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USING THE STAR METRIC TO ACHIEVE BIODIVERSITY GOALS

Guidance for Governments

IUCN Canada NAbSA NATURE-BASED SOLUTIONS FOR CLIMATE ADAPTATION

Cover photograph

Mangrove Pitta *(Pitta megarhyncha)*
NEAR THREATENED
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Credits

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IUCN Canada NAbSA NATURE-BASED SOLUTIONS FOR CLIMATE ADAPTATION

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of Sections and Subsections

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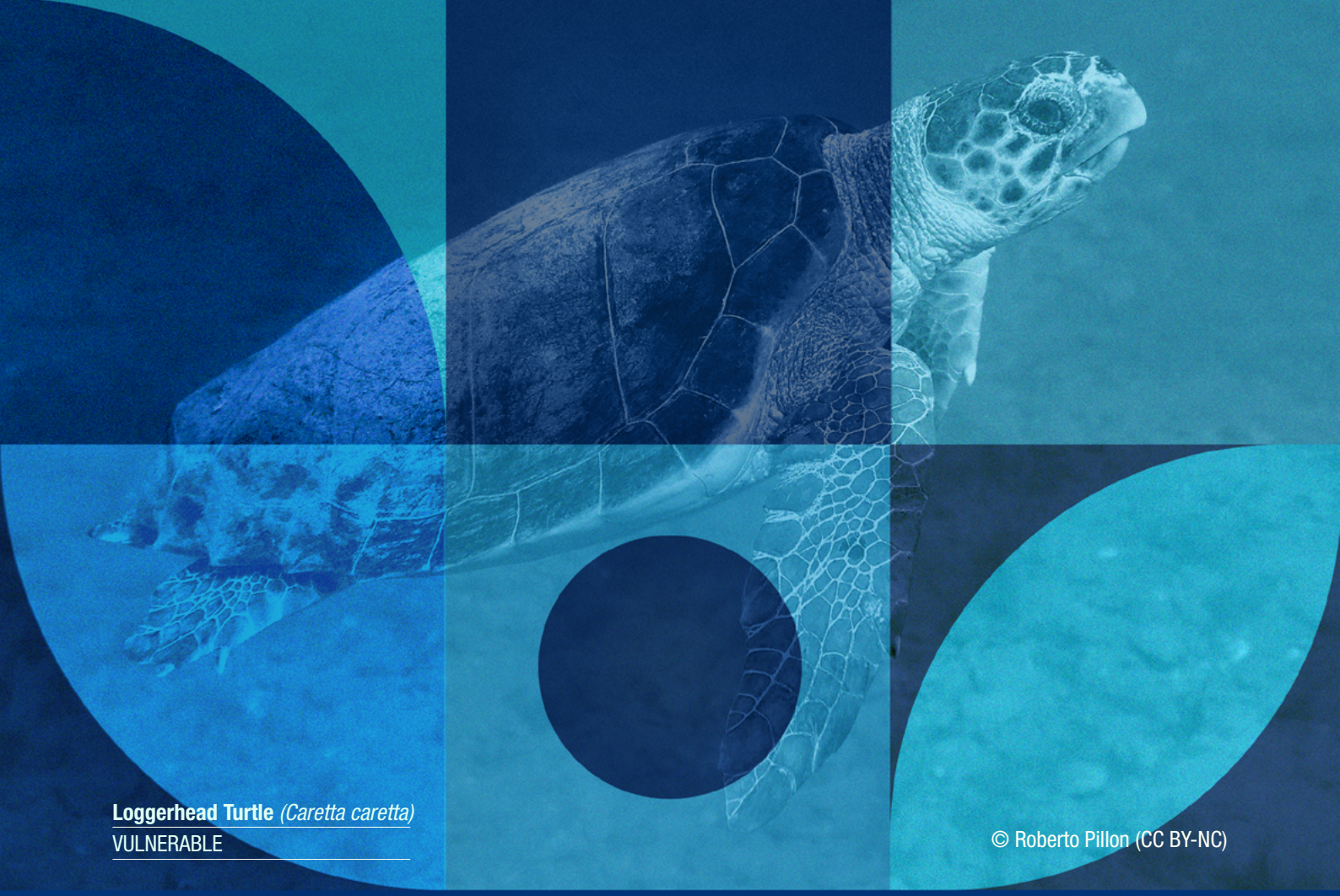

Loggerhead Turtle *(Caretta caretta)*
VULNERABLE

01 WHO IS THIS GUIDANCE FOR?

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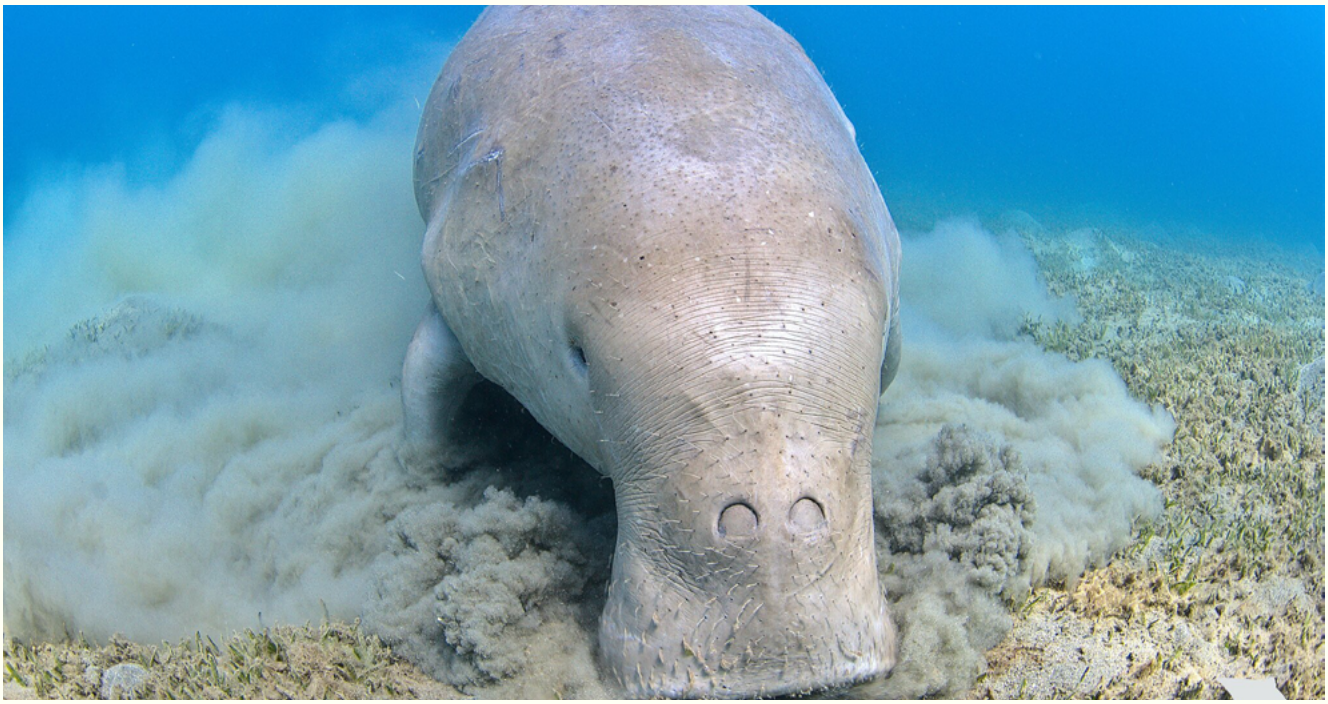

Dugong *(Dugong dugon)* - VULNERABLE / © Luis P B (CC BY-NC)

This guidance provides an overview of the **Species Threat Abatement and Restoration (STAR)** metric and how governments can use it to support target-setting, planning, policy and action for biodiversity conservation.

The guidance is relevant for a range of audiences. However, it particularly aims to support national and sub-national government institutions and agencies that advise on, make or implement decisions affecting nature.

These encompass both:

Those with a direct environmental focus, such as environmental ministries and regulators, or management authorities for natural resources and protected areas;

Those whose decisions indirectly affect nature, in (among others) economic and development planning, agriculture, infrastructure, land-use planning, and local or provincial government.

This guidance is complemented by guidance for the private sector and for civil society organisations.

STAR datasets, and applications of the metric, continue to develop rapidly. **Guidance updates and new examples will be posted on IUCN's** conservation tools web page.

Whale Shark (*Rhincodon typus*)
ENDANGERED

02

THE KMGBF AND GLOBAL GOALS AND TARGETS FOR SPECIES

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The Kunming-Montreal Global Biodiversity Framework (KMGBF) was adopted at the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP15) in December 2022.

The KMGBF is structured around four outcome goals for 2050 and **23 action targets to be urgently implemented by 2030.** The targets and goals provide a coherent collective basis for achieving the KMGBF mission to "halt and reverse biodiversity loss and put nature on the path to recovery" by 2030, and the vision of "living in harmony with nature" by 2050. The targets cover a broad set of actions to reduce direct threats, ensure sustainable use, and put in place the mechanisms for effective biodiversity conservation.

Implementing the KMGBF requires a concerted approach across the whole of society. However, national governments, as CBD contracting Parties, must take the lead. Governments' formal commitment to the KMGBF requires setting national targets and updating National Biodiversity Strategies and Action Plans (NBSAPs) to ensure alignment with the 2050 goals and 2030 targets (see section 4.1.1).

The CBD recognises genes, species and ecosystems as the components of biological diversity. A key part of putting nature on a path to recovery is to safeguard species, for which reducing their risk of extinction is a precondition. KMGBF Goal A aims to halt human-induced extinction of known threatened species, and reduce the extinction rate and risk of all species tenfold by 2050. KMGBF Target 4, which aims to ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, is also highly relevant here. KMGBF Target 2 on restoration, Target 3 on protection of important sites and Targets 5–8 on reducing threats from unsustainable harvest, invasive alien species, pollution, and climate change, respectively, are also relevant.

STAR was designed to guide actions to reduce global extinction risk, and so directly supports implementation and measurement of actions towards KMGBF Goal A. It is relevant also to a number of other intergovernmental agreements and conventions, including the Sustainable Development Goals, and specifically their Target 15.5 on halting extinction (see Section 4 and Annex II).

Mojarra (*Amphilophus lyonsi*)
ENDANGERED

© Jorge San Gil

03 WHAT IS STAR?

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STAR stands for 'Species Threat Abatement and Restoration'. It is a global biodiversity metric based on the IUCN Red List of Threatened Species, calculated in a standardised way using spatially explicit data.

STAR combines data on the current and former presence of threatened and near-threatened species, the threats they face and their risk of extinction, to produce two complementary global data layers for **threat abatement ($STAR_T$) and restoration ($STAR_R$).** The STAR methodology generates STAR scores, and for any given Area of Interest the scores indicate the potential contribution of relevant actions in that area to reduce species extinction risk, through either threat abatement or restoration.

STAR scores can be broken down into scores for specific threats, based on Red List information on the intensity of threats facing individual species. This enables identification of targeted actions needed to abate those threats, and comparison of their potential contribution to reducing extinction risk. STAR scores are additive, comparable and scaleable across different threats, and across all geographies, creating a versatile metric for planning and outcome assessment.

Baryancistrus beggini
VULNERABLE
© Mark H. Sabaj

Box A: STAR and the RLI

In the KMGBF Monitoring Framework, STAR supports the headline Red List Index (RLI) as a complementary indicator. Both indicators are derived from the IUCN Red List, an authoritative global biodiversity dataset for species, but they have quite distinct roles. The RLI tracks changes in the aggregate extinction risk of species, showing improvements or deteriorations. The RLI indicates overall progress towards reducing species extinction risk at a national, regional or global level. It is not applicable at small scales, and responds slowly to change. In contrast, STAR is fully scalable and provides a quantitative score that can be broken down by threat type to help identify and prioritise conservation action.

COSTA RICA / © Pexels Osmany Mederos

3.1

Estimated, Calibrated, Target, and Realised STAR

STAR scores in the global layers are called **Estimated STAR** because they provide an estimate of **local STAR values** based on global datasets, under the assumption that species occur throughout their mapped Area of Habitat, and species-specific threats are uniform across their entire range.

Estimated STAR provides a sound basis for target-setting and prioritisation. When planning specific interventions, Estimated STAR values need to be calibrated using site-specific data (which might include local knowledge and further surveys) to check the presence of species and threats, and actual threat intensity, on the ground or water. **Calibrated STAR** provides a validated measure of a location's potential to contribute to global extinction risk reduction.

To guide their actions, a given actor would then set a **Target STAR**. This could be the same as Calibrated STAR, or could focus on addressing those threats most urgent or material to the actor in question. For a government, for example, Target STAR might be 90% of Calibrated STAR at the national level, consistent with KMGBF Goal A to reduce extinction risk by 90%.

Interventions will aim to improve the status of targeted STAR species through reducing particular relevant threats and/or carrying out habitat restoration. **Realised STAR** is an outcome measure calculated from the measured reduction in threat intensity and/or success of restoration.

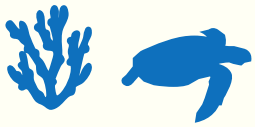
3.2

The STAR global layers

$STAR_T$ scores have been generated globally for the terrestrial, freshwater and marine realms. $STAR_R$ scores have so far been generated only for the terrestrial realm. To ensure that STAR scores from anywhere in the world can be validly compared, the STAR global layers are based on a sub-set of taxon groups that have been comprehensively assessed in the IUCN Red List. This is because to include incompletely assessed taxon groups would introduce significant geographical bias. STAR focuses on the species at highest risk of extinction, namely those assessed as Near Threatened, Vulnerable, Endangered or Critically Endangered on the Red List. Least Concern and Extinct species are not included in STAR.

Figure 1 - outlines the different elements of the global STAR metric and how Estimated STAR relates to Calibrated, Target and Realised STAR.

Estimated STAR

Red List category and threat data **for globally threatened and near-threatened** species in comprehensively assessed taxon groups	Area of Habitat (AoH) maps	Global spatial layer	Status of layer
 **Terrestrial** vertebrates (amphibians, reptiles, birds, mammals)	Current AoH	**Terrestrial** STAR$_T$, (threat abatement)	Available and updated 2025, trees included in next version
	Restorable former AoH	**Terrestrial** STAR$_R$, (restoration)	Available, 2025 update pending (to include reptiles)
 **Marine** seagrasses, reef corals, sharks and rays, bony fishes (certain families), reptiles, birds, mammals	Current AoH	**Marine** STAR$_T$, (threat abatement)	Available
	Restorable former AoH	**Marine** STAR$_R$, (restoration)	For future development
 **Freshwater,** decapod crustaceans, dragonflies, fishes	Current AoH	**Freshwater** STAR$_T$, (threat abatement)	Available by end of 2025
	Restorable former AoH	**Freshwater** STAR$_R$, (restoration)	For future development

CALIBRATED STAR

Refined local values (for STAR$_T$, methodology for STAR$_R$ pending)

Presence of species and threats, and threat intensity, verified to refine estimated STAR values.

TARGET STAR

Planned outcome from interventions.

Using Calibrated STAR, a target set for reduction in STAR score from threat abatement actions.

REALISED STAR

Result of interventions.

Threat abatement and/or restoration tracked to quantify reduction in extinction risk.

