



STAR Assessment Report

Species Threat Abatement and Recovery (STAR) assessment for TRI Myanmar project sites

Estimated Ex-Ante STAR assessment
STAR assessment data by Louise Mair, Newcastle University
Report by Joshua Schneck, IUCN
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THE RESTORATION INITIATIVE



Food and Agriculture
Organization of the
United Nations



An important landscape for threatened biodiversity

This report presents findings from an assessment, using the **Species Threat Abatement and Recovery (STAR)** metric, of the sites and adjacent areas where the TRI Myanmar project¹ is undertaking on-the-ground restoration work and other activities. While relatively small in size, the project sites and adjacent protected areas are important for a number of threatened species. Identified threatened species in project sites include the Eld's deer, Hooded treepie, Eastern hoolock gibbon, Masked finfoot, Greater adjutant, Phayre's leaf monkey, Indian pangolin, and others².

STAR assessments provide quantifiable information on the contribution that abatement – through restoration and other actions – of specific threats in specific places can make to the improvement of species survival probability. This information can be used to make improved land management, conservation, and investment decisions where conservation of threatened biodiversity is among the objectives shared by stakeholders.

This STAR assessment report is the result of a desk-based analysis using readily available global data from the IUCN Red List of Threatened Species³ – the largest and most well-respected data source on species conservation status. A subsequent *Baseline Ex-Ante STAR report*, using locally-gathered and verified data and linking estimated STAR scores to specific Forest Landscape Restoration (FLR) actions, will be developed through 2020.

Background

Conservation of threatened biodiversity is often limited by a lack of readily available information: information on where threatened species are found; the types of threats facing individual species and their significance; and the impacts that different actions and investments can make on conservation outcomes. Moreover, as funding is limited and biodiversity conservation often competes with other land use objectives, conservation actions and investments typically must be weighed against alternative options. To date, these conservation and investment decisions have been made in absence of a quantitative, comparable, scalable, and verifiable measure of the conservation gains from alternative actions.

In response to this need, a new metric and approach is being developed by IUCN, in partnership with Newcastle University, Birdlife International, and others. Called the *Species Threat Abatement and Recovery (STAR)* metric, the tool uses data from the IUCN Red List of Threatened Species to generate both ex-ante (potential) and ex-post (achieved) estimates on the impacts of actions and investments to reducing threats to species loss at a range of scales and over a range of timelines. These actions and investments would include restoration interventions.

The methodology for STAR, which is presently being finalized for publication in a scientific journal, is not presented here in full, although a methodological report will be provided to project partners soon for

¹ This IUCN-led, GEF-supported project is titled, "*Reversing forest degradation and deforestation and restoring forested landscape through local multi-stakeholder management in Myanmar*". This project is one of 11 national projects participating in the GEF-6 Programme The Restoration Initiative (TRI), led by IUCN, in partnership with FAO and UNEP. More information on the TRI Myanmar project available online at: <https://www.thegef.org/project/restoration-initiative-tri-myanmar-reversing-forest-degradation-and-deforestation-and>

² Images of four identified threatened species whose existing habitat overlaps the Project sites are shown on cover page clockwise from top left: Eld's deer; Phayre's leaf monkey; Indian pangolin; Masked finfoot

³ IUCN Red List of Threatened Species is accessible online at: <https://www.iucnredlist.org>

those wishing to better understand the underlying methodology. What is covered here is sufficient for interpretation of STAR scores and the other information presented in the Findings section below.

Interpreting STAR results

The STAR metric is directly linked to the IUCN Red List of Threatened Species that uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies throughout the world. Criteria include factors such as rate of population decline, population size, area of geographic distribution, and degree of population and distribution fragmentation. Species with sufficient data are classified into one of seven groups, ranging from “Least Concern,” for those species unlikely to become extinct in the near future, to “Extinct⁴,” for those species that are no longer extant.

The STAR metric is focused on species classified as threatened (classes CR, EN, VU) or “Near Threatened” (class NT) (see Box 1).





The central idea behind the STAR metric is that for each threatened or Near Threatened species, the total global STAR score available represents the complete alleviation of threats sufficient to result in reclassifying that species as one of “Least Concern”. The total number of STAR units is dependent upon which Red List category a species is classified in, with higher amounts assumed to correspond to greater efforts needed to ensure species survival. The total STAR units per Red List category are:

- 100 STAR units for a Near Threatened species
- 200 STAR units for a Vulnerable species
- 300 STAR units for an Endangered species
- 400 STAR units for a Critically Endangered species

The STAR metric is spatially explicit – that is, its calculation is performed for all Near Threatened and threatened species present at a location, which can be any spatially defined area, from a maximum size of the entire globe, down to a minimum practical size determined by the spatial resolution of species habitat maps (e.g., 5km grid cells). Underlying this calculation is Red List data on species **current Area of Habitat (AOH)** – areas considered part of a species present-day range – as well data on a species **historical AOH** – areas that were once part of a species range but that are now outside of the species present-day range, presumably due to habitat modification/destruction.⁵

The STAR metric is calculated by, along with other variables (see Annex II), factoring the percentage of threatened and Near Threatened species total current AOH found at a location (0-100%). STAR values generated in this way are shown spatially on the left side of the maps below. The STAR calculation is also

Box 1. IUCN Red List species threat classification (abbreviated)

	Critically Endangered - Species has an extremely high risk of extinction in the wild
	Endangered - Species has a very high risk of extinction in the wild
	Vulnerable - Species has a high risk of extinction in the wild
	Near Threatened - Species is likely to move into a threatened category in near future

