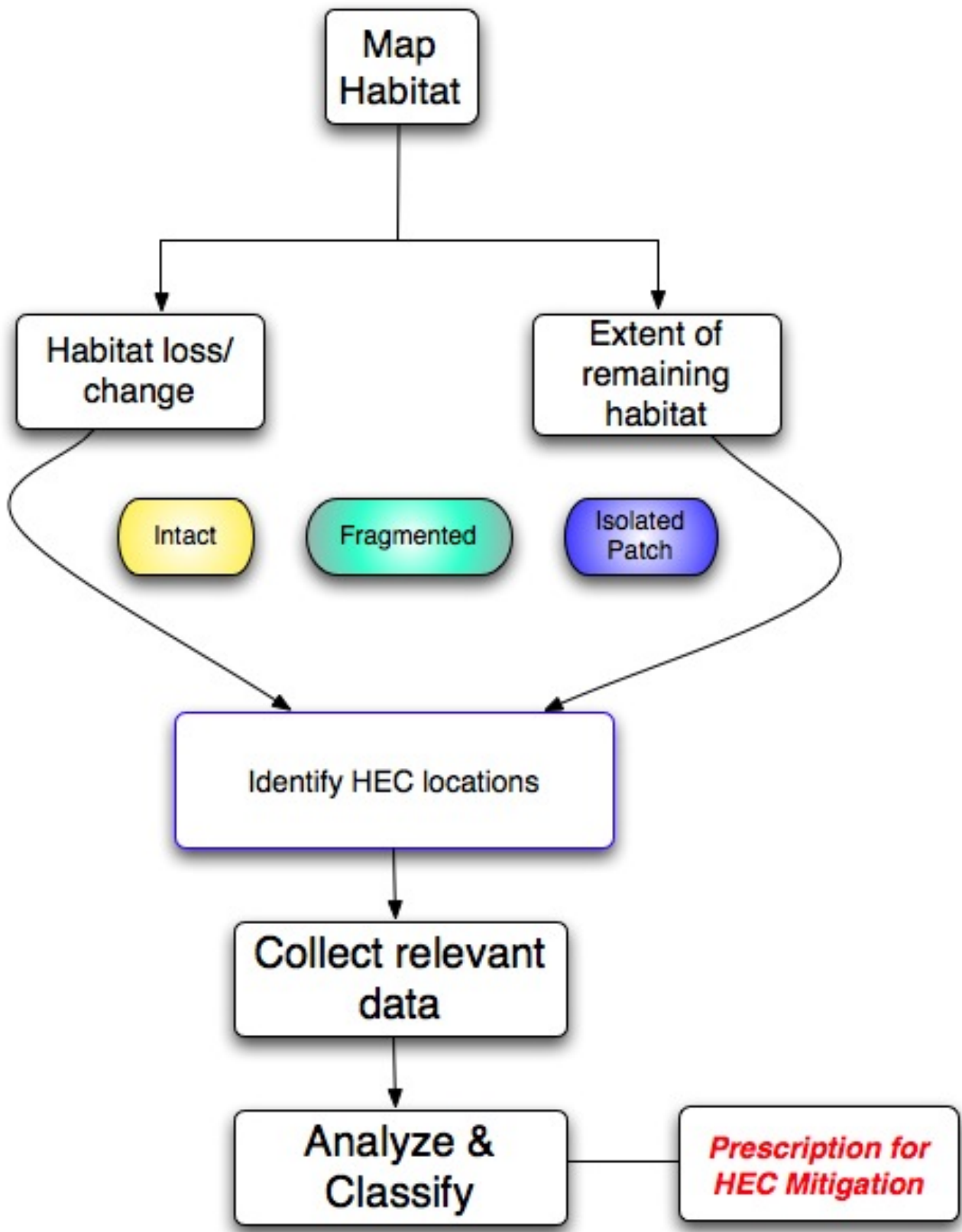
III. GUARDING AND PATROLLING – WITH PEOPLE AND ELEPHANTS

Methods of Containing HEC

III.a. Guarding and patrolling

TYPE	Advantages:	Disadvantages	Efficacy:	COMMENTS	Reference
1. Ground Hut (elderly people) (SL,India):	Cheap and low maintenances cost, mobility (easy to shift)	Vulnerability, difficult when have many entry points, participations, constant vigilance (commitment), require long term commitment.	effective		
2. Watch tower (huts on tree tops) (steel, wooden, tree top and earth fill)	Visibility	stationary, vulnerable to damage, only to inform of ele entry/movement, cannot drive elephant away, constant vigilance	to give early warning/inform	Material: Steel: strong; expensive. Wooden: cheap; not available everywhere Tree top: cheapest; not available everywhere Concrete: strong but expensive Earth: Cheap and material is available.	Lahkar, B.P., Das, J.P., Nath, N.K., Sarma, P.K & Brahma, K. 2009: Conservation of Asian Elephant *Elephas maximus* through Research, Education and Community participation in Manas National Park, India. *Technical Report_Aaranyak_ERCI_01/2009.* pp 1-72. Islam, M.A., Khan, M.M.H., Kabir, M.M., Das, A.K., Chowdhury, M.M. Feeroz, M.M. and Begum, S. 1999. Man-elephant interactions in Bangladesh in 1997. *Bangladesh J, Life Sci,* II (1&2): 31-36. Islam,M.A. and Al-Zabed, A. 1992. Man-elephant interaction at Chunati Wildlife Sanctuary in Bangladesh. Proc. Asian Elephant Conservation Centre, Bangalore, India. pp. 60-67.
3. Beating drums	Cheap, low maintenance, easy to use, convenient to relay information, wide coverage	require large number of people	effective only for some herd/new conflict area, but not solitary male /bull group		
4. Use noise of people (one village to another- message pass)	Simple, no cost, readily available (depending on locality)	Need many people, not consistent	Effective for large herds, not solitary elephant, some aggressive males may charge at humans		Islam, M.A., Khan, M.M.H., Kabir, M.M., Das, A.K., Chowdhury, M.M. Feeroz, M.M. and Begum, S. 1999. Man-elephant interactions in Bangladesh in 1997. *Bangladesh J, Life Sci,* II (1&2): 31-36.

5. Using cell phone (early warning)	quick	Expensive, dependent on electricity (availability)	depend of the network and only to disseminate the information		
6. Use of fire crackers	easy to use, cheap, all weather usage (except regular one)	ele get used to, access to special cracker is limited, impact on elephant has not been studied, potential to make deaf	very effective on short term		• Islam, M.A., Khan, M.M.H., Kabir, M.M., Das, A.K., Chowdhury, M.M. Feeroz, M.M. and Begum, S. 1999. Man-elephant interactions in Bangladesh in 1997. *Bangladesh J, Life Sci,* II (1&2): 31-36. • Islam,M.A. and Al-Zabed, A. 1992. Man-elephant interaction at Chunati Wildlife Sanctuary in Bangladesh. Proc. Asian Elephant Conservation Centre, Bangalore, India. pp. 60-67.
7. Trip wire	Early warning to people, cheap, low tech and cost, easy to install and maintained, easy to shift, no need to be on alert all the time.	accidental breakages, vandalism/stealing, false alarm, (ex, cattle, kids, etc) Corrosion, to convince people, cannot encircle large area.	effective if maintain well		
8. Use of powerful torches/Spot lights	easy to locate the herd/bull, high range of visibility, safe to use/personal safety, portable/easy to handle, easy to maintain, cheap, long lasting	ele get used to, need regular supply of electricity, quality torches are not available everywhere, individually cannot afford.			
9. Volunteers guarding teams	need not to pay, participation based on need, easy to shift (to different location),	not consistent, dependent on the weather condition, lack of interest to be volunteered	Effective- short term		

	flexible in applying different tools				
10. Dogs	cheap warning method, no harm to the ele, easy to use	Confuse with other animal, limited use (SL) not popular, disturbing ele			
11. Direct killing (poison, shooting, live wire 220V, trap gun, traps, jaw explosive (explosive concealed in pumpkin-SL, bed of nails on elephant path-SL)					

III.b. Patrolling

METHOD	1 Foot patrol	2 Elephant Back	3 Vehicle	4 Reference
DETAILS	day/night (villagers, wildlife officers/forest officer, Community Base Organisations)	Elephant back patrolling	tractors/jeeps/trucks/ motorbikes/boats	
APPLICATION	Day/night guarding along village cultivation boundaries on foot	Using trained captive elephants Involving mahouts Combine members of the team and using various tools 4-7 elephants	Day/night group of people travel in vehicle around the border of the cultivations areas. Looking for elephant	Islam, M.A., Khan, M.M.H., Kabir, M.M., Das, A.K., Chowdhury, M.M. Feeroz, M.M. and Begum, S. 1999. Man-elephant interactions in Bangladesh in 1997. *Bangladesh J, Life Sci,* II (1&2): 31-36. Islam,M.A. and Al-Zabed, A. 1992. Man-

				elephant interaction at Chunati Wildlife Sanctuary in Bangladesh. Proc. Asian Elephant Conservation Centre, Bangalore, India. pp. 60-67. IUCN-Bangladesh. 2004. Conservation of Asian Elephants in Bangladesh. IUCN Bangladesh Country Office, Dhaka, Bangladesh.
VARIATIONS OF BASIC TECHNIQUE	Various in number of people involved (5 – 15 persons) Vary in tools used (fire crackers, torches, fire arm, etc) Composition in members (govt officer, communities, NGO/CBOs)	Number of elephant involved, number of people and composition (rangers, communities, CBOs)	Use various vehicle Different number of people Time flexible	
RESOURCES	Man power Tools and equipments Field subsistence	Trained Patrol elephants, Mahouts, ele subsistences,	Vehicles, fuels, staff, field subsistences	
LOCATIONS OF USE	In the edge/entry points of community land/plantation Why: cheap, easy, reliable	Conflict areas, safer (from wild ele and other wild animals, easier, can access various terrains, can carry various tools and equipments needed	In conflict areas with roads, rivers, irrigation canals, reservoirs, faster , safer, any weather	