Condoto Stubfoot Toad
(Atelopus spurrelli)
CRITICALLY ENDANGERED
© Jaime Culebras

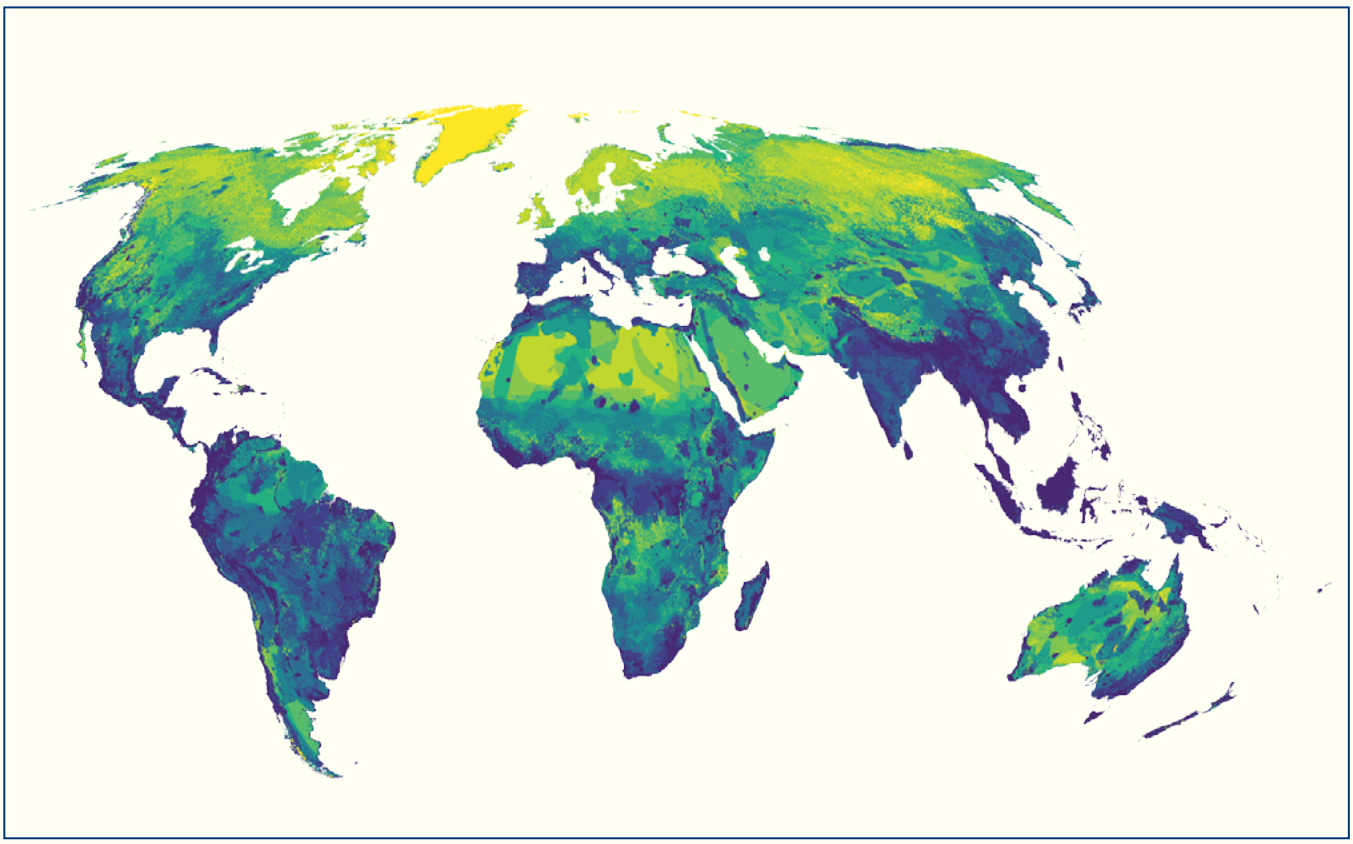
Box B: What do STAR scores mean?

High STAR **threat abatement (START)** scores show areas that currently contain high numbers of threatened species, a large proportion of individual species' ranges, and/or species that are severely threatened. These are locations where positive interventions could make a large contribution to reducing global species extinction risk and where developments that increase threats to species should be mitigated. Such locations may include Key Biodiversity Areas (KBAs), identified for their global significance for biodiversity. KBAs collectively cover less than ten percent of the world's surface area but include nearly 50% of the global **START** score[1].

High STAR **restoration (STARR)** scores indicate areas that previously supported high numbers of threatened species, a large proportion of individual species' ranges, and/or species that are severely threatened. These are locations where restoration activities could make a large contribution to reducing species extinction risk.

Areas with relatively low STAR scores may still include important biodiversity, including threatened species and species of national concern, but are likely to have relatively lower potential for reducing global species extinction risk.

1 Mair et al. 2021



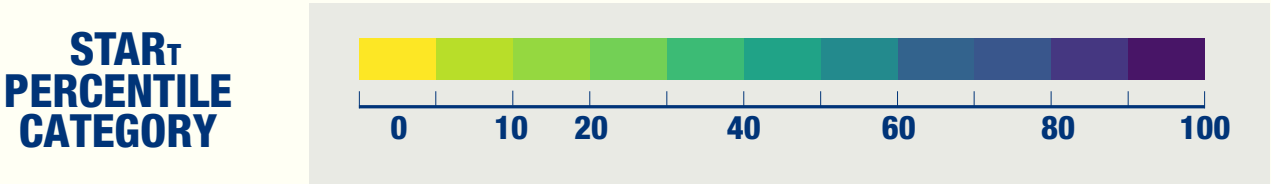


Figure 2 - Updated START terrestrial global layer (version July 2025) for threat abatement, mapped for 1-km grid cells. START marine and STARR terrestrial layers are currently mapped for c. 5-km grid cells. Map colours show the percentile category of STAR scores relative to the global distribution (cells with zero STAR scores shown separately in yellow).

3.3

How STAR works to reduce global extinction risk

STAR aims to support a threat abatement and restoration 'ratchet', where global extinction risk is driven down through an iterative process of action and assessment, so as to achieve the global goal of a tenfold reduction in extinction risk for all species by 2050.

A conceptual outline of this process is shown in Figure 3.

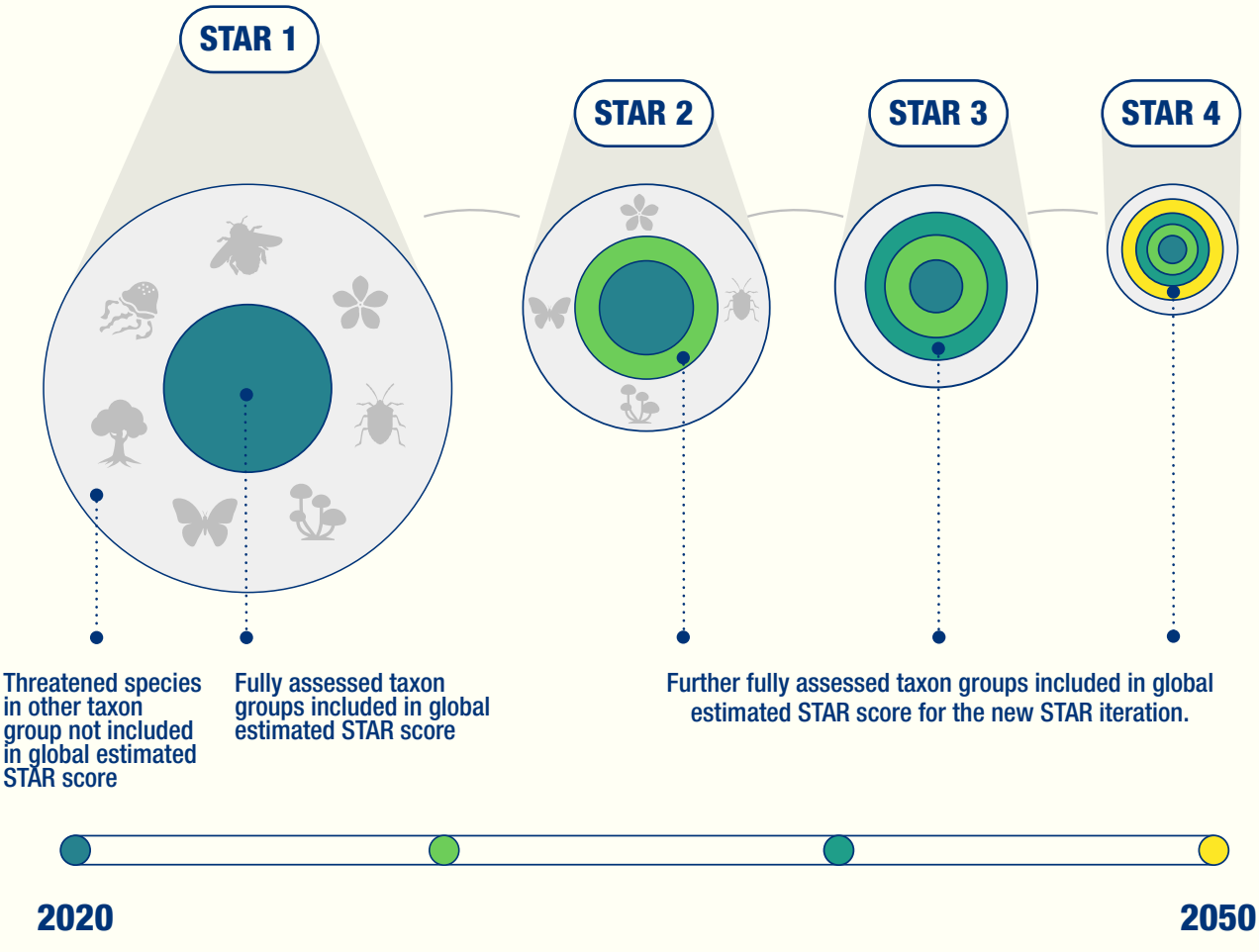


Figure 3 - Conceptual outline of the 'STAR ratchet', an iterative process of assessment and action to reduce species extinction risk tenfold by 2050. The overall area of the circles reflects overall extinction risk and the coloured area total STAR scores in the global layer (thus the overall circle for STAR 4 is one-tenth the area of that for STAR 1). Each iteration of the STAR global layer guides threat abatement and restoration actions for the species included in STAR, reducing extinction risk for those species and also other co-occurring species. With each iteration, more taxon groups are fully assessed and can be included in STAR, but the overall global extinction risk is reduced.

Tucuxi *(Sotalia fluviatilis)*
ENDANGERED

© Fernando Trujillo

04 How STAR can support KMGBF, MEA and SDG implementation

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STAR is a practical and scientifically robust tool designed to translate the ambitious goals of the KMGBF into actionable and measurable steps at various scales. Similarly, STAR can inform a suite of goals and targets across other Multilateral Environmental Agreements (MEAs), including the Ramsar Convention, Convention on Migratory Species, World Heritage Convention and UN Convention to Combat Desertification, and for the Sustainable Development Goals (SDGs). STAR can help governments to make informed decisions, track progress, and demonstrate commitment to halting and reversing biodiversity loss.

Annex II in section 12 outlines how STAR can be used to help achieve particular targets for the KMGBF, other major MEAs and the SDGs.

4.1

Quantifying and prioritizing actions to reduce extinction risk

4.1.1

Setting science-based targets and informing NBSAPs

STAR provides a concrete mechanism for quantifying national contributions to the species-related goals and targets of the KMGBF and SDGs, notably KMGBF Goal A and Target 4, and SDG Target 15.5. STAR scores can be used to develop national, regional or sector-based targets expressed in measurable STAR units.

STAR is ideally suited to inform updated National Biodiversity Strategies and Action Plans (NBSAPs) to align with the KMGBF. Where updated NBSAPs are already developed, STAR can be applied to help implement national targets and actions and track measurable outcomes.

These applications of STAR make transparent how governments are aligning with international obligations and making contributions towards achieving global goals.

4.1.2

Identifying priorities for actions

STAR helps direct limited conservation resources to where they can be most effective. Considering cost and feasibility of addressing threats or implementing restoration alongside STAR scores, governments can strategically allocate funds and efforts to areas where they will yield the greatest reduction in extinction risk. Where relevant, this could include assessment of priorities and projects for official development assistance directed towards nature conservation. Applying STAR is an iterative process (Figure 1), but to maximise its value for decision-making it should first be used as far upstream in the prioritisation process as possible.

STAR scores can be calculated for sub-sets of species relevant to the focus of particular MEAs, and for threat types relevant to particular strategic goals and targets. For example, STAR scores for wetland-dependent species or for migratory species can inform actions for goals and targets of the Ramsar Convention or Convention on Migratory Species.

Using STAR to demonstrate and quantify progress can also provide a springboard for mobilising further resources.

4.1.3

Guiding and accounting for contributions from sub-national and non-state actors

Implementing the KMGBF requires a 'whole of society' approach. This includes sub-national actors (such as cities and local and provincial governments) and non-state actors (including indigenous peoples and local communities, women, youth, civil society, local governments and authorities, academia, the business and financial sectors, and other relevant stakeholders). Non-state actors have been encouraged to make specific commitments to contribute to KMGBF implementation. STAR can help to guide sub-national and non-state actor commitments towards the highest priority interventions, and provides a transparent and standardised way to account for both planned and realised contributions.

4.2

Informing policy and decision-making

STAR provides a data-driven basis for guiding policy, aligned with KMGBF Targets 1, 14, 15 and others. It can inform the development of legislative and administrative measures, such as expanding Protected Area networks, incentivizing sustainable agriculture, or developing robust reporting and disclosure requirements. STAR enables policy decisions to be linked to quantifiable outcomes in reducing extinction risk.

4.2.1

Scaling compensation and contribution requirements

Conservation targets set through STAR (which could be at national, provincial or ecosystem level) form a basis for scaling regulatory 'net gain' or 'no net loss' requirements (e.g. for industrial or agricultural developments). Frameworks have recently been developed to support this approach to target-setting[2].

4.2.2

Guiding and facilitating resource mobilisation

Geographic and intervention priorities set using STAR provide a transparent basis for mobilising resources. Using STAR to demonstrate and quantify progress can demonstrate the effective use of resources and help to scale up resource mobilisation.

4.2.3

Integrating biodiversity into planning

As a spatially explicit metric that highlights areas of high biodiversity significance, STAR can be used alongside other datasets to map biodiversity sensitivity and inform integrated land-use and marine spatial planning.

As with priority setting, STAR should preferably be incorporated as far upstream in the planning process as possible, so that it can be most useful in informing decisions.

2 Simmonds et al. (2019)

Abronia vasconcelosii - VULNERABLE / © Vojtěch Víta (CC BY-NC)

4.3

Enhancing monitoring, reporting, and accountability

Robust monitoring, transparent reporting, and clear accountability mechanisms are crucial for effective implementation of the KMGBF, as highlighted under its Section J. As a standardised, spatially explicit and policy-relevant biodiversity metric, STAR helps to address the challenge of quantifying and aggregating the impacts of interventions. STAR can thus contribute substantially to strengthen monitoring, reporting and accountability for governments.

STAR is a 'complementary indicator' within the KMGBF monitoring framework, so is suitable for direct incorporation into national reports to the CBD. STAR can provide a clear and cumulative measure of national efforts across both state and non-state actors. This allows demonstration of tangible results over time, supporting national reporting obligations, and enabling robust international reviews of progress towards the KMGBF's ambitious goals.

KMGBF's Target 15 calls for governments to require businesses to monitor and disclose their biodiversity impacts across their footprints. STAR has already established its value for business and finance in documenting and disclosing biodiversity risk, opportunities and impacts. Government encouragement or mandate for use of STAR by the private sector can promote greater transparency and consistency in corporate commitments, reporting and disclosure.

GUATEMALA /© Pexels Luis Arroyave

Lesser Flamingo *(Phoeniconaias minor)*
NEAR THREATENED

05 How are STAR scores calculated?

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For any threatened or near-threatened species within an Area of Interest, STAR scores reflect the amount of Area of Habitat (Area of Habitat; see Box C and Glossary) present, expressed as a percentage of the species' total current Area of Habitat. This percentage is used as a proxy for the proportion of the species' population in the area, since detailed population data are available for relatively few species. Across a species' entire current area of habitat, the total score is thus 100.

STAR$_T$ scores are based on the species' current Area of Habitat, while STAR$_R$ scores are based on potentially restorable areas within the species' former Area of Habitat.

All STAR scores are then weighted according to each species' extinction risk, as defined by its IUCN Red List category. The weighting system ranges from 1 for Near Threatened species to 4 for Critically Endangered species (Figure 4). Species listed as Least Concern are excluded from STAR scores. These weightings align with those used in the Red List Index to ensure consistency in extinction risk assessment.

Within a defined Area of Interest, the individual STAR scores of each species are summed to calculate a total STAR score for the area (Figure 5). Specifically:

The total STAR$_T$ score represents the combined, weighted contributions of each species' current Area of Habitat within the area, expressed as a percentage of its current Area of Habitat.

