

TRAINING ON

Planning and Design of Smart Infrastructure for Biodiversity Protection



25–27 April 2022

Rhino Lodge, Sauraha, Nepal



Biodiversity conservation, ecological corridors & transportation infrastructure in Nepal

Babu Ram Lamichhane, PhD | Office In-charge, NTNC – Biodiversity Conservation Center

25 April 2022

Rhino Lodge, Sauraha, Nepal



Mammals

212 sps

Birds

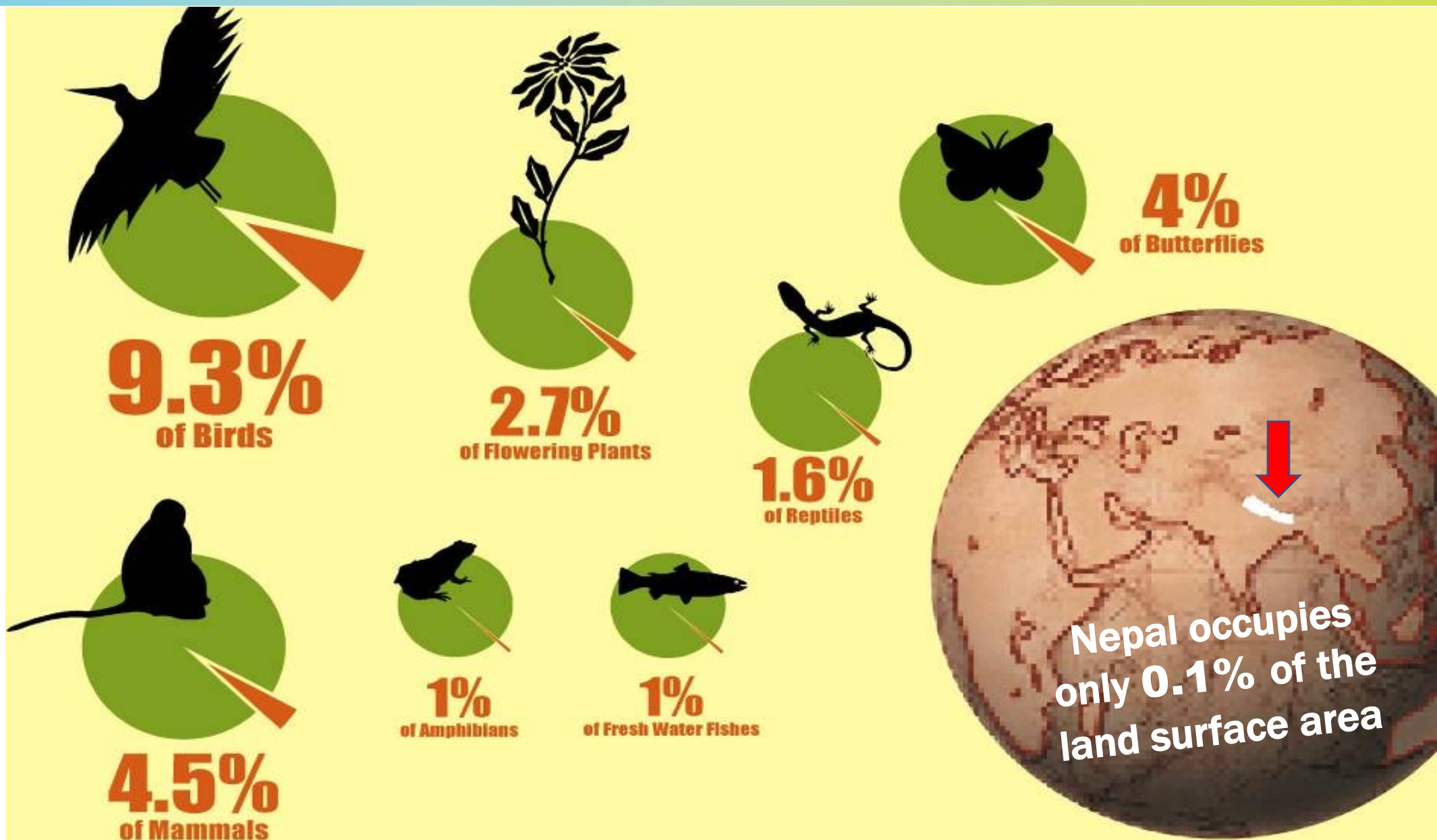
887 sps

Herpeto-
fauna

177 sps

Fish

220 sps

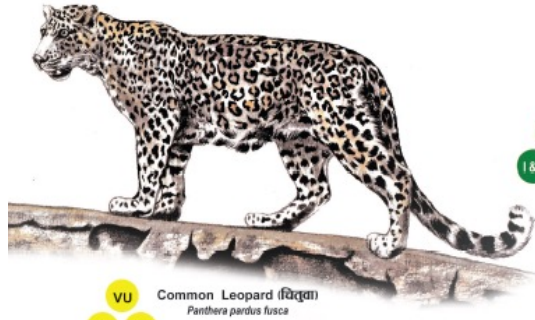


WILD CATS OF NEPAL

नेपालका

जङ्गली

बिरालोहरू



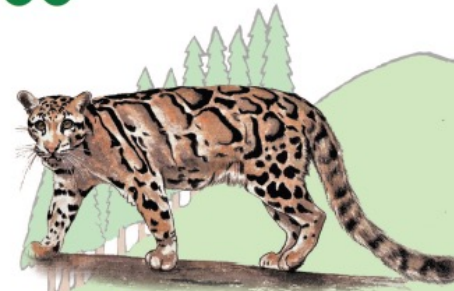
VU Common Leopard (चिप्लुवा)
Panthera pardus fusca



LC Leopard Cat (खरीबाघ)
Prionailurus bengalensis



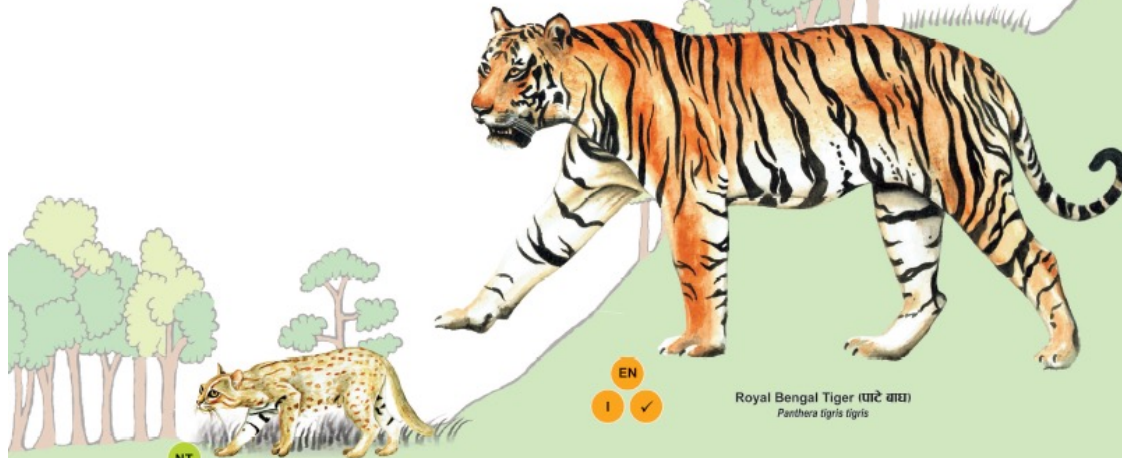
LC Jungle Cat (वन बिरालो)
Felis chaus



VU Clouded Leopard (घाँसे चिप्लुवा)
Neofelis nebulosa



NT Asiatic Golden Cat (सुनौलो बिरालो)
Catopuma temminckii



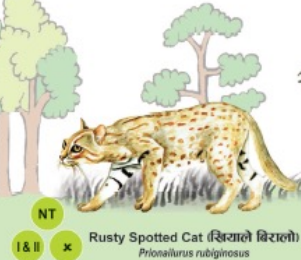
EN Royal Bengal Tiger (घाँटे बाघ)
Panthera tigris tigris



NT Marbled Cat (मिर्च-मिर्चे बिरालो)
Pardofelis marmorata



VU Fishing Cat (मलमल बिरालो)
Prionailurus viverrinus

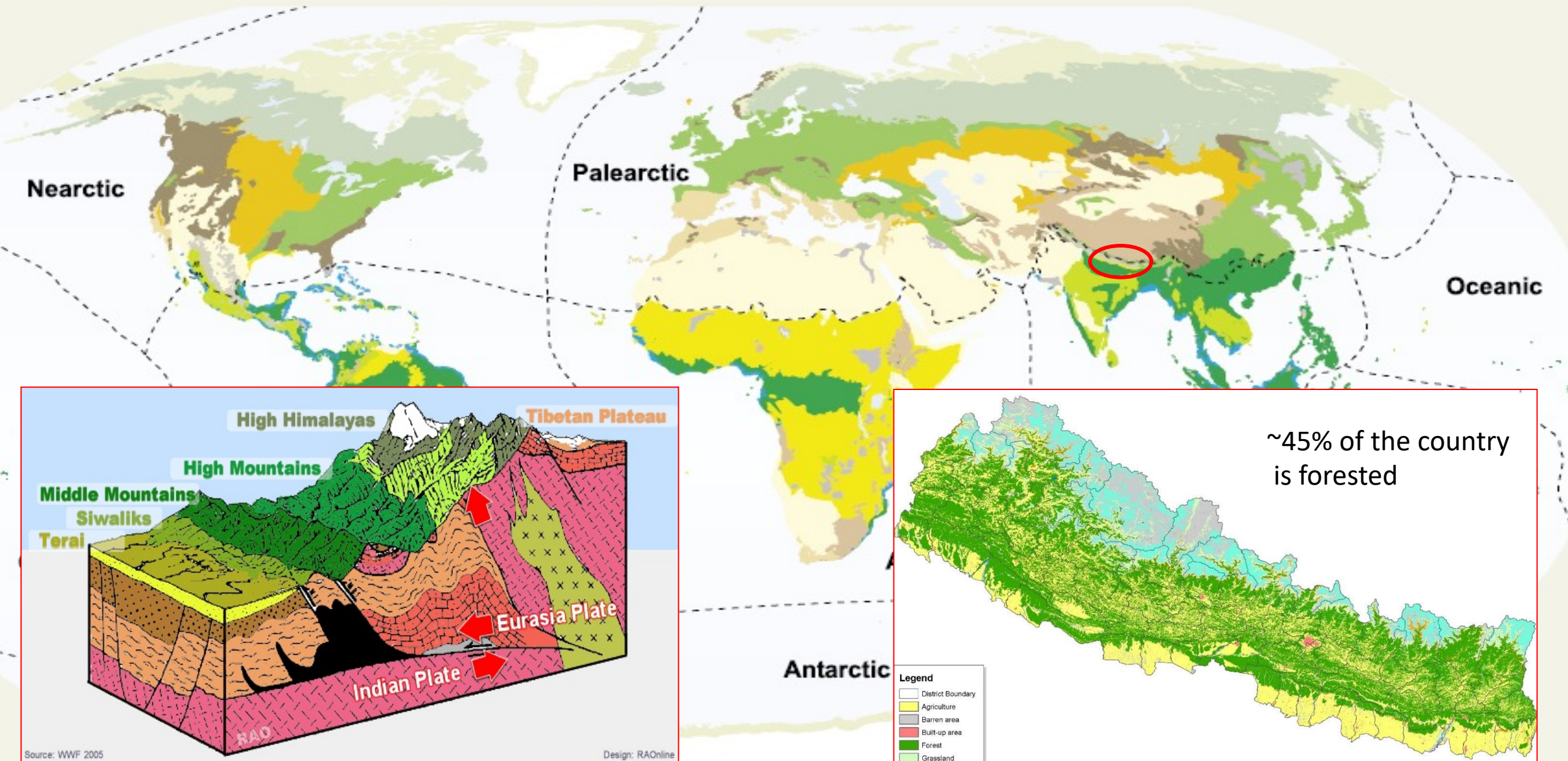


NT Rusty Spotted Cat (सियालो बिरालो)
Prionailurus rubiginosus

DD Data Deficient LC Least Concern NT Near Threatened VU Vulnerable EN Endangered CR Critically Endangered EX Extinct



