Science for Saving Species

Research findings factsheet

Project 3.1: Developing a threatened species index

Threatened Species Recovery Hub

National Environmental Science Programme

Sharing data to save species

Good decision-making for conservation hinges on good data. Accurate knowledge about where species occur helps us to manage them well, and this is particularly true for species that are rare or threatened. However, data are deficient for one in six IUCN-listed species. Filling these knowledge gaps is urgent if we wish to protect threatened species and ecosystems.

Alongside this concern to expand our knowledge are increasing concerns that it is dangerous to publish the locations of species, especially those at risk of exploitation. Scientists must balance difficult and uncertain trade-offs when deciding whether to share information about species' occurrence publicly or privately. For example, shortly after the discovery of Chinese cave geckos in Vietnam was made public, poaching for the pet trade contributed to their local extinction, which prompted calls for scientists not to publish primary biodiversity data of threatened species that reveal their locations.

While we recognise that location data for sensitive species should be well controlled to avoid such lamentable outcomes, we argue that withholding such primary biodiversity data could unnecessarily disadvantage conservation efforts, and obstruct work on behalf of species and locations at low risk of exploitation.

The solution we propose is a decision-tree protocol for scientists that allows for systematic assessment of the risks and benefits of publishing biodiversity data. It aims to enhance conservation efforts, promote community engagement and reduce survey duplication. In particular, it aims to improve conservation outcomes by enabling scientists to understand the benefits of sharing data and the costs of not sharing data, rather than focusing solely on the risks.

What are primary biodiversity data?

Primary biodiversity data provide evidence of the location of a species at a particular time. This can include a sighting, a DNA sample or a verified photograph; or traces such as scats, tracks, nests or burrows that can be attributed with confidence to a particular species. Primary data can also provide biologically useful information such as age, sex, breeding status and population abundance.

Repositories for primary diversity data abound, and include wildlife atlases and online resources such as http://aekos.org.au. Citizen science programs such as eBird also share such data. Further, scientific journals and funding agencies are increasingly requesting transparently archived research data.

Illegal poaching is still a major threat to the Endangered Carnaby's black-cockatoo. Photo: RalphGreen_FlickrCCBYNCND2

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How biodiversity data are shared

There are different ways of sharing biodiversity data depending on the particular conservation sensitivities. They can include:

- publishing precise locations but changing species identifiers to "restricted" or to a higher taxonomic resolution such as genus or family
- publishing accurate species names but masking or changing the location
- withholding species location information entirely.

Currently, the Global Biodiversity Information Facility provides the most comprehensive guidelines for assessing sensitivities around species and publishing their locations. These guidelines recommend first identifying whether a species is at risk of harm from human activity and then assessing the impact of that activity on the species. Following that are rules for determining the degree of sensitivity of a species, and a rule for determining whether sharing information will likely harm the species.

However, this protocol does not give consideration to the benefits of publishing data.

Benefits of sharing data

Sharing primary biodiversity data has direct conservation benefits, by being of use to others. It also features indirect benefits such as:

- verifying existing research
- promoting public engagement
- stimulating new or collaborative research
- informing non-researchers about key ecological or conservation issues.

For species threatened primarily by climate change and habitat loss, the benefits of revealing population locations may outweigh the overall risks of increasing the likelihood of human exploitation. For example, rare species with poorly understood distributions are especially likely to have declined due to habitat loss, but new populations are often found in unexpected parts of their former ranges. Any known location data can be crucial in conservation planning and management to protect the remaining habitats of such species.

Withholding diversity data can lead to perverse outcomes for species needing management to ensure their persistence. It can do this by giving a false impression of restricted range or small populations, and by new locations remaining undiscovered or being unknowingly destroyed in land development.

Risks of sharing data

Poaching is a major risk for species that are highly valued for traditional medicine, recreational hunting and private collections. There is no doubt that it has caused species declines and even extinctions, for example the Javan rhino. It is an ongoing threat to many threatened birds, especially parrots such as Carnaby's black-cockatoo. And a common threat to many orchids, such as the swamp orchid.

Even where people mean no harm, but simply want to see a rare species, their access to the area can have negative consequences such as through damage to habitat, introduction of invasive species and pathogens, or disturbance of feeding and nesting.

