THE IUCN RED LIST:
A KEY CONSERVATION TOOL

Jean-Christophe Vié, Craig Hilton-Taylor, Caroline Pollock, James Ragle, Jane Smart, Simon Stuart and Rashila Tong

The IUCN Red List of Threatened Species™

SSC
Species Survival Commission

Cover photo: *Iberian Lynx (*Lynx pardinus*) – Critically Endangered*. © Joe Zammit-Lucia

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Biodiversity loss is one of the world's most pressing crises with many species declining to critically low levels and with significant numbers going extinct. At the same time there is growing awareness of how biodiversity supports human livelihoods. Governments and civil society have responded to this challenge by setting clear conservation targets, such as the Convention on Biological Diversity's 2010 target to reduce the current rate of biodiversity loss. In this context, *The IUCN Red List of Threatened Species™* (hereafter The IUCN Red List) is a clarion call to action in the drive to tackle the extinction crisis, providing essential information on the state of, and trends in, wild species.
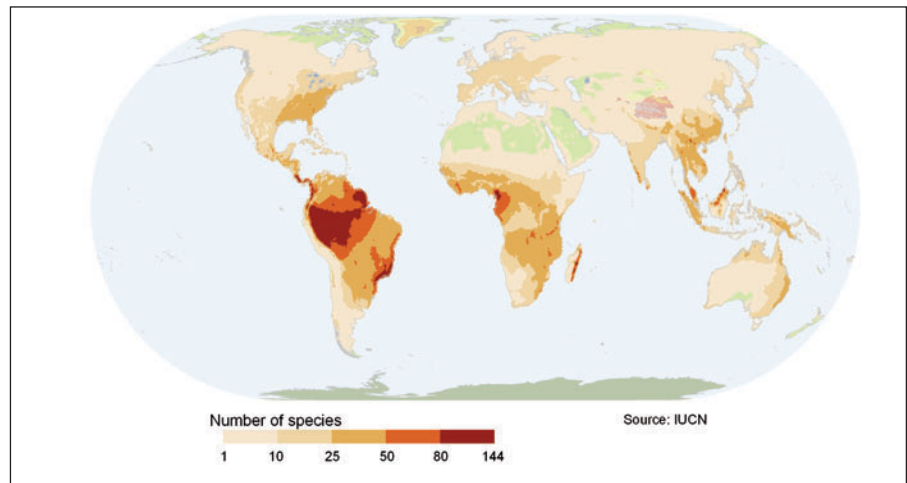
Red List data allows detailed analysis of biodiversity at various scales across the globe .

A highly respected source of information

The IUCN Red List Categories and Criteria are widely accepted as the most objective and authoritative system available for assessing the global risk of extinction for species (De Grammont and Cuarón 2006, Lamoreux *et al*. 2003, Mace *et al*. 2008, Rodrigues *et al.* 2006). The IUCN Red List itself is the world's most comprehensive information source on the global conservation status of plant and animal species; it is updated annually and is freely available online at www.iucnredlist.org. It is based on an objective system allowing assignment of any species (except micro-organisms) to one of eight Red List Categories based on whether they meet criteria linked to population trend, size and structure and geographic range (Mace *et al*. 2008).

*The IUCN Red List can be viewed in its entirety on www.iucnredlist.org*

Far more than a list

One of The IUCN Red List's main purposes is to highlight those species that are facing a high risk of global extinction. However, it is not just a register of names and associated threat categories. The real power and utility of The IUCN Red List is in what lies beneath: a rich, expert-driven compendium of information on species' ecological requirements, geographic distributions and threats that arms us with the knowledge on what the challenges to nature are, where they are operating, and how to combat them.

A wealth of information about threatened and non-threatened species

The IUCN Red List is not limited to just providing a threat categorization. For an increasing number of species, be they threatened or not, it now provides extensive information covering taxonomy (classification of species), conservation status, geographic distribution, habitat requirements, biology, threats, population, utilization, and conservation actions. Spatial distribution maps are also becoming available for an increasing number of species (almost 20,000 species on The 2008 IUCN Red List have maps). All this information allows scientists to undertake detailed analyses of biodiversity across the globe.

Only about 2.5% of the world's estimated 1.8 million described species have been
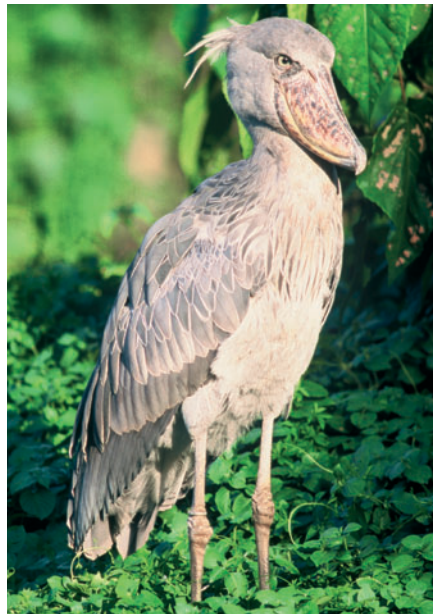
*The IUCN Red List includes threatened and non-threatened species such as the Vulnerable Shoebill (*Balaeniceps rex*) and the Least Concern Guianan Cock-of-the-rock (*Rupicola rupicola*).*
© Jean-Christophe Vié

assessed for The IUCN Red List so far; therefore the number of reported threatened species is much less than the true number at serious risk of extinction. The IUCN Red List is, nevertheless, by far the most complete global list of such species available.