The total STAR$_R$ score represents the combined, weighted contributions of each species' restorable Area of Habitat in the area, also expressed as a percentage of its current Area of Habitat.

Global STAR maps are currently available at a resolution of c. 1-km for STAR$_T$ and c. 5-km for STAR$_R$.

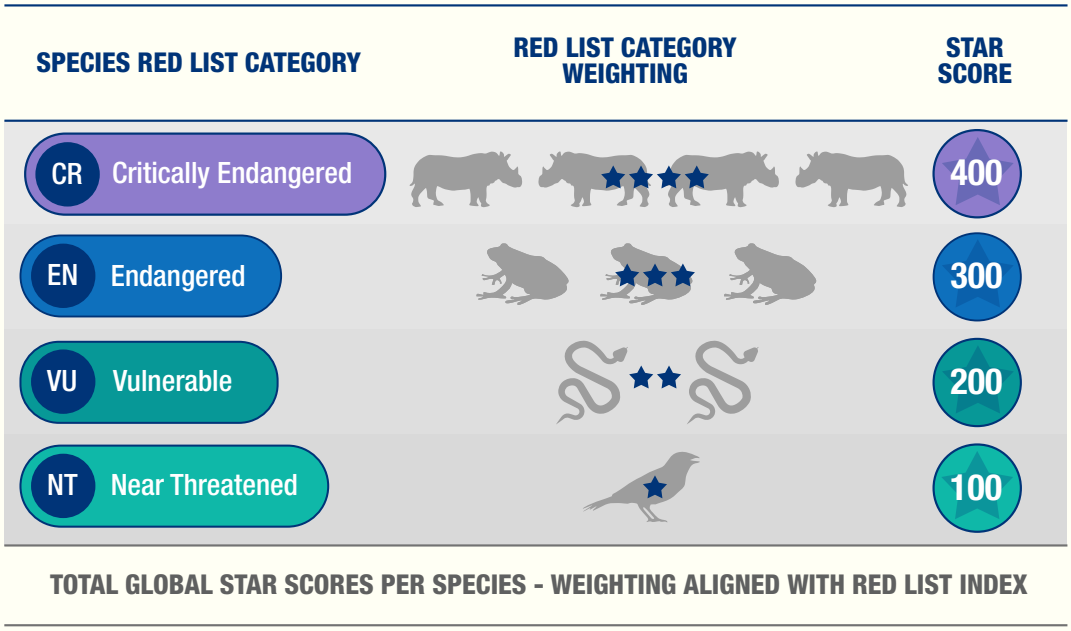
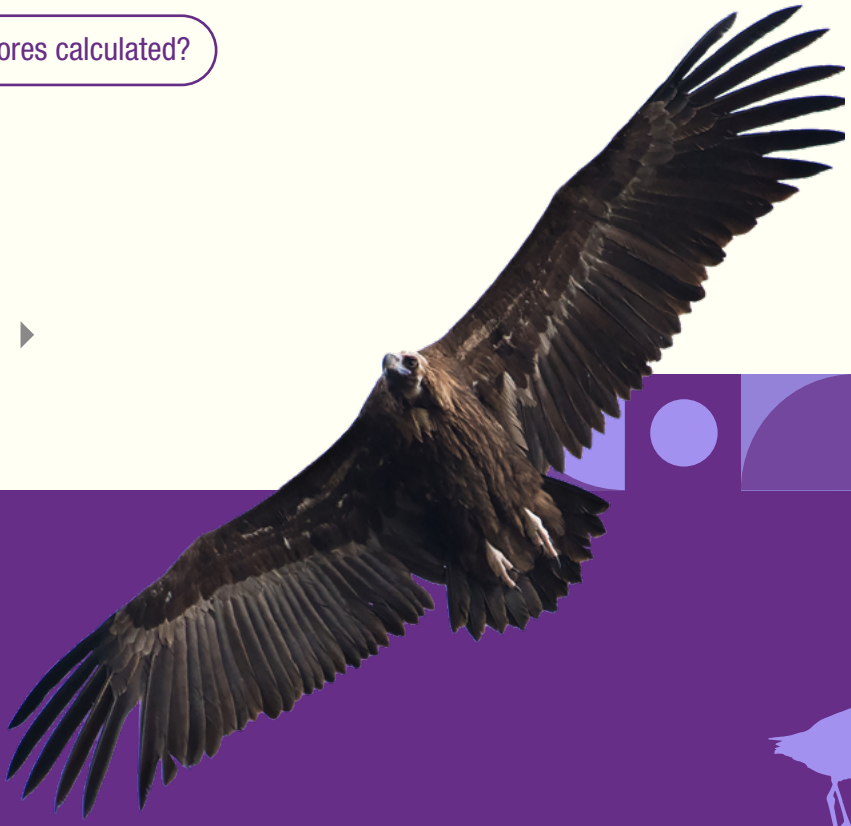


Figure 4 - STAR weighting ranges from 1 to 4 based on a species' Red List threat status. The total global STAR score for a species thus ranges from 100 (Near Threatened) to 400 (Critically Endangered).



Cinereous Vulture
(Aegypius monachus)
NEAR THREATENED

Box C: What is 'Area of Habitat'?

Area of Habitat is defined as "the area, characterized by its abiotic and biotic properties, that is habitable by a particular species"[3]. In practical terms, Area of habitat (AOH) is the area within a species' range with suitable habitat at suitable elevation.

Within a species' known range, current Area of Habitat is assessed by combining the species' defined habitat preferences (documented in the IUCN Red List) and elevation range with land-cover and topographic maps.

Area of Habitat is thus a sub-set of the species' range where it is likely (but not certain) that the species in question will occur.

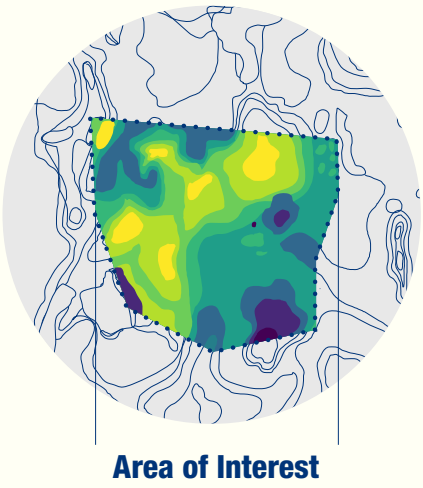
Similarly, restorable Area of Habitat is assessed using the historical range of the species (areas where it used to occur, but is not currently found), maps or models of historical land-cover (showing where Area of Habitat used to be present) and current land cover (showing areas that are potentially restorable).

3 Brooks et al. 2019

1 DEFINE

Area of Interest

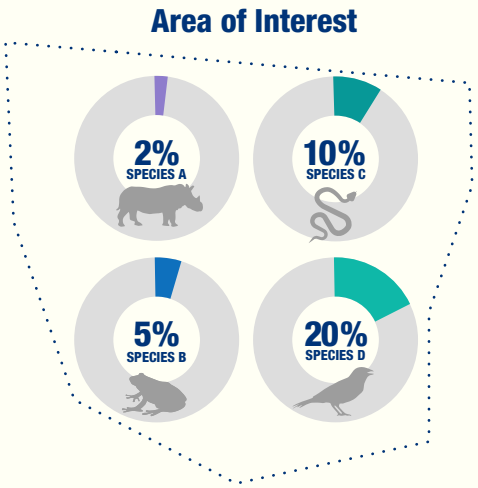
User defines one or more site(s) such as a project area, applying an appropriate buffer.



2 CALCULATE

Percentage Area of Habitat (AoH) overlap of threatened species present within the Area of Interest

STAR uses AoH maps derived from Red List data for CR, EN, VU and NT species. Percentage of AoH is used as a proxy for percentage of global population.



3 COMBINE

% AoH within Area of Interest

For each species STAR combines % of AoH with an IUCN Red List category weighting. Summed across all species to calculate Estimated STARᴛ score.

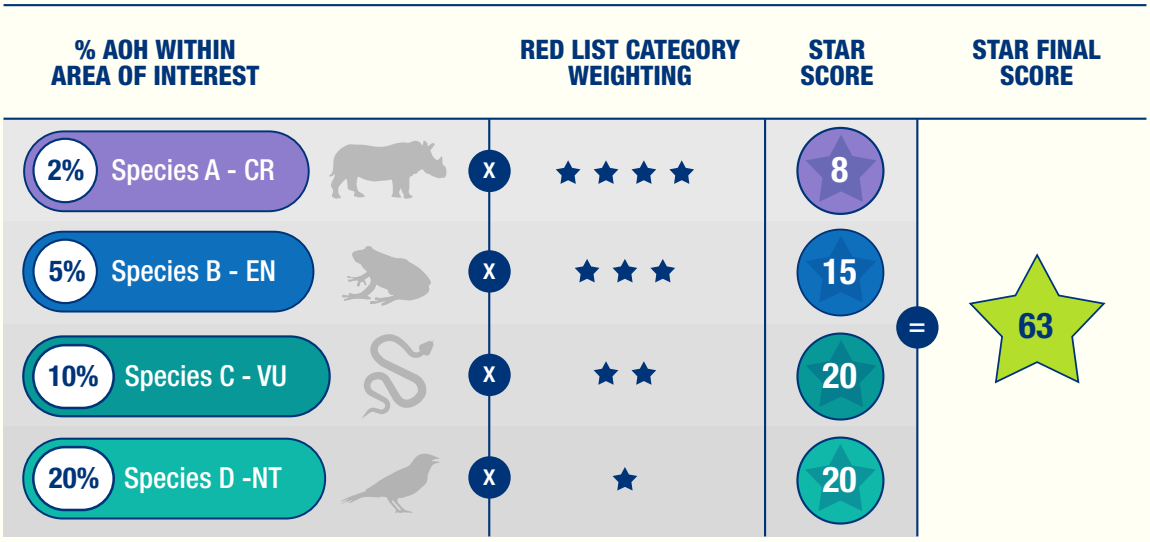


Figure 5 - Outline of the steps in calculating STARᴛ scores for a defined Area of Interest.

5.1

Threat abatement STAR (START)

The sum of global START values across all species theoretically represents the global threat abatement effort needed for all species to be downlisted to Least Concern (in practice this is a simplification, as some species would require additional active management measures[4]). For a given Area of Interest, the overall START score indicates the potential contribution towards reduction of global species extinction risk from threat abatement actions in that area. High scores indicate areas that currently contain relatively many threatened species, a large proportion of individual species' ranges, and/or species that are severely threatened.

The threats affecting each species are identified and documented as part of Red List assessments. Threats are categorised following the IUCN Threats Classification Scheme (version 3.3) and scored for severity and scope to show their impact on a species. The START score incorporates this information, and can be broken down to show the relative contributions of different threats. This allows the targeting of actions to address specific threats and thus to contribute to species conservation goals. Depending on the threat type, such actions could include, for example, better management of hunting, pollution or invasive species.

			PERCENT OF THE TOTAL AREA OF INTEREST ESTIMATED START SCORE FOR EACH SPECIES-THREAT COMBINATION						
SPECIES	IUCN RED LIST CATEGORY	ESTIMATED STAR SCORE FOR EACH SPECIES	INVASIVE SPECIES	ENERGY AND MINING	BIOLOGICAL RESOURCE USE	AGRICULTURE	CLIMATE CHANGE	POLLUTION	TOTAL% FOR EACH SPECIES
A MAMMAL	CR Critically Endangered	8	0%	0%	2%	8%	3%	0%	13%
B AMPHIBIAN	EN Endangered	15	10%	11%	0%	0%	4%	0%	24%
D BIRD	VU Vulnerable	20	0%	0%	16%	12%	0%	4%	32%
C REPTILE	NT Near Threatened	20	0%	0%	14%	18%	0%	0%	32%
ALL SPECIES	PERCENT OF TOTAL STAR SCORE		10%	11%	31%	38%	7%	4%	100%
	TOTAL STAR SCORE	63	6.0	6.8	19.6	23.7	4.4	2.5	

Figure 6 - Example of START scores disaggregated by threat types, for the hypothetical Area of Interest and species shown in Figure 5.

4 Bolam et al. 2022

Mangrove Plantation / © Fabiola Cruz

5.2

Restoration STAR (STAR$_R$)

STAR$_R$ uses a similar approach to STAR$_T$, but for areas that previously supported species that are no longer present. High scores indicate areas that previously supported relatively high numbers of threatened species, a large proportion of individual species' ranges, and/or species that are severely threatened.

For a given Area of Interest, the STAR$_R$ score therefore shows the potential contribution of restoration actions towards reduction of global species extinction risk. In addition to habitat restoration, such action will involve abatement of potential threats, including those such as hunting, pollution or invasive species that could prevent species' successful re-establishment. These scores can be broken down by species and to show the relative contributions of different threats that may need to be addressed, alongside habitat restoration, in the restorable area.

Based on restoration studies, a discounting multiplier (currently 0.29) is applied to STAR$_R$ scores in recognition of the fact that restoration of former Area of Habitat can be a slower and less successful process than threat abatement in existing Area of Habitat.

STAR$_T$ and STAR$_R$ scores are in principle fungible (when calculated using consistent datasets), in other words a unit of either represents an equivalent contribution to global extinction risk reduction, whether for a species, a threat and/or an Area of Interest.

Pallid Harrier *(Circus macrourus)*
NEAR THREATENED

06 Using and interpreting STAR

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Curlew Sandpiper *(Calidris ferruginea)* - VULNERABLE / © Martin Mecnarowski

6.1

Estimated STAR

The global START and STARR maps are available through the Integrated Biodiversity Assessment Tool (see Box D). Governments can access the STAR datasets, and can generate STAR Reports in IBAT for any particular Areas of Interest. For a defined Area of Interest, the report provides a detailed breakdown of STAR values, including by species and threats, and indicates their relative importance at both national and global scales. A buffer around the Area of Interest can also be applied so as to understand the ecological context of the wider landscape.

To aid presentation and interpretation of STAR values in IBAT, both START and STARR grid cell scores are mapped in categories based on percentile ranges. Note that important biodiversity (including threatened species) may be present even in grid cells with very low STAR scores.

Sociable Lapwing
(Vanellus gregarius)
CRITICALLY ENDANGERED
© Adrian Drummond Hill

Box D: The Integrated Biodiversity Assessment Tool (IBAT)

The Integrated Biodiversity Assessment Tool (IBAT) provides access to the STAR layer as well as other key global biodiversity datasets including the IUCN Red List, World Database on Protected Areas (WDPA) and Key Biodiversity Areas (KBAs). Access by government and civil society users is free, with registration; commercial use is under license. IBAT is critical to informing risk management and decision-making processes that address potential biodiversity impacts. Developed through a partnership of BirdLife International, Conservation International, International Union for Conservation of Nature (IUCN) and United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC), the vision of IBAT is that decisions affecting critical natural habitats are informed by the best scientific information and in turn decision makers will support the quest to collect and enhance the underlying datasets and maintain that scientific information.

To provide a more comprehensive and accurate picture of the biodiversity significance of an area, it is good practice to contextualize STAR with other biodiversity metrics, particularly those indicating ecosystem condition at local and landscape scales (see IUCN's RHINO framework). Biodiversity specialists can help interpret Estimated STAR scores and ensure they are considered within the wider ecology and conservation significance of the area.

Estimated STAR is also integrated into the IUCN Contributions for Nature Platform, an online tool where Government and Civil Society Members and other constituents can document, visualize and communicate their contributions to global biodiversity targets (see Box E). Through this platform, anyone can explore contributions from IUCN Members and see their potential to reduce global species extinction risk through threat abatement and restoration actions.