It is imperative for researchers to understand not only where species occur but also the spread and intensity of in situ and ex situ threats to them.

The matter is compounding, as the increase in use of social media is making it more difficult to manage sensitive information. When black market prices for threatened species range from US$2 for a sea turtle in Mexico to US$31,000 for an Australian black-cockatoo and US$400,000 for a gorilla, it is necessary to know whether publishing new localities or ecological information about a population will increase the threats to the species.

Other deterrents to publishing

Other "risks" of publishing biodiversity data can have a cultural, social or economic basis. For example, fishers may not share data on the location of threatened species out of concern that the data may be used against them to prosecute for violations or lead to fishing restrictions. Another example is research scientists concerned at the time and cost in sharing data that could be spent instead on publishing more papers or writing more grants.

A decision tree for sharing biodiversity data

The focus on the risks of sharing primary biodiversity data has failed to take into account situations when the benefits outweigh the risks. We propose that scientists follow a decision tree that considers the benefits of sharing biodiversity data, including locations of threatened species. Our decision tree considers all the relevant threats to species, and whether conservation mechanisms are in place to mitigate them or could be put in place.

The main risks are exploitation for trade or resource uses, or disturbance or destruction of the habitat due to human access. The first step to identifying the risk of publishing locality data for a species is identifying how valuable it is to collectors, poachers or others with an ex situ interest in it.