⁴ A close category to “Extinct” is “Extinct in the wild,” for those species that survive only in captivity, cultivation and/or outside native range.
⁵ Brooks, T.M., Pimm, S.L., Akçakaya, H.R., Buchanan, G.M., Butchart, S.H.M., Foden, W., Hilton-Taylor, C., Hoffmann, M., Jenkins, C.N., Joppa, L., Li, B.V., Menon, V., Ocampo-Peñuela, N. & Rondinini, C. (2019) Measuring Terrestrial Area of Habitat (AOH) and Its Utility for the IUCN Red List. *Trends in Ecology & Evolution*. Note that for the STAR analyses, a baseline of 1992 is used for determining what is historical AOH.

generated using the extent of historical and restorable AOH at a location, expressed as a percentage of total global current AOH. STAR values generated in this way are shown spatially on the right side of maps below.

In this way, the two-sided calculation and presentation of STAR values reveals the following:

- Conservation potential from **Existing habitat (left side of maps)**: The maximum contribution that restoration and threat abatement actions⁶ on habitat presently part of identified threatened species range (current AOH) can make towards conservation of those species.
- Conservation potential from restoring **Lost habitat (right side of maps)**: The maximum contribution that restoration and threat abatement actions on habitat once but no longer part of identified threatened species range (historical AOH) can make towards conservation of those species.

STAR units generated for current AOH and historical AOH are equivalent, meaning that restoration and threat abatement of lost habitat can complement and (theoretically) substitute for threat abatement and restoration of existing habitat. In practice, restoration and threat abatement of lost habitat is likely to be more costly and technically demanding and require longer periods of time to achieve the same conservation benefits to threatened species as restoration and threat abatement actions in existing habitat. However, the cost and feasibility of restoration and threat abatement of lost habitat is highly context specific, and should therefore not be excluded from consideration – indeed for some highly threatened species with restricted ranges, restoration of lost habitat may be essential for these species medium- and long-term survival. Presentation of STAR scores for both Existing habitat and Lost habitat, as shown on the accompanying maps, facilitates consideration of the full range of restoration and threat abatement actions.

When results of the STAR metric calculation are presented in a map, as they are on the following pages, areas of relatively higher STAR values correspond to higher concentrations and severity of threatened species, and greater opportunity for reducing risks to threatened species and for contributions to species conservation.

As noted above, analysis linking estimated STAR scores to specific FLR actions will be developed through 2020 and presented in a subsequent *Baseline Ex-Ante STAR report*.

Beyond the spatial mapping of STAR scores, other useful information is provided in this report including:

- List of all threatened and Near Threatened species thought to be present⁷ at the project sites, as well as species Red List threat classification and corresponding STAR scores [Tables A1-A3 in Annex I]
- Chart showing relative contribution (i.e., share of the STAR score) that abatement of specific threats believed to be impacting identified threatened species at the Project sites would make to conservation of those species [Figures 1 in Findings section]

⁶ In interpreting these maps, it's important to keep in mind that restoration activities have the potential to alleviate threats to threatened species in both existing (current AOH) habitat and for areas of lost (historical AOH) habitat.

⁷ i.e., the identified species current AOH overlaps with the Project site.

Findings

The STAR assessment for the TRI Myanmar Project sites shows these sites to be of importance for a number of threatened species. Because the *FLR sites*, *Chatthin Wildlife sanctuary*, and *Zalone Taung National Park* are either adjacent to or near one another, the same identified threatened species are found across most of the sites. In all, the current and historical habitat of 52 threatened species overlaps with the project sites, as shown in tables A1-A3 below in Annex 1.

Among the identified threatened species, three species are responsible for some 50% of the total STAR score possible from restoration and threat abatement actions in existing and lost habitat in the Project sites. They are the Eld's deer (23% of total STAR), Hooded treepie (16% of total STAR), and Eastern hoolock gibbon (12% of total STAR).

Other threatened and Near threatened species with current AOH overlapping project sites, in decreasing order of associated STAR scores, are the Masked finfoot, (6% of total STAR), Greater adjutant (5% of total STAR), Jerdon's minivet (4% of total STAR), Phayre's leaf monkey (3% of total STAR), Large-spotted civet (3% of total STAR), Slender-billed vulture (3% of total STAR), and the Indian pangolin (2% of total STAR).

In total, the maximum amount of STAR available at all project sites including the Chatthin Wildlife sanctuary and Zalone Taung National Park from restoration and threat abatement actions in existing habitat is 18. The maximum amount of STAR available at all project sites from restoration and threat abatement actions in lost habitat is 33 – almost double that from restoration and threat abatement actions in existing habitat, indicating a significant portion of lost habitat for threatened species overlaps with project sites.

As shown in Map 1, STAR scores are distributed relatively evenly across project sites, with no single site showing exceptionally high or low STAR values relative to the others. Some particularly important areas for restoration of lost habitat can be found adjacent to the three small FLR sites in the center of the project landscape.

To put these STAR values in context, a map showing STAR values across Myanmar is provided below (Map 2).

Threats to identified threatened species at the Project sites

The STAR assessment identifies threats and their relative contribution to species decline at project sites, based on IUCN Red List information on the scope and severity of threats affecting listed species. As shown in Figure 1, 33% of the total STAR score for the project sites is represented by restoration and other actions addressing the threat of non-timber crop production. Continuing downward in severity, the other threats believed to be affecting threatened species at the project sites are hunting, logging and wood harvesting, livestock farming and ranching, and pollution.

A more detailed description of these threats is found in Table 1 below.