IMPLICATION for Conservation	Save the elephant	High, good use of captive elephant and mahouts	High	
IMPLICATION for HEC mitigation	Effective for mitigation	Effective	Effective where there are roads and water bodies with access to vehicles	
SUITABILITY (for particular types of HEC)	Human safety and property	Can apply for any type of HEC, but to cover large areas they will need transportations	HEC areas with accessibility	
Causes of failure	Low motivation, no equal participation, no incentives, limited energy of the team	Dealing with dominant wild bull/musth elephant High cost of maintenance	Fuel costs, Lack of vehicle, limited resources for running and repair cost, breakdown the vehicle, damage by elephants, no roads	
Causes of Success	Combine voluntary efforts, flexible in mobility, wide range of method can be applied	Safer to approach wild elephants, and able to negotiate various terrains	Fast, safe, time flexibility	
Potential improvements	Better system in recruiting volunteers, skill in community organizations, create system for incentives	Better training for the ele and mahouts	Better vehicle and numbers of vehicle, installment of necessary tools and equipments	
Potential for use with other mitigation techniques	High	High	High	
Information needs	Locations, existing natural barriers, time of the damage, number of ele, number of people needed, intensity of the damage	Availability of resources	Accessibility of HEC areas	

III.c. Miscellaneous Methods

	1. Use of various Fire based methods	2. Use of various noise based method	3. Use of various methods to cause injury/pain
How the method is applied	torches, *bhoga*-modified fire torch, rubber ball fire, log fire	Individual collective action	Throwing the missiles, Direct hitting the elephant

List and define variation of basic technique	Various materials, intensity	Yelling/shouting, megaphones, drum beatings, crackers, canon (carbide guns)-Indonesian practice, etc Special type of fire crackers,	rubber bullets, spears, arrows, locally made guns, trap guns, sticks, bed nail, jaw explosive, catapult
Resources needed	Fuels, persons, jute, bamboo, wooden pole, etc	Hand mikes, speakers, empty tin/cans, drums, barrels, bamboo	Gun powders, bullets, fire arms, stones, spear
Where and why it is used	SL, Indo,INDI, BD easy to prepare, cheap, locally availability	IND,INDO,BD,SL Local availability, low technology, low cost, Local people can turn it out	rubber bullets (SL,), spears(BD,IND), arrows (IND),locally made guns (IND,SL), trap guns(SL), sticks, bed nail(SL,INDO), jaw explosive(SL),catapult (IND,BD) Islam, M.A., Khan, M.M.H., Kabir, M.M., Das, A.K., Chowdhury, M.M. Feeroz, M.M. and Begum, S. 1999. Man-elephant interactions in Bangladesh in 1997. *Bangladesh J, Life Sci,* II (1&2): 31-36.
Implication for Conservation	Some techniques are lethal	Not harmful	Very harmful for elephants and mostly fatal.
Implication for HEC mitigation	Effective		Effective but deadly.
Is it suitable for any particular type of HEC	Crop and property protection	Crop raiding, property destruction	Crop raiding, entering village, property.
Causes of failure	Elephant get used to the method, high cost of fuel, not available in market	Elephants get used to it, Only effective for short distance,	Illegal
Causes of Success	Most Ele afraid of fire	Most elephants are afraid of noise	Instant removal of elephants from the locality.
Potential improvements	Dissuade people from using lethal method Additional and regular supply of kerosene	Better design of hand held cannon, Direct the sound/noise	Dissuade people from using lethal methods.
Potential for use with other mitigation techniques	High	high	

Information needs			

4. Use of Kunki (trained captive elephants)

5. Use of various repellants methods (flash light, chili smoke, log fires, chili based repellents)

6. Short Distance Drives away from agricultural areas. These would be short distance drives and not translocations

IV. BARRIERS AND DETTERENTS

IV.a. Containing HEC

1. Containing elephant movements (site specific)
2. Protecting Human habitation/property
3. Protecting crops/plantations
4. Containing isolated/pocketed population
5. Guiding the elephants/facilitating movement in corridor

6. Applying various artificial barriers (Thorny Bushes/Live fencing, power fencing, trenches, ditches,

IV.b. Barriers

Hard or permanent Barriers

Soft or temporary Barriers

1. Physical
2. Psychological
3. Combination

IV.c. Buffer areas

Buffer areas- creating a belt of cover with plant species not depredated by elephants.

Advantages	Disadvantages
Less HEC problem (situation like Periyar Complex, India, Pine Plantation, Thailand) Economic gain to the local people Enhances tolerance of local people	Create a cover shelter belt for elephants for depredation and HEC (tea gardens, Assam). Often not acceptable by people due to initial income generation losses. Forest fire

Buffer area- without any cover (suggestion and ideas?)

Livestock corralling

IV.d. Deterrents

Devices that are applied independent of guarding.

	1. Chemical- tiger urine, Irritant (chilli)	2. Lights/fire	3. Noise making devices
		Light- Flood lights, strobes, spot lights and fluorescent light, solar panels Fire- fire crackers, carbide bamboo cracker (Cambodia) mashals (fire torch), gun	By human being, speakers, noise making device hanging on wire fences and projectors

		shoot.	
How the method is applied – clearly defining the technique	Chilli hedge, chilli rope, chilli smoke (smoking ball)	Based on local availability and climatic factor	Depending on the availability of the materials and devices Use of megaphones
List and define the variations of the basic technique	Local availability		
Resources/tools needed to implement this method	Raw materials (chilli, tobacco, oil and grease), Training,	Batteries, solar panels, light equipments, oils and fire crackers, cartridges.	Drums, amplifiers, crackers and projectors.
Where and why it is used	India (Assam, South India), Sri Lanka, Cambodia, Thailand	All range countries.	All range countries.
Implications for Conservation	Limited success, habituation, availability of pungent variety	Short term measures Temporarily effective/habituated.	Widely used and common method
Implications for HEC		Injurious to elephants	Temporary and often habituated
Is it suitable to any particular type of HEC situation	Low intensity	Low and limited	Low
What are the causes for its failure	Weather (wind and rain)	Habituation, weather condition	Habituation and weather factor
What are the causes for its success	Dependant on irritancy and pungency of chilli	Community involvement and participation	Mobilization of community involvement and participation
Potential improvements	Awareness to bring right kind of chilli to grow and use.	Integrated and used in different intervals	Coordinated actions, alternating the methods in different intervals
Potential for use with other mitigation methods	It can be combined with guarding system but no substantiated outcome.	It can be combined with other methods.	Can be combined.
Information needs	Finding a right variety of chilli and handling technique.	Models for community participation	Good models of community participation and involvement.
Information documented			

Deterrents Continued…

	4. Odors (chemical and natural bio-products)	**5. Live or biological fences**	**6. Wooden/wire fences**
		Citrus, agave, euphorbia, throny bushes (zigyphus), chilli, bamboo	Barbed/Razror wire fences, chain-link fences, wire-CD fences, trip wire
How the method is applied – clearly defining the technique	Tiger urine soaks in gunny bags and hangs on wire fence	Planting hedge and barrier homestead	Exclusion of elephants from small crop field and human habitation. Trip wire-Early warning

			system for larger field
List and define the variations of the basic technique	Depending on the availability of the materials	In Cambodia, bamboo fences have been used to deter elephants to enter in crop field selectively to the regularly used movement path.	Trip wire-Flash light and automobile horn together with driving team Bee hives on fences (not tried in Asia)
Resources/tools needed to implement this method	Depending on the availability of the materials	Sapling, labour, water	Fence materials, horns, batteries, light, used CDs Capacity and training
Where and why it is used	India (West Bengal)	All range countries.	Trip wire- Thailand (western), India (Assam), Sri Lanka, Wire fence Cambodia (south)
Implications for Conservation	Limited implication in conservation & HEC	Invasive factor due to selection of exotic species. Limited to small areas	Limited level
Implications for HEC			
Is it suitable to any particular type of HEC situation	Low	Suitable for homestead and villages	Low to medium
What are the causes for its failure	Weather condition, lack of interest and availability of chilli	High maintenance, maturity and replacement of crop	Cost prohibitive and maintenance required
What are the causes for its success	Dependant on irritancy	Economic benefit from planted species	Early warning for taking integrated effort
Potential improvements	Mobilizing community involvement and participation	Even age plantation, rows different species , operate plant nurseries	Community mobilization for sharing labour cost and taking integrated preventive measures.
Potential for use with other mitigation methods	Mobilizing community involvement and participation	Information needs	Can be combined.
Information needs	Concentrating and extracting chilli capcisine (scolville unit) and other binding materials.	Better suvlicultural techniques	Monitoring and establishing efficacy of different fence.
Information documented			