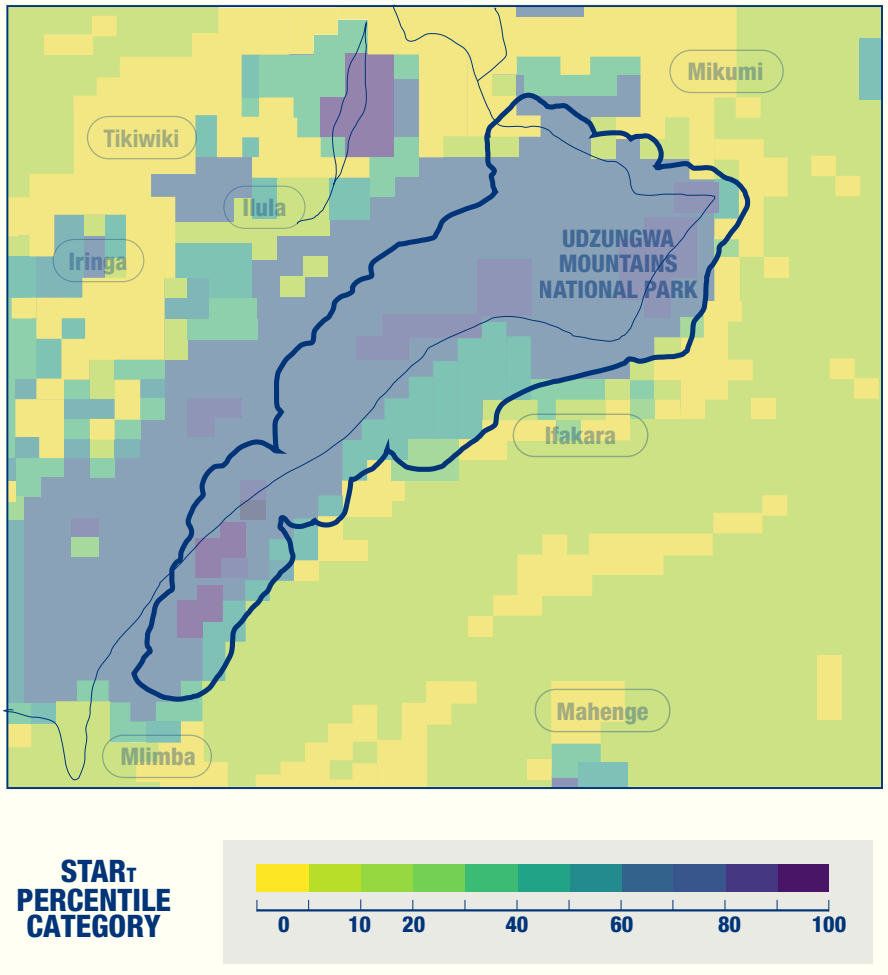


Figure 7 - Example Estimated START map for a defined Area of Interest (the Udzungwa Mountains Landscape, in Tanzania), generated within IBAT. Map colours show the percentile STAR score for each 1-km grid cell, relative to the global distribution of cells, with zero STAR scores categorised separately in yellow.

Mrs Hume's Pheasant
(Syrmaticus humiae)
VULNERABLE

Box E: IUCN Contributions for Nature Platform

STAR is embedded within the IUCN Contributions for Nature Platform, an online tool where IUCN Government and Civil Society Members and other constituents can document, visualize and communicate their contributions for nature in support of global biodiversity targets. The platform provides a geospatial interface that supports planning, reporting and collaboration, while also giving global visibility to local initiatives. By overlaying the STAR layers with a project footprint, represented as a spatial polygon, the platform calculates a project's Estimated **START** and **STARR** values. Through integration of STAR, the platform offers a powerful, results-oriented mechanism that supports practitioners to assess and communicate the potential conservation and restoration impact of their work to reduce global species extinction risk.

6.2

Calibrated and Target STAR

Estimated START is based on the best available global data on threatened species. As its name implies, it provides an estimate of the species and threats expected in a given Area of Interest. However, this estimate may not reflect the situation on the ground or water with complete accuracy. Although a species is expected to occur throughout its defined Area of Habitat, distributions may in reality be patchy and uneven. Species range maps may also be based on incomplete knowledge, so that species sometimes are present in an Area of Interest where they have not been mapped. The threats affecting a species may also vary across its Area of Habitat in type and intensity, which Estimated START cannot take into account in absence of reliable, fine-scale global threat mapping.

Calculation of Calibrated START therefore uses location-specific data to produce a more accurate estimate for an Area of Interest. This involves confirming that species contributing to the site's STAR score are indeed present in the Area of Interest, checking for the potential presence there of other threatened or near-threatened species, and confirming the presence, severity and scope of each relevant threat (Figure 8).

The calibration process may involve consulting with experts, checking biodiversity databases, accessing local monitoring data, harnessing remote sensing, applying indigenous and local knowledge, and possibly additional field surveys if other data are not sufficient. Clear documentation of sources is essential and any taxonomic or mapping discrepancies need to be examined and resolved. Threats should be assessed for their actual impact on each species locally, and insignificant threats excluded from the site's STAR score, since attempting to abate such threats does not contribute to extinction risk reduction.

A technical description and example of the START calibration methodology are in peer review for publication[5]. Practical guidance on information gathering and recalculation is given in the IUCN RHINO (Rapid High-Integrity Nature-positive Outcomes) framework, and IBAT includes functionality to calculate Calibrated START based on user-inputted values.

5 Mair et al. (in review, a and b)

The results of the calibration process are a more accurate assessment for the Area of Interest of the threatened species present and the threats that apply to them. Calibrated $STAR_T$ scores can next be used to inform establishing a Target $STAR_T$ and planning actions for threat abatement. The calibrated values help in identifying the threats that interventions should focus on, and in setting quantitative targets for threat reduction. While Calibrated $STAR_T$ scores show the threats that contribute most to species extinction risk in the Area of Interest, other considerations are also important in identifying focal threats to address, including feasibility, cost-effectiveness, and other social, economic or ecological considerations relevant to the site, stakeholders and actors involved. The IUCN RHINO framework provides additional guidance on such considerations.

Threat reduction targets should be quantitative and time-bound. For example, a target could be to reduce the area impacted by invasive plant species in the Area of Interest from 100 ha to 5 ha over a five-year period. This represents a reduction of 95% in threat intensity and can be expressed as a Target STAR score, using the Calibrated $STAR_T$ score for the relevant threat type. For instance, if the Area of Interest's Calibrated $STAR_T$ score for the Invasive Species threat type is 2.4, the Target STAR would be 95% of this, or 2.28. Target scores can be added across threat types to calculate an overall Target STAR score for the site.

A methodology for calibration of $STAR_R$ has not yet been formalised. It would involve assessing the restorability of suitable habitat in an Area of Interest, the likelihood of successful recolonisation or reintroduction of relevant STAR species, and the feasibility of addressing relevant threats in the area restored.

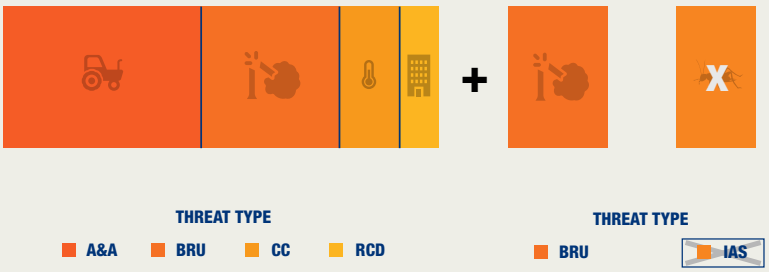
Figure 8-Part 1 - Overview of the START calibration process, illustrated by a hypothetical example. Threat types: A&A, Agriculture and aquaculture; BRU, Biological resource use, IAS, Invasive and other problematic species, genes and diseases; CC, Climate change and severe weather; RCD, Residential and commercial development.

STEP 3

Assess the presence and local intensity (scope and severity) of threats to STAR species

Assessment of threats at the site shows that:

- Invasive Alien Species do not threaten any STAR species here, so this component of the STAR score must be excluded
- Intensity of Biological Resource Use is greater here for species A and E than the average over their global range, so the STAR score associated with this threat will increase

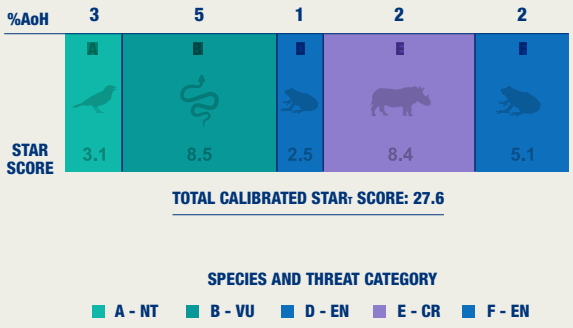


Threat components for species C (not at site) must also be excluded, and threat components for species F (now known to be at site) must be included.

STEP 4

Recalculate STAR scores using the calibration formulae, to give a new site total and a new breakdown by species and threat

Based on global data layers the Area of Interest has an estimated START score of 27.6



Calibrate threat components

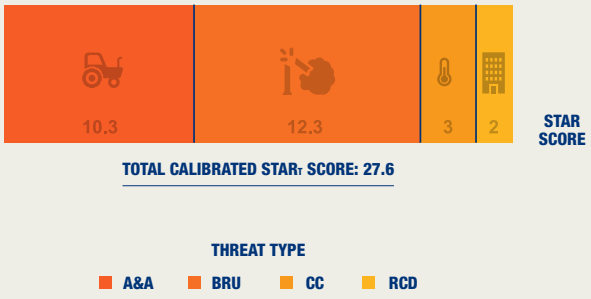


Figure 8-Part 2 - Overview of the START calibration process, illustrated by a hypothetical example. Threat types: A&A, Agriculture and aquaculture; BRU, Biological resource use, IAS, Invasive and other problematic species, genes and diseases; CC, Climate change and severe weather; RCD, Residential and commercial development.

6.3

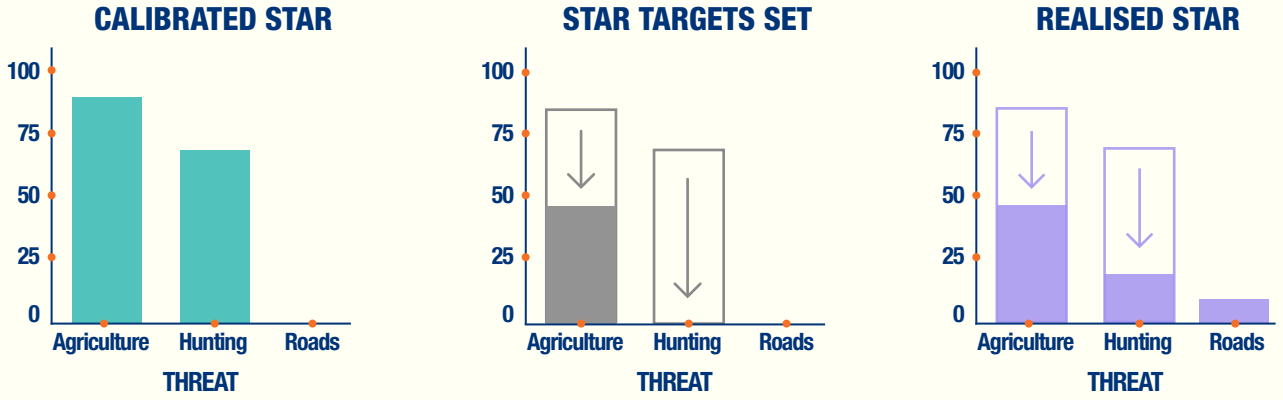
Realised STAR

Once Calibrated START has been employed to set threat reduction targets, the next step is to identify a suitable indicator for the intensity of each confirmed threat acting at the Area of Interest. The indicator is used to measure the baseline level of threat intensity and how these change in the Area of Interest over time. Assessing the proportional change in threat intensity over time is the basis for calculating Realised STAR, which is a measure of progress towards the threat reduction target, and of the contribution towards reducing global species' extinction risk (Figure 9).

Note that all non-negligible threats confirmed to be acting at the Area of Interest need to be monitored, as it is possible that threats that are not the focus of interventions may increase in intensity. Monitoring also needs to check for new threats that may emerge over time.

Suitable indicators for threat intensity will depend on the context of the Area of Interest, STAR species and threat types involved. They may use relevant proxy measures that reliably indicate threat. For example, the intensity of threat from unsustainable trapping could be measured as the density of snares detected with standard survey effort, while the intensity of threat from forest conversion to agriculture could be measured directly using satellite imagery.

The methodology for calculating Realised STAR is outlined in Mair et al. (in review, a) and further practical guidance is given in the IUCN RHINO framework. Functionality for supporting these calculations is also under development in IBAT.



Local data confirm which species and threats are present in the Area of interest and the estimated STAR score is adjusted. Although the threat from Roads was included in Estimated STAR, this threat is not present at the site.

Total calibrated START score is 90 (agriculture) + 70 (hunting) = **160**

Baseline threat intensity is measured using indicators: the annual rate of forest loss to agriculture and the number of snares per survey. Action targets are set to reduce the threat from agriculture by 50% and the threat from hunting by 100%, over five years.

Target score for realised STAR (Target STAR) is (0.5*90) + (1* 70) = **115**

Interventions are implemented and threat intensity is monitored using the chosen indicators. The threat reduction target is met for agriculture (50% reduction). However, Roads have now emerged as a new threat impacting species in the Area of Interest, with a STAR score of 10.

Realised STAR score is (0.5*90) + (0.7* 70) - 10 = **84**

Figure 9 - A simple example illustrating the approach for setting Target STAR and assessing Realised STAR

6.4

Case example: setting and focusing national threat-abatement targets

The steps involved in using STAR to set national targets can be illustrated for the hypothetical case of Guatemala, a mid-sized (c. 109,000 km^2), biodiverse tropical country in Central America.

This example uses Estimated START data from current global mapping. However, the process described is **purely illustrative** and should not be taken to reflect Guatemala's official biodiversity priorities or commitments as articulated by national authorities.

STEP 1

Obtain Estimated START scores and threat breakdown, and make an initial interpretation in light of the national biogeographic and conservation context.

The first step in national target setting is to obtain, map and interpret STAR scores from the Estimated START global map. The map of terrestrial START scores for Guatemala, mapped by percentile categories, shows high scores (compared to the global average) over large parts of the country (Figure 10a). This reflects Guatemala's status as a biodiverse tropical forest country with extensive remaining natural habitat, and shows that there are many areas with high potential for threat abatement actions to reduce global species extinction risk.

A complementary way to map START scores is by the actual score per grid cell. Given the skewed distribution of STAR scores (where a few grid cells have very high scores: see section 7.2), using order-of-magnitude categories when mapping scores makes for a clearer visual presentation (Figure 10b). This map shows clear 'hotspots' where high START scores are concentrated, corresponding closely with Guatemala's central mountain belt that separates lower-lying areas to the north and south (Figure 10c).