Species: the cornerstone of biodiversity

Species provide us with essential services: not only food, fuel, clothes and medicine, but also purification of water and air,

prevention of soil erosion, regulation of climate, pollination of crops, and many more. They also provide a vital resource for economic activities (such as tourism, fisheries and forestry), as well as having significant cultural, aesthetic and spiritual values. Consequently the loss of species diminishes the quality of our lives and our basic economic security.

Species are easier to identify and categorize than ecosystems, and they

*Species are the building blocks of biodiversity and provide us with essential services. Barracudas (*Sphyraena sp.*) in Guinea Bissau and Cork Oaks (*Quercus suber*) in Portugal. © Jean-Christophe Vié*
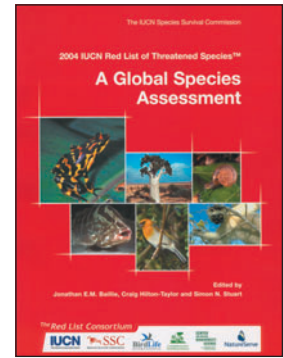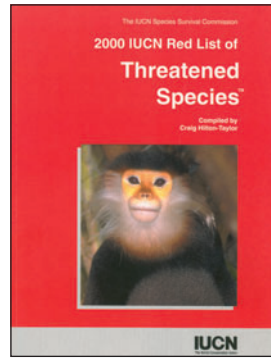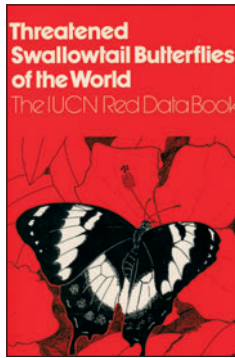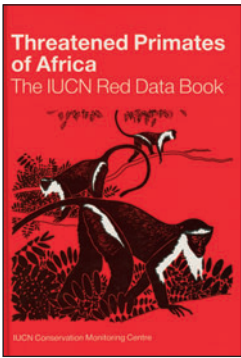
Some examples of past Red List publications.

are easier to measure than genes. They provide the most useful, and useable, indicators of biodiversity status and loss. Species have been extensively studied for more than two centuries and there is an impressive amount of information dispersed around the world, that once compiled and standardized, can be used for developing strategies to tackle the current extinction crisis.

A long and successful history

The IUCN Red List is well established and has a long history. It began in the 1960s with the production of the first Red Data Books (Fitter and Fitter 1987). The concept of the Red Data Book, registers of wildlife assigned categories of threat, is generally credited to Sir Peter Scott when he became Chair of the then IUCN Survival Service Commission in 1963, with the first two volumes (on mammals and birds) published in 1966.

Since the 1960s The IUCN Red List has evolved from multiple lists and books dedicated to animal groups or plants into a unique comprehensive compendium of conservation-related information now too large to publish as a book. However it can be viewed in its entirety on a website managed and maintained by the IUCN Species Programme. It is updated once a year and is freely available to all users of the World Wide Web.

Identifying, documenting and monitoring trends

By assessing the threat status of species, The IUCN Red List has two goals: (i) to identify and document those species most in need of conservation attention if global extinction rates are to be reduced; and (ii) to provide a global index of the state of change of biodiversity. The first of these goals refers to the "traditional" role of The

IUCN Red List, which is to identify particular species at risk of extinction. However, the second goal represents a more recent radical departure, as it focuses on using the data in the Red List for multi-species analyses in order to identify and monitor trends in species status.