Deterrents Continued…

	7. Chili/chemical fences	8. Electric fences (power fence)	9. Trenches
	Vinegar, chilli & tobacco	Single/multiple strands	Moats, trenches
How the method is applied – clearly defining the technique	Vinegar-Filled bottle hanged on trip wire fence (Thailand) Chilli & tobacco- on ropes	With standard safety measures/local improvised method	The method is applied through specified trenches width and depth un-

	with some locally binding substances		negotiable by elephants.
List and define the variations of the basic technique	Method used for applying the chemicals	Standard safety measure equipment are cost prohibitive, low cost method are being used in India (Janta Fencing, Using forest tree to reduce cost of poles) and Sri Lanka (used some parts of discarded television)	Forest interface and to surround the isolated/pocketed population.
Resources/tools needed to implement this method	Vinegar, chilli, tobacco and fence materials	Components of power fence (energizers, fence materials, post, solar panels)	Labour intensive, cost
Where and why it is used	Thailand, India, Sri Lanka and Laos Along the forest interphase/crop fields	Small to large crop field, human habitation and forest inter-phase (Thailand, Sri Lanka, India, Cambodia, Bhutan, Nepal, Indonesia)	Sri Lanka, Thailand (western part), India (eastern India) To restrict movement of elephant into human habitations/crop fields
Implications for Conservation	Limited level targeting small areas	Localizing and killing of elephants reported from Sri Lanka	Permanent barrier for genetic exchange (in case pocketed population)
Implications for HEC			behavioral changes, nutritional changes and also habitat changes
Is it suitable to any particular type of HEC situation	Low	Crop protection, human habitation protection, forest interface barrier to check dispersal, guiding and movement facilitation in corridor areas.	Suitable in certain soil type (lateratic)
What are the causes for its failure	Weather	Maintenance, social factors, frequent breaching and cost for standard equipments	Filled up by elephants in soft soil condition, maintenance failure, cost prohibited Soil erosion, often mortality of elephants (specially calf, Assam)
What are the causes for its success	Community involvement and participation	People involvement and participation	Where ever lateratic soils are there maintenance cost is low. Labour cost can be met out from community support.
Potential improvements	Can be combined.	Reinforcement of power fences through pole capping and wire projection for giving proper shocks. Elephant intrusion early warning system (SLWCS)	Design and maintenance-excavated soil to be put up on the outer side of the trenches and properly planted to check soil erosion (India). Elephant intrusion early warning system (SLWCS)
Potential for use with other mitigation methods	Efficient technologies for tripping system and monitoring.	Can be reinforce with trenches	Can be combined with power fence to reinforce the efficacy of the trenches.

Information needs		Monitoring fence breaking causes and reinforcement. Efficient remote monitoring system (SLWCS)	More information required for the alteration of behaviour of elephants. Efficient remote monitoring system (SLWCS)
Information documented			

Deterrents Continued…

	10. Odors (chemical and natural bio-products)	**11. Live or biological fences**	**12. Wooden/wire fences**
		Citrus, lemon grass, agave, euphorbia, throny bushes (zigyphus), chilli, bamboo	Barbed/Razror wire fences, chain-link fences, wire-CD fences, trip wire
How the method is applied – clearly defining the technique	Tiger urine soaks in gunny bags and hangs on wire fence	Planting hedge and barrier homestead	Exclusion of elephants from small crop field and human habitation. Trip wire-Early warning system for larger field
List and define the variations of the basic technique	Depending on the availability of the materials	In Cambodia, bamboo fences have been used to deter elephants to enter in crop field selectively to the regularly used movement path.	Trip wire-Flash light and automobile horn together with driving team Bee hives on fences (not tried in Asia)
Resources/tools needed to implement this method	Depending on the availability of the materials	Sapling, labour, water	Fence materials, horns, batteries, light, used CDs Capacity and training
Where and why it is used	India (West Bengal)	All range countries.	Trip wire- Thailand (western), India (Assam), Sri Lanka, Wire fence Cambodia (south)
Implications for Conservation	Limited implication in conservation & HEC	Invasive factor due to selection of exotic species. Limited to small areas	Limited level
Implications for HEC			
Is it suitable to any particular type of HEC situation	Low	Suitable for homestead and villages	Low to medium
What are the causes for its failure	Weather condition, lack of interest and availability of chilli	High maintenance, maturity and replacement of crop	Cost prohibitive and maintenance required
What are the causes for its success	Dependant on irritancy	Economic benefit from planted species	Early warning for taking integrated effort
Potential improvements	Mobilizing community involvement and participation	Even age plantation, rows different species	Community mobilization for sharing labour cost and taking integrated preventive

			measures.
Potential for use with other mitigation methods	Mobilizing community involvement and participation	Information needs	Can be combined.
Information needs	Concentrating and extracting chilli capcisine (scolville unit) and other binding materials.	Better suvlicultural techniques	Monitoring and establishing efficacy of different fence.
Information documented			

Deterrents Continued…

	13. Metal/rail barriers/ Walls/Concrete slabs with barbed wire	**14. Sharpened wooden stakes/spiked wooden planks or Cattle guard type barriers**	
		In India, walls with spikes have been used to deter elephants in the infrastructure development sites such as airports, dam sites and also to protect house properties.	
How the method is applied – clearly defining the technique	Raising specified thickness of wall and setting metal or rail barriers 5 to 6 feets above ground. Concrete slabs with barbed wires in an interval of 2 to 3 feets (Khao Yai NP, Thailand)		
List and define the variations of the basic technique	Not applied in many countries for cost therefore lack any clear idea about variation.		
Resources/tools needed to implement this method	Discarder scraps of used railway lines and other metal barriers in low cost.		
Where and why it is used	India (Airforce, Tezpur, Assam, India), Thailand (Khao Yai NP) To permanently barrier elephants or blocking their movement		
Implications for Conservation	Isolation for genetic exchange.		
Implications for HEC	behavioural changes, nutritional changes and also habitat changes.		
Is it suitable to any particular type of HEC situation	In high conflict areas and in corridor areas guiding elephant movements. To		

	create absolutely elephant free zones.		
What are the causes for its failure	Adoption this technique is cost prohibitive.		
What are the causes for its success	Low maintenance, high effectiveness		
Potential improvements	Selecting proper thickness of metal barrier can reduce the cost.		
Potential for use with other mitigation methods	Not required.		
Information needs	More information required for the alteration of behaviour of elephants.		
Information documented			
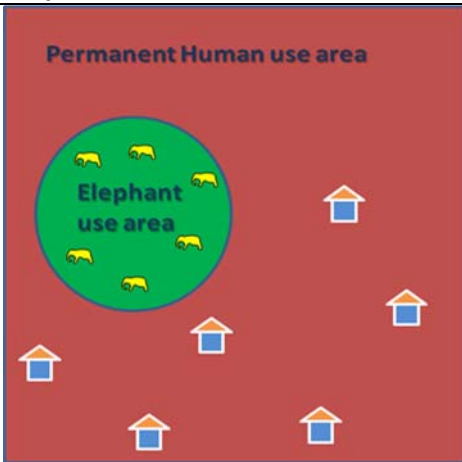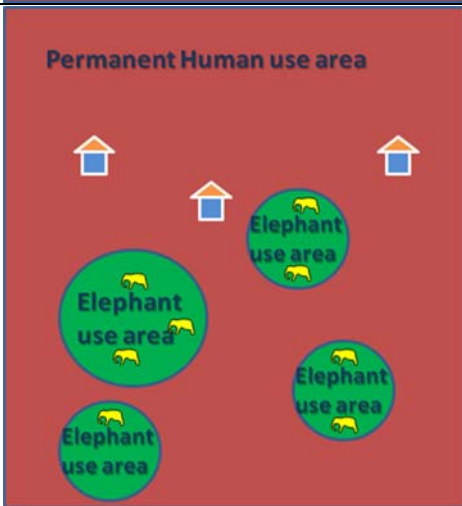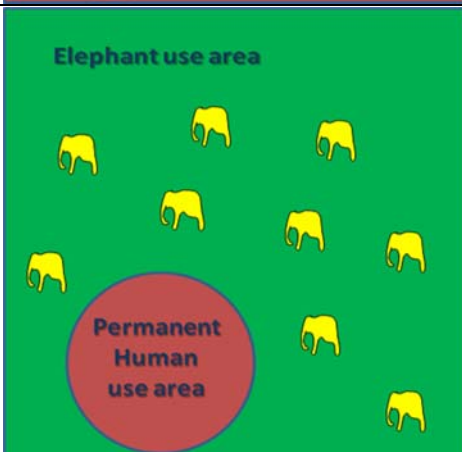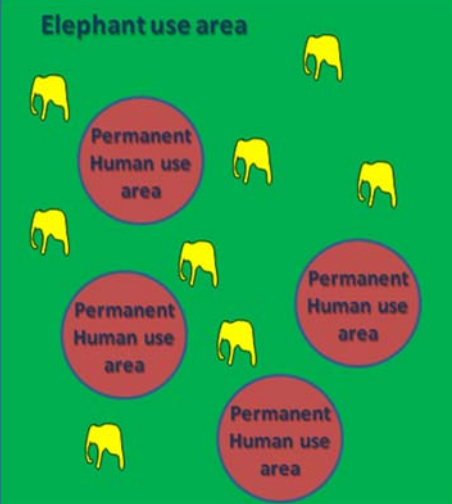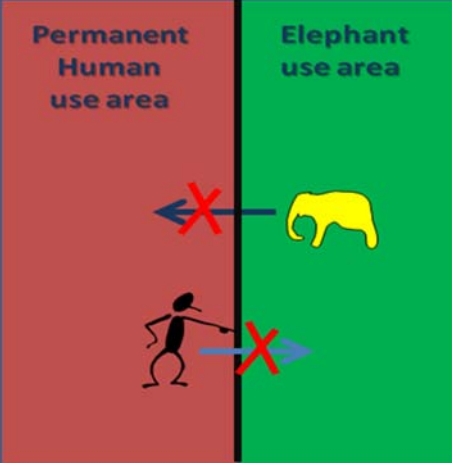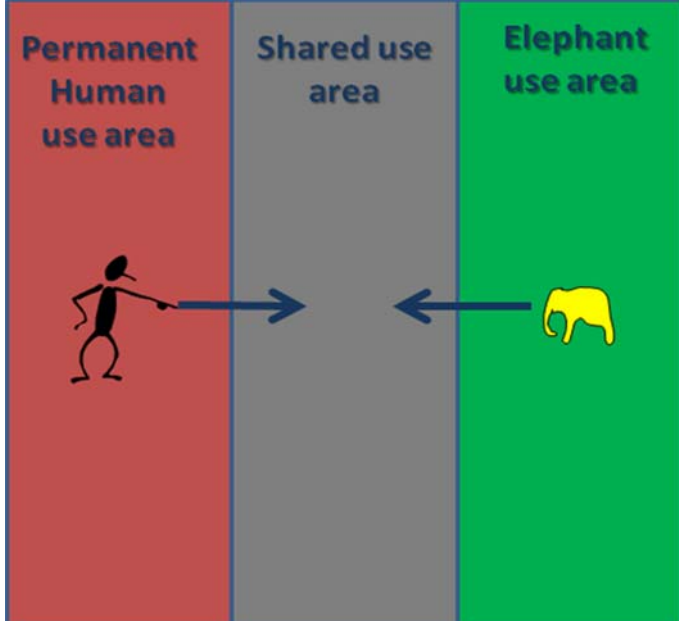
V. Changing the human use area – elephant habitat interface/ removal of the interface
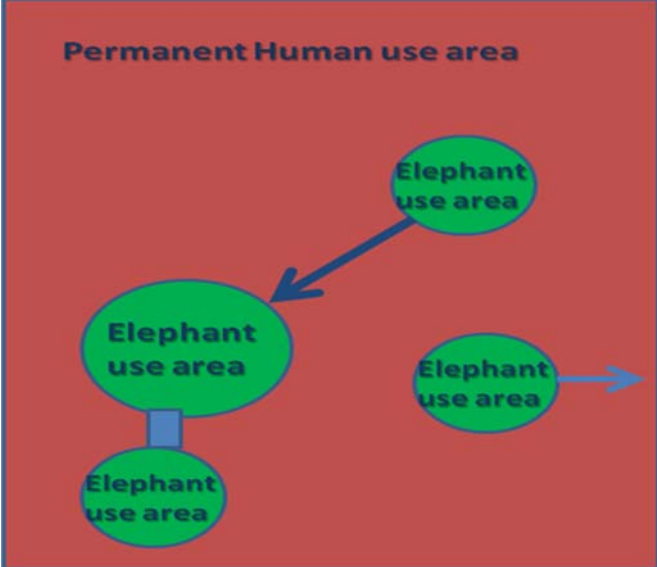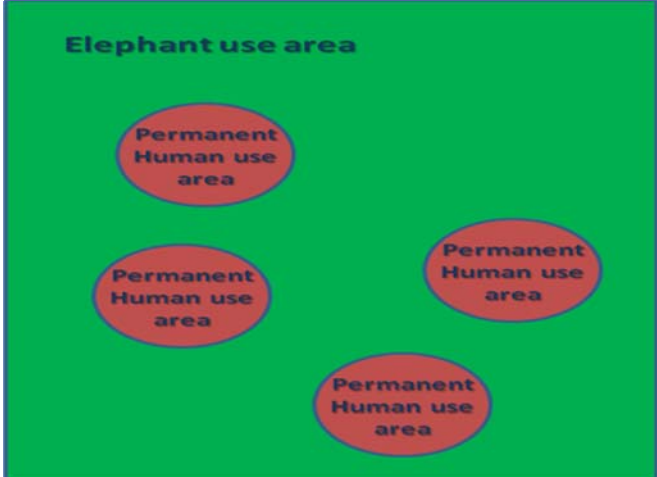
V.1. Assessment- It is important to consider both elephant habitat and human use areas at the landscape scale. Equally important is to consider the type of interface exists or is possible in the area experiencing HEC. This includes assessing the following