High biodiversity

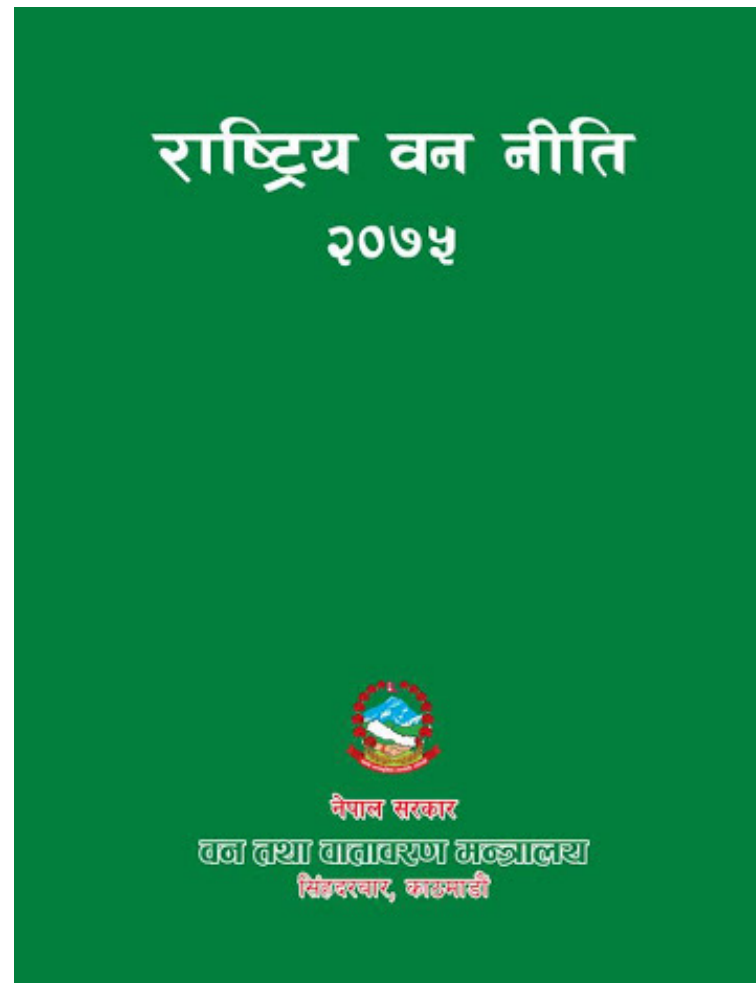
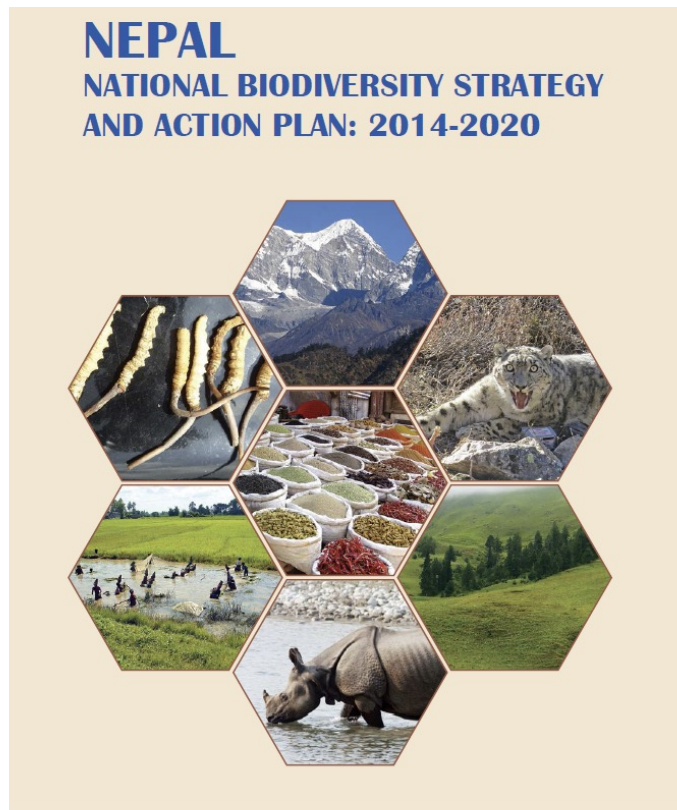