To achieve these goals the Red List aims to (i) establish a baseline from which to monitor the change in status of species; (ii) provide a global context for the establishment of conservation priorities at the local level; and (iii) monitor, on a continuing basis, the status of a representative selection of species (as biodiversity indicators) that cover all the major ecosystems of the world.
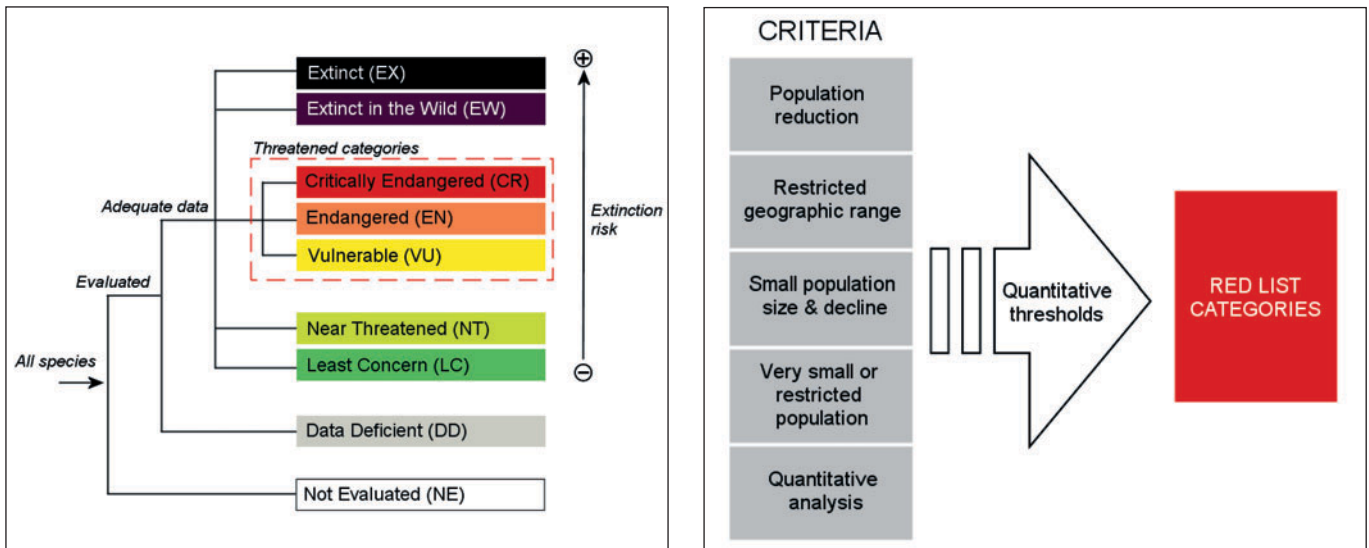
The high profile, standards and scientific integrity of The IUCN Red List are maintained in the following ways: (i) the

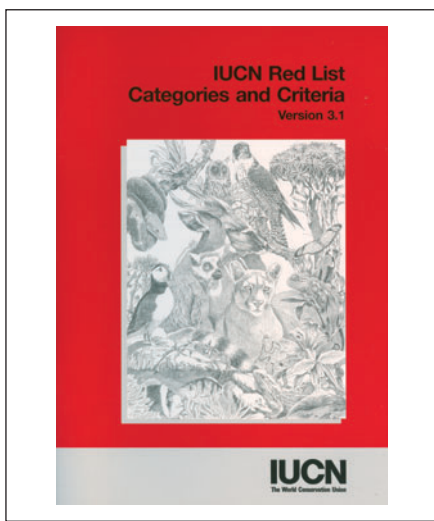Mantella milotympanum – *Critically Endangered.* © Franco Andreone

Indri (Indri indri) – *Endangered.* © Jean-Christophe Vié

Structure of the Red List Categories and the five Red List Criteria.

scientific aspects underpinning The IUCN Red List are regularly published in the scientific literature (Butchart *et al*. 2004; 2007; Colyvan *et al.* 1999; Mace *et al.* 2008); (ii) the assessment process is clear and transparent; (iii) the listings of species are based on consistent use of the Red List Categories and Criteria and are open to challenge and correction; (iv) all assessments are appropriately documented and supported by the best scientific information available; (v) the data are freely available through the World Wide Web to all potential users; (vi) The IUCN Red List is updated regularly (annually at present) but not all species are reassessed with each update – many assessments simply roll-over from the previous edition; and (viii) analyses of its findings are regularly published, approximately every four to five years, usually at the time of the World Conservation Congress (Hilton-Taylor 2000; Baillie *et al.* 2004; Vié *et al*. 2008).

From expert judgment to robust criteria

The first Red List Criteria were adopted in 1994 (IUCN 1994) after a wide consultative process involving hundreds of scientists. The IUCN Red List Categories and Criteria were revised in 2001 (IUCN 2001). They currently include nine categories and five quantitative criteria. The *Guidelines for Using The IUCN Red List Categories and Criteria* (http://www.iucn.org/redlist) have been developed and are updated on a regular basis; they provide detailed guidance on how to apply the categories and criteria and aim at providing solutions to specific technical issues to ensure that assessments are conducted in a standardized way across various plant and animal groups.

The IUCN Red List Categories and Criteria are the world's most widely used system for gauging the extinction risk faced by species. Each species assessed is assigned to one of the following categories: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient, based on a series of quantitative criteria linked to population trend, population size and structure, and geographic range. Species classified as Vulnerable, Endangered and Critically Endangered are regarded as 'threatened'. The IUCN Red List Criteria were developed following extensive consultation and testing, and involved experts familiar with a very wide variety of species from across the world, and can be

used to assess the conservation status of any species, apart from microorganisms.

The Red List Criteria were developed for use at the global scale when the entire range of a species is considered. They can be applied at any regional scale, provided the guidelines for application at regional levels (IUCN 2003) are used, but they may not be appropriate at very small scales.