1. What kind of land use pattern occurs in the area?
2. What type of interface exists or is possible?
3. Whether removal of the interface is possible?
4. Socio-economic factors
5. Local attitudes and perspectives

V.2.

Scenario	Graphic		Example
1a. Elephants in Permanent Human Use Areas			Sri Lanka North west region and southern region Sri Lanka
1b. Elephants in Permanent Human Use Areas			Sri Lanka North west region and southern region Sri Lanka, South west Bengal, Asssam, Kinabatangan, Sabah
2a.Permanent Human Use in Elephants Areas			Thailand

2b. Permanent Human Use in Elephants Areas	**Elephant use area** Permanent Human use area Permanent Human use area Permanent Human use area Permanent Human use area	Assam, South west Cambodia, Sri Lanka - Randenigala, Kurunegala, Puttalam, Anuradhapura; India - Corbett tiger reserve; Lao PDR – Nakai Nan Thun,
3. Elephant- Permanent Human use interface	**Permanent Human use area** **Elephant use area**	
4. Elephant - Human shared use interface	**Permanent Human use area** **Shared use area** **Elephant use area**	
5. Elephants Surrounded by Permanent Human Use Areas	**Permanent Human use area** **Elephant use area**	Population Viability Assessment: e.g. Numbers, genetic diversity, habitat quality etc., proxy: Available habitat Viable Hard boundary Barrier Unpalatable food plants (Sri Lanka, India – Nanditha) Livestock (Thailand -

		Simon) Alternatives for forest dependencies (KD – Thal india) Shared use boundary Tourism (Lao – Alex, Sabah – Isabelle) Temporary farming with temporary barriers (Sri Lanka, Thailand) Non viable: Move elephants (population viability assessment recommended before transloction)
6. Elephants Scattered in a Permanent Human Use Area		Population Viability Assessment: e.g. Numbers, genetic diversity, habitat quality etc., If viable Barriers (see previous slide) Corridors to link patches where elephant movement occurs and move people from corridor area If non viable: Translocate to viable patches Removal of elephants from the area
7. Scattered Human Use in Elephant Area		Cluster human use areas together Drive elephants out of human use area and establish a hard or shared use area

V.3.

Main types of interface

1. Elephant-permanent human use interface
2. Elephant –human shared use interface
3. Elephant-human in dynamic or diffused interface (humans and elephants move about randomly without no set pattern)

V.4.

Two main types of interface removal

1. Removal of people
2. Removal of elephants

V.5.

Two main types of interface

	1. Elephant-permanent human use interface	**2. Elephant –human shared use interface**
How the method is applied	It is important to define or identify the most effective hard boundary between human and elephant habitats. The current boundaries in an area, for example a Protected Area or agricultural areas, may not be the most effective or efficient. New boundaries may need to be considered to create the most effective or efficient interface.	Modify land use practices/patterns in buffer areas between elephant habitat and human use areas
List and define the variations of the basic technique	-Use the current defined boundary, -If no boundary exists and one is needed then define it - Perhaps consider moving or amending the current boundary -Fencing elephants inside suitable habitat, -Fencing elephants out of human use areas	Change crop types, e.g. chili, pepper, tobacco, citrus, tea, coffee, etc…. Move crop storage areas away from the buffer closer to main village q settlement areas Change from crop production to livestock raising, e.g. cattle, pigs, chicken, etc….. Change to or supplement with tourism in the buffer/shared use areas, perhaps seasonal, perhaps in conjunction with other mitigation methods Change to a congruous agricultural area with cooperative guarding rather that dispersed agricultural areas with individual guarding Purchase private forested areas close to interface to make the buffer area Land swap with farmers. For those farmers with agricultural areas in the proposed buffer provide alternative areas for them to grow crops.
clearly defining the technique	-Encircling habitat versus creating a hard barrier along part of an interface that is commonly used by both humans and elephant	-Identify and define the size/ shapes of the interface (mapping) Assess causes/extent of the HEC Assess land status/ownership Assess land use patterns and incorporate into the strategy -Modify land use in the interface area Develop MOU's/ Agreements with land owners to regulate land use and benefits as a consequence.

		-Developing mechanisms for financial sustainability
Resources/tools needed to implement this method	-Use maps to identify the most effective interface -If mapping information does not exist then create that information using survey methods, GPS, ground truthing, sketch maps, (all at the landscape scale or whichever scale is appropriate)	-Dependent on type of elephant/human interface
Where and why it is used	Eg. Nagerhole NP in Karnataka, India (article unknown) other articles needed -To minimize conflict -To conserve and protect elephants	-Usable in most HEC range countries -This mitigation technique mostly addresses the cause of HEC and is preferably used as a prevention method, although, it can be used as a HEC reduction method in combination with other mitigation techniques.
Implications for Conservation	Boundaries will be known by local people, Reducing biotic pressures (keeping cattle out of forest, etc) Easier/cheaper to monitor/enforce a defined boundary	Positive - reduces or minimises HEC -depending on the activity in the shared use/buffer area there is possibility to increase income in affected human settlement areas or compensate for crop losses Negative -modifying land use practices may give incentive for new people to move into the area thereby increasing pressures on land and resources and possibly increasing HEC -by modifying interface areas may increase pressure on both human and elephant populations
Implications for HEC mitigation (does it resolve HEC)	Other problem species crop raiding control (e.g. deer, pigs, buffalo) Easier/cheaper to monitor/enforce a defined boundary Needs to be used in combination with other HEC mitigation techniques It is an important part of the process of conservation and HEC mitigation but the process of defining where the boundary is does not resolve HEC.	Not on its own Changes perception of local people Content to be added
Is it suitable to any particular type of HEC situation?	Yes But there are very important factors to consider, for example -the size/length and shape of the habitat interface, the quality of habitat, suitability of the habitat to have a hard barrier considering land use patterns.	In principle everywhere but again it depends on the local context Content to be added