All of these findings should be interpreted with care, as they rely upon global data that may not reflect local conditions, either because they are outdated or incorrect. As noted, a subsequent *Baseline Ex-Ante STAR report*, using locally-gathered and verified data and linking estimated STAR scores to specific Forest Landscape Restoration (FLR) actions, will be developed through 2020.

It is hoped that this Estimated Ex-Ante STAR assessment can help inform the work of the TRI Myanmar project, as well as other efforts to help conserve threatened species in Myanmar.

Figure 1. STAR values generated at all **project sites** by restoration and other actions that address identified threats (shown on Y axis of chart). The percentage values shown at the top of several bars refer to the % of total project site STAR value represented by restoration and other actions addressing a particular identified threat.

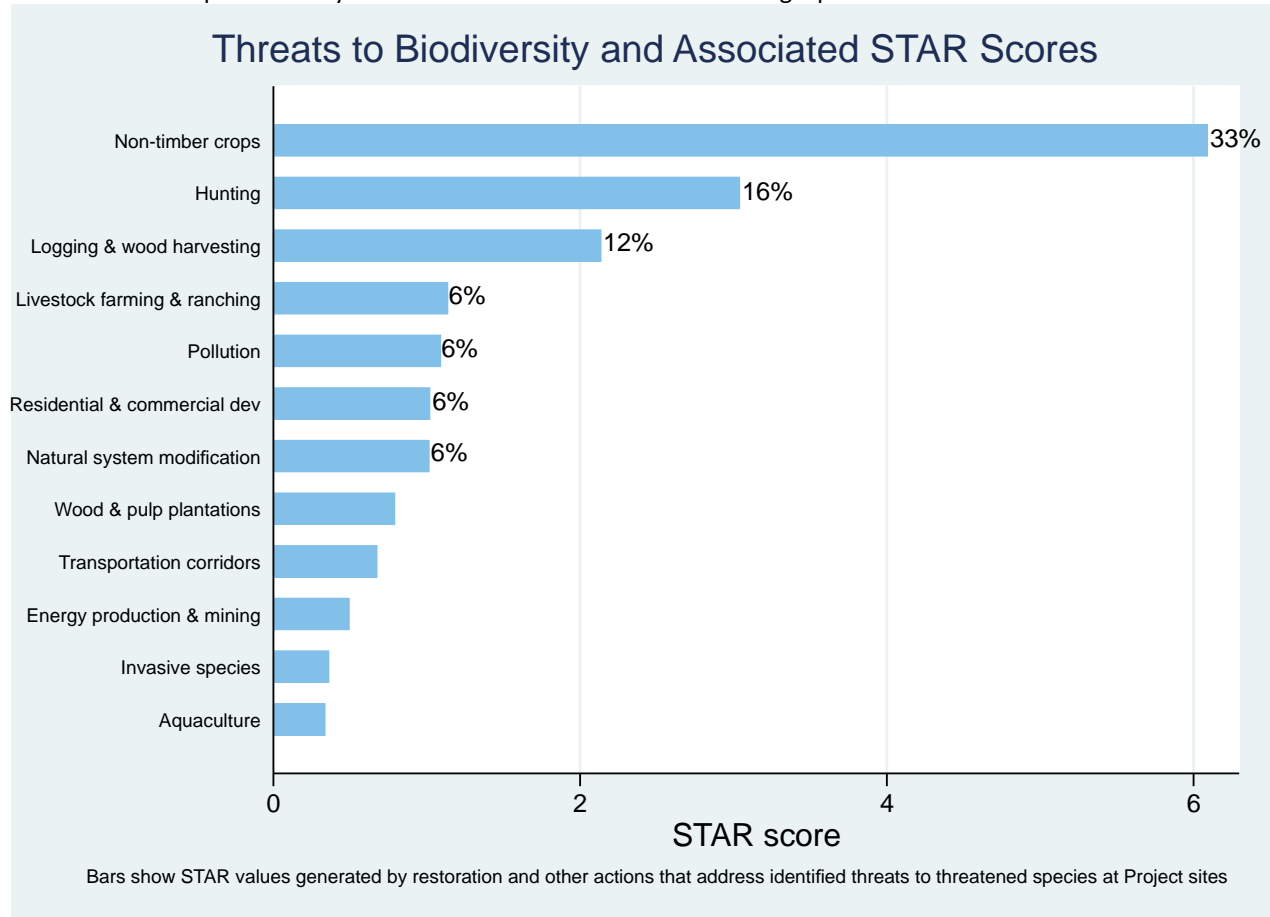


Table 1. Summary information on IUCN threats classification scheme⁸

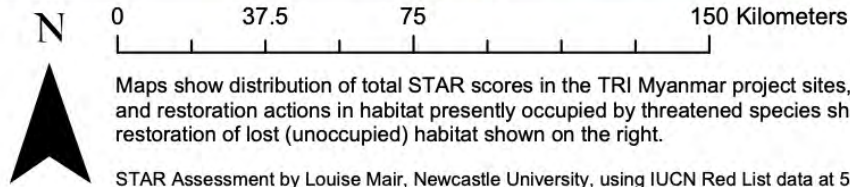
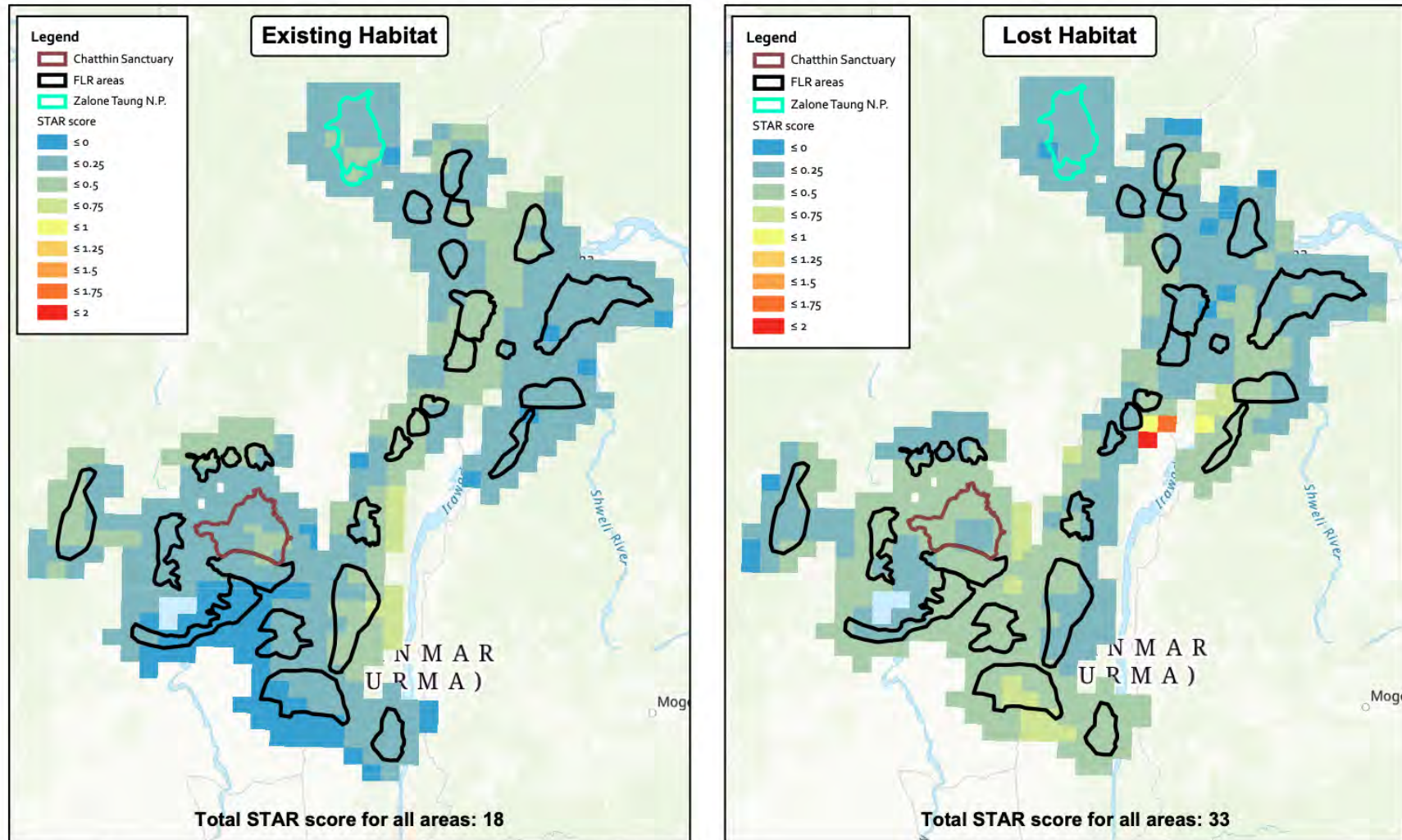
Threat	Description
Aquaculture	Threats from farming of aquatic animals raised in one location on farmed or non-local resources; also hatchery fish allowed to roam in the wild.
Climate change & severe weather	Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events that are outside of the natural range of variation, or potentially can wipe out a vulnerable species or habitat
Energy production & mining	Threats from production of non-biological resources. Examples include oil and gas drilling; mining and quarrying; and exploring, developing and producing renewable energy.
Human disturbance	Threats from human activities that alter, destroy and disturb habitats and species associated with non-consumptive uses of biological resources.
Hunting	Killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