Before 1970s

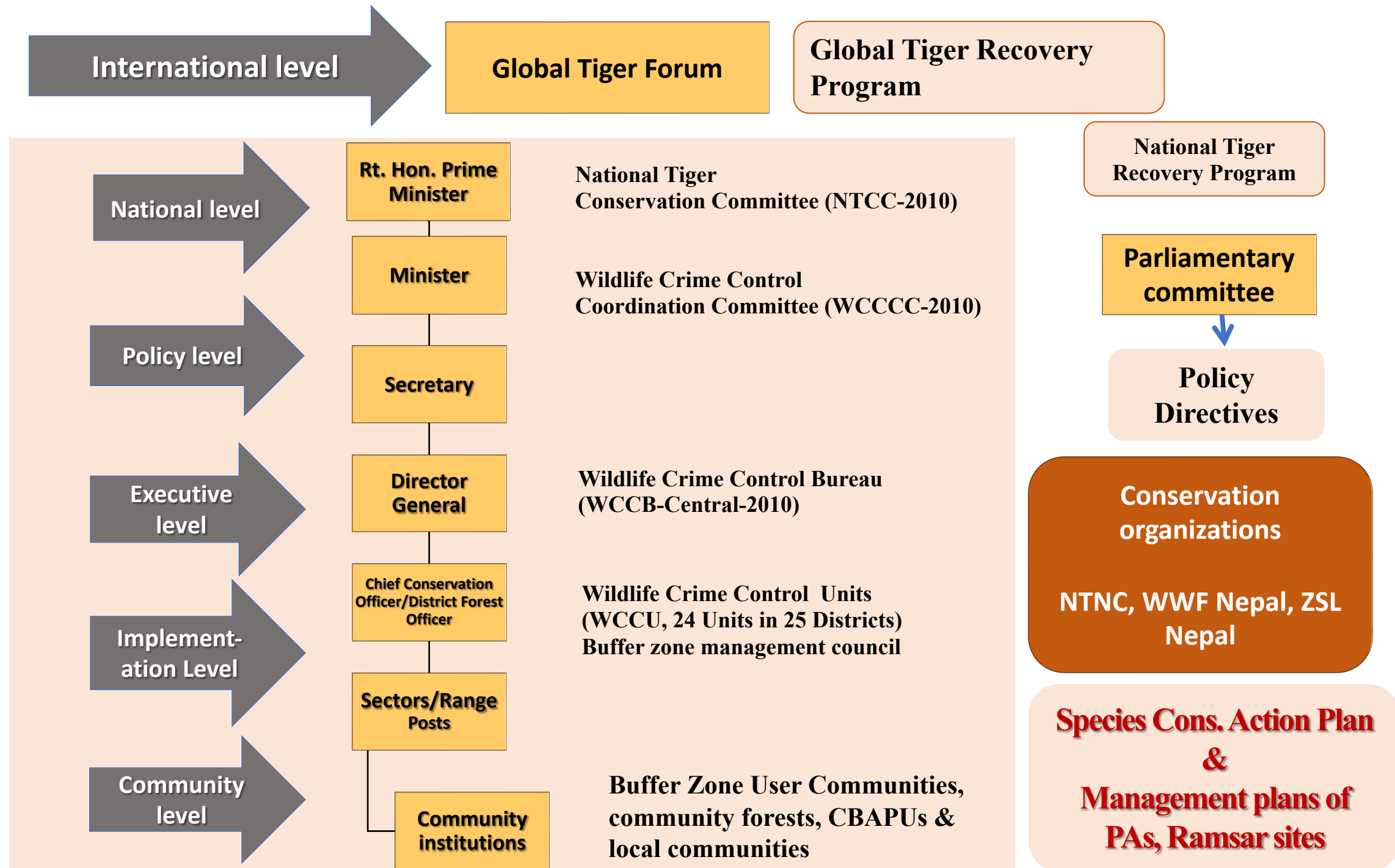


After 1970s

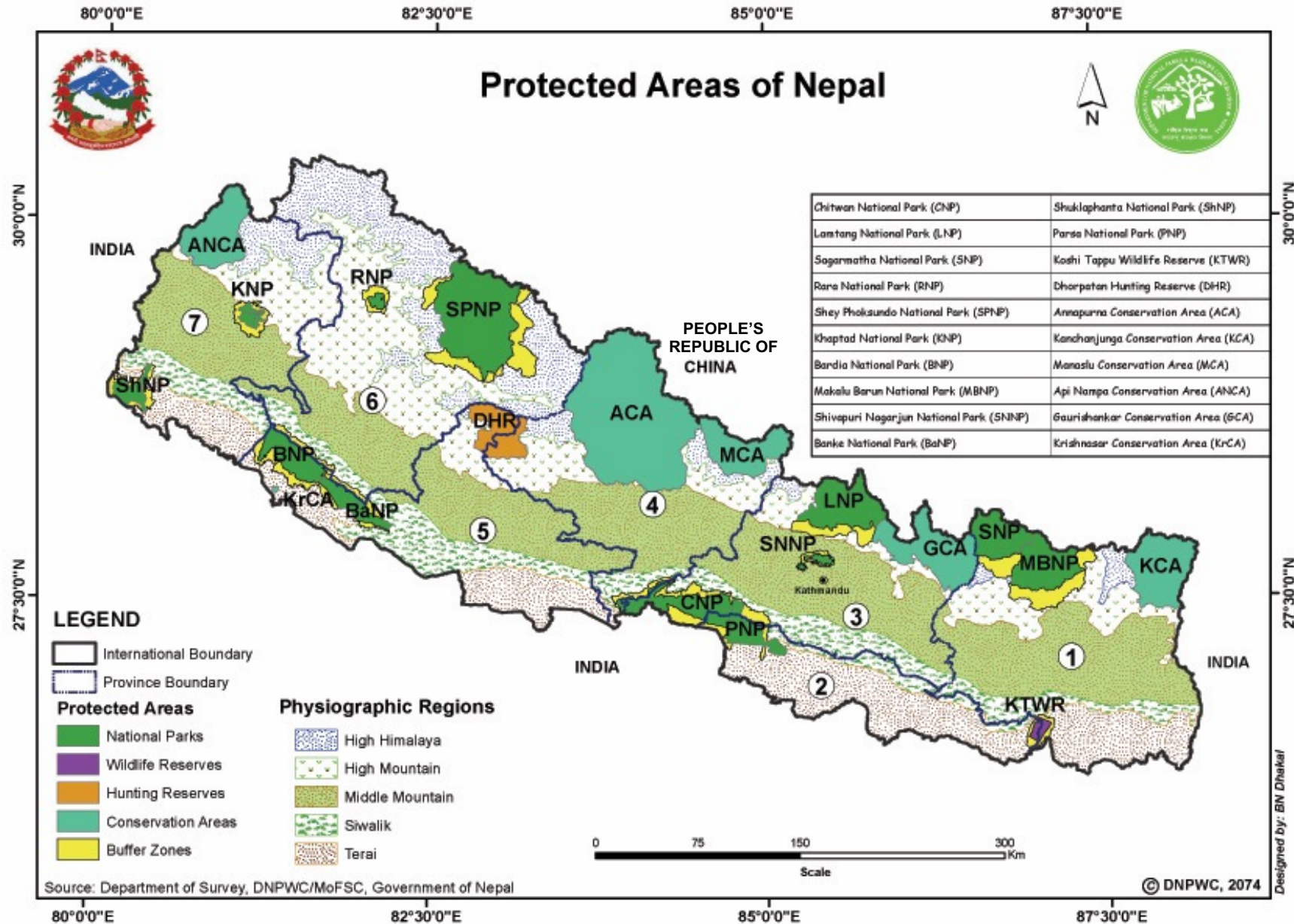




1. Constitution of Nepal (2015)
2. **National Parks and Wildlife Conservation Act (1973)**
3. Soil Conservation and Watershed Management Act (1982)
4. **Forest Act 2019**
5. Environmental Protection Act (1995)
7. Plant Protection Act (2007)
8. Forest Regulation 2019
9. National Parks and Wildlife Conservation Regulation (1974)
10. Himali National Parks Regulation (1980)
11. Soil Conservation and Watershed Regulation (1983)
12. Wildlife Reserve Regulation (1978)
13. Environmental Protection Regulation (1995)
14. Buffer Zone Regulation (1996)
15. Conservation Area Management Regulation (2001)
18. Captive Elephant Management Policy (2004)
19. National Wetland Policy (2013)
20. Agroforestry Policy (2004)
21. Rangeland Policy (2012)
22. Climate Change Policy (2011)
23. REDD+ Strategy (2018)
24. Agriculture Development Strategy (2017)
25. Non-Timber Forest Products and Herbs Development Policy (2004)



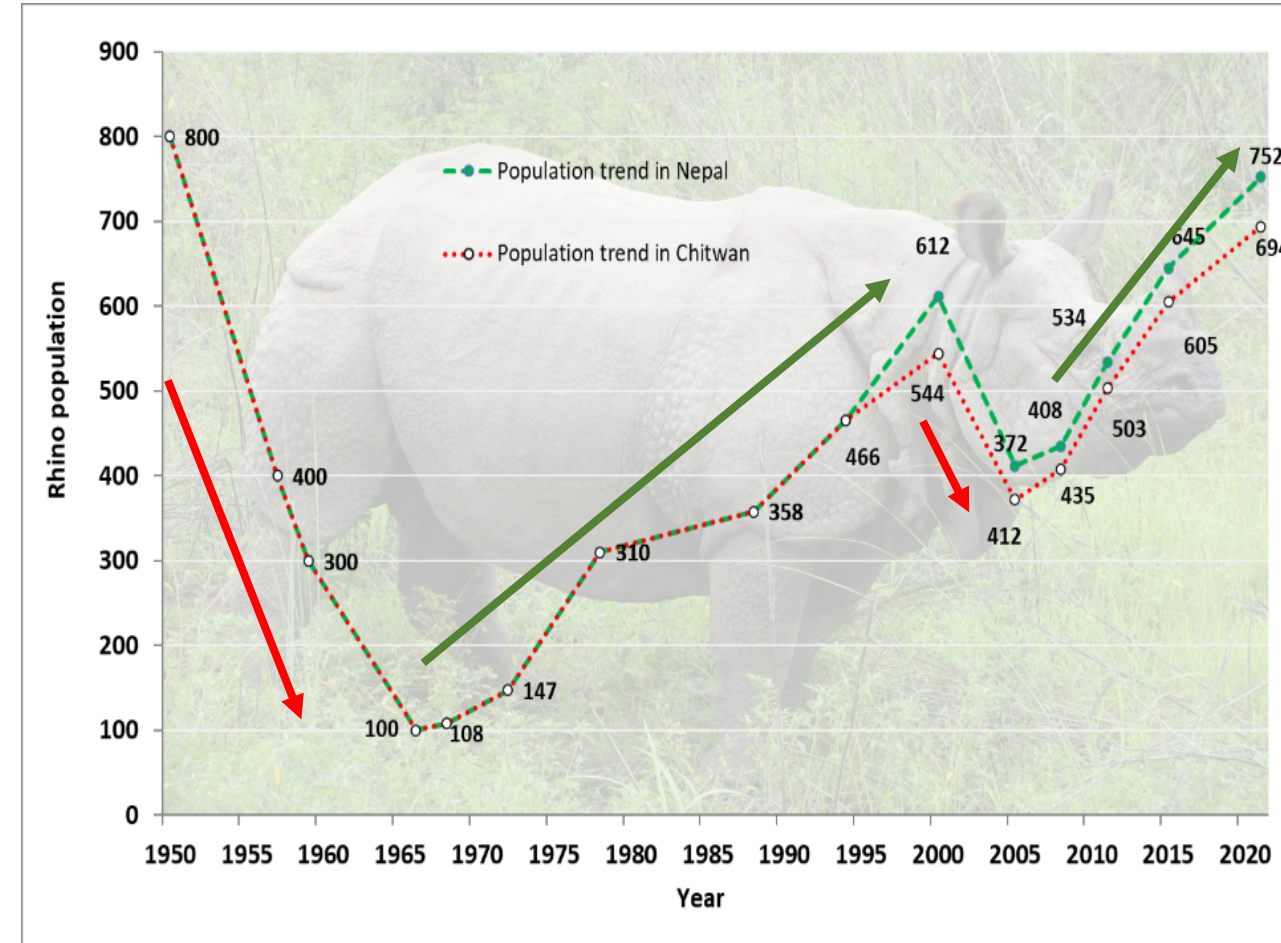
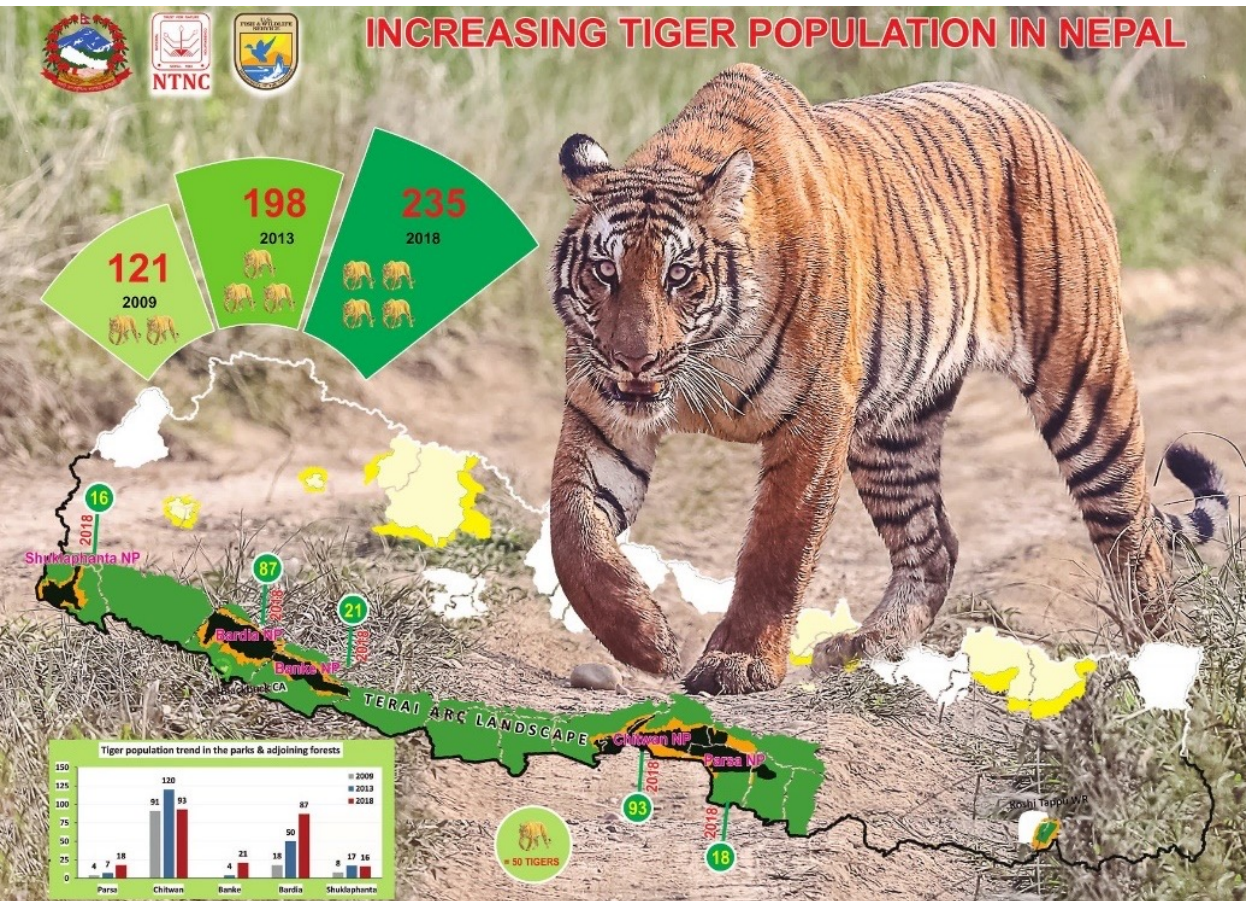
Protected Area System in Nepal