What are the causes for its failure?	Local people not consulted in the creation of the interface/hard barrier area
	          -Construction of the barrier is too expensive
	          -The barrier is not maintained or is
		Climate not suitable for alternate crops
		Not always a market available for the specific land use change
		Lack of political will
		Lack of capacity

	too expensive to maintain -Equipment is stolen -Conflict of interest between local community interests and conservation of elephants -Lack of resources and capacity in responsible govt agencies to effectively design and implement a hard boundary	Lack of funding Lack of technical support <mark>Content to be added</mark>
What are the causes for its success?	-Local people cooperate and reap benefit from reduced HEC -Funding for set up, maintenance, and monitoring is long term and sustainable -Local govt and responsible agencies committed to designing, implementing and monitoring the strategy	Improved income Cooperation among stakeholders
Potential improvements	-Incorporate these principals into land use planning at all government levels; national, provincial, district, village -For temporary settlements implementation of the barrier may be seasonal -Incorporate local needs into the planning and design of any hard boundary, e.g. put gates in long barriers to allow access (if access is desirable)	Content to be added by group
Potential for use with other mitigation methods	-Yes -Potential to use in combination with long term land use planning, -Potential to use in combination with translocation in terms of limiting an elephant population/problem animals to increasingly smaller areas making it easier to capture them	Content to be added by group
Information needs	-References to case studies in the literature -Further discussion by workshop members online	Content to be added by group

Two main types of interface removal

	1. Removal of people	**2. Removal of elephants**
How the method is applied		
List and define the variations of the basic technique		
clearly defining the technique		
Resources/tools needed to implement		

this method		
Where and why it is used		
Implications for Conservation		
Implications for HEC mitigation (does it resolve HEC)		
Is it suitable to any particular type of HEC situation?		
What are the causes for its failure?		
What are the causes for its success?		
Potential improvements		
Potential for use with other mitigation methods		
Information needs		

VI. CAPACITY AND RESOURCES

VI.1. Capacity –broad definition

- Technical: To evaluate the extent of HEC
- To select how to mitigate HEC – choose various methods
- To mobilize communities
- To bring together all the stakeholders
- To develop effective tools
- To implement the tools for HEC mitigation
- To gather technical and financial to implement selected strategy

VI.2. Introduction:

Technical: Quick evaluation techniques to be adapted for understanding the HEC. The capacity is very poor to evaluate. Need a format for evaluation. Chronological documentation and spatial database (GIS maps) needed.

VI.3. Management/people related issues

3.1 Lack of capacity

- In assessing HEC
- In addressing HEC
- In mitigating or in availability of/selecting tools to mitigate

3.1.a. Capacity building

- At various government levels, within various departments, villages and conservation organizations
- Village administration: A critical factor – conflict and mitigation steps succeed only with their involvement.
- Local political parties/peoples representatives
- Implementing authorities – lack of training in dealing with incidents, communication, mitigation, resource utilization, knowledge, ele behaviours, lack of coordination/collaboration etc.

3.1.b. Awareness

- Lack of awareness among individuals, local governments, development planners, international multi & bi lateral Aid agencies, NGOs and other implementing agencies about impacts of HEC.

3.1.c. Public and government

- Decreasing tolerance levels among humans. Changes in value system – with economic change influencing social and cultural values.

3.2. Lack of cooperation

This is a major constraint in HEC mitigation and that needs to be addressed in a very serious manner through awareness and capacity building.

3.2.a. Within communities

- Lack of coordination and cooperation among communities – need cohesion. Problem with a minority of the community, not necessarily the entire village, for example. Diversity of ethnicity, religion, socio-economics can lead to differences in opinions and challenging in conflict resolution and mitigation actions. Degree of influence of HEC on communities leads to disparity in action.
- Local political parties influence actions and results in non-cooperation.
- State of leadership in the community can influence collective action.
- Conflict of interest between members within communities.

3.2.b. Between communities and government

Differences in perception and consequences of conflicts between the two stakeholders leads to conflicts.

- Relations between the two is influenced by leadership qualities in the community.
- Mutual benefits/trade off between HEC and NTFP collections, influencing relations between communities and implementing agency.

3.2.c. Between NGOs and government

Sometimes operate in isolation. Need to establish trust and cooperation. Commom goals between NGOs working in different sectors (wildlife and human rights) and government – involving both nature conservation and human benefits.

3.3. Lack of resources

- Who actually needs to address HEC, to whom, and who needs to pay for it? Legal and social issues.
- Government should be the key player (with effective participatory approach).
  - Kinds of resources.
  - Social and Corporate responsibility, local level foundation/trust.
  - Individuals should take responsibility for their own safety.
  - HEC mitigation stepping stone to Joint Wildlife Management – participative management between communities and government.
  - Local management systems specific to areas need to be recognized.
  - Need to develop a mechanism to pay for HEC mitigation action.
  - Collective action
- Microfinance:
  - Sustainable. Bangladesh model.
  - Communication – cell phones; loans for electric fence, underground storage, etc.; cooperatives – contributions by individuals in cash or kind;
- Education:
  - Strategy: Quick evaluation techniques.
  - Development of simple and robust data collection protocol for current events. Ecosystems India and Nature Conservation Foundation, India and..will coordinate and develop this for all Asian Elephant areas in collaboration with NGOs in the countries.
  - Compilation and processing of data available with the forest department/village panchayat/government representative.
  - Data collection and analysis through HEC committees formed at village level.
  - Policy to assess HEC and regular record keeping.
  - Identify HEC hotspots.
  - Daily reporting of HEC through wireless/mobile following Corbett National Park Model.
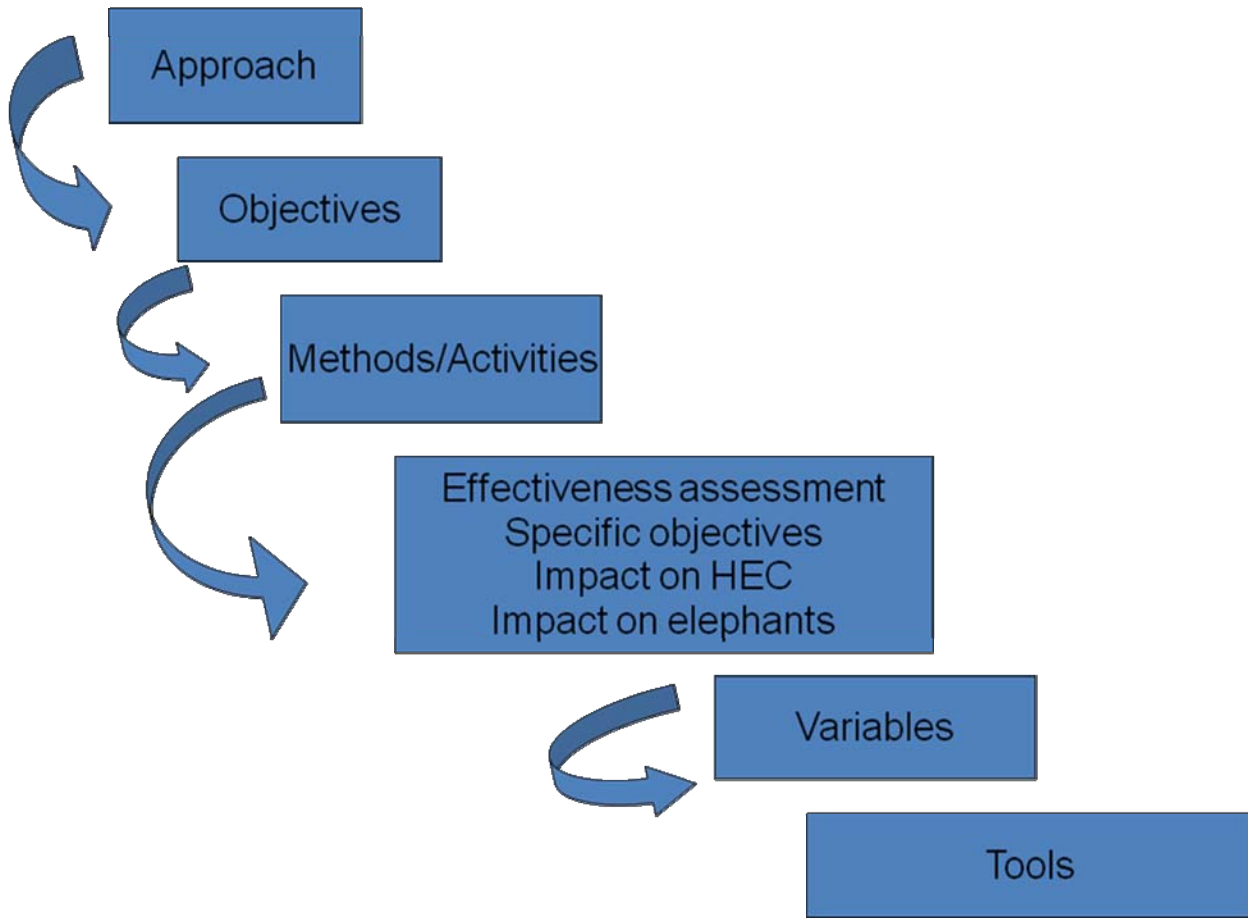
- Chronological documentation and spatial database (GIS maps) needed.
  - Forest department should be encouraged to do this on a regular basis based on the above assessment of HEC.
  - Simple village level maps with HEC information should be developed by the forest department.
  - Non-availability of/selecting tools to mitigate
- Develop national HEC network with toll free helpline services.
- Psychological 'training'
  - Attitudinal change through 'art of living' training in building/enhancing tolerance levels towards elephants and reduce HEC.
  - Confidence building strategies between communities, the government and other stakeholders.
- Alternative source of income
  - Develop alternate income generating strategies during HEC periods or as livelihood alternatives by local NGOs and forest department.
  - In case of human death in a family, provide employment.
- Identify HEC hotspots through regular assessments and develop specialized strategies to deal with the issue.
  - Collaboration between government agencies, NGOs and communities to identify hotspots and develop mitigation strategies.
- Microfinance:
  - NGOs help form and facilitate formation of groups.
  - Provide capacity building
  - Follow up training/capacity building/proposals/accounts
  - Extend loans to purchase mitigation equipments
  - NGOs provide mechanism to establish credit worthiness of affected communities.