Invasive species	Threats from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance
Livestock farming & ranching	Threats from raising of domestic terrestrial animals in one-location (livestock farming), as well as threats from domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats (livestock ranching)
Logging & wood harvesting	Harvesting trees and other woody vegetation for timber, fiber, or fuel
Natural system modification	Threats from actions that convert or degrade habitat in service of “managing” natural or semi-natural systems, often to improve human welfare. Examples include fire & fire suppression; dams and water management and use, and other ecosystem modifications like tree thinning, beach construction, etc.
Non-timber crops	Threats from farming of crops planted for food, fodder, fiber, fuel or other uses as a result of agricultural expansion and intensification
Pollution	Threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources. Includes domestic & urban waste water, and industrial and agricultural runoff, and garbage and solid waste, as well as heat, sound or light that disturbs wildlife or ecosystems
Residential & commercial development	Threats from human settlements or other non-agricultural land uses with a substantial footprint. Examples include housing and urban areas; commercial and industrial areas; and tourism and recreation areas (e.g., golf courses; resorts; campgrounds)
Transportation corridors	Threats from long narrow transport corridors and the vehicles that use them including associated wildlife mortality
Wood & pulp plantations	Threats from establishment, expansion, and intensification of stands of trees planted for timber or fiber outside of natural forests, often with non-native species

⁸ From IUCN Red List Threats Classification Scheme version 3.2, available: <https://www.iucnredlist.org/resources/threat-classification-scheme>