- NPs- 12
- WLR- 1
- HR – 1
- CAs- 6
- BZ- 13

23.39%
area of
country

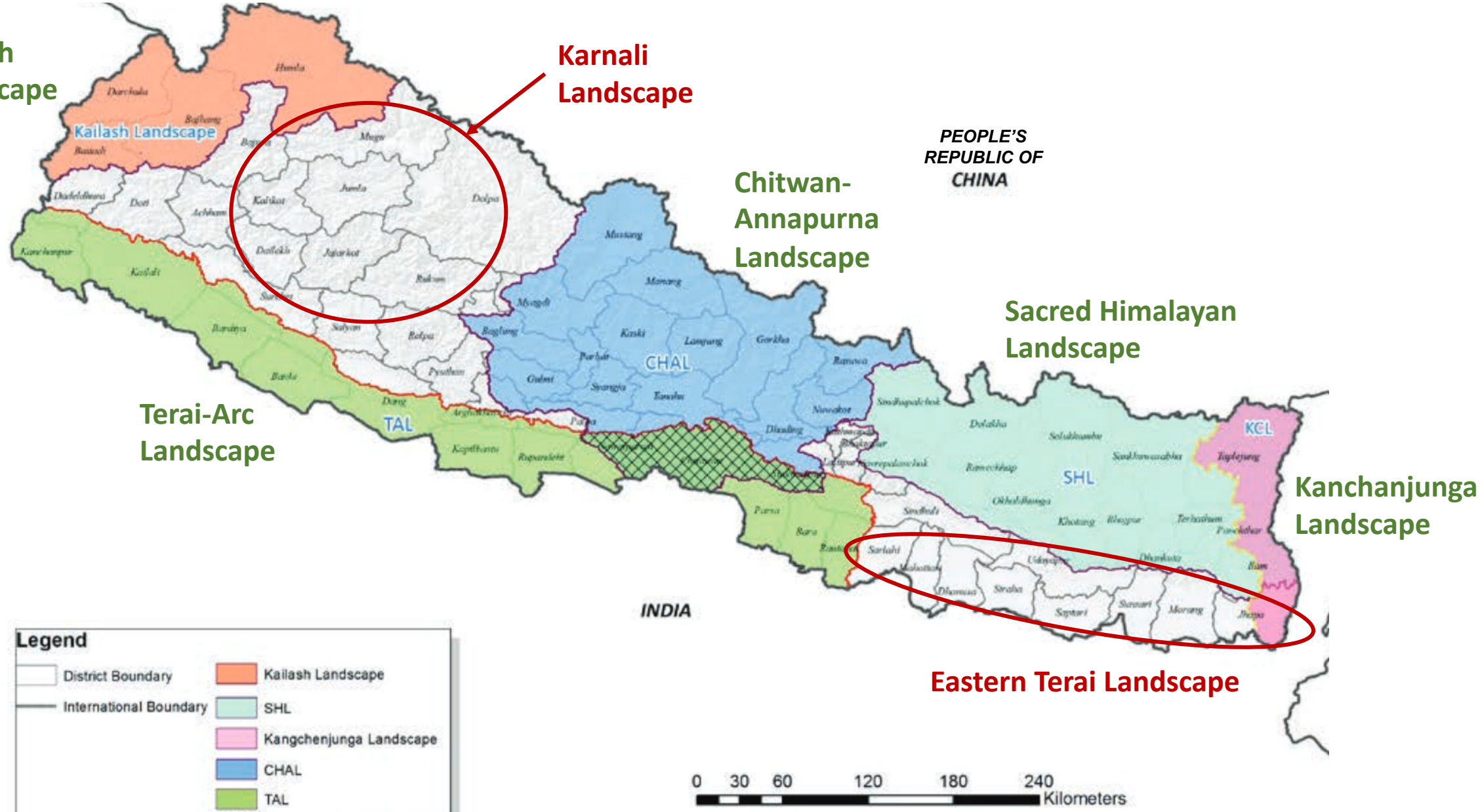
Tiger and rhino population trend in Nepal



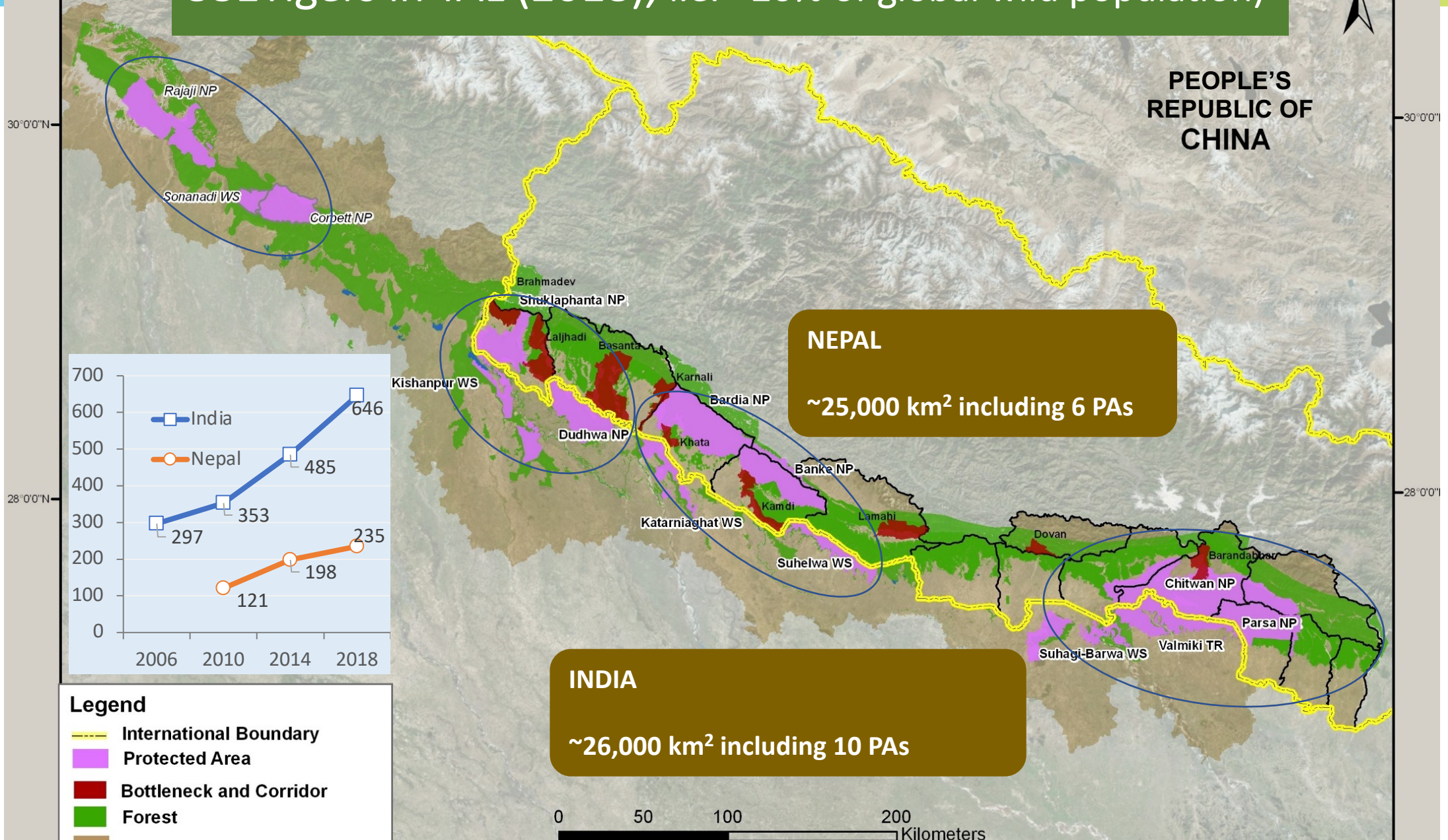
- Loss/degradation of habitats and dispersal corridor
 - Encroachment
 - Forest conversion
 - Invasive species
 - Pollution
 - overextraction
- Poaching and illegal trade
- Conflict with communities
- Diseases
- Changing climate