- Education
  - Continuous outreach to convey moral support and caring
  - Development of education/training unit in government agencies to build capacity among communities and within the agency.
  - Training teachers and other educators to bring about attitudinal and behavioural changes towards elephants in youngsters and locals using active learning techniques. Zoo Outreach Organisation along with other NGOs in Asian Elephant range countries will develop the model, conduct training and disseminate teaching methodology.
  - Wildlife conflict and management should be included as integral part curriculum of school and college education.
  - Train people in escape methods in emergency HEC situation through compilations in manual
  - Education in appreciation of nature and wildlife with a view towards creating or improving attitudes towards elephants in HEC areas.

- Capacity Building
  - In assessing HEC
    - AsESG must develop simple protocol for assessing HEC in Asian Elephant range countries.
      - Compile a manual on the science and techniques of HEC assessment (by AsESG).
    - Assessing HEC hotspots protocol must be developed by AsESG.
      - Global, regional and local level hotspots manual must be developed by AsESG along with local NGOs and forest department.
    - Train the forest department staff in daily reporting systems of HEC.
  - In addressing HEC
    - Forest department sharing best practices in mitigating HEC with communities.

- Taking communities to areas with best practices.[5]
- Development of best practices manual with regular reviews by the AsESG at the global level.
- Development of best practices manual with regular reviews by the forest departments at the local level.
  - NGOs to develop community leadership through training in mitigating HEC.
    - Develop education materials
    - Conduct community leadership training
    - Develop application forms for compensation and training in filling forms.
    - Train forest department in mitigation methods
    - Inform forest department in elephant movements and HEC occurrences.
    - Train in mitigation techniques to local communities.

- In availability of/selecting tools to mitigate
  - Provide technical training to communities in appropriate mitigation methods. E.g. maintaining electric fences
  - Train women in mitigation strategies and maintenance
  - Train children in appropriate preventive practices
  - Train people in escape methods in emergency HEC situation

- Identify HEC hotspots
  - Conservation Himalayas in collaboration with other willing organizations and AsESG will develop a protocol to determine HEC hotspots in all Asian Elephant range countries.
- Alternative sources of income
  - NGOs and forest department must be trained in community outreach regarding alternate livelihoods or income generation appropriate for the area.
  - NGOs provide training in alternate livelihoods as well as provide mechanism to market.

- Microfinance:
  - NGOs build capacity to existing SHGs or build capacity to start new ones.
  - NGOs must interact with banks and commercial organizations to support SHGs and cooperatives
  - Build linkages between credit institutions and SHGs.
  - Linking SHGs with government departments such as agriculture, horticulture, veterinary, etc.
  - Linking SHGs with research organizations where there is mutual benefit and cooperation in carrying out research activities.

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[5] "HEC mitigation is always conducted using an evidence-based/adaptive management approach (i.e. one based on monitoring of the effects of the method(s) on HEC rates and elephants)." It doesn't mean that trenches are better than fences or similar. So study trips to areas with best practices would mean taking people to see HEC mitigation in an area where it is effective and there is clear evidence of that efficacy because appropriate monitoring is being conducted.

VII - **Monitor and measuring human elephant conflict mitigation success/failure**

```
Approach
   ↓
Objectives
   ↓
Methods/Activities
   ↓
Effectiveness assessment
Specific objectives
Impact on HEC
Impact on elephants
   ↓
Variables
   ↓
Tools
```

Effectiveness assessment	Variables (Before and after implementation)	Tools to measure
Specific objective	Habitat quality of sites before and after implementation	Habitat analysis
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions	Social survey techniques, Direct field measurements
Impact on elephants	Frequency of use of restored area, elephant numbers, behavior, demography, morbidity and mortality	Resource selection techniques, Population census, Animal tracking techniques
Specific objective	The nature and extent of habitat connectivity in elephant landscapes	Spatial analysis
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions	Social survey techniques, Direct field measurements
Impact on elephants	Habitat utilization, ranging pattern, elephant numbers, demography, mortality	Quantifying elephant use of habitats, Elephant numbers, Animal tracking techniques
Specific objective	Extent and configuration of elephant habitat	Spatial analysis
Impact on HEC	Human deaths, crop loss, human attitudes and perceptions	Social survey techniques, Direct field measurements
Impact on elephants	Habitat utilization, ranging pattern, elephant numbers, demography, mortality	Quantifying elephant use of habitats, Elephant numbers, Animal tracking techniques
Specific objective	Elephant presence inside and outside the barrier, frequency and extent of breaching barrier	Direct/indirect surveys
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions	Social survey techniques, Direct field measurements
Impact on elephants	Elephant health, numbers, demography, mortality, ranging pattern,	Elephant body condition, population census/estimates, animal tracking techniques

Specific objective	Elephant intrusions	Social survey techniques, direct field observations
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions	Social survey techniques, direct field measurements
Impact on elephants	Movement pattern, elephant numbers, demography, mortality	Behavioural observations,population census/estimates, animal tracking techniques

Specific objective	Elephant response	Animal tracking, behavioural observations
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions at both captured and released sites	Social survey techniques, direct field measurements
Impact on elephants	Health and mortality	Animal tracking, behavioural observations, body condition
Specific objective	Number of problem elephants at the captured site	Social survey techniques, direct field observations
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions at both captured and released sites	Social survey techniques, direct field observations
Impact on elephants	Health, mortality	
Specific objective	Number of problem elephants at the captured site	Social survey techniques, direct field observations
Impact on HEC	Number of instances of human deaths, crop loss, human attitudes and perceptions at both captured and released sites	Social survey techniques, direct field observations

Specific objective	Proportion of affected households receiving benefits	Social surveys
Impact on HEC	Human attitudes and perceptions	Social surveys

Impact on elephants	Injuries to elephant and their mortality	Social surveys and direct field observations
Specific objective	Human attitudes and perceptions	Social surveys
Impact on HEC	Human attitudes and perceptions	Social surveys
Impact on elephants	Injuries to elephant and their mortality	Social surveys and direct field observations

VIII. COMPENSATION FOR LOSS[6] FROM HUMAN ELEPHANT CONFLICT.

BACKGROUND

- **Regardless of deciding whether to use compensation or not, the long term goal of mitigating HEC is to secure elephants and their habitat.**
- **Points to consider when determining if a compensation technique may be suitable for an HEC situation**

No type of compensation should be considered in the case of illegal activities either inside or outside a Protected Area (PA).

1. Direct Payments – situations under which these techniques might be considered:
    - Loss of life; especially of the household's major income earner. .
    - Loss of home
2. Indirect Payments- situations under which these techniques might be considered:
2.1 Alternative income
    - Sites experiencing repeated crop loss and continuing current agricultural activities is not recommended
    - Sites where development of an activity could escalate HEC.
2.2 Improving existing income
    - Sites where it is feasible to adapt existing income-generating activities in some way that will reduce HEC
2.3 Improving livelihoods
    - Sites where it is feasible to link improving livelihoods to change in human behaviour that will in some reduce HEC

1.DIRECT PAYMENTS

Definition: Direct payments are money given or received as payment or reparation for injury or loss of human life, property, or crops.

1.1 CASH PAYMENTS

Definition: In some range state countries cash payments are a scheme under which an individual/household will be covered for loss due to elephants (e.g. injury and/or loss of life and/or property and/or crops) as per existing rules and regulations. There is no financial contribution expected from the affected individual or household.

References:

- AFESG Compensation Online Document (Simon)
- Guidelines for designing compensation schemes for human-wildlife conflict (Nyhus et al., 2003)[7]

- NCD (2008): Bhutan National Human-Wildlife Conflict Management Strategy. Nature Conservation Division. Department of Forest, Ministry of Agriculture. 1-87pp

A review and assessment process would be needed to identify if and when the use of compensation and insurance is suitable (as with all other mitigation tools).

List of direct payment compensation procedures in range countries:

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[6] We have focused this specifically on loss of human life or property, or human injury
[7] Nyhus, P., H. Fischer, et al. (2003). "Taking the bite out of wildlife damage: the challenges of wildlife compensation schemes." Conservation in Practice **4**(2): 37-40.

- **Sri Lanka** has adopted a compensation scheme – crop damage reported to authority, but very few get – poorly managed, corrupt, inadequate, inefficient. Bandara & Tisdell (2003) published on the subject – Economics of Elephant-human conflict. [8]
- **India**– long time in existence. All states did not implement simultaneously when introduced. (see details in reference: World Bank/WWF document) <ask Sushant>
    - Uttarakhand, India. Paid compensation for loss of life. Issue is who to pay when there are claims.
- **Nepal**- Compensation only for the loss of life, injury and property outside the PA. No compensation paid for loss of crops under any conditions. Reported that this system is working quite well; especially in cases where PAs have very large revenues from tourism (Shant Raj, pers. comm.) Also see the World Bank/WWF document.
- **Laos** - does not pay compensation under any circumstances; voluntary contributions from individuals/agencies for loss of life.
- **Indonesia** – compensation for loss of life but not crops.
- **Thailand –** no formal compensation scheme, however at local level there may be some support for "natural disaster"
- **Cambodia –** no compensation scheme
- **Vietnam**
- **China –** there is compensation for crop loss, injury and loss of human life
- **Myanmar** – no compensation scheme
- **Bangladesh** – no compensation scheme
- **Malaysia** – Very limited - only in peninsular Malaysia there is some compensation for crop loss but villagers generally unaware of it. There is no compensation in Sabah/Borneo
- **Bhutan -** no direct compensation; however there is plan to develop for loss of human life or property, or human injury.

<mark>Pros and Cons of compensation</mark>

Pros

- In areas where compensation is practiced, the absence of compensation in cases where people are engaged in illegal activities (e.g. poaching in a PA, planting crops in a PA) may discourage infractions.
- Compensation for loss of human life and injury may reduce public animosity towards elephants and protected areas.