Map 1. Ex-Ante STAR Assessment map for TRI Myanmar project sites

Species Threat Abatement and Recovery Assessment

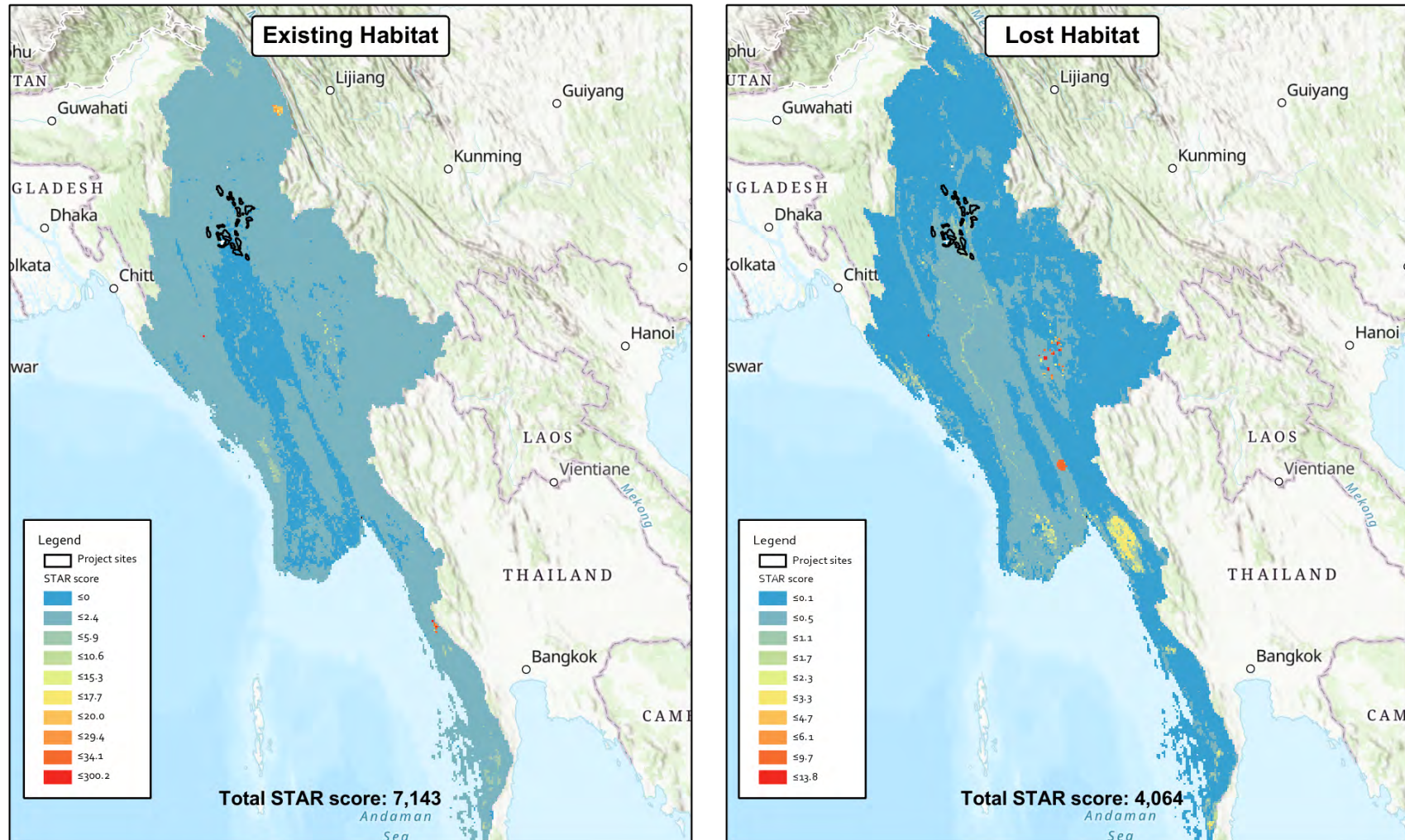
Ex-Ante STAR Assessment for TRI Myanmar Project Sites



Map 2. Ex-Ante STAR Assessment map for all of Myanmar, providing context and location of threatened biodiversity hotspots

Species Threat Abatement and Recovery Assessment

Ex-Ante STAR Assessment for Myanmar



0 187.5 375 750 Kilometers

Maps show distribution of total STAR scores across Myanmar, with portion of total score generated by threat abatement and restoration actions in habitat presently occupied by threatened species shown at left, and portion of total score generated by restoration of lost (unoccupied) habitat shown on the right.

STAR Assessment by Louise Mair, Newcastle University, using IUCN Red List data at 5km resolution. Map by Joshua Schneck, IUCN. March 16, 2020.

Annex 1. Identified threatened species in TRI Myanmar project sites and associated STAR scores

Table A1. Identified threatened and Near Threatened species for FLR sites and associated STAR scores

