# GC Insights: Nature stripes for raising engagement with biodiversity loss

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**Abstract.** Globally there has also been a stark decline in biodiversity since 1970 yet climate change receives far greater attention. The 'warming stripes' have shown the power of very simple graphical visualisations of data for communicating with broad audiences. The 'nature stripes' show how biodiversity data can also be presented in a similar way to positive effect.

## 1 Introduction

10 The climate and biodiversity crises are interlinked, with transformational change required. However, biodiversity loss ~~has been found to~~ receives up to **eight time**s less media coverage than climate change (Legagneux et al., 2018). ~~The transformational changes across society required to tackle these issues mean that t~~The public need to be aware of the problems and be willing participants in enacting the solutions. Intergovernmental science-policy initiatives to resolve these two environmental crises are insufficient without public awareness, because policy decisions are closely related to awareness of the issues by the public

15 (McCombs & Shaw 1972). There is therefore a clear need to inform ~~for public engagement about biodiversity loss through communicating to~~ a wider audience about biodiversity loss.

The imbalance between attention given to climate warming and biodiversity loss is potentially surprising as there is a sense that many people love the natural world. ~~While the weather may be a common topic of conversation, love for climate is perhaps~~

20 ~~less typical.~~ In the UK and beyond people enjoy art and poetry that considers nature, many cherish naturalists and enjoy nature documentaries and millions of people are members of nature conservation organisations. Yet nature is in decline.

Climate change differs through being structurally global, whereas global data for biodiversity loss must be aggregated across many species and populations (Moran, 2017) and there are differences in how climate and biodiversity are monitored

25 (O'Conner et al., 2020). ~~It has been proposed that~~E~~e~~mergent data suggests the Earth is entering a mass extinction (Ceballos et al., 2016), with others noting ~~it is~~ population decline**s**, rather than species loss, ~~that is apparent~~ above natural variations (Briggs, 2017). It is perhaps the case that the costs and effect of climate are more visible through the impact on local weather patterns. Whereas, the loss of wildlife, even when local, can be imperceptible, with baselines shifting such that each generation has a new norm (Soga & Gaston, 2018). It has also been suggested that biodiversity researchers have invested less effort in

30 promoting their findings (Legagneux et al., 2018), although the comparative lack of media interest also makes this more difficult.

Professor Ed Hawkins at the University of Reading created the '**warming stripes' in 2018**. A series of vertical-coloured bars shows how the planet has warmed over 200 years. In the first week alone, warming stripes were downloaded by over a million

35 people from the website (www.ShowYourStripes.info). The warming stripes have been shared widely, increasing the awareness of climate change by being simple and adaptable.

Effective communication of geoscience issues such as biodiversity loss present an enormous challenge and there is a need to create and share ideas (Hawkins et al., 2019). In that spirit and responding to Legagneux's call to focus on public and media

40 awareness of biodiversity through conveying accurate and well-structured information, this short paper shares the 'nature stripes'- ~~approach~~ as a communication engagement ~~and~~tool and considers some reasons for their emerging success.

**2 The data and approach**

Conveying accurate information on biodiversity over time requires a suitable dataset. Biodiversity is widely understood at the species level, and the Living Planet Index (LPI) is a multi-species indicator based on mean levels of vertebrate species

45 population abundance around the world for 1970-2016. The LPI links closely to ecosystem function and ecological process and ~~as a~~ measure~~s of~~ trends in species abundance ~~it resonates with the public and decision makers~~. The LPI is constructed from time-series population indicators and the global data is aggregated from over 20,000 populations of over 4000 species. The LPI reveals an average drop of 68% in the population of mammals, birds, fish, amphibians and reptiles since 1970. ~~The~~ Given the complexities of biodiversity measurement, the LPI can be misrepresented by the popular media, however it provides an

50 important tool in communicating biodiversity trends, such as in the high-profile Living Planet Report (WWF, 2020) and associated communications (WWF, 2022). Combined with powerful graphical representations the data can capture attention and ~~start conversations and~~drive action around biodiversity loss.