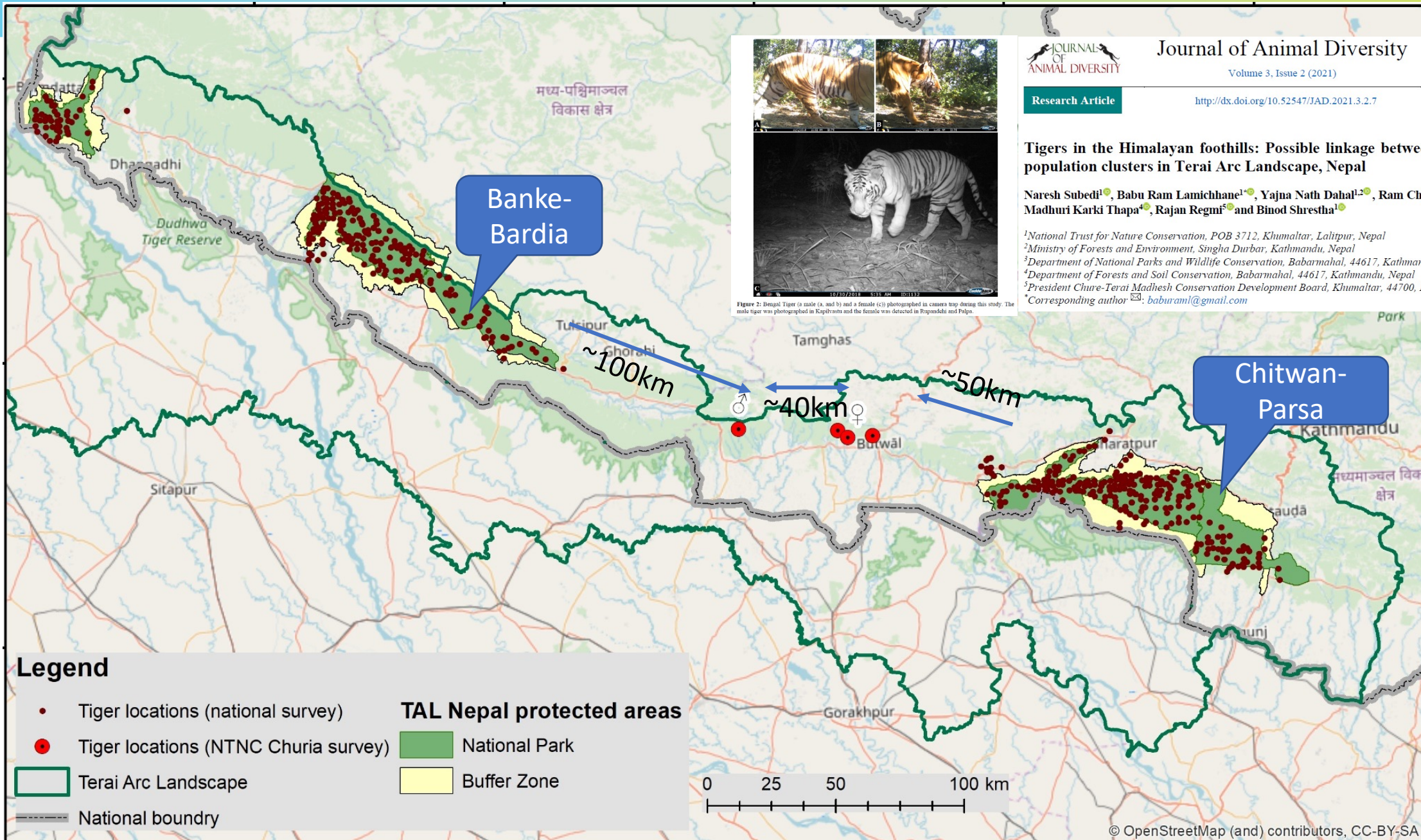


Conservation landscapes in Nepal



881 Tigers in TAL (2018), i.e. ~20% of global wild population)

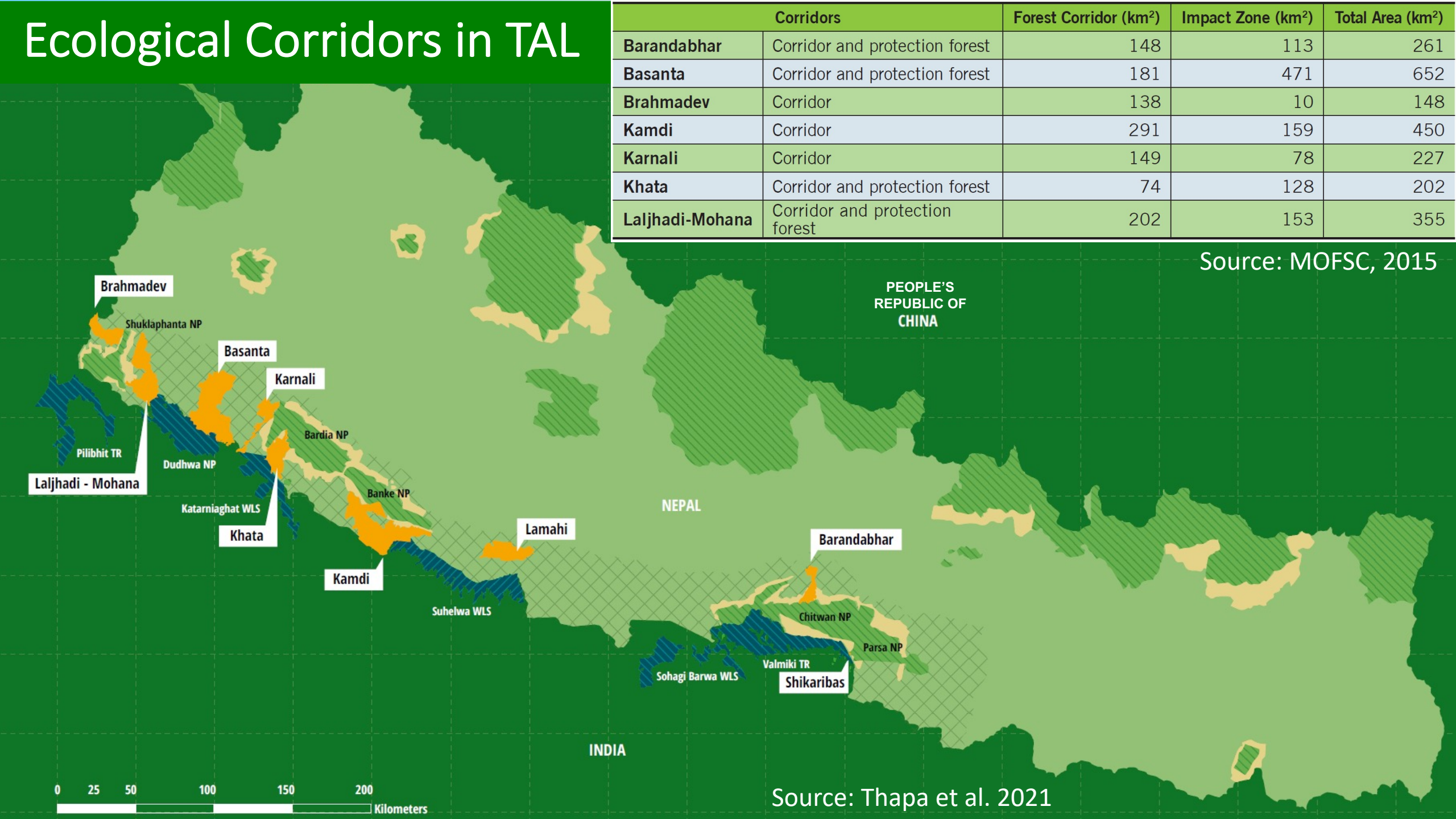




Ecological Corridors in TAL

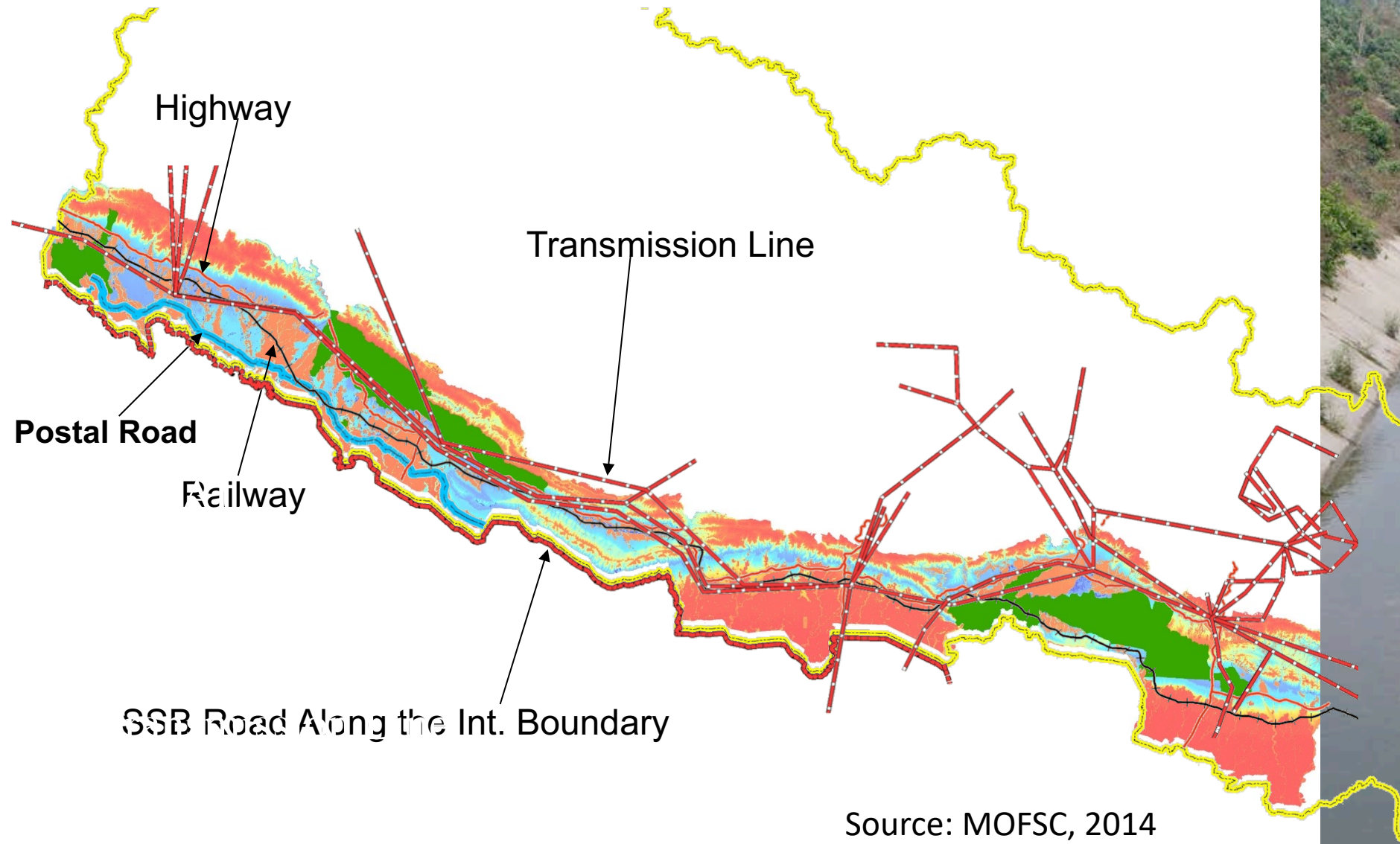
Corridors		Forest Corridor (km ²)	Impact Zone (km ²)	Total Area (km ²)
Barandabhar	Corridor and protection forest	148	113	261
Basanta	Corridor and protection forest	181	471	652
Brahmadev	Corridor	138	10	148
Kamdi	Corridor	291	159	450
Karnali	Corridor	149	78	227
Khata	Corridor and protection forest	74	128	202
Laljhadi-Mohana	Corridor and protection forest	202	153	355

Source: MOFSC, 2015



Source: Thapa et al. 2021

Large linear infrastructures in Tarai



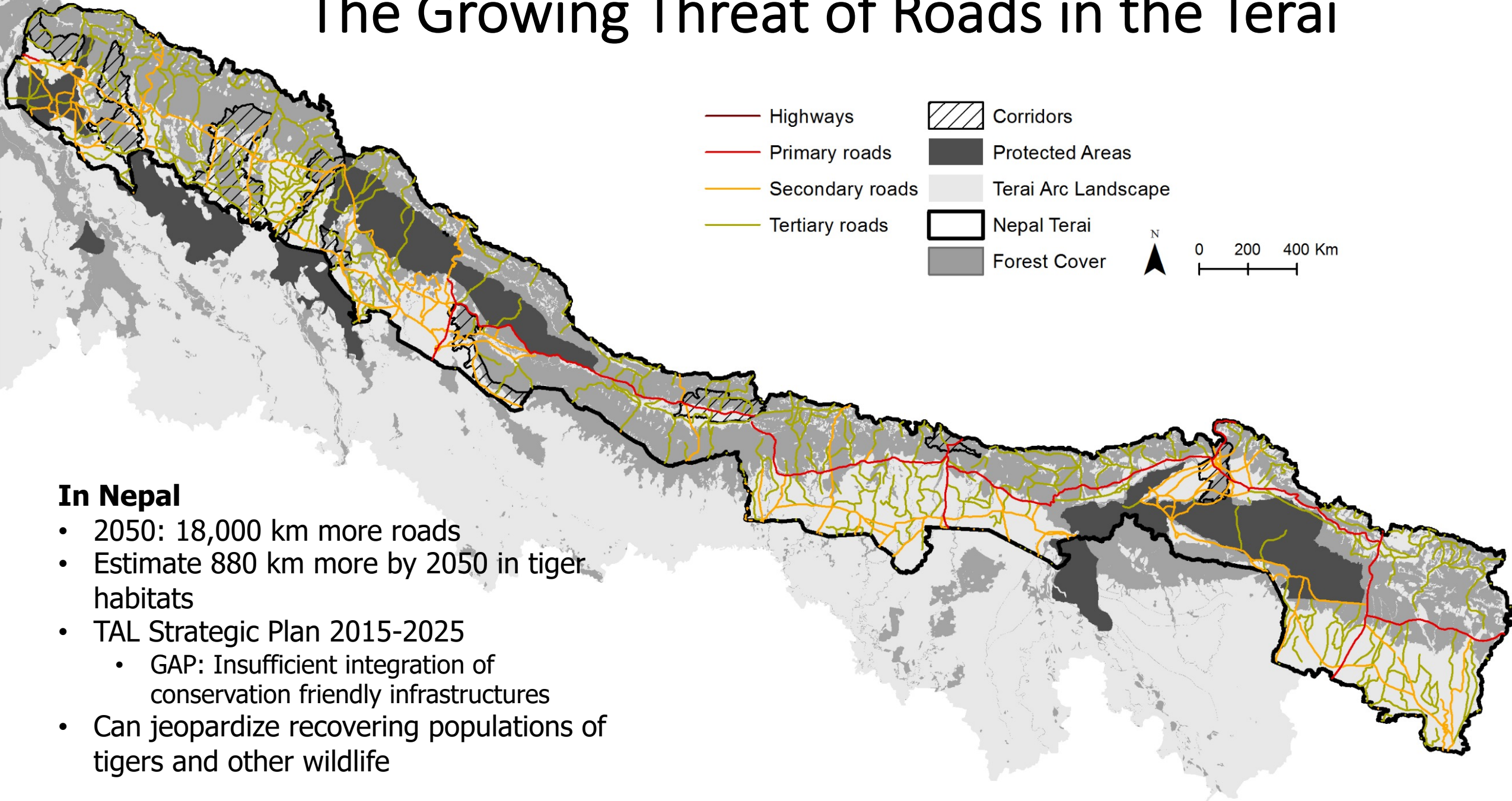
Source: MOFSC, 2014



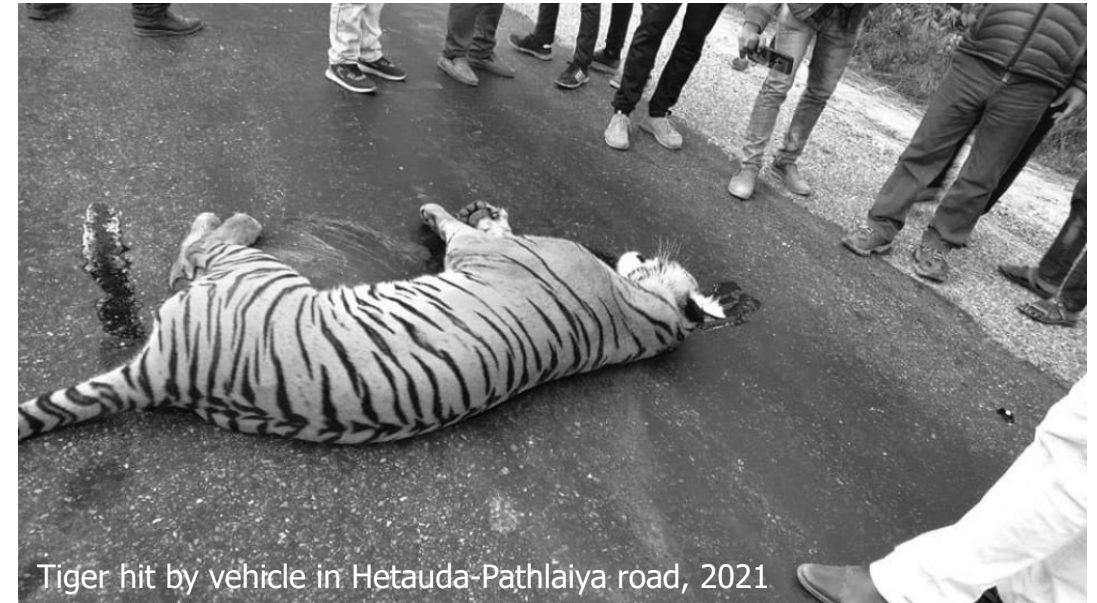
Tarai region of Nepal

- High density people
- High density wildlife
- Many large scale infrastructures are planned or started