Working in partnership

The IUCN Red List is compiled and produced by the IUCN Species Programme based on contributions from a network of thousands of scientific experts around the world. These include members of the IUCN Species Survival Commission Specialist Groups, Red List partners (currently Conservation International, BirdLife International, NatureServe and the Zoological Society of London), and many others including experts from universities, museums, research institutes and non-governmental organizations. Assessments can be done by anyone and submitted to IUCN for consideration. Assessments are impartial and are developed and approved based on their scientific merits without consideration of their policy implications. This approach allows for an independent, robust process, requiring rigorous peer-review of all the data. Assessments are periodically updated to ensure that current information is available to users. The IUCN Red List is therefore a synthesis of the best available species knowledge from the world's foremost scientists. Only after the data have

been through the peer review process can they be included in The IUCN Red List.

An effort has also been made to work in partnership with other organizations to agree for example, on standard classification schemes and a common language for threats and conservation measures (Salafsky *et al.* 2008)

A complex and rigorous process

The IUCN Species Programme plays the lead role in helping to fund, convene and facilitate the assessment workshops which drive much of the data gathering and review process for the Red List. It has expanded its staff to facilitate the coordination of assessments. This has allowed the information to grow significantly in recent years, particularly in terms of the number and type of species being assessed, and in the improved richness of the collected data. It has also permitted a significant increase in the quality and consistency of the assessments within and across groups of organisms.

Since 2000, a significant effort has been made to increase the number of assessments through assessing entire taxonomic groups, as BirdLife International has done for birds since 1988. This led to the establishment of a central Red List Unit and the establishment of global assessment teams within the IUCN

*Great White Shark (*Carcharodon carcharias*) – Vulnerable.* © Jeremy Stafford Deitsch

Species Programme. In particular, a Biodiversity Assessment Unit established in partnership with Conservation International is coordinating the work on mammals, reptiles, amphibians and marine species. Other IUCN units are coordinating global freshwater biodiversity and regional species assessments. These units play a key role in running the assessment processes, and also in finding the necessary resources to

mobilize the experts' knowledge and bring assessments to completion.

The Species Survival Commission (SSC) currently has 85 Red List Authorities which work very closely with the Species Programme, especially in identifying the leading experts to contribute to assessments, and conducting evaluations of the data as part of the peer-review process. Many of the Red List Authorities are part of SSC Specialist Groups, and some are also within the Red List Partner organizations.

From the field to The IUCN Red List

All species assessments are based on data currently available for the species (or subspecies, population) across its entire global range. Assessors take full account of past and present literature (published and grey) and other reliable sources of information relating to the species. For subspecies, variety or subpopulation assessments, a species-level assessment is also carried out.

All submitted assessments are evaluated by at least two qualified reviewers, in most cases assigned by the Red List Authorities. The evaluation process is similar to the peer review process used by scientific

*Asian Wild Ass (*Equus hemionus*) – Endangered.* © Jean-Christophe Vié

journals in deciding which manuscripts to accept for publication.

A sophisticated information management system

IUCN has developed the Species Information Service (SIS), an information management tool to collect, manage, process, and report data - to the point of publication on The IUCN Red List. The SIS allows the contributors to participate in the Red List assessment work more easily than was the case in the past. In addition, through improved data exploration capabilities on The IUCN Red List website, SIS is making the world's most accurate, up-to-date information on species, their distribution and conservation status accessible with flexible, easy-to-use tools to support sound environmental decision-making.

Almost 45,000 listed species

The number of species assessed as threatened keeps increasing every year. By 2008, 44,837 species have been assessed; at least 38% of these have been classified as threatened and 804 classified as Extinct. The documented number of threatened species and extinctions is only the tip of the iceberg, as this number depends on the overall number of assessed species; in addition 5,570 species classified as Data Deficient are possibly threatened (Hilton-Taylor *et*

al. 2008). The number of Extinct species is also a very conservative estimate given that for a species to be listed as Extinct requires exhaustive surveys to have been undertaken in all known or likely habitats throughout its historical range, at appropriate times and over a timeframe appropriate to its life cycle and life form (IUCN 2001). Species that are likely to be Extinct but for which additional surveys might be necessary to eliminate any doubt, are classified in the Critically Endangered Category with a "Possibly Extinct" flag (Butchart *et al*. 2006).

Comprehensive assessments of every known species of mammal, bird, amphibian, shark, reef-building coral, cycad and conifer have been conducted. There are ongoing efforts to complete assessments of all reptiles, all fishes, and selected groups of plants and invertebrates.

Around 1.8 million species have been described, yet the estimates of the total number of species on earth range from 2 – 100 million. We are far from knowing the true status of the earth's biodiversity. Although, only a small proportion of the world's species has so far been assessed, this sample indicates how life on earth is faring, how little is known, and how urgent the need is to assess more species.
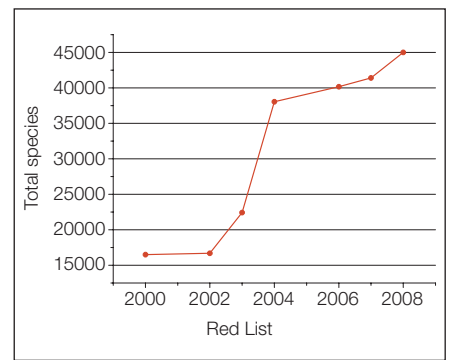
Number of species appearing on each published IUCN Red List since 2000.