Cons

- Compensation generally has been viewed as the government accepting blame for HEC. So, the government in India uses the term "ex-gratia relief".
- In range states where the government is sole manager of protected areas (PA) and wildlife, it is probably not unreasonable for citizens to hold the government responsible for HEC that occurs outside the PA.
- Long drawn out process. Verification of extent of loss takes time.
- Typically it is difficult to find an honest and neutral assesser of HEC incidents to determine if compensation should / should not be paid. Nepal appears to be an exception to this point where they have found a workable means to assess HEC; see detail on structure and system above.
- Rangers/other government employees have many duties in addition to administering the crop damage complaints and verification.
- Many cases claims are not filed.
- In some states it works better than in others, especially in communist states (West Bengal)– more efficient due to people oriented governance. Many states prone to abuse, false claims, corruption, etc.
- Compensation does not resolve conflicts or crop damage.
- May have an unintended impact of making HEC worse in cases where compensation results in farmers guarding crops and property less rigorously than if compensation was not paid.
- If done properly, compensation could end up being extremely expensive for the government and use resources that may be better spent on other aspects of HEC mitigation.

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[8] Ex. Crop insurance scheme run by Ceylinco Insurance -http://www.indiaenvironmentportal.org.in/node/7613

- Most schemes that compensate for crop damage do not require guarding. Under conditions where compensation for crop damage is paid, difficult to verify if farmers are actively engaged in protecting.

"Monetary compensation schemes for elephant damage appear to suffer from a considerable number of deficiencies. These can be divided into reasons for "a flawed concept" (1 - 3 below) and reasons for "practical problems" (4 - 8 below)[9]

1. Compensation is unable to decrease the level of the problem (because the cause of the problem is not being addressed).

2. Compensation reduces the incentive for self-defence by farmers (and therefore could even exacerbate the scale of the problem).

3. Compensation cannot address the unquantifiable social 'opportunity costs' borne by people who are affected by the threat of problem elephants (Hoare 2000; Naughton et al 1999). This is a considerable component of HEC.

4. Compensation is cumbersome, expensive and slow to administer (because of the need to train assessors, cover large areas, have stringent financial controls etc) and once embarked upon, potentially has no end point.

5. Compensation is open to considerable abuse or blatant corruption (e.g. through: bogus claims; inflated claims; deliberate cultivation in places where crops are likely to be damaged).

6. There are usually never sufficient funds to cover all compensation claims.

7. Payment of compensation to only some victims may cause disputes or social problems.

8. Where compensation schemes need to be promulgated in law, their ability to keep pace with changing economic circumstances or changes in social policy are hopelessly slowed down.

Management Agencies

1.1.1 GOVERNMENT

- Relevant pros and cons listed above apply here.

1.1.2 GOVERNMENT/NGO BASED

- Are there any examples, other than in Nepal, of a government / NGO based schemes? If so, how are they working and have they been objectively assessed?
- Transboundary issues of HEC. Suggest governments working through INGOS to facilitate transboundary means of compensation, i.e. payments. Some examples from Nepal-India (Shant Raj)

1.1.3 COMMUNITY BASED

- May be easier to find the independent neutral assessor that the community would respect, if structured properly (see Nepal example) (Ref: Evaluation of buffer zone initiatives-including compensation-in Nepal; contact Shant for reference).
- where is the funding going to come from to finance these schemes.
- Check to see if any village self-help schemes are in existence where money is contributed and used to cover loss[10].

Source of Funds for Cash Payments

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[9] Ref. African Specialist Group

[10] One option is for NGO's/Govt to contribute a single bulk payment and then the system to run off the interest and so that funds continue to grow some money could be given as Micro-Finance loans. The system has to be community managed with no funds to outside organizations except that the funding agency (NGO/CBO) and govt should have a vote on the committee and to sustain this they should be paid a fixed sum from the fund every quarter/year.

1. **Industry**

Funds sources from industry and the schemes they support could be administered by an agency headquarted in industry, government or NGO. Some examples are as follows:

- LAOS. Compensation from NT2 hydropower project for PA management, which is administered by a government agency responsible for PA management. This should be expanded to specifically identify how much of the revenues will be used for compensation/cash payments for HEC. reference: Arlyne Johnson)
- Large scale plantations on edge of PAs could be asked to provide small percentage of profits in a fund for HEC compensation

2. **Tourism**
- **Park entry fees.** Administered by government.
- **Community-based tourism.** The community sets up a fund to pay cash payments for HEC. See the Bagmara model from Nepal,(Chitwan NP).
- **Private sector.** A portion of profits from private sector lodges, operators,
    i. Chitwan, Nepal. Lodge administers the fund and pays to victims of HEC.
    ii. Taxes on private sector operators that would be administered by government
3.

Monitoring Requirements

There needs to be an evaluation of compensation schemes to determine if there is a:

- change in community attitudes (e.g. increase in tolerance, not taking retaliation for elephant damage, etc) as a result of compensation schemes.
- if conservation of elephants is improved as a result of compensation schemes.

Identify actions that may be needed

- Compensation is a complex issue for addressing losses caused by HEC and requires further investigation and assessment. For example, review the current Nepal community-based compensation scheme as a structure for potentially applying compensation for HEC losses.
- Clear guidelines / recommendations are needed regarding how to administer cash payments. For example, when a loss occurs, what steps should be taken to address the following questions:
    o Who should be paid?
    o How should they be paid?
    o How much should they be paid?

1.2 INSURANCE

Definition: Insurance is a mechanism where a premium is paid by an individual, a household and /or a community in exchange for reparation for loss from HEC (e.g. injury and/or loss of life and/or property and/or crops) under previously agreed conditions of protection and payment. There is generally a third party involved that assesses the amount of the premium based on a set of variables such as crop type, willingness to guard, guarding mechanism, etc.

References: NCD (2008): Bhutan National Human-Wildlife Conflict Management Strategy. Nature Conservation Division. Department of Forest, Ministry of Agriculture.1-87pp

Review of the use of insurance schemes in range states:

- Sri Lanka: Insurance schemes are now available with private companies in Sri Lanka. This is optional for farmers to participate in. Many farmers are not participating because of the cost of the premium.
- **India**– - state governments have made attempts but they have generally been refused <ask Sushant>
- **Nepal**- No insurance scheme, but trying to develop mechanism

- **Laos** – No insurance scheme.
- **Indonesia** – Trialed by NGO (WCS) but premiums were relatively high and farmers did not participate. Government pays premium for life insurance for 100 people every year and then pay for loss of life due to human-wildlife conflict
- **Thailand** – no insurance scheme
- **Cambodia** – no insurance scheme
- **Vietnam**
- **China** – no insurance scheme so far but being negotiated with insurance company
- **Myanmar** – no insurance scheme
- **Bangladesh** – no insurance scheme (but for tiger conflict there is a scheme)
- **Malaysia** – no insurance scheme
- **Bhutan -** no insurance scheme. There is a plan to initiate crop insurance scheme to protect crops from wildlife damages.

==Pros and Cons of insurance==

Pros

- Insurance for loss of human life and injury may reduce public animosity towards elephants and protected areas.
- Is insurance less likely than compensation to lead to considerable abuse or blatant corruption (e.g. through: bogus claims; inflated claims; deliberate cultivation in places where crops are likely to be damaged). May be transparent in private sector.
- Insurance operated by private companies may reduce the pressure on governments to solve HEC problems through compensation schemes. Governments may be able to use funds otherwise used for compensation for solving HEC problems.

Cons

- Long drawn process. Verification takes time? More info needed to determine if this is the case or not.
- Check for more information to determine if is difficult to find an honest and neutral assesser of HEC incidents to determine if insurance should / should not be paid.
- HEC will still occur but check for more information to determine if insurance reduce conflict or animosity towards elephants.
- May have an unintended impact of making HEC worse in cases where potential insurance payments results in farmers guarding crops and property less rigorously but this needs checking.
- If done properly, insurance premious could end up being extremely expensive for the farmers and use resources that may be better spent on other aspects of HEC mitigation. ==Check below.==
- Scheme that insure for crop damage may or may not require guarding. Under conditions where insurance for crop damage is paid, would need to have methods to verify if farmers are actively engaged in protecting. Needs more checking.

   2. Insurance may reduce the incentive for self-defence by farmers (and therefore could even exacerbate the scale of the problem). Needs checking.
   3. Does insurance address the unquantifiable social 'opportunity costs' borne by people who are affected by the threat of problem elephants (Hoare 2000; Naughton et al 1999). For example, like a life insurance policy for loss of life. Social opportunity costs are a considerable component of HEC.
   4. Insurance may be cumbersome, expensive and slow to administer (because of the need to train assessors, cover large areas, have stringent financial controls etc)
   7. Payment of insurance to only some victims may cause disputes or social problems.
   8. Would insurance schemes be able to keep pace with changing economic circumstances or changes in social policy? For example, a premium increasing after a single claim?

An insurance scheme could be managed and funded by either government, private sector /INGO/ NGO, community or any combination of these agencies. This could be in the form of matching funds, administration of the scheme, etc.

Identify actions that may be needed

- Insurance is still a novel idea for addressing losses caused by HEC and requires further investigation and assessment. For example, review the current Nepal community-based compensation scheme as a structure for potentially applying insurance to HEC losses.

1.2   2. INDIRECT PAYMENTS

Definition: Indirect payments are assistance to develop, support and / or implement means to address income loss caused by HEC, with the intent of increasing the resilience of people to HEC. This approach can take the shape of developing alternative sources of income or it can focus on enhancing/improving existing sources of income (e.g. improving marketing options for existing crops to increase income, etc) and / or improving livelihoods. Any type of indirect payment scheme needs to be regularly and systematically evaluated to determine if the scheme has a positive impact on people's attitudes and behavior towards HEC and elephant conservation.