The Growing Threat of Roads in the Terai



- Direct mortality
- Barriers to movement
- Reducing gene flow
- Increased access to remote areas
- Facilitate human settlement growth
- Extraction and harvest
- Traffic disturbance



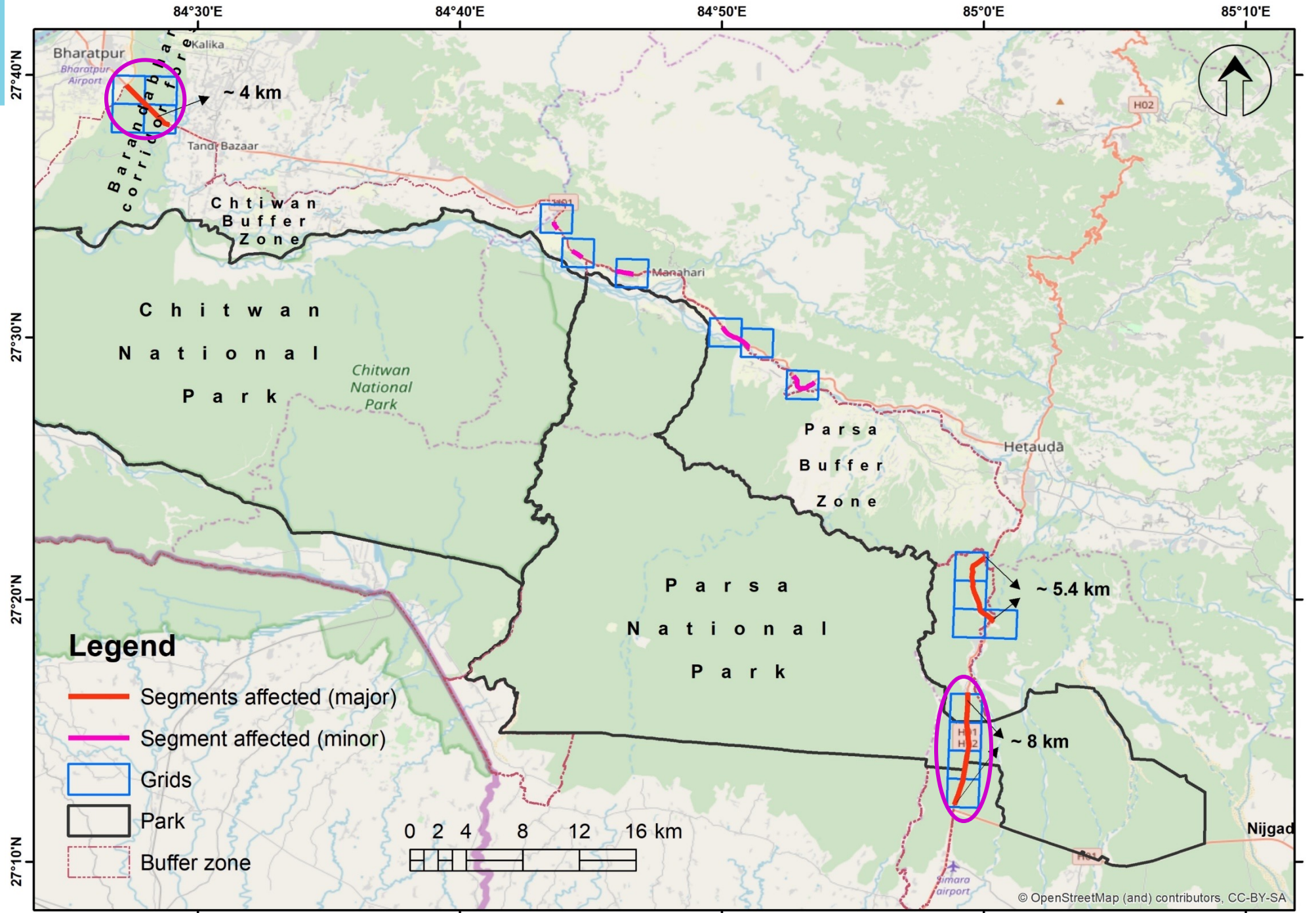
Tiger hit by vehicle in Hetauda-Pathlaiya road, 2021

¹Laurance et al. 2009 *Trends Ecol. Evol.*; ²Clements et al. 2014 *PLOS ONE*; ³Ibisch et al. 2016 *Science*; ⁴Di Marco et al. 2019 *Nature*; ⁵Farhadinia et al. 2019 *Nat. Ecol. Evol.*; ⁶Clevenger et al. 2002 *Conserv. Biol.* ⁷Fahrig & Rytwinski 2009 *Ecol. Soc.*

- Fragment and degrading key habitats of tigers and their prey species
 - Lights and motion reduce the quality of habitat near roads
 - Barriers to tiger movement and reduce gene flow
 - Encourage human settlement growth
- Increase mortality
 - Increase in collisions between vehicles and tigers and their prey
 - Increase human-tiger conflict



Narayanghat to Pathlaiya



BARANDABHAR CORRIDOR



CORRIDOR AREA
109.13 sq. km



KEY WILDLIFE SPECIES
Tiger, Leopard,
Elephant, White Rumped
Vulture, Gharial



FOREST COVER
99.18 sq. km



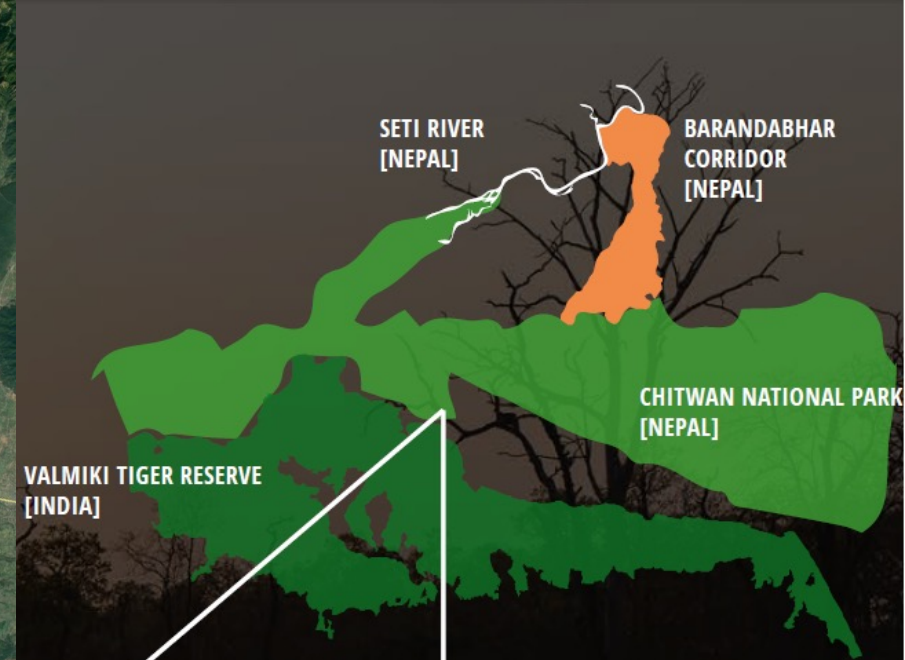
PRIMARY HABITAT TYPES
Sal Forests, Wetlands,
Grassland



PRIMARY CHALLENGES
Drought, Water Pollution,
Eutrophication, River
Poisoning, Encroachment,
Invasive Species, East-West
Highway, Railway

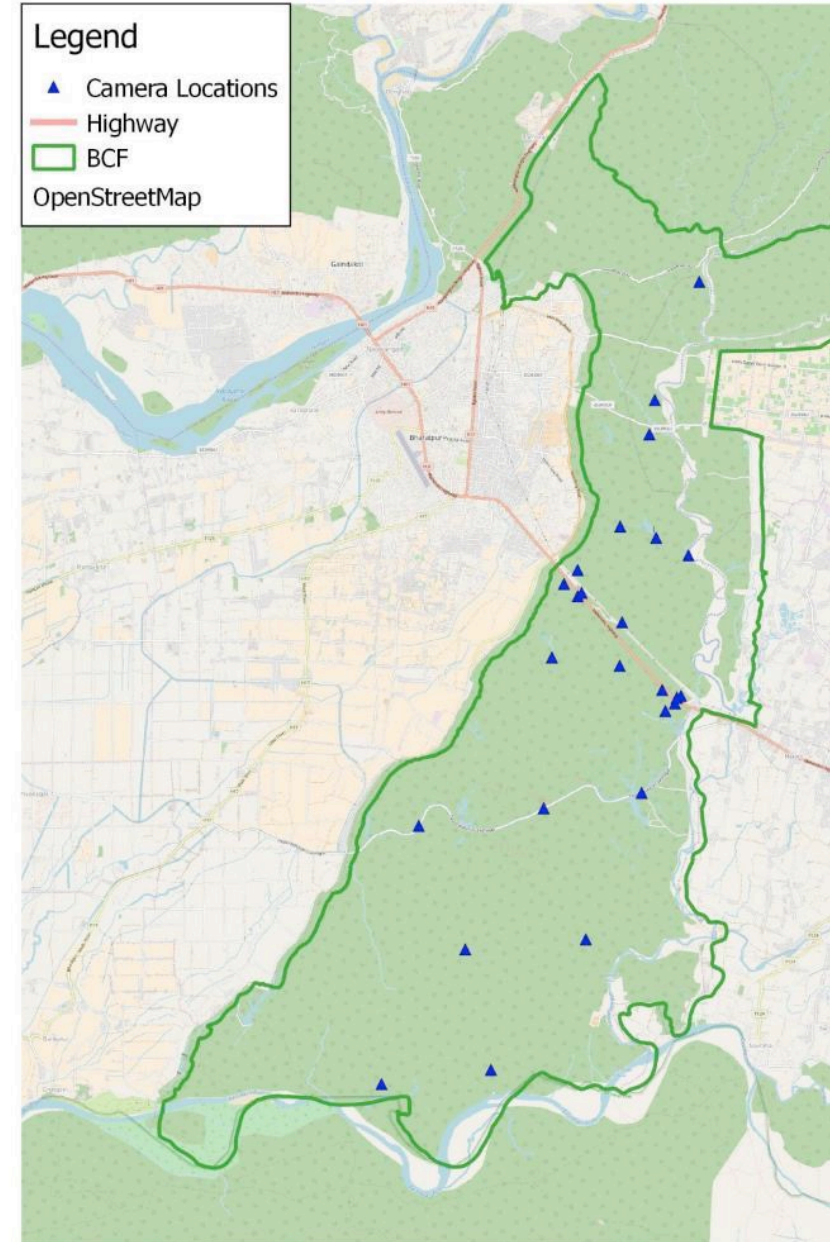


MAJOR RIVERS AND RAMSAR SITES
Khageri, Beeshazar and
Associated Lakes



Source: Thapa et al. 2021

- 25 cameras were installed in the forest (2016 – 2020)
- 10 cameras are installed along the highway on forest trails that passes across the road in order to monitor the wildlife movement
- Cameras are checked every 3-4 weeks