Despite the limited number of species assessed in relation to the total number of species known, and the significant number of Data Deficient species included in it, the Red List is still the largest dataset of current information on species. It allows us to measure how little the diversity of life on our planet is known and how urgent the need is to expand the assessment work if we want to be in a position to track progress towards reducing biodiversity loss.

Better links with regional and national Red Lists

The global IUCN Red List only includes information on species, subspecies or populations that have been globally assessed; regional and national level

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Plant and invertebrate species are currently under-represented on the Red List but a dedicated effort is being made to increase their number. © José Antonio Moya (Nudibranch). © Jean-Christophe Vié (Equadorian plants)

An example of a regional biodiversity analysis: threatened terrestrial mammal species richness in Europe.

assessments are currently not included unless these are also global assessments (for example, a species that is only found in one country, (i.e., is endemic) and therefore has the same Red List status at both national and global levels).

For non-endemics, it is important to note that the status of a species at the global level may be different to that at a national level. In certain situations, a species may be listed as threatened on a national Red List even though it is considered Least Concern at the global level by IUCN and vice versa.

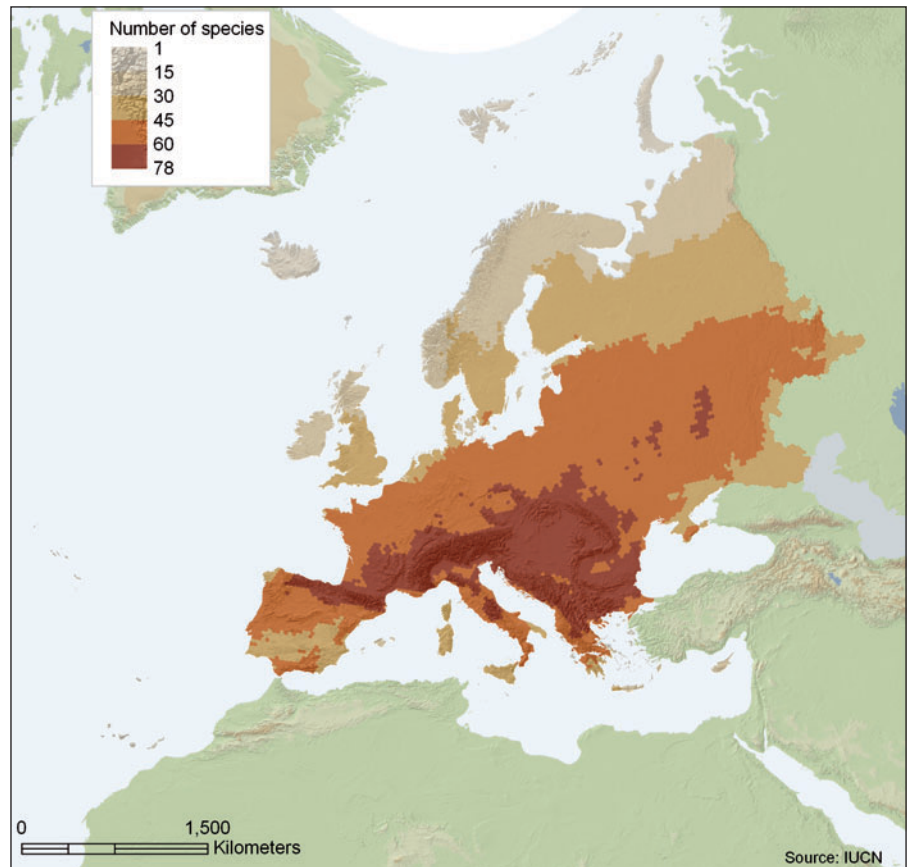An increasing number of regional and national Red Lists are compiled following the *Guidelines for Application of IUCN Red List Criteria at Regional Levels* (Gärdenfors *et al.* 2001; IUCN 2003). IUCN is increasingly undertaking regional Red List projects, for example in Europe and in the Mediterranean region (Temple and Terry 2007; Cuttelod *et al*. 2008). IUCN is also collaborating with other national Red List projects to incorporate their data, especially on national endemics, into the global IUCN Red List.

Regional and national lists are usually country-led initiatives, and are not centralized in any way; they differ from each other widely in terms of scope and quality but are very useful to guide conservation work at sub-global levels. IUCN and its Red List Partners are

currently discussing how to disseminate the data in the national and regional Red Lists more effectively, especially those that are conducted using the IUCN standards.

A multitude of uses

The IUCN Red List can help answer many important questions including:

- What is the overall status of biodiversity, and how is it changing over time?

- How does the status of biodiversity vary between regions, countries and sub-national areas?

- What is the rate at which biodiversity is being lost?

- Where is biodiversity being lost most rapidly?

- What are the main drivers of the decline and loss of biodiversity?