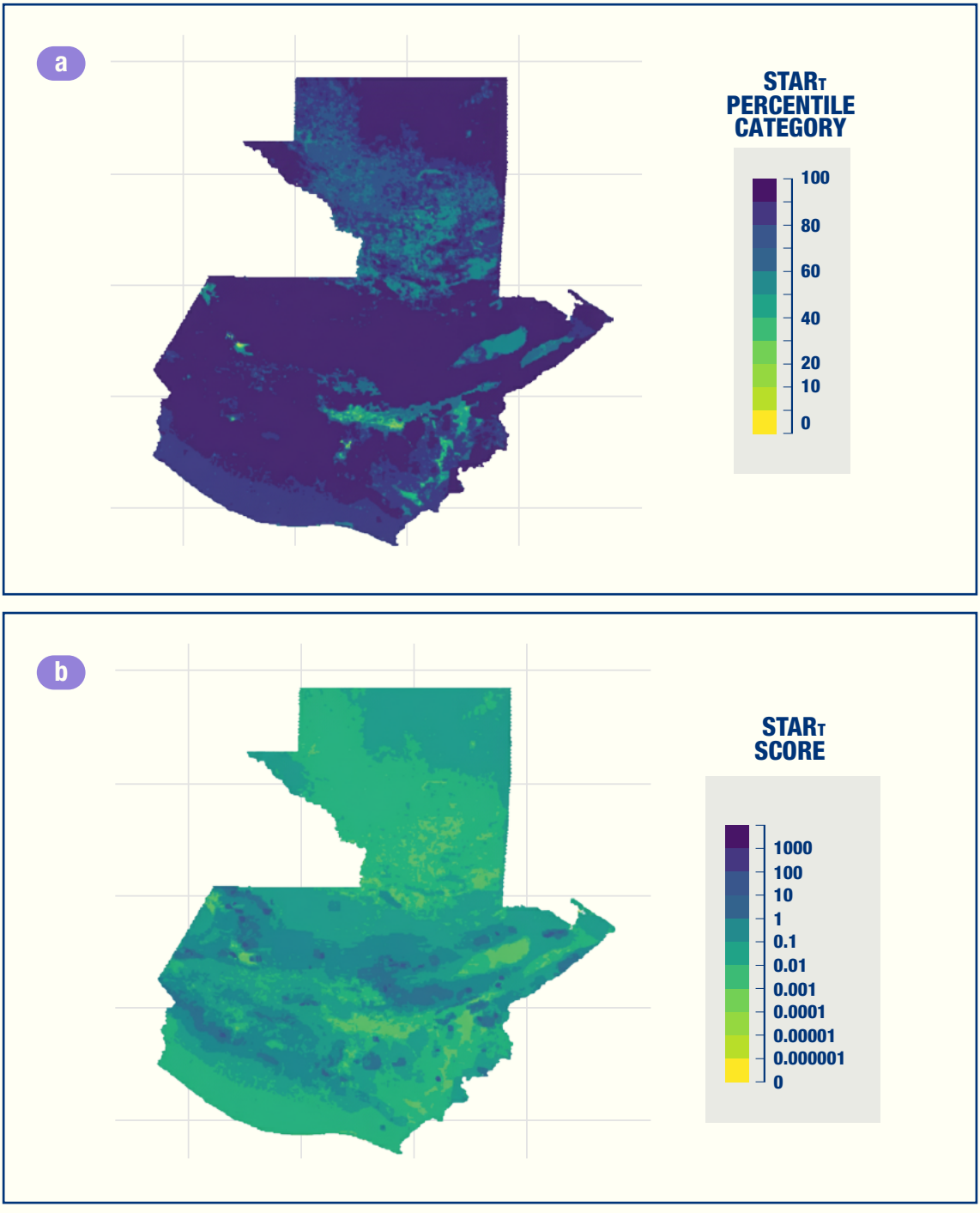


Figure 10 - Part 1 - (a) Map of Estimated START 1-km grid scores for Guatemala, categorised by percentile of the global START distribution. **(b)** Map of Estimated START 1-km grid scores for Guatemala, categorised by START score on a logarithmic scale.

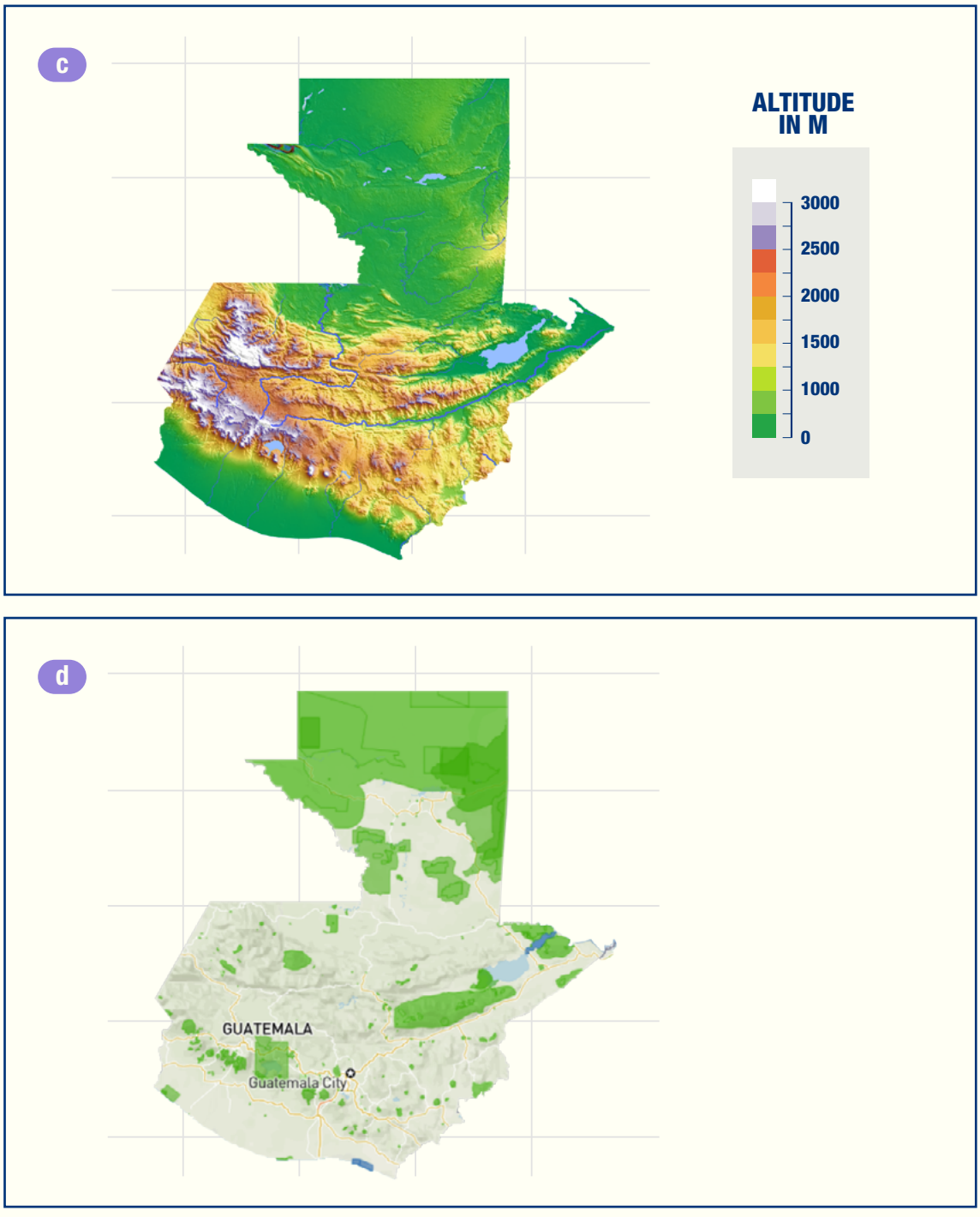


Figure 10 - Part 2 - (c) Topographic map of Guatemala[6], **(d)** Protected Areas in Guatemala (green, terrestrial and blue, marine)[7].

6 Map adapted from Wikimedia Commons, https://en.m.wikipedia.org/wiki/File:Guatemala_Topography.png, shared under a Creative Commons Attribution-Share Alike license

7 UNEP-WCMC and IUCN (2025), Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], August 2025, Cambridge, UK: UNEP-WCMC and IUCN.

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Altiplano Resiliente Project - © UICN ORMACC Luciano Capelli

Guatemala already has 352 terrestrial or marine Protected Areas (PAs, Figure 10d). Terrestrial PAs cover 20.1% of the land area (including inland waters), c. 21,900 km^2, some way short of the 30% KMGBF target for 2030. The total terrestrial STAR$_T$ score for Guatemala is 33,373 STAR units and more than one-third of this (12,678 STAR units, c. 38%) is contained in existing PAs.

Over half of the total terrestrial area protected is made up of the large Maya Biosphere Reserve and associated National Parks and Wildlife Reserves in the north of Guatemala. The Maya Biosphere Reserve protects a very important species-rich tropical forest landscape, contiguous with other biosphere reserves in Mexico. However, from the STAR map in Figure 1c it is clear that opportunities to decrease extinction risk are concentrated elsewhere in Guatemala, including many sites that are currently unprotected.

Using the Estimated STAR$_T$ data, the total national STAR$_T$ score can be broken down into scores relating to both broad (Level 1) and more detailed (Level 2) threat categories from the IUCN Threat Classification scheme (Figure 11).

The broad threat categories contributing the most to the total STAR$_T$ score for Guatemala are agriculture and aquaculture (32.5%), biological resource use (20.0%), invasive species and diseases (14.1%), climate change and severe weather (11.8%), and residential and commercial development (7.0%). These top five broad categories make up 85% of the STAR$_T$ score.

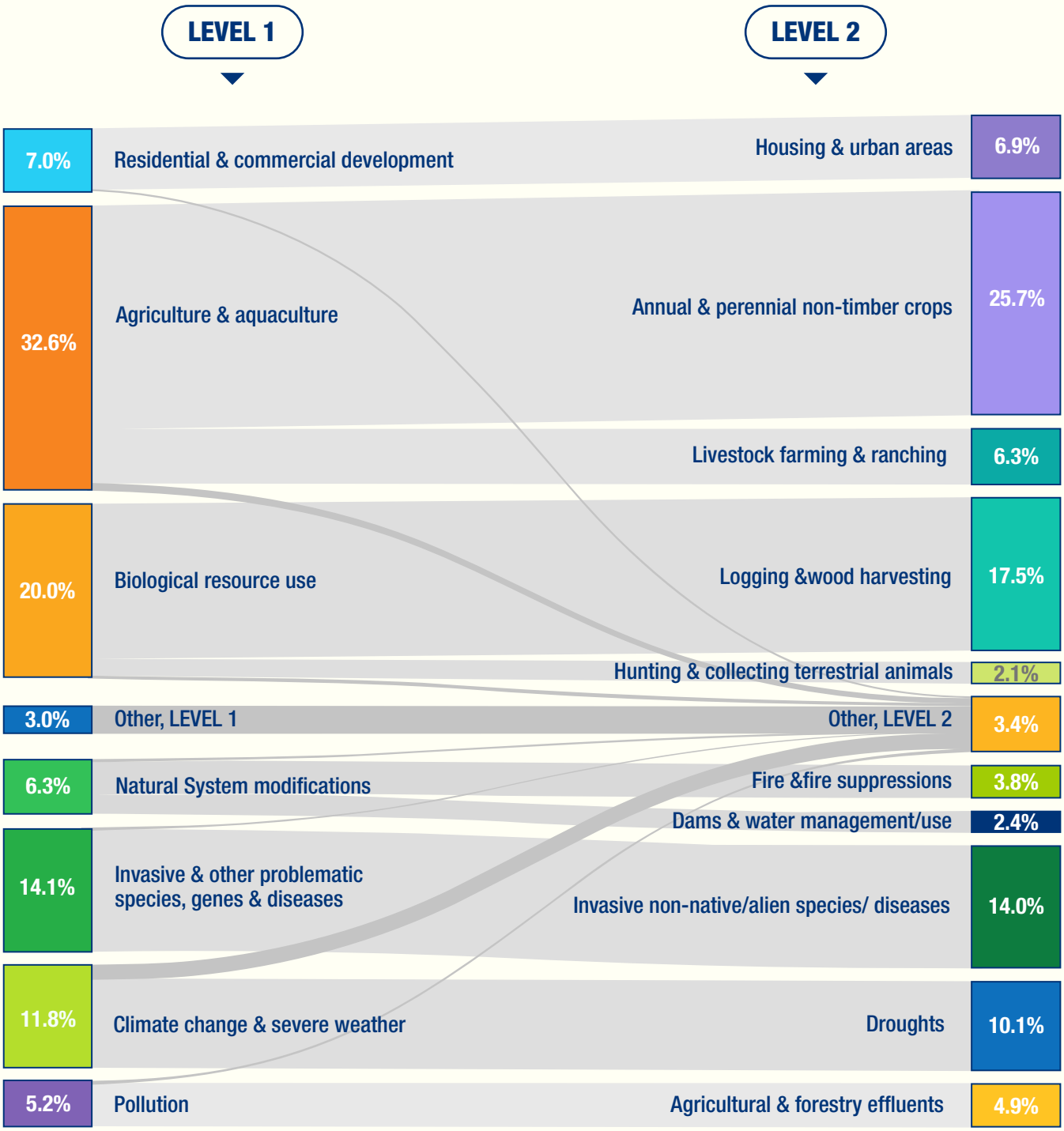


Figure 11- Threat categories contributing to the national STAR$_T$ score for Guatemala.

A more detailed breakdown within categories shows that the top 10 detailed threat types (Level 2 in the IUCN classification make up nearly 94% of the total START score (Figure 11, Table 1).

THREAT TYPE	START SCORE	PERCENT OF TOTAL	CUMULATIVE PERCENTAGE
Annual & perennial non-timber crops	8575.9	25.7%	25.7%
Logging & wood harvesting	5846.9	17.5%	43.2%
Invasive non-native/alien species/diseases	4677.4	14.0%	57.2%
Droughts	3364.9	10.1%	67.3%
Housing & urban areas	2290.5	6.9%	74.2%
Livestock farming & ranching	2092.7	6.3%	80.5%
Agricultural & forestry effluents	1635.8	4.9%	85.4%
Fire & fire suppression	1263.4	3.8%	89.1%
Dams & water management/use	792.9	2.4%	91.5%
Hunting & collecting terrestrial animals	698.6	2.1%	93.6%
Other threats	2134.1	6.4%	100.0%
TOTAL	33373.2	100.0%	

Table 1- The top 10 detailed threat types (Level 2 of IUCN Threats Classification Scheme) contributing to the total START score for Guatemala.

STEP 2

Carry out initial START calibration at national level

An initial calibration step (Section 6.2) should be undertaken to check the list of species and threats contributing to the total START score, using expert input and available literature and national databases. The aim is to confirm that all listed species do occur in Guatemala, to identify any threatened species that might be missed; similarly, to identify any threats not relevant to the Guatemala context. The total START score and threat breakdown can then be adjusted accordingly.

For example, among other findings the calibration exercise might conclude that some threat types are absent or at reduced intensity within Protected Areas, because these have legal protection and are managed for conservation, leading to an adjusted total START score for Protected Areas (PAs) (Table 2).

	LEVEL 1 THREAT TYPE	TOTAL START SCORE IN PAs	WEIGHTING	ADJUSTED STAR SCORE
1	Residential and commercial development	932.5	0	0.0
2	Agriculture and aquaculture	3601.4	0	0.0
3	Energy production and mining	94.6	0	0.0
4	Transportation and service corridors	44.0	0.1	4.4
5	Biological resource use	2609.3	0.3	782.8
6	Human intrusions and disturbance	61.0	0.3	18.3
7	Natural system modifications	788.6	0.2	157.7
8	Invasive species and diseases	2093.0	1	2093.0
9	Pollution	591.1	0.5	295.5
10	Geological events	16.5	1	16.5
11	Climate change and severe weather	1846.5	1	1846.5
12	Other	0.1	0.5	0.0
	TOTAL	12678.5		5214.8

Table 2 - Hypothetical illustration of adjusted Estimated START score through calibration of threat intensity, for Protected Areas (PAs) in Guatemala. Some threat types, such as Residential and commercial development, are considered to be absent or at negligible intensity within PAs, so receive a zero weighting. Other threat types (e.g. Climate change and severe weather) may have the same intensity within as outside PAs, so remain unchanged (with a weighting of 1). Threat types such as Biological resource use may be present in PAs but at a reduced intensity compared to unprotected areas, so receive an intermediate weighting.

Brown Wood-Rail *(Aramides wolfi)* - VULNERABLE / © Lisa Brunetti

Based on the hypothetical calibration of STAR$_T$ scores shown in Table 2, the total national STAR$_T$ score for Guatemala would be recalibrated from 33,373 to 25,909 STAR units, a reduction of c. 22%.

STEP 3

Set an initial national STAR target

Information is then available to set an initial national target for extinction risk reduction. GBF Goal A states that the extinction rate and risk of all species should be reduced tenfold by 2050. Threat abatement actions are key to achieve this goal, though additional actions (including restoration and species-focused interventions) will also be needed. In the STAR context, the goal could be interpreted as a 90% reduction in the threat burden for threatened species (see Figure 3). For Guatemala, based on the Calibrated STAR$_T$ total in Step 2 above, this amounts to a Target STAR$_T$ of c. 23,318 over 25 years. For practicality, this could be expressed as an initial 10-year national target to abate threats by 9,330 STAR$_T$ units by 2035.

STEP 4

Identify priority locations and threats for interventions

Having set a national target for threat abatement, this needs to be implemented through a plan that prioritises which threats to focus on where. Key considerations will be:

Which threats are tractable to address?

For example, it may be feasible for well-planned interventions in target locations to reduce pressures for land conversion or biological resource use, but harder to address climate-change related threats such as drought, or the spread of invasive pathogens. Even in these more difficult cases, management measures to increase ecosystem resilience or species-focused interventions could help to reduce the impacts of threats on focal species, effectively reducing threat intensity.