~~Conditional formatting of the~~ To create the stripes conditional formatting of the LPI data allows each data point to be assigned

55 a colour. Choice of colours is critical to ensure that the graphic is as intuitive as possible, as with the blues and reds used in the warming stripes. As biodiversity and nature is commonly depicted by the colour green, the 1970 LPI of '1' was represented by a vibrant green. As the decline of wildlife can be seen as a loss of colour, the lowest LPI figure ~~so far~~ was represented by grey. A mid-point value in the data was represented by yellow, the most eye-catching colour (Crameri et al., 2020) which is harmonious with green and a combination preferred by users (Weingerl & Javoršek, 2018). The colour selection also avoids

60 the problematic red-green and rainbow colourmaps (Crameri et al., 2020). The ~~, such that the~~ declining trend in the LPI was

therefore captured by a transition from green to yellow and then from yellow to grey, as depicted in the striped bars in Figure 1.

However, given the LPI is a single value representing many species globally, the decline since 1970 is smooth, the colour changes are too subtle for clear stripes to emerge, as depicted by the smooth bar in Figure 1. In order to capture the trend and produce stripes the high and low confidence intervals for each year were used to caluculate a random point using the following formula in MS Excel, Stripe Value = LPI_Value + ((LPI_Value_Upper_CI - LPI_Value Lower CI)/2)*(RANDBETWEEN(-10,10))/10. To allow differing levels of decline to be represented a protocol and colourmap are used to ensure higher levels of decline use a darker grey, with low levels of decline only reaching yellow (see Figure 1).

The creation of artificial variability within the confidence intervals is openly acknowledged. However, it is reiterated that the nature stripes are intended to be a communication and public engagement tool to motivate action on the acknowledged, yet underreported issue of biodiversity loss, rather than a visualization of the data for further analysis. The stripes engage people with the overall declining trend in biodiversity over time. The random variability also means stripes for the same data can differ, however, once again as a communication rather than analysis tool replication is not a significant issue.

Although such stripe graphics alone have proven successful, science communication must also make people care. To do so there is a need to go beyond facts to creating emotional connections by telling stories (Joubert et al., 2019), which can be seen as facts wrapped in emotions (Olson, 2009). Stories provide a powerful way to engage people with science and help them understand it (Dahstrom, 2014; ElShafie, 2018). Within this context, imagery can be combined with the stripes to add meaning, emotion and help tell a story. For example, images of flocks of birds that decrease in density as the stripes become grey can be overlayed (Figure 1). Or, as shown in Figure 1, the stripes can be combined with iconic and colourful species, such as the Toucan or flocks of birds. There are many opportunities to use the nature stripes to prompt emotions, trigger meaning and tell a story (see biodiversitystripes.info). This opportunity was soon spotted by Greenpeace (2022), as shown in Figure 1, and Nature4Climate (2022). Nature4Climate, comprising sixteen international environmental and civil society groups, used the stripes to announce a global effort to raise the profile of protecting and restoring ecosystems in the Nature Zones at both COP27 and COP15.

## 3 Discussion

Sadly, climate warming and biodiversity loss face a battle for attention against well-funded opposition. This takes place in a modern world of decreasing attention spans where attention spans shorten combined within a myriad of fast paced options considered at pace (van de Sand et al., 2020). Several high-profile users of the warming stripes have reported that the graphic

stopped them 'scrolling' through their social media feeds. Environmental scientists and nature conservation organisations must learn the power of meaning and emotion that those engaging consumers have been using for decades (Holbrook & Hirschman, 1982), often contributing to the environmental challenges we face today.

The original warming stripes, biodiversity stripes, or nature stripes (using more familiar terminology), meet many of the principles of effective data visualisation (Midway, 2020). The core information to be conveyed was identified and represented in a different form, using colour which always add meaning, while retaining simplicity. With the potential for creative overlays, for example with Ccollaboration with artists, there isadds an opportunity for sharing further stories about nature and the human relationship with it.

The use of the stripes concepts with alternative datasets also allows messages to be modified for particular audiences. The LPI database includes several continental regions and groups of species, for example freshwater species where the stripes can be coloured from blue to grey. Alternative data sources should allow stripes that focus on the biodiversity of specific nations, regions and stripes for a variety of species, from insects to birds. The stripes concept can also be used to represent the declining use of nature words in cultural products (Kesebir & Kesebir, 2017).

The story told by the nature stripes engages people and can help them care about the loss of wildlife, and loss of colour in the world. This matters as there is global recognition fromsince organisations such as the UN and IPBES recognise that the failing human relationship with nature is an underlying cause of the environmental crises. Greening the grey, orC compassion and care for nature, is a pathway to rebuild the human-nature relationship (Lumber et al., 2017; Richardson et al., 2020)., both through a greener and more colourful natural world and providing opportunities for people to care for nature and green the grey.
The nature stripes can potentially connect people with these issues so they start to care for nature and begin to green the grey.