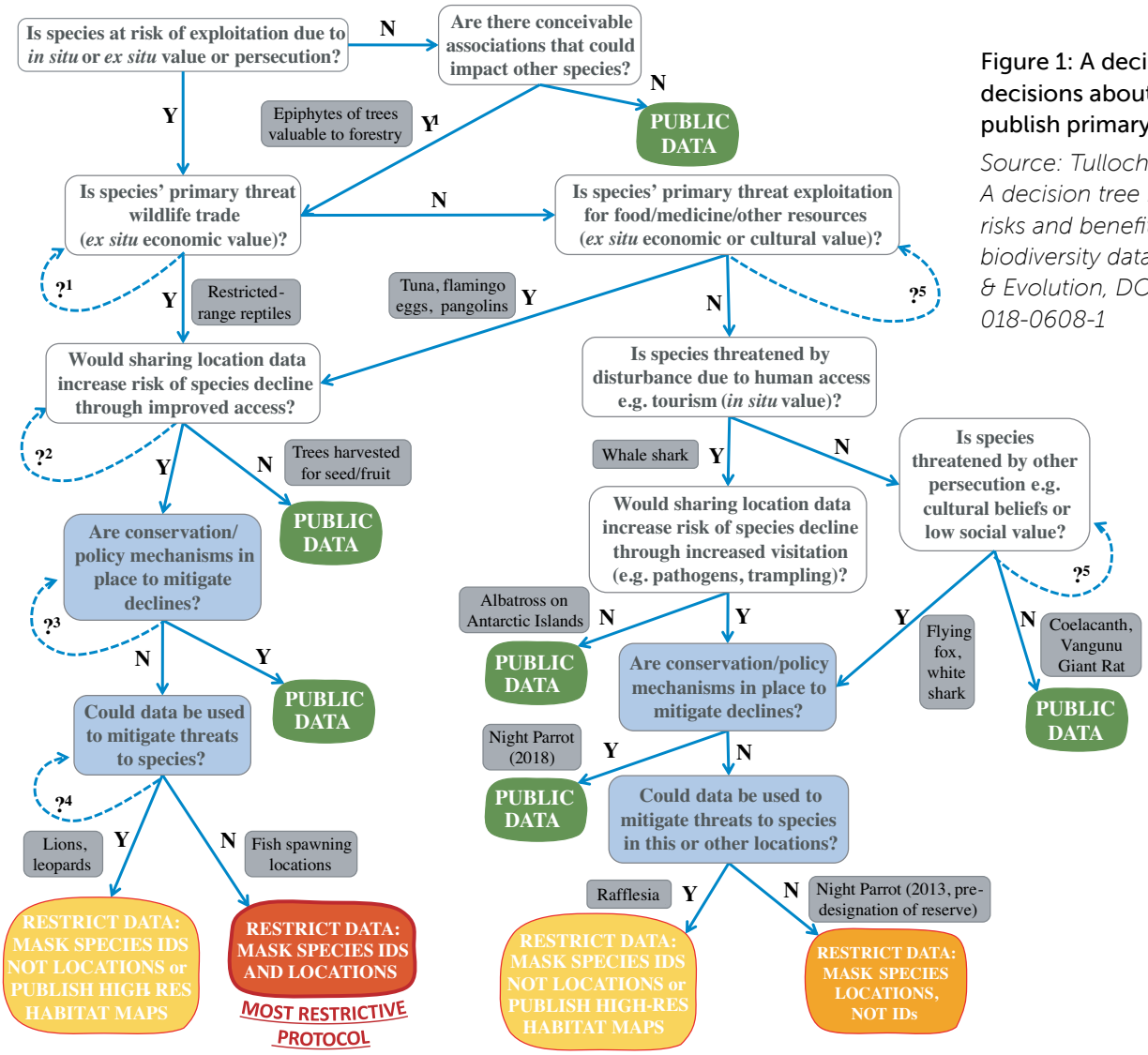

Figure 1: A decision tree to guide decisions about whether to publish primary biodiversity data.

Source: Tulloch, A. et al (2018) A decision tree for assessing the risks and benefits of publishing biodiversity data, Nature Ecology & Evolution, DOI: 10.1038/s41559-018-0608-1

The West Indian Ocean coelacanth

The Critically Endangered west Indian Ocean coelacanth (Latimeria chalumnae), had been thought to be extinct for 60 million years when it was discovered and tagged off the South African coast in 2000. Although potentially valuable to collectors, their deep cave habitats are difficult to access and the greatest threat is fisheries bycatch, not poaching. The publicity generated by making the location data available has led to new marine protected areas, fisheries management measures and a US$6 million multinational research program that is also benefitting many other southern African species.

Photo: Alberto Fernandez Fernandez, Wikimedia, CC BY-SA 3.0

This will enable assessment of the likely harm to the species or population if visitors exploit it or disturb it at the published localities.

The decision tree allows for the fact that risks to some species might be mitigated by conservation measures such as restricting access through physical barriers (e.g., fencing off reserves). Where it is not feasible to restrict access, data publication protocols can be used to mask characteristics of the data to protect the species or its location from being identified. An example of this could be a government conservation agency collating all threatened species location data to create a high-resolution habitat map. This could engage the public by supplying information about species distribution while not providing specific location records, except to researchers, to whom it could be available under licence. Such habitat maps would also be recommended for species with a high *in situ* value (e.g. for ecotourism) and no current protective mechanisms (e.g., whale sharks, rare birds), to prevent disturbance to their populations and habitat.

When the primary threats to a species are neither *in situ* or *ex situ* exploitation or disturbance, we recommend making species location data public. This is due to there being little risk of increased visitation to the site or little chance that visitation would affect population viability.

In some cases where a species has a high *in situ* value, the benefits of publishing data might still outweigh the risks of increased visitation. See the West Indian Ocean coelacanth example.

Publishing specific location data for the Swamp Orchid (Phaius australis) could facilitate illegal collection which is an identified major threat to this Endangered species. Photo Kieran Kinney CC BY-NC-ND-2.0.

Integrating the decision tree into conservation decision-making

While we acknowledge that it will sometimes be time-consuming and difficult for individual researchers to obtain the information needed to walk through our decision tree, all the same information will be available to those responsible for evaluating species for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and for IUCN Red Listing. Thus, it would be practical for a decision tree such as ours to be integrated into these evaluation processes as well as into national and subnational assessments of species' threat status and updated regularly.

Sharing species information is critical to building biodiversity knowledge and managing the global extinction crisis. Almost all data publication decisions made by governments and individuals focus on the costs of sharing, with benefits never explicitly quantified.

Our decision tree for publishing spatial biodiversity data aims to overcome this inefficiency, and enable scientists to make better choices about whether, how and when to publish primary biodiversity data. Our tree will help decision-making to be explicit about the benefits of publishing, weighing them against the risks, and helping to ensure that species are not put in greater danger from new data that are made public.

Further Information

For more information please see: *Tulloch, A. et al (2018) A decision tree for assessing the risks and benefits of publishing biodiversity data, Nature Ecology & Evolution, DOI: 10.1038/s41559-018-0608-1*

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