- **Tigers**

- Total 17 (6 F, 9 M, 2 unk; 2 died)
- 7 residential individuals (4 female + 3 male)
- 5 individuals use the forest occasionally

- **Greater One-horned Rhinoceros**

- 20+ individuals

- **Leopard**

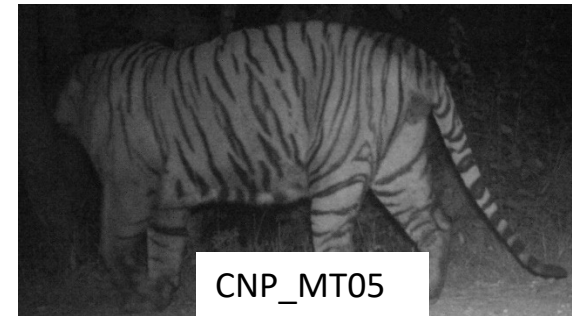
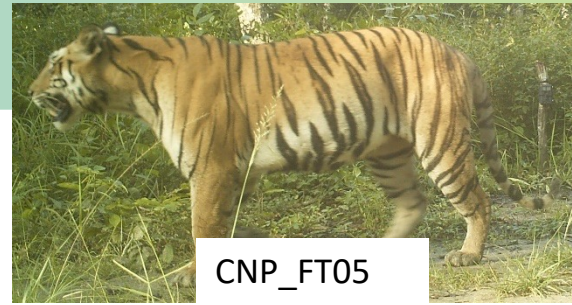
- 12 individuals (2016)

- **Sloth Bear**

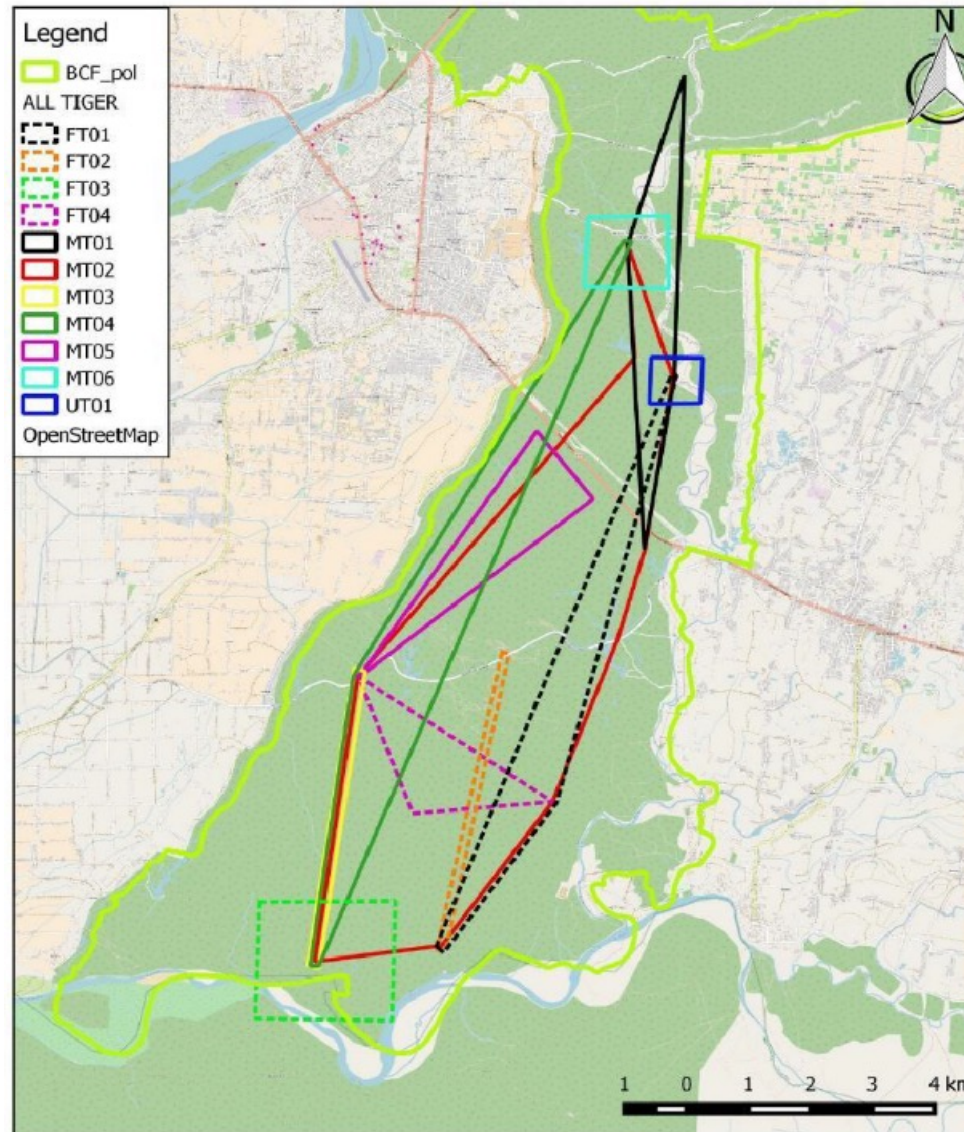
- **Asian Elephant**

- **Gaur**

- **Wild dog**



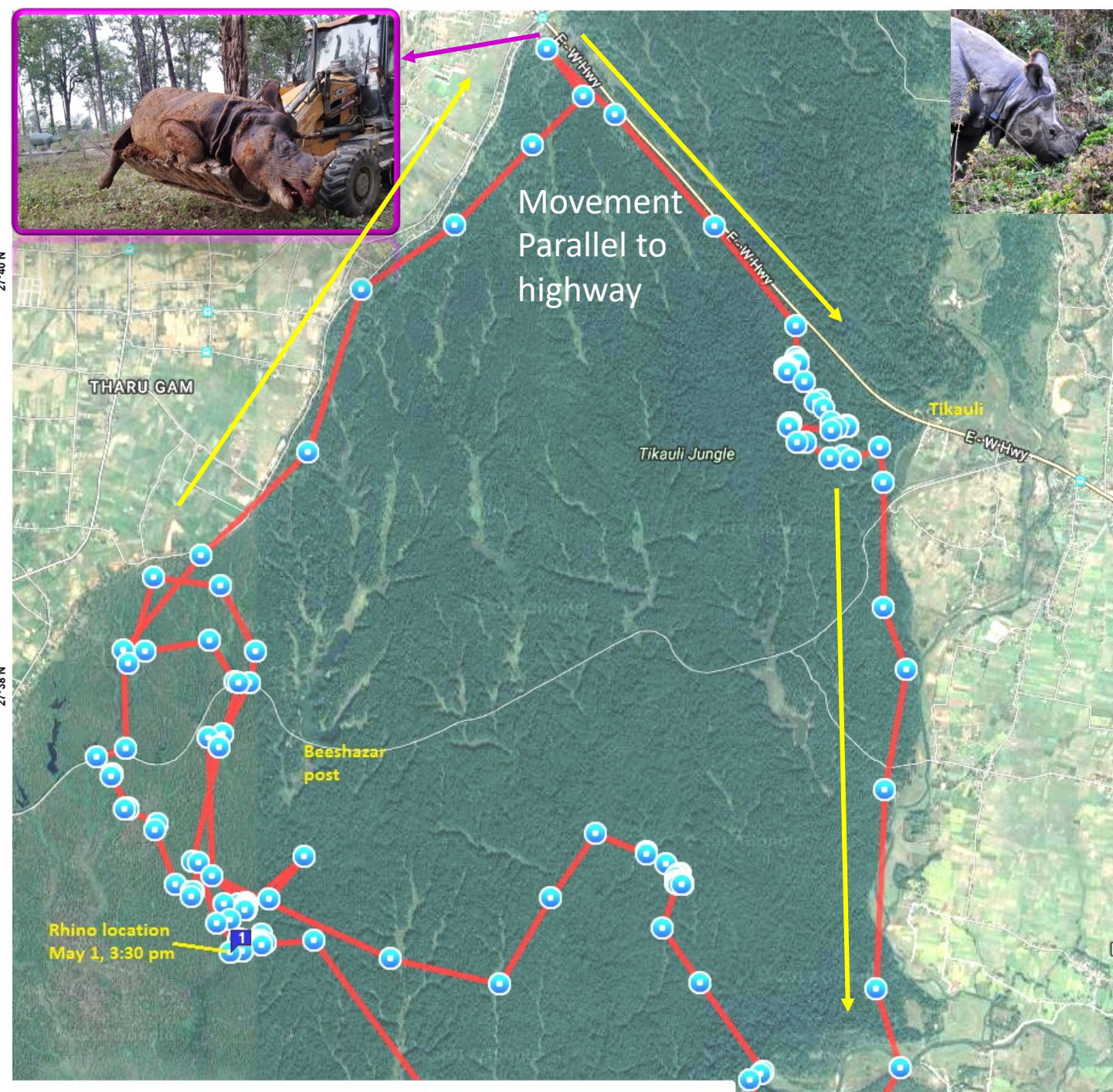
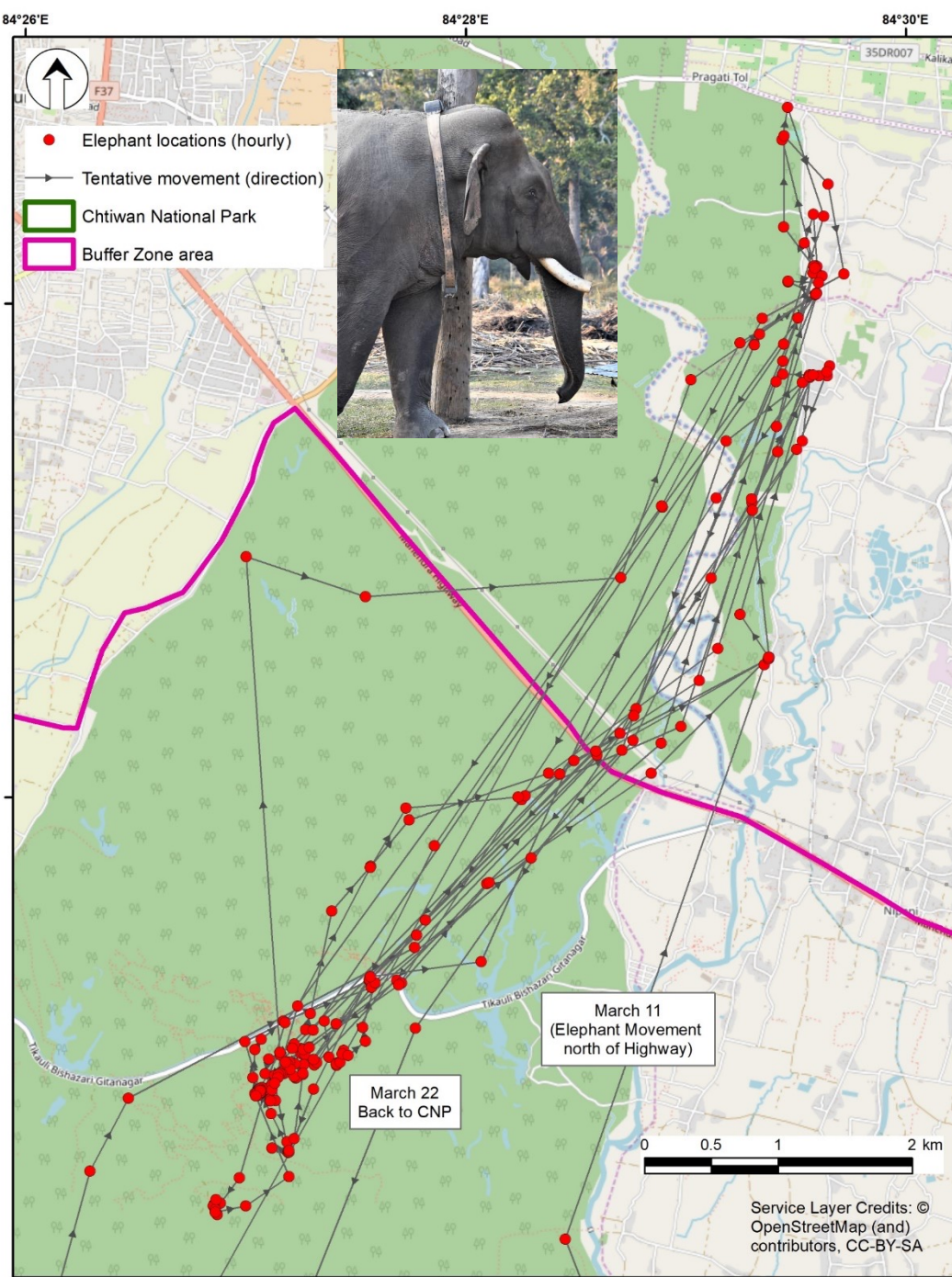
- **Tigers**
 - Only males crossed the highway both ways.
 - Females mostly remained south of the highway (n=4). Those crossed the highway (n=2), do not return back.
- **Greater One-horned Rhinoceros**
 - Some crossed the highway, some returned back
- **Elephant**
 - 12 individuals (2016)