Where are the opportunities for threat abatement greatest?

The map of STAR$_T$ scores provides a starting point. The 10% of grid cells with the highest STAR$_T$ scores capture no less than 87.6% (29,245 STAR$_T$ units) of the total national STAR$_T$ score, representing hotspots of opportunity for global extinction risk reduction. Across these highest-scoring cells, 72.5% (an area of c. 8,100 km^2) are in locations that presently have no formal protection. These hotspots are obvious candidates for new Protected Areas or other effective conservation measures (OECMs), where effective conservation could go a long way towards meeting national commitments to Target 3 (Protected Areas) and Target 4 (halting species extinctions) under the KMGBF. There are of course many other aspects to consider for establishing new Protected Areas or OECMs, including spatial configuration and socio-economic context. Interventions may be more effective when implemented at landscape level, and/or through creation of new Protected Areas large enough to form viable ecological units.

Threat intensities are likely to be lower within existing Protected Areas than outside them. For Protected Areas with high STAR$_T$ scores, however, there may still be substantial opportunities to reduce extinction risk through improved management that addresses ongoing threats.

With expert input, drawing on relevant data sources and informed by existing land-use and economic plans, and using realistic assumptions of how far each threat type can be abated, a provisional set of locations and threats can be prioritised for threat abatement actions. Given that site-level calibration (section 6.2, section 6.6) may reduce site STAR scores, total Estimated STAR$_T$ scores for the collective priority set should be larger than the the overall target. A 'buffer' of 10-20% to account for calibration may be appropriate and realistic.

© UICN

STEP 5

Carry out site-level calibration, and re-set Target START for each site

For each location, calibrate the START score using the approach outlined in Section 3.1, and re-set a realistic and appropriate Target START for each focal site.

STEP 6

Iterate earlier steps as necessary

Check whether revised Target START scores across all site add up to the defined target. If necessary, iterate previous steps in light of new information to develop a revised national START score, national target, and/or priority set of sites and threats.

STEP 7

Develop and implement an appropriate action plan, embedded in the NBSAP and other relevant land-use and conservation plans nationally and sub-nationally.

6.5

Case examples: sub-national priority setting

Achieving the KMGBF targets and goals requires a concerted effort across society, including the active involvement of sub-national authorities and local governments. STAR can be used to inform sub-national planning and priority-setting, as illustrated by studies for India and Colombia.

6.5.1

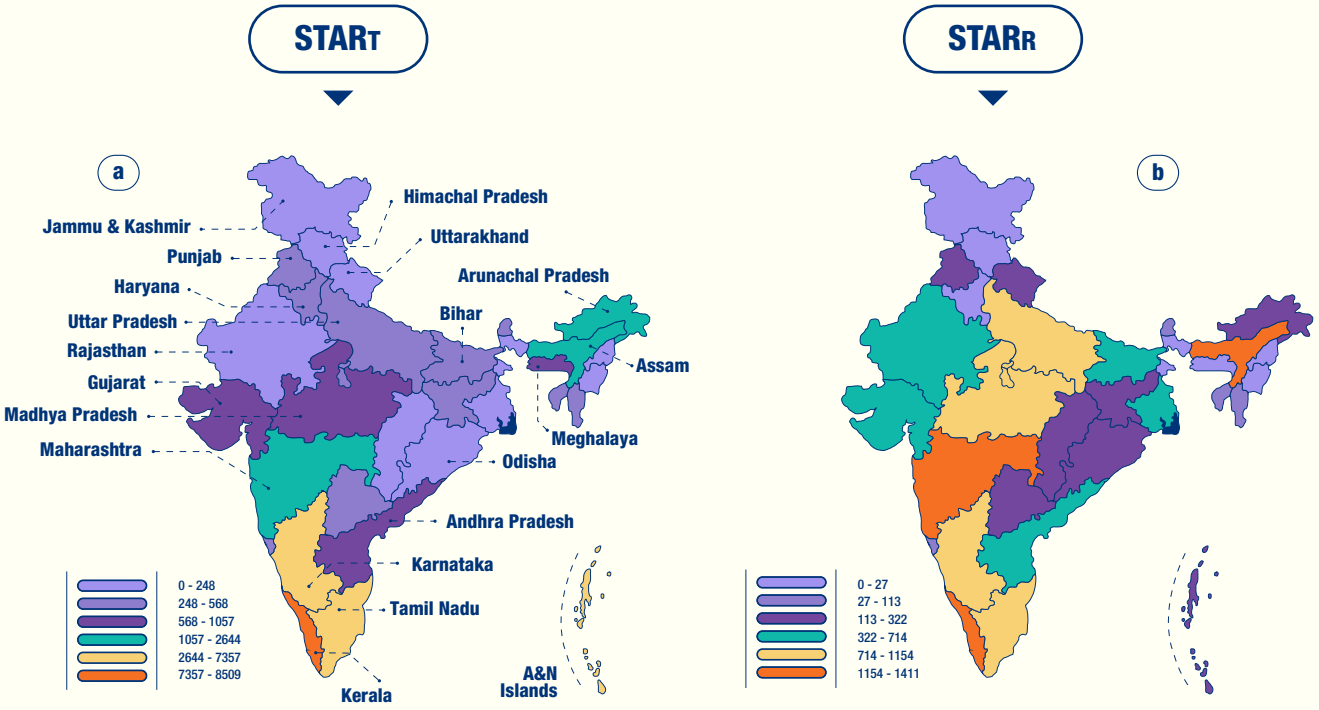
India: using STAR to assess species risk reduction potential across states and districts

For India, a large, megadiverse country with a wide array of ecoregions, estimated global STAR was used to map the potential for species extinction risk reduction across all 36 states and 666 districts, and across different types of threat[8].

India's total national START score of 41,817 represents 3.4% of the total global Estimated START score (for mammals, birds and amphibians). Notably, 20% of India's states contribute 80% to the national STAR score. These are the southern states of Kerala (20%), Tamil Nadu (18%), and Karnataka (13%); the north-eastern states of Arunachal Pradesh (6%) and Assam (5%); the western state of Maharashtra (5%); and the Andaman and Nicobar Islands in the Indian Ocean (12%). Similarly, the top 10% of districts contribute 83% to the national STAR score. These patterns are related to concentrations of threatened and/or restricted-range species rather than just the size of states or districts (Figure 12).

Some states, such as West Bengal, have high species richness but relatively low START scores. Such states still have important biodiversity responsibilities and can prioritise conservation investments to prevent habitat loss and degradation and ensure that species currently assessed as Least Concern do not become threatened.

8 Chaudhary et al. 2022



Three key threats, from annual and perennial non-timber crop production, biological resource use and residential and commercial development, contribute nearly 80% of the total STAR score, and are the overall priorities to address nationally.

For STARR, geographic patterns for high-scoring states are partly complementary to those for START (Figure 12). The states with highest STARR scores include several that are relatively low-scoring for START, including Madhya Pradesh, Uttar Pradesh and Andhra Pradesh. This indicates the potential of targeted habitat restoration in these states for reducing extinction risk. It also illustrates how considering both threat abatement and restoration provides a more complete picture of conservation opportunities. At national level, not only the area of habitat being restored matters but also where exactly it is carried out.

Of the 25 individual threatened species that contribute the most to START scores, around ten are endemic to a single district, highlighting the need for focused conservation attention in the respective state/district to prevent their global extinction.

The results of this study provide Indian policymakers at national, state and district levels with crucial information for devising effective biodiversity conservation policies. Within each district and state, detailed STAR maps, together with mapping of existing conserved areas, can further guide spatially targeted conservation interventions.

Figure 12. - Total estimated global STAR metric scores for threat abatement **(a)** and restoration **(b)** for India's 36 states, redrawn from Chaudhary et al. 2022. Based on threatened amphibians, birds and mammals in the 2019 Red List.

6.5.2

Colombia: guiding conservation investment to maximise benefits and minimise costs

For the country of Colombia, a study[9] applied STAR alongside other datasets to investigate trade-offs between conservation and economic development.

Colombia is a highly biodiverse country, with an economy mainly reliant on large-scale agriculture. Agricultural expansion has accelerated since 2016 following the end of five decades of internal armed conflict.

This study mapped the opportunity cost of conserving forest rather than using the land for agriculture. These results were combined with START maps to produce a prioritization map that guides policy-makers to target conservation actions toward regions where conservation benefits are high and economic impacts are low.

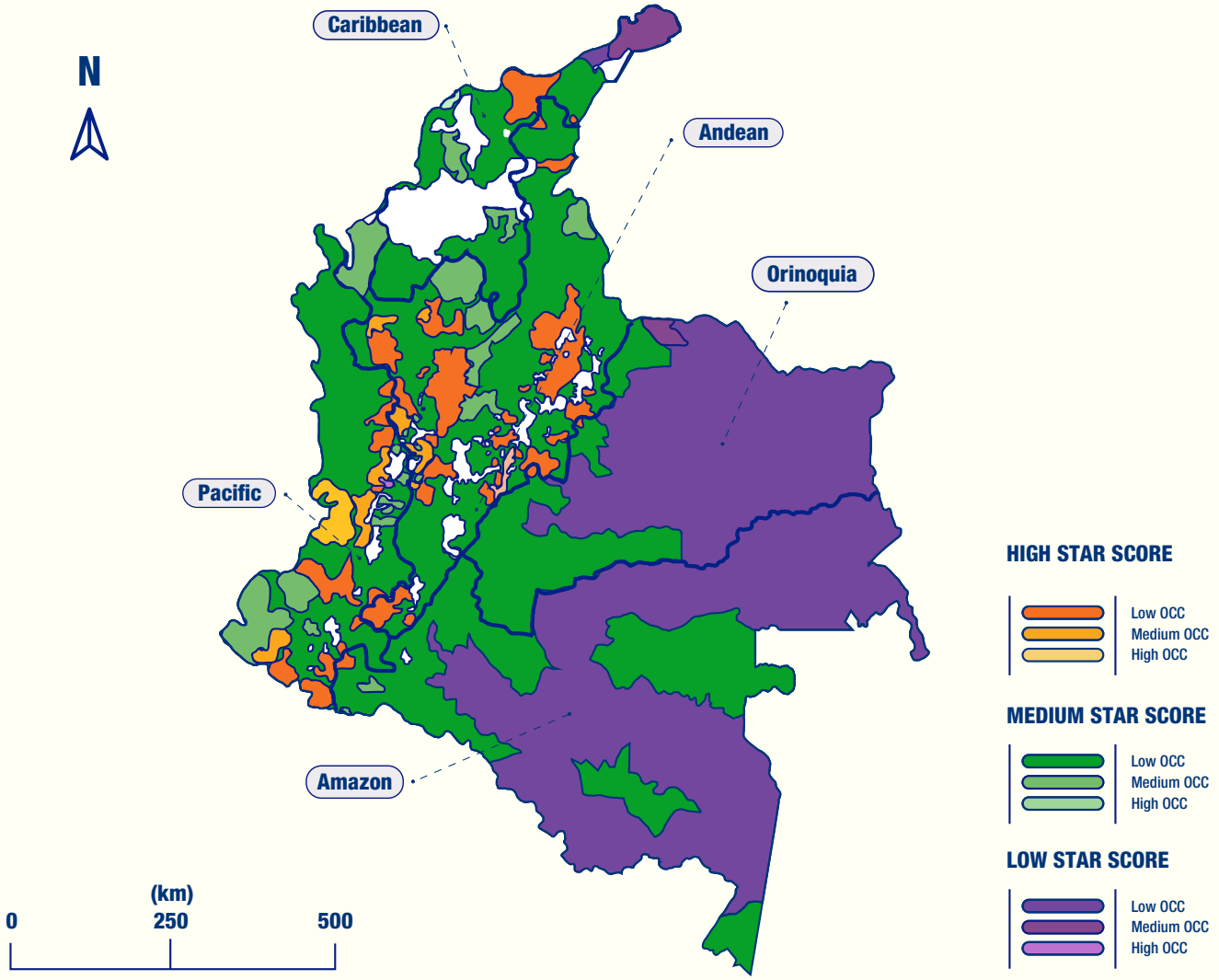
The approach demonstrates how to use the STAR metric as a benefit layer in a return-on-investment analysis, together with a proxy of to inform biodiversity conservation spending while ensuring the economic benefits of agriculture.

The authors developed a predictive spatial model for the risk of forest conversion and the probability of different types of agricultural activities following conversion. To assess the opportunity cost of conservation (OCC), this model was combined with the expected annual returns of each agricultural activity. Opportunity costs varied widely across different natural regions of the country, but relatively small proportions of currently forested areas were assessed as having 'medium' or 'high' opportunity costs (14% and <1%, respectively).

Next, the agriculture-related threats component of Estimated START was used to map expected benefits of conservation investment. Of areas of the country that were forested in 2017, 31% had medium START scores and 6% high START scores, showing a concentration of potential conservation benefits in relatively small regions.

Using a simple classification of STAR and OCC scores, municipalities could be identified with high potential benefits for conservation and low opportunity costs, and vice versa (Figure 13).

9 Guerrero-Pineda et al. 2022



These findings are directly relevant for policy decisions, as they guide approaches to maximize the biodiversity benefits from investments using limited conservation funding while ensuring that landowners maintain returns equivalent to agricultural development. The approach can be adapted and applied in other contexts to optimise trade-offs between conservation and development objectives.

Figure 13 - Results from categorisation of STAR$_T$ scores and opportunity cost for conservation (OCC) across municipalities within different natural regions of Colombia, redrawn from Guerrero-Pineda et al. 2022. Municipalities with high STAR$_T$ score and low OCC show high potential for cost-effective conservation investment.

INDIA /© Pexels Rehan Verma

6.6

Case example: calibrating START for San José Northern Subcatchments landscape, Costa Rica

American Crocodile *(Crocodylus acutus)* - VULNERABLE - © Serena Tang, CC BY-NC-ND 2.0

6.6.1

Context

The International Union for Conservation of Nature (IUCN) led a process to calibrate global STAR$_T$ estimates for the San José Northern Subcatchments (SJNS) landscape, an area of 957 km^2 located within the central mountain range of Costa Rica that includes the northern region of the country's capital, San Jose.

This is a key water catchment area where a water fund, Agua Tica, is co-ordinating nature-based solutions for water protection across public and private actors. The STAR metric was used to identify the potential contributions towards KMGBF Goal A from specific actions across the SJNS landscape.

6.6.2

Process

Specialist consultation was used to validate the presence of species and the presence and intensity of threats. A first round of consultation involved 15 volunteer specialists selected based on their taxonomic expertise and relevant research experience in the landscape, and working separately to each other. A second and third consultation round involved a small number of paid national specialists, to fill gaps in data for certain species, and then to combine the consultation results with additional information from the literature to compile a consensus view. In parallel, to separate out certain threat types more clearly, a land-use change analysis was undertaken to estimate natural habitat loss over the landscape in the period 1998-2019 related to different drivers.

The calibration process was carried out over an 8-month period and involved around 100 working days for project staff to complete and coordinate data collection, analysis and calibration, in addition to specialist inputs.

6.6.3

Results

Key results of the consultation process included:

- Eight of the 43 threatened or near-threatened species included in Estimated START were considered unlikely to be present, either because of local extirpation or because they did not in fact occur in this part of their mapped Area of Habitat.
- Relatively low intensity (compared to global averages for Estimated START species) for threats from invasive alien species, in particular related to chytrid fungi disease affecting amphibians.
- Identification and intensity scoring of one or more new threats (for example, agricultural and forestry effluents) for nearly all of the Estimated START species thought to be present.
- Identification of nine additional threatened species thought likely to be present but not originally included in Estimated START.

Calibration adjusted the total START score for the SJNS landscape from 898 START units to 768 START units. This calibrated score does not include the additional threatened species identified, as the method to incorporate these had not yet been developed when this study was carried out.

The calibration process gave a better understanding of the threats important in the landscape, with START scores spread more evenly across a wider suite of threats than before calibration. After calibration, the largest opportunity to reduce species extinction risk was linked to land-use, with livestock farming and ranching the most significant threat (14% of the total). The threat from invasive non-native species/diseases (related to chytrid fungi disease) was 13% of the total after calibration compared to 65% beforehand. This highlighted the need not only to address ongoing threats, but for proactive management to reduce potential future threats to amphibians from chytrid fungi disease.