#	Common name	Scientific name	Common grouping	RED List Status	STAR score, threat abatement in existing habitat	STAR score, restoring lost habitat	% of current AOH in Project site	% of Lost AOH in Project site
1	Eld's deer	Rucervus eldii	Deer	EN	2.82	6.62	0.94%	2.21%
2	Hooded treepie	Crypsirina cucullata	Bird	NT	1.95	5.54	1.95%	5.54%
3	Eastern hoolock gibbon	Hoolock leuconedys	Gibbon	VU	1.47	3.07	0.73%	1.54%
4	Masked finfoot	Heliopais personatus	Waterbird	EN	0.79	1.82	0.26%	0.61%
5	Greater adjutant	Leptoptilos dubius	Bird	EN	0.50	1.34	0.17%	0.45%
6	Jerdon's minivet	Pericrocotus albifrons	Bird	NT	1.09	1.06	1.09%	1.06%
7	Phayre's leaf monkey	Trachypithecus phayrei	Monkey	EN	0.33	0.98	0.11%	0.33%
8	Large-spotted civet	Viverra megaspila	Civet	EN	0.37	0.90	0.12%	0.30%
9	Slender-billed vulture	Gyps tenuirostris	Bird	CR	0.35	0.85	0.09%	0.21%
10	Indian pangolin	Manis crassicaudata	Pangolin	EN	0.29	0.71	0.10%	0.24%
11	Red-headed vulture	Sarcogyps calvus	Bird	CR	0.20	0.48	0.05%	0.12%
12	Chinese pangolin	Manis pentadactyla	Pangolin	CR	0.18	0.44	0.05%	0.11%
13	White-rumped vulture	Gyps bengalensis	Bird	CR	0.16	0.41	0.04%	0.10%
14	Balloon frog	Glyphoglossus molossus	Frog	NT	0.09	0.36	0.09%	0.36%
15	Hog badger	Arctonyx collaris	Badger	VU	0.12	0.35	0.06%	0.18%
16	Bengal slow loris	Nycticebus bengalensis	Loris	VU	0.12	0.34	0.06%	0.17%
17	Woolly-necked stork	Ciconia episcopus	Waterbird	VU	0.11	0.33	0.05%	0.16%
18	Lesser adjutant	Leptoptilos javanicus	Bird	VU	0.10	0.30	0.05%	0.15%
19	Northern pig-tailed macaque	Macaca leonina	Macaque	VU	0.14	0.30	0.07%	0.15%
20	Dhole	Cuon alpinus	Dog	EN	0.11	0.29	0.04%	0.10%
21	Smooth-coated otter	Lutrogale perspicillata	Otter	VU	0.07	0.25	0.03%	0.12%
22	Ashy-headed green pigeon	Treron phayrei	Bird	NT	0.08	0.24	0.08%	0.24%
23	Alexandrine parakeet	Psittacula eupatria	Bird	NT	0.06	0.19	0.06%	0.19%
24	Spot-billed ptilin	Pelecanus philippensis	Waterbird	NT	0.05	0.19	0.05%	0.19%
25	Blossom-headed parakeet	Psittacula roseata	Bird	NT	0.06	0.19	0.06%	0.19%
26	Gaur	Bos gaurus	Bison	VU	0.12	0.17	0.06%	0.09%
27	Sun bear	Helarctos malayanus	Bear	VU	0.06	0.17	0.03%	0.09%
28	Grey-headed parakeet	Psittacula finschii	Bird	NT	0.05	0.14	0.05%	0.14%
29	Clouded leopard	Neofelis nebulosa	Leopard	VU	0.07	0.13	0.03%	0.07%
30	Black-headed ibis	Threskiornis melanocephalus	Waterbird	NT	0.04	0.13	0.04%	0.13%
31	Asian small-clawed otter	Aonyx cinereus	Otter	VU	0.04	0.13	0.02%	0.06%
32	Red-breasted parakeet	Psittacula alexandri	Bird	NT	0.03	0.11	0.03%	0.11%
33	Sambar deer	Rusa unicolor	Deer	VU	0.03	0.09	0.01%	0.04%
34	Mainland serow	Capricornis milneedwardsii	Antelope	NT	0.03	0.08	0.03%	0.08%
35	Rufous-bellied eagle	Lophotriorchis kienerii	Bird	NT	0.02	0.08	0.02%	0.08%
36	Banteng	Bos javanicus	Bovine	EN	0.16	0.08	0.05%	0.03%
37	Binturong	Arctictis binturong	Bearcat	VU	0.02	0.08	0.01%	0.04%
38	Asian black bear	Ursus thibetanus	Bear	VU	0.02	0.08	0.01%	0.04%
39	Marbled cat	Pardofelis marmorata	Cat	NT	0.02	0.07	0.02%	0.07%
40	Oriental darter	Anhinga melanogaster	Waterbird	NT	0.01	0.06	0.01%	0.06%
41	Black-necked stork	Ephippiorhynchus asiaticus	Waterbird	NT	0.01	0.05	0.01%	0.05%

#	Common name	Scientific name	Common grouping	RED List Status	STAR score, threat abatement in existing habitat	STAR score, restoring lost habitat	% of current AOH in Project site	% of Lost AOH in Project site
42	Asian golden cat	<i>Catopuma temminckii</i>	Cat	NT	0.00	0.02	0.00%	0.02%
43	Asian elephant	<i>Elephas maximus</i>	Elephant	EN	0.02	0.02	0.01%	0.01%
44	Indian hog deer	<i>Axis porcinus</i>	Deer	EN	0.04	0.02	0.01%	0.01%
45	Indian skimmer	<i>Rynchops albicollis</i>	Bird	VU	0.03	0.01	0.01%	0.01%
46	Yellow-breasted bunting	<i>Emberiza aureola</i>	Bird	CR	0.01	0.01	0.00%	0.00%
47	Black-bellied tern	<i>Sterna acuticauda</i>	Bird	EN	0.02	0.01	0.01%	0.00%
48	Greater spotted eagle	<i>Clanga clanga</i>	Bird	VU	0.00	0.01	0.00%	0.00%
49	River lapwing	<i>Vanellus duvaucelii</i>	Bird	NT	0.01	0.00	0.01%	0.00%
50	Pallas's fish eagle	<i>Haliaeetus leucoryphus</i>	Bird	EN	0.01	0.00	0.00%	0.00%
51	Great stone-curlew	<i>Esacus recurvirostris</i>	Bird	NT	0.01	0.00	0.01%	0.00%
52	Tiger	<i>Panthera tigris</i>	Tiger	EN	0.02	0.00	0.01%	0.00%
TOTAL					12.51	29.33		