- What is the effectiveness and impact of conservation activities?

© Jean-Christophe Vié

Black-browed Albatross Thalassarche melanophrys - *Endangered. © Richard Thomas*

The IUCN Red List is used in many different applications, some of which are outlined below as examples.

An indicator of biodiversity trends: The IUCN Red List Index

Governments have agreed various targets to reduce biodiversity loss. A global target of reducing or stopping biodiversity loss by 2010 has been adopted respectively by the Parties to the Convention on Biological Diversity (CBD) and the European Union. In 2000, the United Nations adopted the Millennium Development Goals (MDG) with Goal 7 aiming at ensuring environmental sustainability by 2015; this goal underpins the others, in particular those related to health, poverty and hunger. Tools are needed to monitor our progress towards achieving these targets and to highlight where we need to focus our conservation efforts. Indicators are vital in tracking progress in achieving these targets. The IUCN Red List Index (RLI) provides such an indicator and reveals trends in the overall extinction risk of sets of species (Brooks and Kennedy 2004; Butchart *et al*. 2005ab, 2007).

The development of reliable indicators requires robust baseline data; species

data are still scarce for most species groups and have been collected in a variety of formats. Collecting the baseline information is certainly what requires the largest effort in terms of time, expense and the number of people involved. To respond to this challenge, IUCN and its partners have been putting extensive efforts in biodiversity assessment initiatives at global and regional levels to develop The IUCN Red List in a manner that allows the Red List Index (including various cuts of it) to be calculated and measured over time.

The *IUCN Red List Index (RLI)* has been officially included in various sets of indicators to measure progress towards the 2010 CBD target. It has also been recently adopted as an indicator to measure progress towards the UN MDG 7 goal. It will play a vital role in tracking progress towards achieving these targets, and beyond.

The RLI shows trends in the overall extinction risk of sets of species. It is based on the number of species that move between Red List Categories as a result of genuine improvements in status (e.g., owing to successful conservation action) or genuine deteriorations in status (e.g.,

owing to declining population size). The RLI shows the net balance between these two factors. It excludes non-genuine changes in Red List status resulting, for example, from improved knowledge, taxonomic changes, or correction of earlier errors (Butchart *et al.* 2004; 2007).

The proportion of species threatened with extinction is a measure of human impacts on the world's biodiversity, as human activities and their consequences drive the vast majority of threats to biodiversity.

Birds are the class of organisms for which all species (9,990) have been assessed the largest number of times (five times between 1988 and 2008). For this group, the percentage threatened increased from 11.1% in 1988 to 12.2% in 2008.

The RLI for the world's birds shows that their overall status (extinction risk) deteriorated steadily during 1988-2008. The RLI for birds in different regions shows that declines have occurred worldwide but regions differ in the overall extinction risk of their bird fauna, and in the rate of declines.

Birds are excellent, although not perfect, indicators for trends in other forms of
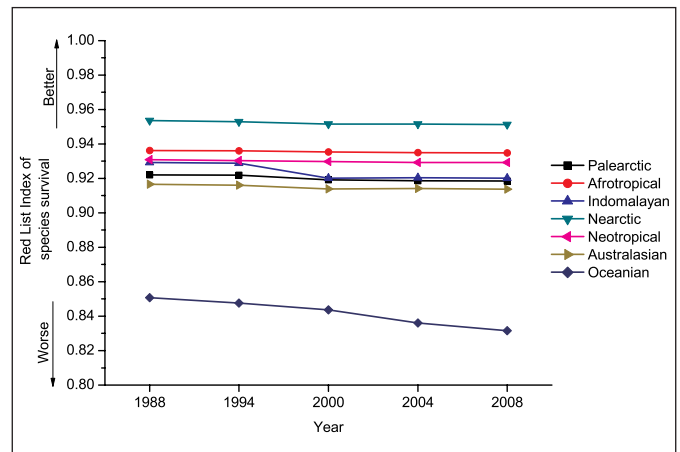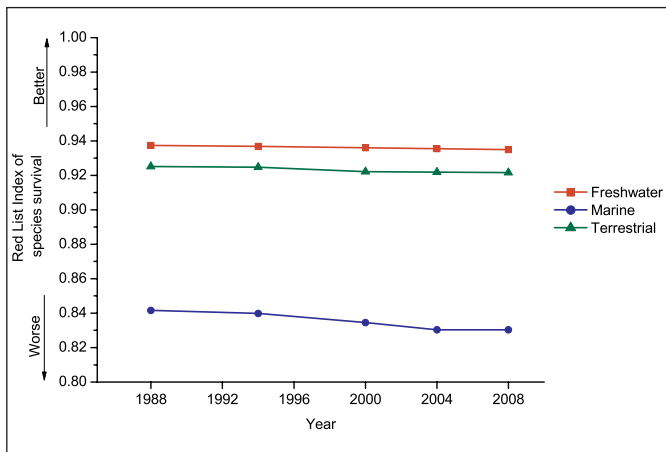
The Red List Index for the world's birds shows that their overall status deteriorated steadily during 1988-2008. Declines have occurred worldwide but regions and biomes differ in the overall extinction risk of their bird fauna, and in the rate of declines (source BirdLife International). Similar graphs will be available shortly for mammals, amphibians, corals and cycads.

biodiversity. Several other classes of organisms have been comprehensively assessed for The IUCN Red List and found to be even more threatened than birds. This is the case for mammals (Schipper *et al*. 2008), amphibians (Stuart *et al*. 2004), reef-building corals (Carpenter *et al*. 2008), sharks and rays, freshwater crustaceans, cycads and conifers. A preliminary RLI has already been calculated for mammals, amphibians and corals.