6.6.4

Lessons

Other lessons from this exercise for future Estimated STAR calibration include:

- For efficiency, information gathering efforts can be prioritised for the species and associated threats that make the greatest potential contribution to the Area of Interest's Estimated START score.
- Use of multiple information sources, from expert input, geo-spatial analysis, and literature and database review, generated valuable complementary information for calibration.
- Future calibration exercises could also consider spatial variation within the landscape in the presence of species, and presence and intensity of threats
- Using structured expert elicitation techniques could have provided clearer indications of confidence in the calibration findings. Documentation of data sources and uncertainty, and incorporation of publicly available species occurrence records, are also important. Quantified levels of uncertainty can help in focusing interventions on the species most likely to be present in the Area of Interest.
- The calibration process can inform the most appropriate indicators for monitoring changes in threat intensity in response to future conservation interventions.
- Information collected during calibration should be fed back into the Red List, and into public databases of species observations.
- Specialists engaged through the calibration process have potential to continue to contribute to target-setting, intervention planning and implementation and monitoring to assess Realised STAR.

Asian Golden Cat *(Catopuma temminckii)*
VULNERABLE

07

Considerations when using STAR

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Biodiversity is complex and multi-faceted. Similarly, biodiversity decision-making involves a wide range of information types and considerations, including social and economic aspects. No single biodiversity metric will be suitable for every situation, and in some cases a suite of complementary metrics may be needed.

STAR is a robust and versatile biodiversity metric with many practical applications. Like any such metric, however, it has limitations and constraints that relate either to its design or to gaps in available data.

It is important to understand these limitations, both intrinsic and data-related, so as to ensure that STAR is used and interpreted appropriately. Note that work is actively underway to address known data gaps and improve and extend the global STAR datasets.

7.1

STAR focuses on threatened species

STAR gives higher scores to locations with many threatened species that have small global ranges. This follows a well-established approach to conservation priority-setting that emphasizes threat (reflecting limited options in time) and irreplaceability (reflecting limited options in space).

As the KMGBF goals and targets illustrate, these are important aspects to consider when targeting conservation interventions, but not the only ones. For instance, STAR does not directly highlight opportunities for conserving intact ecosystems or species communities, ecological processes, ecosystem functions and services, economically or culturally important species, or the recovery of species that are depleted but not yet threatened with extinction. It does not directly address evolutionary history, although research is underway to develop a linkage between STAR and the "Evolutionarily Distinct & Globally Endangered" (EDGE) metric[10].

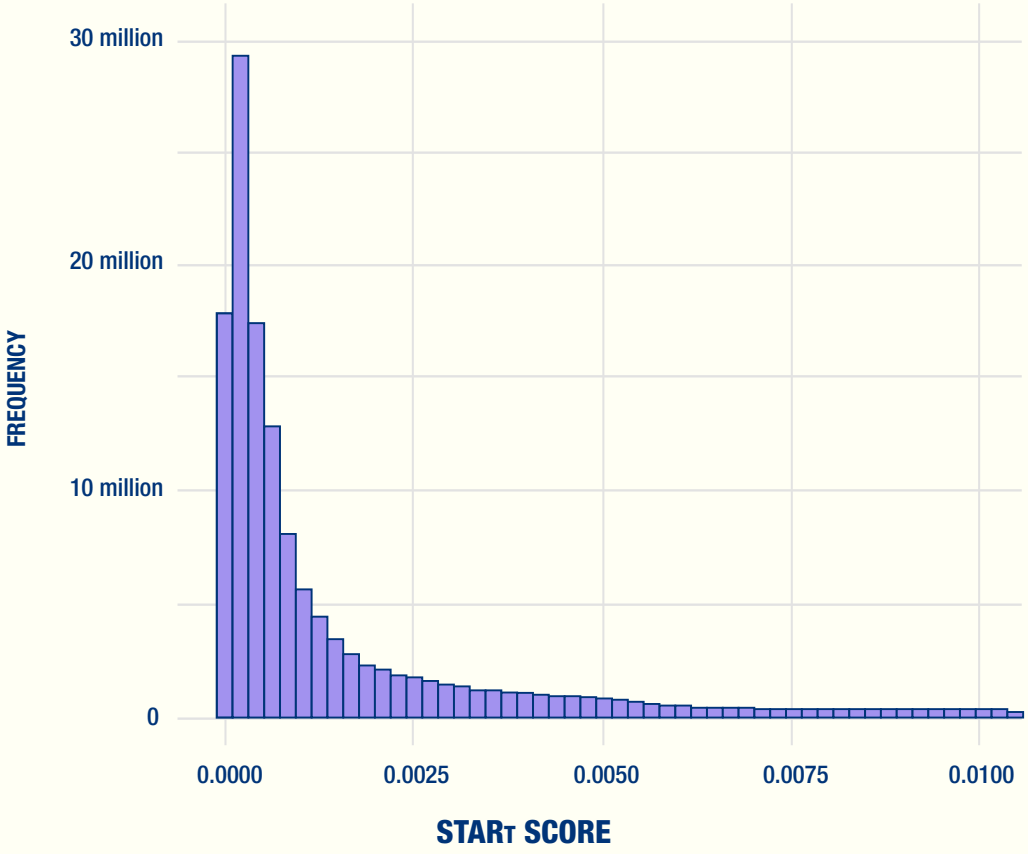
A low STAR score for an Area of Interest does not necessarily mean that the Area of Interest lacks current or potential biodiversity value. It does show that there is relatively limited opportunity for interventions there to reduce global species extinction risk (for the taxa included in STAR).

10 Gumbs et al. 2023

7.2

STAR scores have a skewed distribution

Global patterns of species richness and range-size mean that STAR grid-cell scores have a distribution that is substantially right-skewed. This means most grid cells have low scores while a few have very high scores.



This pattern of STAR scores is generally apparent for any large-scale geographical unit, whether globally, regionally or nationally.

Across the world, very high STAR scores are concentrated mainly in the tropics, and especially in certain tropical mountain, island and coastal marine areas. This concentration reflects the biogeographic distribution of threatened species, and hence opportunities to reduce global extinction risk.

There are, however, few areas globally with STAR scores of zero. Even if an area has a low STAR score, for example in many high latitude regions, in deserts, and in the high seas, there are still important opportunities to implement actions within the area to reduce extinction risk.

Figure 14 - The global frequency distribution of Estimated START scores for terrestrial 1-km grid (the very small proportion of cells with scores higher than c. 0.011 form a long 'tail' that is not shown).

7.3

Global STAR only includes comprehensively-assessed species groups

Global STAR scores reflect the status of taxon groups currently included in the STAR. To ensure that STAR scores are comparable across the world, these taxon groups must be comprehensively assessed on the Red List. How well these groups indicate the status of other, less well-known taxon groups (for example, terrestrial higher plants) may vary.

Global STAR scores also do not consider species threat at national or regional scale. However, it is possible to calculate STAR based on national or regional red lists to address such species (Section 8.2).

As further taxon groups on the Red List become comprehensively assessed, the global STAR layers will be updated. For instance, terrestrial STAR$_T$ has recently been updated to include reptiles alongside amphibians, birds and mammals, and now covers all terrestrial vertebrates. Freshwater species and tree species are in the process of being added into terrestrial STAR$_T$.

7.4

Geographic variation in species life-cycle stages is not fully reflected in STAR

Currently, the Area of Habitat calculations in STAR do not fully account for species that spend different parts of their life-cycle in different locations, and sometimes different realms. Such species include, for example, migratory terrestrial birds or bats, oceanic seabirds that nest on islands, or fish that spend part of the lives in freshwater and part in the sea. These complex life-cycles are not yet adequately reflected in Area of Habitat estimates which could lead to STAR scores under- or over-estimating potential for extinction risk reduction at a location.

The STAR methodology is being refined so that it better accounts for different life-cycle stages. In the next iteration, global STAR is also expected to present a single global layer across all realms, rather than separate terrestrial, freshwater and marine layers.

Variegated Spider Monkey *(Ateles hybridus)* - CRITICALLY ENDANGERED / © Joachim S. Müller (CC BY-NC-SA)

7.5

Estimated STAR makes some simplifying assumptions

To enable calculation of standardised, comparable scores, estimated global STAR assumes that across a species is present, at uniform densities, and subject to uniform threat intensities across its Area of Habitat.

The STAR calibration process (section 6.2) is applied to refine STAR estimates using ground-truthed data. At present, calibration corrects for species' presence and the local presence and intensity of threats.

The calibration methodology is being further developed to account for spatial differences in species population density.

7.6

STAR scores are comparable only when based on the same datasets

Estimated, Calibrated, Target, and Realised STAR scores are comparable when calculated in the same way using the same underlying datasets.

However, it is not appropriate to compare STAR scores that are calculated using different datasets, for example where different STAR scores are based on:

- National red lists compared to the global IUCN Red List
- Differently dated versions of the Red List
- Inclusion of different taxon groups
- Different methodologies (including land cover datasets) for Area of Habitat mapping.

The global IUCN Red List is continually updated and refined as new information becomes available and new or revised assessments are made. Similarly, global STAR estimates are updated (on a less frequent schedule) to reflect the latest Red List information. This results in different versions or 'vintages' of STAR being available over time.

Assessment of Realised STAR over time should be based on the STAR version that was used to calculate Calibrated STAR for a location, and not altered to reflect subsequent versions.

7.7

Some threatened species require additional targeted interventions

Fully addressing the threats faced by a species, over its entire range, is expected to reduce its risk of extinction, so that it would no longer be assessed in a threatened category on the Red List[11]. However, some species may require further targeted interventions in addition to reduction of relevant threats[12]. These could include, for example, captive breeding for population replenishment or re-introduction, focused habitat management, or assisted movement. KMGBF Target 4 is designed to mobilise such interventions as needed over and above threat abatement and restoration. Potential species-specific needs should be assessed when planning interventions after the STAR calibration process (section 6.2).

11 Mair et al. 2021

12 Bolam et al. 2021

Javan Rhinoceros *(Rhinoceros sondaicus)*
CRITICALLY ENDANGERED

08 Other approaches and metrics to complement STAR

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The global STAR layers provide robust and versatile biodiversity metrics with varied applications. However, in some contexts other approaches and metrics, outlined below, may be useful to complement STAR.

8.1

IUCN Green Status

The STAR metric focuses on reducing extinction risk, guiding actions that can move threatened species to the Least Concern Red List category. While a Least Concern species has relatively low risk of near-term extinction, it may be far from fully recovered to a healthy, viable and functional status. KMGBF Goal A for 2050 recognises this, with the aim that by 2050 "the abundance of native wild species is increased to healthy and resilient levels".

The IUCN Green Status of species complements the Red List by providing a tool for assessing the recovery of species' populations and measuring their conservation success.

The Green Status assesses species against three essential facets of recovery[13]. A species is considered to be fully recovered if, across all parts of its range (including those previously occupied before major human impacts) it is all of

1. **Present**
2. **Viable,** i.e. not threatened with extinction
3. Performing its **ecological functions.**

These factors contribute towards a **Green Score** that ranges from 0–100%, which shows how close a species is to its **fully recovered** state.

The Green Status framework and Green Score can be used as a complementary measure to STAR for target-setting and action planning to achieve the component of Goal A focused on healthy and resilient species.

13 Akçakaya et al. 2018

8.2

National Red Lists

Many countries have developed National Red Lists using IUCN's Guidelines for Application of the IUCN Red List Criteria at Regional and National Levels. National Red Lists assess and categorise the extinction risk status of species at the national level.

The STAR metric methodology is applicable at national (or regional) scale as well as globally. Depending on the robustness, completeness and recency of the national Red List assessment, developing a national STAR dataset may have some practical advantages:

- National Red Lists may include additional taxon groups that are fully assessed (at national level) and can be incorporated in the STAR metric. For example, some national Red Lists include full assessments for higher plants and certain invertebrate groups. National STAR datasets may thus give a more broadly representative view of biodiversity than the global STAR layer.
- STAR based on National Red Lists may show greater differentiation of scores across grid cells, especially for countries where there are relatively few globally threatened species present.
- National Red Lists can help to highlight not only global but national-level responsibilities and priorities for reducing species extinction risk.

On the other hand, there may be practical challenges in assessing current and former Area of Habitat, and the relevance, scope and severity of threats, for nationally threatened species that are not already in the STAR global layer.

Mair et al. (2023) provide examples of applying STAR based on national Red Lists, focusing on vascular plants in Brazil, Norway, and South Africa, to identify key opportunities for reducing extinction risk by threat type and location.

Giant Anteater *(Myrmecophaga tridactyla)* - VULNERABLE / © Andy Jones (CC BY-NC)

8.3

Other metrics focused on species extinction risk

The recently-developed Land-cover change Impacts on Future Extinctions (LIFE) metric also focuses on opportunities to reduce extinction risk. It has similarities to STAR but can be used for complementary purposes.

The metric estimates change in species' extinction risk from land-cover changes[14]. LIFE uses a non-linear model to relate past and present habitat loss to a species' extinction probability. Global layers for LIFE show the marginal effect of converting or restoring natural habitats to or from arable land.

Like STAR, LIFE is based on Area of Habitat mapping for species of terrestrial vertebrates, and LIFE scores are comparable and scaleable. Unlike STAR, LIFE is focused on land-cover change in the terrestrial realm (not other threats or realms), but includes Least Concern as well as threatened species. As with STAR, LIFE has a range of potential applications[15]. It is likely to be particularly useful for situations relating to land-use planning for agricultural development, and where STAR scores are relatively low and the larger species complement in LIFE provides better differentiation of scores across grid cells in a landscape.

The LIFE global layers have been published, with conditions of use as set out by the custodians of the underpinning data sets.

14 Eyres et al. 2025a

15 Eyres et al. 2025b

COLOMBIA /© Pexels a3tabacos

Glossary

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AoH - Area of Habitat	The area within a species' range with suitable habitat at suitable elevation. A species' Area of Habitat is estimated based on IUCN Red List data on species' ranges, habitat associations (cross-walked to landcover classes) and elevation limits.
Area of Influence	In impact assessment, the Area of Influence is the geographic extent where a project's direct and indirect environmental and social impacts may potentially occur. It defines the spatial scale for identifying and managing risks, including both the project's direct operations and any unplanned but predictable developments that might be caused by the project.
Area of Interest	A defined geographic area for potential interventions to reduce species extinction risk. Estimated STAR scores for an Area of Interest are obtained by overlaying a user-defined location or polygon on the global STAR map.
Calibrated STAR	A validated measure of an Area of Interest's potential to contribute to species' extinction risk reduction. It is based on adjustment of Estimated STAR following further assessment using location-relevant data on the presence of species, and presence and intensity of threats.
CBD - Convention on Biological Diversity	An international treaty adopted in 1992 with three main goals: the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits from the use of genetic resources.
CMS - Convention on Migratory Species	Also known as the Bonn Convention, an international treaty under the United Nations Environment Programme (UNEP) adopted in 1979 to protect migratory species of wild animals and their habitats on a global scale.
Critically Endangered species	See 'IUCN Red List categories'
EDGE species - Evolutionarily Distinct and Globally Endangered species	Species identified using a scientific framework that considers both evolutionary uniqueness and risk of extinction. EDGE species capture significant evolutionary history and are at the brink of disappearing, so their extinction would result in a disproportionate loss of the planet's unique evolutionary heritage.
Endangered species	See 'IUCN Red List categories'

Estimated STAR	STAR scores mapped as global layers that provide an estimate of local STAR values based on global datasets, under the assumptions that species occur uniformly throughout their mapped Area of Habitat, and species-specific threats are uniform across their entire range.
IUCN Contributions for Nature Platform	An online tool and geospatial interface where IUCN Government and Civil Society Members and other constituents can document, visualize and communicate their contributions for nature in support of global biodiversity targets.
IUCN Green Status of Species	A scientific framework that measures a species' recovery by assessing how close it is to being ecologically functional and viable across its entire native range.
IUCN Habitats Classification Scheme	A hierarchical framework used to standardize the categorization of habitats for international conservation efforts. It provides the basis for assessing species-habitat associations and mapping species' area of habitat. The scheme has three levels of organization, moving from 18 broad categories (Level 1) to more specific habitat classes (Level 2) and specific habitat sub-types (Level 3).
IUCN Red List categories	The IUCN Red List of Threatened Species divides species into nine categories based on their risk of global extinction. Species are assessed based on scientific criteria such as population size, rate of decline, and geographic distribution. The Red List categories used in STAR calculation are: • Critically Endangered (CR): Highest risk of extinction. A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild. • Endangered (EN): Very high risk of extinction. A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild. • Vulnerable (VU): Risk of extinction. A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild. • Near Threatened (NT): A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered, or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. In addition, Least Concern (LC) species are those that do not qualify or nearly qualify for a threatened category, because they remain relatively abundant and widespread, and are not suffering rapid declines. Their inclusion on the Red List helps to track overall biodiversity trends as well as identify species that may be declining but are not yet threatened with extinction. Least Concern species may still be a focus for conservation attention to achieve species recovery.