Table A2. Identified threatened and Near Threatened species for **Chatthin Sanctuary sites** and associated STAR scores

#	Common name	Scientific name	Common grouping	RED List Status	STAR score, threat abatement in existing habitat	STAR score, restoring lost habitat	% of current AOH in Project site	% of Lost AOH in Project site
1	Eld's deer	Rucervus eldii	Deer	EN	0.72	1.00	0.24%	0.33%
2	Hooded treepie	Crypsirina cucullata	Bird	NT	0.44	0.61	0.44%	0.61%
3	Eastern hoolock gibbon	Hoolock leuconedys	Gibbon	VU	0.31	0.42	0.15%	0.21%
4	Greater adjutant	Leptoptilos dubius	Waterbird	EN	0.10	0.13	0.03%	0.04%
5	Phayre's leaf monkey	Trachypithecus phayrei	Monkey	EN	0.07	0.10	0.02%	0.03%
6	Large-spotted civet	Viverra zibetha	Civet	EN	0.06	0.08	0.02%	0.03%
7	Slender-billed vulture	Gyps tenuirostris	Bird	CR	0.06	0.08	0.01%	0.02%
8	Indian pangolin	Manis crassicaudata	Pangolin	EN	0.05	0.07	0.02%	0.02%
9	Balloon frog	Glyphoglossus molossus	Frog	NT	0.04	0.06	0.04%	0.06%
10	Red-headed vulture	Sarcogyps calvus	Bird	CR	0.03	0.05	0.01%	0.01%
11	Chinese Pangolin	Manis pentadactyla	Pangolin	CR	0.03	0.04	0.01%	0.01%
12	Northern pig-tailed macaque	Macaca leonina	Primate	VU	0.03	0.04	0.02%	0.02%
13	Asian golden cat	Catopuma temminckii	Cat	NT	0.03	0.04	0.03%	0.04%
14	White-rumped vulture	Gyps bengalensis	Bird	CR	0.03	0.04	0.01%	0.01%
15	Hog badger	Arctonyx collaris	Badger	VU	0.03	0.04	0.01%	0.02%
16	Bengal slow loris	Nycticebus bengalensis	Loris	VU	0.03	0.04	0.01%	0.02%
17	Woolly-necked stork	Ciconia episcopus	Bird	VU	0.02	0.03	0.01%	0.02%
18	Lesser adjutant	Leptoptilos javanicus	Bird	VU	0.02	0.03	0.01%	0.02%
19	Dhole	Cuon alpinus	Dog	EN	0.02	0.03	0.01%	0.01%
20	Guar	Bos gaurus	Bison	VU	0.02	0.03	0.01%	0.01%
21	Smooth-coated otter	Lutrogale perspicillata	Otter	VU	0.02	0.03	0.01%	0.01%
22	Ashy-headed green pigeon	Treron phayrei	Bird	NT	0.02	0.03	0.02%	0.03%
23	Black-headed ibis	Threskiornis melanocephalus	Waterbird	NT	0.02	0.02	0.02%	0.02%
24	Spot-billed pelican	Pelecanus philippensis	Waterbird	NT	0.01	0.02	0.01%	0.02%
25	Alexandrine parakeet	Psittacula eupatria	Bird	NT	0.01	0.02	0.01%	0.02%
26	Blossom-headed parakeet	Psittacula roseata	Bird	NT	0.01	0.02	0.01%	0.02%
27	Sun bear	Helarctos malayanus	Bear	VU	0.01	0.02	0.01%	0.01%
28	Grey-headed parakeet	Psittacula finschii	Bird	NT	0.01	0.02	0.01%	0.02%
29	Marbled cat	Pardofelis marmorata	Cat	NT	0.01	0.02	0.01%	0.02%
30	Asian small-clawed otter	Aonyx cinereus	Otter	VU	0.01	0.01	0.01%	0.01%
31	Red-breasted parakeet	Psittacula alexandri	Bird	NT	0.01	0.01	0.01%	0.01%
32	Sambar deer	Rusa unicolor	Deer	VU	0.01	0.01	0.00%	0.01%
33	Rufous-bellied eagle	Lophotriorchis kienerii	Bird	NT	0.01	0.01	0.01%	0.01%
34	Mainland serow	Capricornis milneedwardsii	Antelope	NT	0.01	0.01	0.01%	0.01%
35	Asian black bear	Ursus thibetanus	Bear	VU	0.01	0.01	0.00%	0.00%
36	Oriental darter	Anhinga melanogaster	Waterbird	NT	0.01	0.01	0.01%	0.01%
37	Black-necked stork	Ephippiorhynchus asiaticus	Waterbird	NT	0.01	0.01	0.01%	0.01%
38	Jerdon's minivet	Pericrocotus albifrons	Bird	NT	0.01	0.01	0.01%	0.01%
39	Clouded leopard	Neofelis nebulosa	Leopard	VU	0.00	0.01	0.00%	0.00%
TOTAL					2.37	3.27		

Table A3. Identified threatened and Near Threatened species for **Zalone Taung National Park** and associated STAR scores