For other groups (e.g., reptiles, fishes, molluscs, dragonflies, and selected groups of plants) assessment work is being undertaken with the aim of developing RLIs for each of these groups. For species groups that are composed of very large numbers of species (e.g., plants and invertebrates), a Red List Index will be calculated on the basis of a random sample of 1,500 species. This approach, pioneered by the Zoological Society of London, will

allow trends in the status of a broader spectrum of biodiversity to be determined (Baillie *et al*. 2008; Collen *et al*. 2008).

Advising Policy and Legislation

The IUCN Red List data is used to inform the development of national, regional and sub-national legislation on threatened species protection, and also the development of national biodiversity

A preliminary assessment of all plant species have been called for by the Convention on Biological Diversity. © Jean-Christophe Vié

The IUCN Red List is a useful tool for infrastructure development and planning. © Jean-Christophe Vié

strategies and action plans. It is also used to inform multi-lateral agreements such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, and the Convention on Biological Diversity (CBD). The Red List is recognized as a guiding tool to revise the annexes of some agreements such as the Convention on Migratory Species.

The IUCN Red List is also an important tool for implementing some elements of the Global Strategy for Plant Conservation adopted by the CBD in 2002, for example, Target 2 which calls for a preliminary assessment of all plant species and Target 7 aiming at conserving 60 per cent of the world's threatened species *in situ* (Callmander *et al.* 2005).

Informing Development and Conservation Planning

In regional and national resource management and development, The IUCN Red List can be used to guide management at scales ranging from local to national and sometimes regional levels. Examples include setting policies and developing legislation related to land-use planning, certification, transport, energy, river-basin management, and poverty reduction.

For site-development and planning, The IUCN Red List is a key input into the Environmental Impact Assessment process and can guide site level management and planning. There is growing interest by the corporate sector in using the Red List information to inform the selection and management of sites in which they operate.

The wealth of information contained in The IUCN Red List on the distribution and ecological requirements of species can

be used in large-scale analyses such as identifying gaps in threatened species coverage by the existing protected area network (Rodrigues *et al*. 2004). The data has long been used at various scales in conservation planning , especially for defining specific requirements of species at site, landscape/seascape level, and global levels. For example, Red List data are used to support the identification of site-scale conservation priorities, such as Important Bird Areas, Key Biodiversity Areas, Important Plant Areas, Ramsar Sites, and Alliance for Zero Extinction sites (Eken *et al*. 2004; Hoffmann *et al*. 2008).

The Red List also helps to inform the conservation planning of wide-ranging species for which site-based approaches are not suitable strategies. Red List data have been used in the identification of global priorities (e.g., Endemic Bird Areas) and for setting geographical priorities for conservation funding, for example the Global Environment Facility (GEF) Resource Allocation Framework, which determine each country's GEF funding allocation.

Informing conservation action for individual species

Red List data (including information on habitat requirements, threats that need to be addressed, and conservation actions that are recommended) can be used