IUCN Red List of Threatened Species	International standard for assessing species extinction risk. The IUCN Red List of Threatened Species is compiled by IUCN's global network of experts, specialist groups and partners.
IUCN Threats Classification Scheme	A standardized, hierarchical framework used to document and categorize direct threats to species and ecosystems, and a core component of the IUCN Red List of Threatened Species assessment process.
KBA - Key Biodiversity Area	A site of global significance for the persistence of biodiversity, identified consistently and rigorously using the set of quantitative scientific criteria in the KBA global standard.
KMGBF - Kunming-Montreal Global Biodiversity Framework	A framework adopted at the 15th Conference of the Parties (COP15) to the UN Convention on Biological Diversity in December 2022 that sets out a pathway to halt and reverse nature loss and reach the global vision of a world living in harmony with nature by 2050. The framework sets 23 global targets for 2030 and four long-term goals for 2050.
Least Concern species	See 'IUCN Red List categories'
LIFE metric - Land-cover change Impacts on Future Extinctions metric	A global metric that considers species' current and past Area of Habitat to map the impact of land-use changes on extinction risks, currently for terrestrial vertebrates.
MEA - Multilateral Environmental Agreement	A legally binding international agreement between three or more countries that addresses shared environmental problems through collective action and coordinated rules, aiming to foster international cooperation to manage environmental issues that are global or transboundary in nature.
NBSAP - National Biodiversity Strategy and Action Plan	A country's official plan for addressing biodiversity loss that outlines national actions and strategies to meet international goals, such as the targets set by the global Kunming-Montreal Biodiversity Framework. NBSAPs identify threats, define conservation and sustainable use strategies, and promote concerted and cross-sectoral efforts to protect nature and ensure human well-being.

Near Threatened species	See 'IUCN Red List categories'
OCC - Opportunity Cost of Conservation	The lost direct economic or social benefits arising from alternative land or resource uses that were forgone to protect biodiversity.
OECM - Other Effective Area-based Conservation Measures	As defined by the Convention on Biological Diversity (Decision 14/8), a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values.
Protected Area	IUCN defines a Protected Area as a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Such areas have the primary goal of nature conservation, even if other activities, such as sustainable resource use, are permitted.
Ramsar Convention	Also known as the Convention on Wetlands, an intergovernmental treaty adopted in 1971 (in Ramsar, Iran) that provides a framework for nations to conserve and wisely use wetlands and their resources. The convention's three main pillars are the designation of important wetlands as Ramsar Sites, promoting wise use of all wetlands, and fostering international cooperation on shared wetland systems and resources.
Realised STAR	A conservation outcome measure in STAR units, calculated from Calibrated STAR values and the measured threat intensity reduction and/or restoration success resulting from conservation interventions in a defined Area of Interest.
RHINO - Rapid High-Integrity Nature-positive Outcomes	An approach developed by IUCN providing science-based pathways for the delivery and reporting of rapid, high-integrity contributions to the Kunming-Montreal Global Biodiversity Framework (KMGBF) and the Sustainable Development Goals (SDGs) (see IUCN 2025).

RLI - Red List Index	A metric that tracks the global extinction risk of a group of species by measuring changes in their IUCN Red List Categories over time, showing whether species are overall becoming more or less threatened. The RLI is recognized as a key indicator for international biodiversity and sustainability goals.
SDGs - UN Sustainable Development Goals	A set of 17 interconnected goals to transform the world by 2030. Adopted by all United Nations Member States, they constitute a universal call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice, and prosperity.
STAR$_R$ - Species Threat Abatement and Restoration metric - Restoration	A metric to show the potential or achieved contribution to reducing species' extinction risk, based on actions to restore species' habitat while preventing threats in a defined Area of Interest.
STAR$_T$ - Species Threat Abatement and Restoration metric - Restoration	A metric to show the potential or achieved contribution to reducing species' extinction risk, based on actions to lower the intensity of specific threats in a defined Area of Interest.
Target STAR	An objective for reduction in species' extinction risk measured in STAR units, calculated from Calibrated STAR values and targets for reduced threat intensity and/or restoration success resulting from conservation interventions in a defined Area of Interest.
UNCCD - United Nations Convention to Combat Desertification	An international agreement adopted in 1994 that links land management, environment and development. It aims to restore degraded land, mitigate the effects of drought, and improve conditions for people in drylands (arid, semi-arid, and dry sub-humid areas) through a participatory approach to sustainable land stewardship.
Vulnerable species	See 'IUCN Red List categories'
WHC - The World Heritage Convention	An international treaty under the United Nations Educational, Scientific and Cultural Organization (UNESCO), adopted in 1972, to identify, protect and preserve cultural and natural sites of 'Outstanding Universal Value' around the world. The Convention establishes a framework for international cooperation, the criteria for inscribing sites onto the World Heritage List and the duties of States Parties to protect these properties.

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Annex I

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Annex I: STAR methodology and underpinning data

The STAR methodology and calculation of the first-version terrestrial STAR layer are described in Mair et al. 2021. Calculation of marine STAR is described in Turner et al. 2024.

The estimated global START layer (version 2) was updated in 2025 and is based on the following datasets:

- The IUCN Red List of Threatened Species. Version 2025-1
- IUCN Threats Classification Scheme (Version 3.3)
- IUCN Habitats Classification Scheme (Version 3.1).

For Area of Habitat[16] estimates (see Box C) in the current START global layer, species' suitable habitat was determined by applying habitat associations listed in the Red List assessments. To map this, terrestrial habitats in the IUCN habitats classification scheme were matched to Copernicus Global Land Service Land Cover (CGLS-LC100, version 3.01, 2019 epoch) discrete landcover classes through a crosswalk table[17]. Elevation thresholds were applied through the Copernicus GLO-30 Digital Surface Model, considered the most recent and accurate elevation data[18], corrected via a machine learning algorithm to remove forests and buildings[19].

For the first terrestrial global STAR layers (v 1), including the current STARR layer, and for Marine START the Red List datasets used were:

- The IUCN Red List of Threatened Species. Version 2019-3.
- IUCN Threats Classification Scheme (Version 3.2, 2019)
- IUCN Habitats Classification Scheme (Version 3.1).

AoH mapping was based on Strassburg et al. 2020 and for marine START is described in Turner et al. 2024.

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16 Brooks et al. 2019

17 Dahal et al. 2022, Lumbierres et al. 2022

18 Guth & Geoffroy 2021

19 Hawker et al. 2022

Annex II

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Annex II: How STAR can support global goals and targets for nature

KMGBF 2030 TARGET	SUMMARY OF RELEVANT ELEMENTS	POTENTIAL USE OF STAR
TARGET 1	Ensure biodiversity-inclusive spatial planning to minimize loss of areas of high biodiversity importance.	STAR global maps can inform integrated spatial planning for land and sea, and guide zoning and development decisions, through highlighting areas with high potential to reduce species extinction risk via threat abatement and restoration.
TARGET 2	Ensure at least 30% of degraded terrestrial, inland water, coastal and marine ecosystems are under effective restoration.	STARR maps, and on-ground calibration of STARR scores, can guide where and how to restore ecosystems so as to maximise the benefits of restoration for extinction-risk reduction.
TARGET 3	Effectively conserve and manage at least 30% of terrestrial, inland water, coastal and marine areas, especially those of particular importance for biodiversity.	START maps, and on-ground calibration of START scores, can inform identification and prioritization of areas of particular importance for biodiversity, including Key Biodiversity Areas (KBAs), as the focus for improved management effectiveness or expansion of protected area and OECM networks.
TARGET 4	Halt human-induced extinction of known threatened species and reduce extinction rate and risk tenfold by 2050.	STAR can directly quantify and aggregate (in STAR units) the potential and achieved contributions of actions to reducing species extinction risk, providing a measurable metric for national progress towards this core KMGBF goal.

TARGETS 5, 6, 7, 8 AND 10	Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal. Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity. Reduce pollution risks and the negative impact of pollution to levels that are not harmful to biodiversity. Minimize the impact of climate change and ocean acidification on biodiversity, and increase biodiversity resilience. Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably.	STAR quantifies the relative contribution of different threats to species extinction risk. STAR can be used to identify and prioritize species and locations where actions to address particular threats will have the most impact on reducing species extinction risk.
TARGET 14	Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting.	As a standardised, quantified and scalable biodiversity metric STAR has wide potential applications to inform policy and planning, including integrated spatial planning, sectoral policies, strategic assessment and biodiversity accounting.
TARGET 15	Encourage and enable businesses to monitor, assess, and transparently disclose biodiversity risks, dependencies and impacts.	Private sector use of STAR helps to standardize and quantify biodiversity risk assessment and disclosure of both positive and negative impacts. Encouraging and enabling businesses to use STAR can make it easier for governments to track corporate commitments, actions, disclosure, reporting and outcomes and integrate them into national targets and reporting.

Table 3- Summary of how STAR can be applied to support achievement of a range of KMGBF targets

OTHER MEA GOALS AND TARGETS (SELECTED EXAMPLES)	SUMMARY OF RELEVANT ELEMENTS	POTENTIAL USE OF STAR
Ramsar Convention, 2022 update of the 4th Strategic Plan 2016 – 2024		
TARGET 5	The ecological character of Ramsar sites is maintained or restored, through effective planning and integrated management.	STAR global maps, and Calibrated/ Target STAR, for freshwater and wetland-dependent species, can help to guide and focus conservation, threat reduction and restoration efforts for Ramsar sites. STAR helps show where and which actions can have the greatest positive impacts on reducing species extinction risk. Realised STAR can demonstrate and quantify how far interventions have reduced species extinction risk.
TARGET 7	Sites that are at risk of change of ecological character have threats addressed.	
TARGET 12	Restoration is in progress in degraded wetlands, with priority to wetlands that are relevant for biodiversity conservation, disaster risk reduction, livelihoods and/or climate change mitigation and adaptation.	
TARGET 13	Enhanced sustainability of key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture and fisheries, when they affect wetlands, contributing to biodiversity conservation and human livelihoods.	STAR scores broken down by threat types can show which threat abatement measures could have the most positive impact on reducing species extinction risk.

Convention on Migratory Species, Samarkand Strategic Plan for Migratory Species 2024-2032		
TARGET 1.3	By 2032, the conservation status of all migratory species listed in CMS Appendices has improved.	STAR global maps, and Calibrated/ Target STAR scores for migratory species can help in planning species- and site-focused interventions for threat abatement and restoration. Realised STAR can demonstrate and quantify how conservation efforts have reduced extinction risk for migratory species.
TARGET 2.2	By 2032, all important habitats for migratory species listed in CMS Appendices are protected, effectively conserved, managed and restored.	
TARGET 2.3	By 2032, the loss, degradation and fragmentation of important habitats for migratory species listed in CMS Appendices is reduced, and habitats are restored to ensure that such habitats support their viability.	
GOAL 3 AND GOAL 3 TARGETS	Threats affecting migratory species are eliminated or significantly reduced, related to: Target 3.1 Take, use and trade Target 3.2 Direct mortality Target 3.3 Pollution Target 3.4 Climate change Target 3.5 Invasive alien species	

UN Convention to Combat Desertification 2018–2030 Strategic Framework		
UNCCD STRATEGIC OBJECTIVE 4 EXPECTED IMPACT 4.1	To generate global environmental benefits through effective implementation of the UNCCD Sustainable land management and the combating of desertification/ land degradation contribute to the conservation and sustainable use of biodiversity and addressing climate change.	STAR global maps, and Calibrated/ Target STAR, can help to guide and focus efforts to combat desertification and land degradation where these will generate the greatest global environmental benefits from reducing species extinction risk. Realised STAR can demonstrate and quantify how far interventions have reduced species extinction risk.
World Heritage Convention Global Strategy for a Representative, Balanced and Credible World Heritage List and IUCN's World Heritage Strategy 2023		
The Global Strategy aims to ensure that the World Heritage List reflects the world's cultural and natural diversity of outstanding universal value.	In support of the Global Strategy, The IUCN's World Heritage Strategy 2023 aims inter alia to: • Advise on filling remaining gaps on the World Heritage List for sites of potential Outstanding Universal Value for biodiversity • Promote the role of World Heritage sites in contributing to the Global Biodiversity Framework.	• STAR can help to identify and justify potential natural World Heritage sites to fill global gaps, including in key under-represented biomes. • STAR can help to demonstrate the contribution of World Heritage Sites to the Global Biodiversity Framework. For example, natural World Heritage Sites, cover only around 1% of terrestrial land area but include more than 4% of the total global terrestrial STAR score[20].

Table 4 - Summary of how STAR can be applied to support achievement of a range of goals and targets for other Multilateral Environmental Agreements

20 IUCN (2023). IUCN World Heritage Strategy: New ambition for World Heritage. Gland, Switzerland: IUCN.

Sustainable Development Goals Targets

SDG TARGET	SUMMARY OF RELEVANT ELEMENTS	POTENTIAL USE OF STAR
14.2 PROTECT AND RESTORE [MARINE AND COASTAL] ECOSYSTEMS	Sustainably manage and protect marine and coastal ecosystems.	STAR global maps, and Calibrated/ Target STAR, can help to focus protection, management and restoration efforts where they can have the greatest positive impacts on reducing species extinction risk.
14.5 CONSERVE COASTAL AND MARINE AREAS	Conserve at least 10 per cent of coastal and marine areas… based on the best available scientific information.	STAR global maps, and Calibrated/ Target STAR, can help to focus ecosystem conservation and restoration efforts where they can have the greatest positive impacts on reducing species extinction risk. Realised STAR can demonstrate and quantify reductions in extinction risk resulting from conservation efforts.
15.1 CONSERVE AND RESTORE TERRESTRIAL AND FRESHWATER ECOSYSTEMS	Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems	STAR global maps, and Calibrated/ Target STAR, can help to focus ecosystem conservation and restoration efforts where they can have the greatest positive impacts on reducing species extinction risk.
15.5 PROTECT BIODIVERSITY AND NATURAL HABITATS	Protect and prevent the extinction of threatened species.	STAR global maps, and Calibrated/ Target STAR, can inform where and which threat abatement and restoration actions will be most effective in reducing in species extinction risk. Realised STAR can demonstrate and quantify progress towards the target.

15.7 ELIMINATE POACHING AND TRAFFICKING OF PROTECTED SPECIES	Urgent action to end poaching and trafficking of protected species of flora and fauna	STAR global maps and breakdown by threat types can highlight the species and spatial priorities for interventions to reduce poaching and trafficking impacts on threatened species.
15.8 PREVENT INVASIVE ALIEN SPECIES ON LAND AND IN WATER ECOSYSTEMS	Measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems.	STAR global maps and breakdown by threat types can highlight the species and spatial priorities for interventions to reduce invasive species impacts on threatened species.
15.9 INTEGRATE ECOSYSTEM AND BIODIVERSITY IN GOVERNMENTAL PLANNING	Integrate ecosystem and biodiversity values into national and local planning and accounts.	STAR can be used to set targets and plan interventions as part of national and local planning, and to quantify reductions in extinction risk for environmental accounting.

Table 5 - Summary of how STAR can be applied to support achievement of a range of targets for Sustainable Development Goals 14 (Life below Water) and 15 (Life on Land)


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