#	Common name	Scientific name	Common grouping	RED List Status	STAR score, threat abatement in existing habitat	STAR score, restoring lost habitat	% of current AOH in Project site	% of Lost AOH in Project site
1	Eastern hoolock gibbon	Hoolock leuconedys	Gibbon	VU	0.60	0.02	0.30%	0.01%
2	Masked finfoot	Heliopais personatus	Waterbird	EN	0.38	0.02	0.13%	0.01%
3	Jerdon's minivet	Pericrocotus albifrons	Bird	NT	0.32	0.03	0.32%	0.03%
4	Large-spotted civet	Viverra zibetha	Civet	EN	0.14	0.01	0.05%	0.00%
5	Slender-billed vulture	Gyps tenuirostris	Bird	CR	0.13	0.01	0.03%	0.00%
6	Indian pangolin	Manis crassicaudata	Pangolin	EN	0.11	0.00	0.04%	0.00%
7	Red-headed vulture	Sarcogyps calvus	Bird	CR	0.08	0.00	0.02%	0.00%
8	Greater adjutant	Leptoptilos dubius	Bird	EN	0.08	0.01	0.03%	0.00%
9	Chinese pangolin	Manis pentadactyla	Pangolin	CR	0.07	0.00	0.02%	0.00%
10	White-rumped vulture	Gyps bengalensis	Bird	CR	0.07	0.00	0.02%	0.00%
11	Tiger	Panthera tigris	Tiger	EN	0.07	0.00	0.02%	0.00%
12	Northern pig-tailed macaque	Macaca leonina	Macaque	VU	0.06	0.00	0.03%	0.00%
13	Guar	Bos gaurus	Bison	VU	0.06	0.00	0.03%	0.00%
14	Lesser adjutant	Leptoptilos javanicus	Bird	VU	0.05	0.00	0.03%	0.00%
15	Hog badger	Arctonyx collaris	Badger	VU	0.05	0.00	0.03%	0.00%
16	Bengal slow loris	Nycticebus bengalensis	Primate	VU	0.05	0.00	0.03%	0.00%
17	Dhole	Cuon alpinus	Dog	EN	0.05	0.00	0.02%	0.00%
18	Wolly-necked stork	Ciconia episcopus	Bird	VU	0.05	0.00	0.02%	0.00%
19	Asian elephant	Elephas maximus	Elephant	EN	0.04	0.00	0.01%	0.00%
20	Clouded leopard	Neofelis nebulosa	Leopard	VU	0.04	0.00	0.02%	0.00%
21	Ashy-headed green pigeon	Treron phayrei	Bird	NT	0.04	0.00	0.04%	0.00%
22	Alexandrine parakeet	Psittacula eupatria	Bird	NT	0.03	0.00	0.03%	0.00%
23	Blossom-headed parakeet	Psittacula roseata	Bird	NT	0.03	0.00	0.03%	0.00%
24	Binturong	Arctictis binturong	Bearcat	VU	0.03	0.00	0.02%	0.00%
25	Sun bear	Helarctos malayanus	Bear	VU	0.03	0.00	0.02%	0.00%
26	Spot-billed pelican	Pelecanus philippensis	Waterbird	NT	0.03	0.00	0.03%	0.00%
27	Grey-headed parakeet	Psittacula finschii	Bird	NT	0.03	0.00	0.03%	0.00%
28	Asian small-clawed otter	Aonyx cinereus	Otter	VU	0.02	0.00	0.01%	0.00%
29	Black gian squirrel	Ratufa bicolor	Squirrel	NT	0.02	0.00	0.02%	0.00%
30	Marbled cat	Pardofelis marmorata	Cat	NT	0.02	0.00	0.02%	0.00%
31	Red-breasted parakeet	Psittacula alexandri	Bird	NT	0.02	0.00	0.02%	0.00%
32	Sambar deer	Rusa unicolor	Deer	VU	0.02	0.00	0.01%	0.00%
33	Mainland serow	Capricornis milneedwardsii	Antelope	NT	0.02	0.00	0.02%	0.00%
34	Asian black bear	Ursus thibetanus	Bear	VU	0.02	0.00	0.01%	0.00%
35	Smooth-coated otter	Lutrogale perspicillata	Otter	VU	0.01	0.00	0.01%	0.00%
36	Rufous-bellied eagle	Lophotriorchis kienerii	Bird	NT	0.01	0.00	0.01%	0.00%
37	Oriental darter	Anhinga melanogaster	Waterbird	NT	0.01	0.00	0.01%	0.00%
38	Black-necked stork	Ephippiorhynchus asiaticus	Waterbird	NT	0.01	0.00	0.01%	0.00%
39	Yellow-breasted bunting	Emberiza aureola	Bird	CR	0.01	0.00	0.00%	0.00%
40	Greater spotted eagle	Clanga clanga	Bird	VU	0.01	0.00	0.00%	0.00%
TOTAL					2.94	0.14		

Annex 2. Calculation of STAR scores

The STAR score for a site considering species current AOH (left side of Maps 1 and 2) is calculated as:

$$\sum (P_{C_{Sp}} \times W_{Sp} \times R_{SpT})$$

where $P_{C_{Sp}}$ is the current extent of Area of Habitat (AOH) for species Sp at the site, expressed as a percentage of the total global current AOH for the species; W_{Sp} is the Red List category weighting of species Sp ; and R_{SpT} is the relative contribution⁹ of threat T to the extinction risk of species Sp .

The STAR score for a site considering species restorable historical AOH (right side of Maps 1 and 2) is calculated as:

$$\sum (P_{r_{Sp}} \times W_{Sp} \times R_{SpT})$$

where $P_{r_{Sp}}$ is the extent of restorable historical AOH for species Sp at the site, expressed as a percentage of the total global current AOH for the species.

⁹ See STAR methodology (forthcoming) for an explanation of the “Relative contribution to threats” factor and its calculation