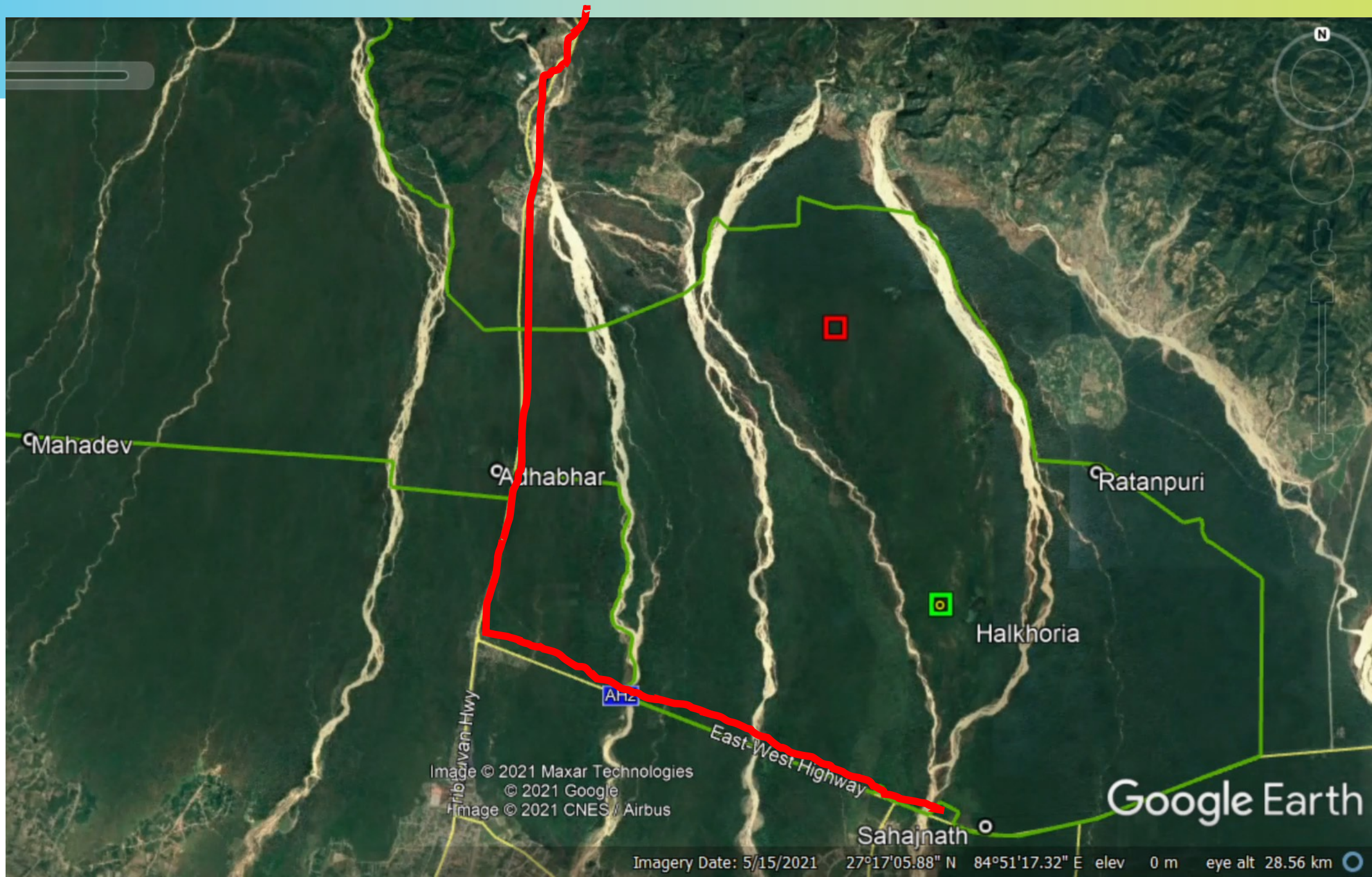


Tigress (CNP_FT54) trying to cross the highway



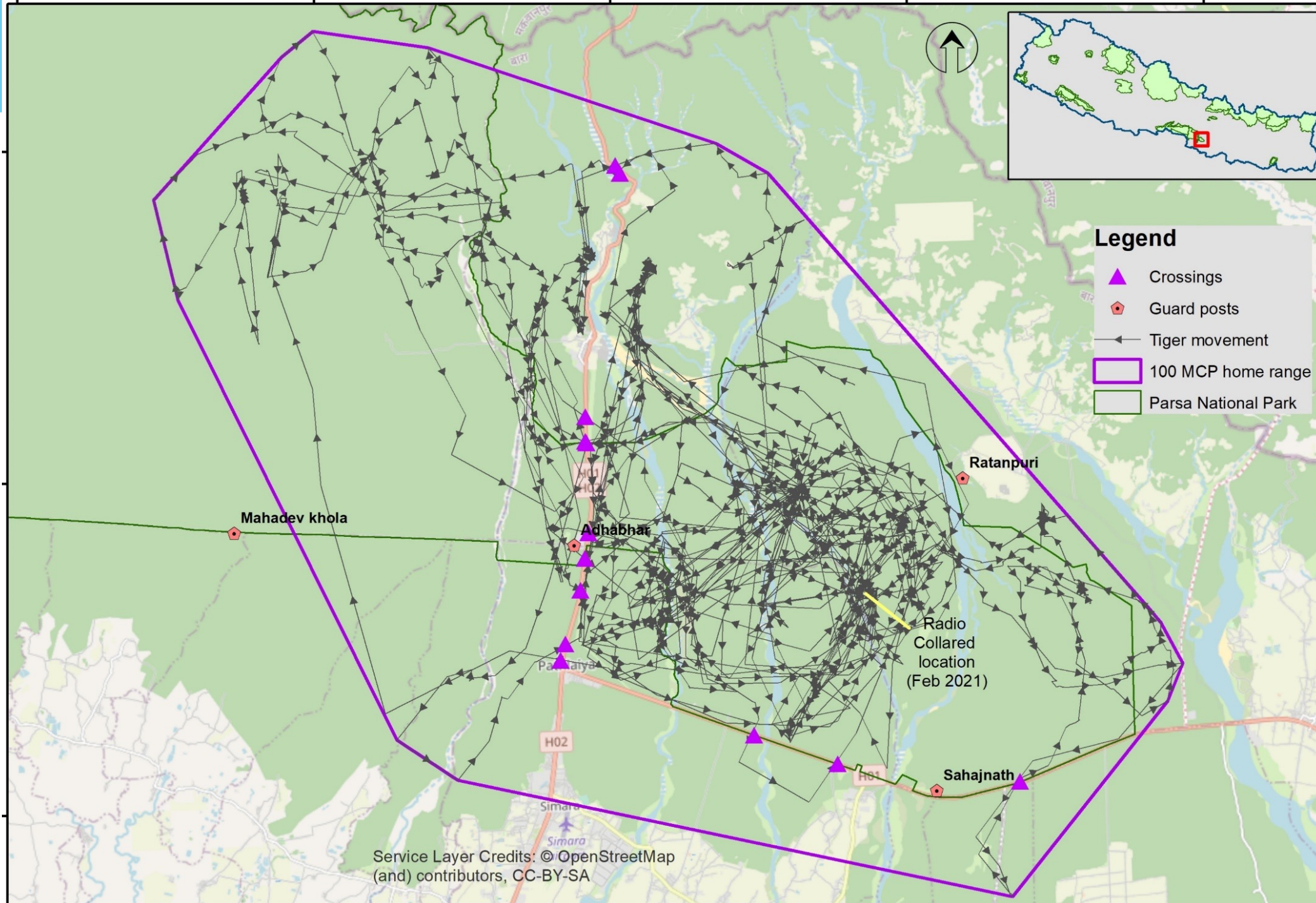
Two minutes later she is seen running back most probably due to the heavy traffics





During lockdown May 1 – July 28, 2021





Current practices



Photo by
Pramod Neupane
Rajesh Ghimire

- Government of Nepal recently endorsed the **wildlife friendly infrastructure construction Directives**.
- Wildlife crossing structures should be constructed in the infrastructures planned in future and already under construction

नेपाल सरकार
वन तथा वातावरण मन्त्रालयको
सूचना

वन्यजन्तुमैत्री पूर्वाधार निर्माण निर्देशिका, २०७८

प्रस्तावना: वन्यजन्तुको आवतजावतलाई सुरक्षित तुल्याई वन्यजन्तु दुर्घटना कम गर्न तथा मानव र वन्यजन्तु बीचको द्वन्द्व न्यूनीकरण गर्नको लागि वन्यजन्तुको बासस्थान र हिँडडुलका क्षेत्रमा निर्माण हुने रेखात्मक प्रकृतिका पूर्वाधार संरचनालाई वन्यजन्तुमैत्री बनाउन वाञ्छनीय भएकोले,

राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण ऐन, २०२९ को दफा ३३क. ले दिएको अधिकार प्रयोग गरी नेपाल सरकारले यो निर्देशिका बनाएको छ।

परिच्छेद-१

प्रारम्भिक

१. संक्षिप्त नाम र प्रारम्भ: (१) यस निर्देशिकाको नाम “वन्यजन्तुमैत्री पूर्वाधार निर्माण निर्देशिका, २०७८” रहेको छ।
(२) यो निर्देशिका नेपाल राजपत्रमा प्रकाशन भएको मिति देखि प्रारम्भ हुनेछ।



Nairobi, Kenya



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