**Data Availability**

Living Planet Index is available from http://stats.livingplanetindex.org/. Note that products derived from LPI data for financial gain are prohibited without written permission of ZSL and WWF

**Ethical Statement**

Ethical clearance not required for data visualisation using publicly available data.

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Stripes for 68% Global LPI decline based on mean data

Stripes based on data within confidence intervals and with example overlay

Stripes for 94% Latin LPI decline

Stripes for 25% decline

100%                Colour Selection for Percentage Decline                0%

Stripes based on mean data

Stripes based on data within confidence intervals and with example overlay
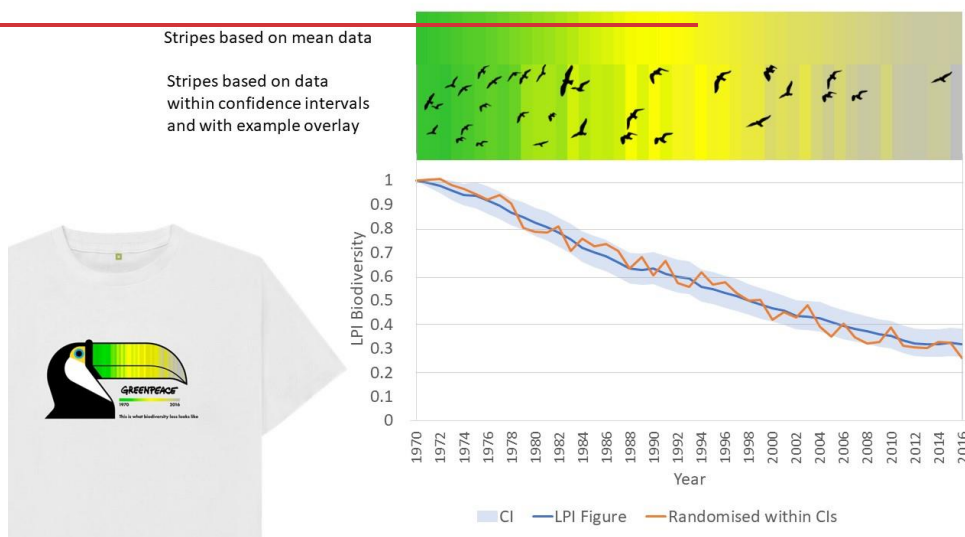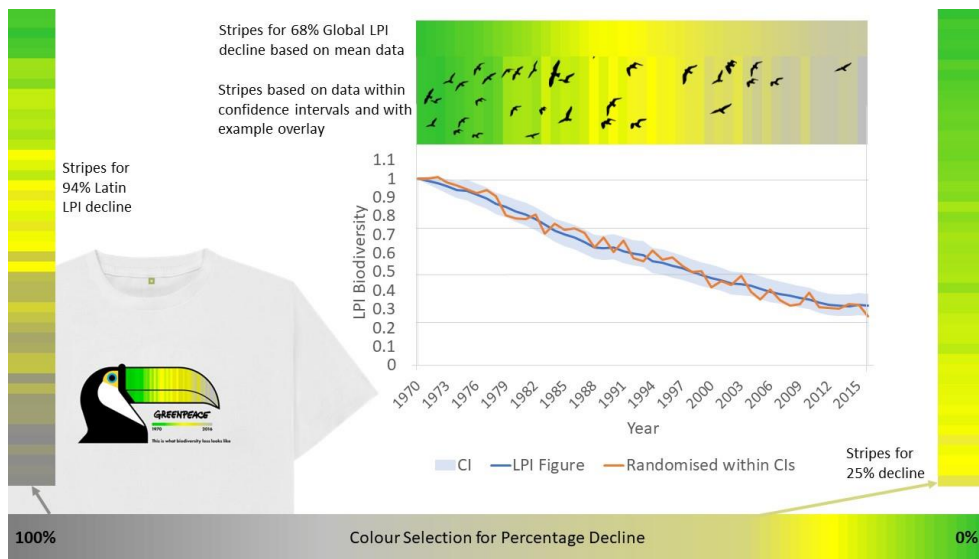
**Figure 1. LPI mean and 'striped' data in traditional line chart form and represented with stripes, together with overlay, colour selection map examples and use example on a a Greenpeace t-shirt (Greenpeace/teemill).**