*Fergusson Island Striped Possum (*Dactylopsila tatei*) – Endangered. © Pavel German*
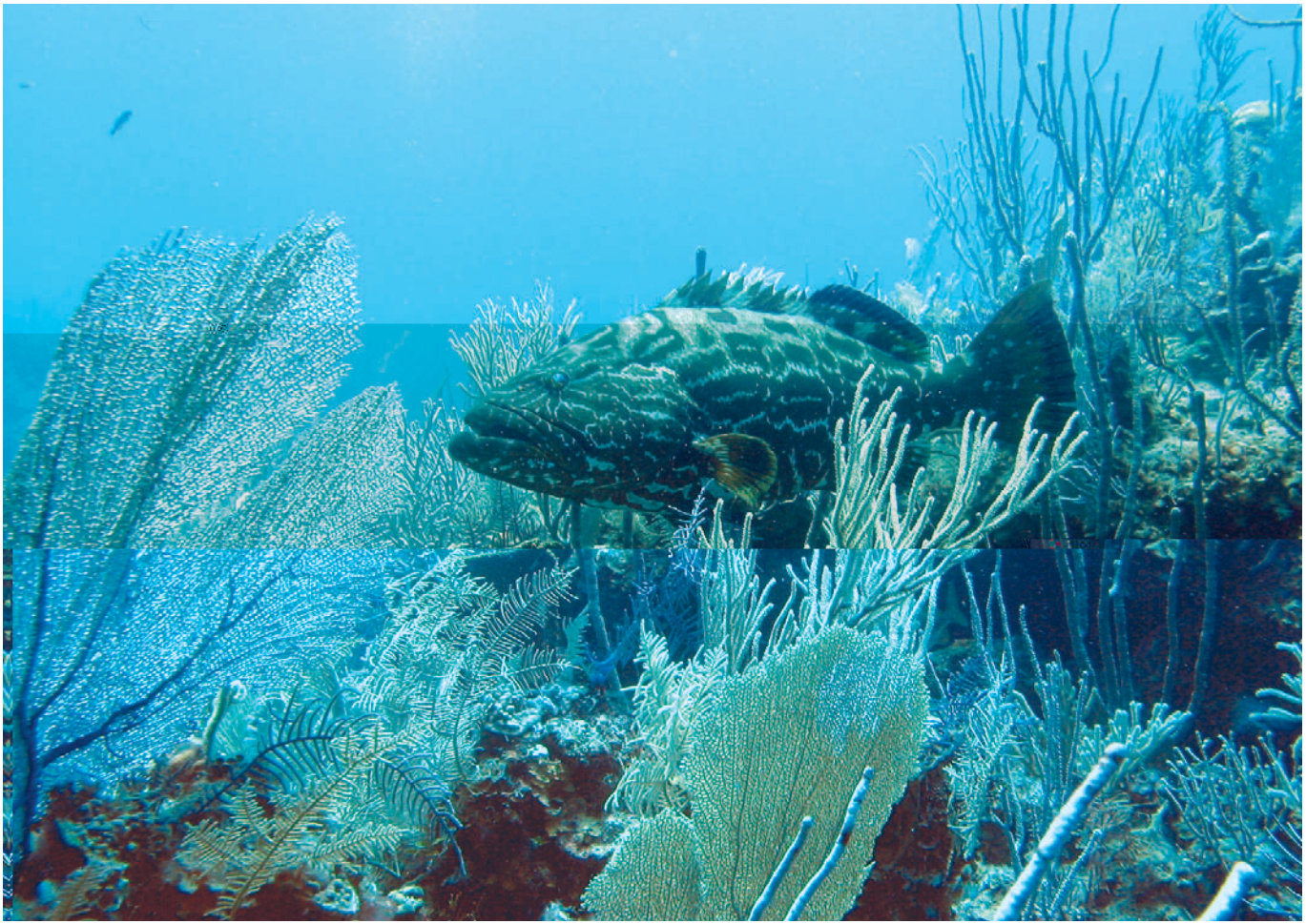
*Black Grouper (*Mycteroperca bonaci*) – Near Threatened. © Craig Dahlgren*

to identify species that require specific conservation action, and to help develop the conservation programmes and recovery plans. The data have also been used in the identification of Evolutionary Distinct and Globally Endangered (EDGE) species, unique animals that are often not the focus of significant conservation support (http://www.edgeofexistence.org/).

Red for Danger… Red as a 'Wake up' Call?

Biological diversity goes beyond species and encompasses ecosystems and genes. However, species remain the well-identified building blocks of biodiversity, and they are easily understood by the public and policy makers alike. By enhancing knowledge on the state of biodiversity, explaining complex species-conservation issues, and highlighting species at risk, The IUCN Red List is attracting increasing attention to the important role that species play if ecosystems are to function properly.

The Red List is increasingly informing academic work (e.g. school home-work assignments, undergraduate essays and dissertations) and many key websites rely on information from The IUCN Red List to help spread their messages and educate the world about conservation issues. Examples include ARKive, Encyclopedia of Life (EOL), Wikipedia, Alliance for Zero Extinction (AZE) and many more. IUCN strives to make The IUCN Red List an important companion to other sites, thus increasing their ability to have conservation impact. The Red List also provides a solid factual basis when drafting funding proposals which seek support for meaningful conservation work.

Guiding scientific research

A significant number of species are listed in the Data Deficient Category and could well be threatened. These species represent a priority for future research including species-specific survey work and research into threatening processes across multiple

species. The Red List is therefore used to identify species-specific survey work and ecological studies that need to be done. Using data gaps identified in the assessment process helps guide research and funding opportunities.

The IUCN Red List data also highlight general overarching threatening processes, such as emerging threats like climate change. The use of these data could greatly improve the quality of models predicting the impacts of climate change on biodiversity (Foden *et al*. 2008).

Guidelines for data use

The IUCN Red List is not intended to be used alone as a system for setting conservation priorities. Red List assessments simply measure the relative extinction risk faced by species, subspecies, or subpopulations. The Red List Category is not on its own sufficient to determine priorities for conservation action. To set conservation priorities, additional

Micrixalus gadgili - Endangered - is known from just three sites in the Western Ghats of southern India. Amphibians are one of the most threatened groups of species worldwide. © S.D. Biju

information must be taken into account (Miller *et al.* 2006)

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The Alpine Ibex Capra ibex *is endemic to Europe. It was driven very close to extinction in the early 19th century and is now listed as Least Concern.*
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