Notes:

- Schemes would have to be designed carefully to avoid providing incentives that would encourage habitat conversion in PAs by increasing cash income through enhanced crop production.
- If incomes cannot be enhanced to a level of a "reasonable" livelihood (requires definition of standard), then managers may need to consider options in relocation of communities away from PAs to reduce HEC.
- some people will do this (i.e. alternative income) on their own and they do not see it as compensation any more. In those cases any "compensation" may have to go above and beyond the current compensation activities.

2.1 ALTERNATIVE SOURCES OF INCOME

Background and definition: In cases where individuals, households and/or communities continuously suffer relatively high levels of loss of income due to HEC, alternative sources of income may be considered for these sites. This assistance is provided to recover the loss due to HEC and/or develop positive attitude towards the conservation of elephants and their natural habitats.

1.2.1.1   Agro-forestry related
- Techniques being trialed
    - Sri Lanka. Reforestation project operated by community (teak, wood apple, timber trees, fruit trees). Can also cultivate mixed cash crops that are not a target for crop raiding. Addresses the HEC problem, because you have trees in place. Need for quantifiable data. (Reference: SLWCS reports/documents).
    - Sri Lanka. Home gardens for sale of annuals, perennials, (Jackfruit, breadfruit, wood apple, etc). Need for quantifiable data on income, change in attitudes, linkage to tolerance for elephants (Reference: SLWCS reports/documents). Key point: The gardens are a great distance away from areas where elephants are present but largely meant to provide improved incomes. The technique is linked to farmer guarding and maintaining fences. This also results in farmers harvesting less firewood (loss of habitat) because they are able to purchase other fuel sources.

- India - Terai Arc Landscape. Vermi composting so farmers do not have to buy fertilizers; sold for forest nurseries, etc. (References: contact Hem Tewari for documents that have evaluated this technique.)

- Cautions to observe with these methods
  - Alternative cash crops that have the tendency to contribute to habitat loss and rapid encroachment –e.g. Oil palm, rubber
  - Avoid the use of potentially invasive species.
  - Avoid planting species that increase HEC in elephant areas.
  - These methods likely work best where there are good systems of governance.

1.2.1.2 Cultural/handicraft related

- Techniques being trialed
  - Sri Lanka. Protected Area management and conservation (Reference: Upul). Making woven rattan bags that were sold in the PA. The problem was that there was no good market for the products.
  - India – Corbet National Park. Jute bags. Good cooperation with Forestry department. All visitors to the park had to buy the bag and it did make money for a few household but on a very small scale (2-3 families).
  - India- Villagers weaving elephant shawls. (Reference: Bibhuti Lahkar)
- Cautions to observe
  - All need evaluation to show linkages to reduced HEC and increased tolerance for elephants.

1.2.1.3 Eco-tourism related

- Techniques being trialed
  - Laos. Ban Na Elephant Tower. (Reference: Arlyne Johnson). Started to reduce HEC in a village that was suffering crop loss and loss of life from elephants. Money is being generated and shared among several villages that are impacted by HEC. No quantifiable data available yet to demonstrate if the technique is increasing tolerance to HEC or not.
  - Nepal. Money from tourism being fed into compensation scheme and HEC mitigation activities. Evaluation upcoming – PhD. Thesis. (References: contact Shant Raj for documents that have evaluated this technique.)
  - India. 0.1 million people visting Terrai Arc Landscape. Tourists buying agriculture produce and handicrafts. No scientific evidence yet that this technique is actually reducing HEC directly. (References: contact Hem Tewari for documents that describe this technique.)
  - Sri Lanka. Field Scouts Program. (Reference: Ravi Corea). Provide local residents with training in field research methods – GIS, compass, field data collection. Then these people are monitoring the HEC mitigation methods and alternative income schemes. This also serves a foundation for ecotourism project – called experiential travel. International experiential travelers (Earthwatch, Frontiers, etc) pay to come work- conducting research and monitoring at the field site – also teach English. Earning<for project?> ~100,000USD per year. This money in turn is used to hire the field scouts and pay for other village-assistance activities – pay for fences, etc for HEC materials. Also using this money for helping in other parts of Sri Lanka. Always HEC related. Has been run since 2002 so have now worked out logistics for operating relatively smoothly. Evidence of effect on HEC is Upul, one individual that joined as a field scout and then became active in elephant conservation.

- Cautions to observe
  - All need evaluation to show linkages to reduced HEC and increased tolerance for elephants.
  - Tourism is a volatile market and dependent on security and economic situations beyond control.

1.2.1.4 NTFP

- Techniques being trialed

- o Sri Lanka. Protected Area management and conservation (Reference: Upul). Making woven rattan bags that were sold in the PA. The problem was that there was no good market for the products.
  - o India – Corbet National Park. Jute bags. Good cooperation with Forestry department. All visitors to the park had to buy the bag and it did make money for a few household but very small scale (2-3 families).
  - o India- Villagers weaving elephant shawls. (Reference: Bibhuti Lahkar)
  - o Sri Lanka. Wild bee honey harvested in the dry season. Concept was to determine if increasing income from wild honey might lead to increased tolerance of PAs. Is harvesting wild honey in PAs a potential source of HEC with people in PAs? Now only assessing the situation.
- Cautions to observe
  - o All need evaluation to show linkages to reduced HEC and increased tolerance for elephants.

1.1.5. In Sumatra, farmers get paid for guarding through a cooperative structure.**<need to define the structure?>**

Background and definition: In cases where individuals, households and/or communities are suffering loss of income due to HEC, methods of improving existing incomes may be considered for these sites. This assistance is provided to recover the loss due to HEC and/or develop positive attitude towards the conservation of elephants and their natural habitats.

1.2.1.5 Improved agricultural practices
- Improving existing crops could magnify HEC if the HEC has not been addressed
- Providing alternative crops (discussed in another group).
- Potential to trial but not many examples.

- Items being trialed
Sri Lanka. (Reference: Upul) In Upul's village, they erected a fence to keep elephants away and this allowed family to increase income from agriculture, which allowed the family to send Upul to university and receive an education.

-

1.2.1.6 Improved marketing
- Items being trialed
  - o Loki. Elephant pepper (see below under 'value added').

- Cautions to observe
  - Recommend to engage interdisciplinary team or business specialists to assess and improve marketing before engaging in improving income from existing sources.

1.2.1.7 Value addition
Definition: Adding incentive for villagers to 'process' crop one step further to get better return for sale of crop.

- Items being trialed

- - - o WWF (Christy Williams). Producing coffee in BBS NP Sumatra as "certified not grown in PA". Pay higher price for coffee grown outside BBS so coffee is no longer grown in NP encroached areas
- - - o Africa. Loki Osborne. Elephant Pepper Development Trust. Both value added and marketing to increase income through existing chili production.
  - o Sri Lanka. The SLWCS has initiated a program to cultivate orange (*Citrus sinensis*) as an alternative crop and deterrent. Feeding trials using captive elephants showed that elephants do not preferentially eat citrus varieties.   While the prognosis for the project is good the project is still being monitored and evaluated to quantify its benefits to minimize HEC.

1.3.8   Microfinance as a tool for improving income from existing sources
- Sumatra - adding microfinancing will give more incentive to people to manage their crops (in addition to guarding, etc.), raise their income, and is used in case something (crop?) might fail. Trial for fishing ponds (using local govt assistance) in S Sumatra. Find out local markets of what is easy to do/raise and sell. Don't give everything (i.e. if fishing concept don't give all the equipment, just the bait) so that people are encouraged to become involved and try.
- Nepal – groups of 10 women, gave each family a piglet (seed money came from NGO NTNC), women save money from sale of pigs, established a saving/credit scheme (i.e. pay 1 Rp/month) and they can borrow short-term loans. With each new member a piglet from an existing litter is provided.
- India- Microfinance and field scout program. Adopt models used by Nepal – cross pollination of a good idea. Still being tested. (Reference: Bibhuti Lahkar)
- Sri Lanka – ADB, PAM Project (add details/reference)

- Cautions to observe
  - o Microfinancing needs transparency to remain successful when savings get too high. Insurance policy could also come out of microfinancing option.

2.3 LIVELIHOOD IMPROVEMENT LINKED TO REDUCING HEC
Definition: Improving the quality of life of individuals, households and/or communities where their livelihoods are adversely affected by HEC. This assistance is provided to mitigate negative impacts on livelihoods due to HEC and/or develop positive attitude towards the conservation of elephants and their natural habitats.

Items being trialed or to be considered

1. Kalimantan – habitat protection for wildlife; could potentially be applied to elephant habitats in other areas. Health and Harmony doctors have a clinic outside orang-utan PA. People living near the PA receive subsidized health care. There is a level of payments that is based on how much habitat protection / restoration the individual / household is doing. Need to examine the assessment tool used for measuring the level of protection / restoration. (Reference: Mini, USFWS)
2. Nepal. Used in several PAs. NGOs (WWF, ZSL, etc) administer with funds generated from donors. Pays school fees for families that have suffered loss from HEC. Also, children from these families have first opportunities for jobs in the PA system. (reference: Shant Raj)
3. Nepal. (See diagram for structure). If communities protect elephant habitat, people who are injured receive free health care. For others, the health care cost is subsidized. (Reference: Shant Raj)

Good information to add to group on methods for reducing HEC through pressure reduction
- India –Terai Arc Landscape. Biogas production to reduce firewood harvest and loss of habitat. People are not entering the PA. (References: contact Hem Tewari for documents that describe this technique.) There has been no retaliation in areas where this is being trialed by 50+ households.

- Nepal. Biogas production to reduce firewood harvest and loss of habitat. People are not entering the PA. (References: contact Shant Raj for documents that have evaluated this technique.)

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Definition List