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 receive up to eight times less media coverage than climate change (Legagneux et al., 2018). The transformational changes across society required to tackle these issues mean that 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 for public engagement about biodiversity loss through communicating to a wider audience.

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 emergent data suggests the Earth is entering a mass extinction (Ceballos et al., 2016), with others noting it is population decline, 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 promoting

30 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 people from the website (www.ShowYourStripes.info). The warming stripes have been shared widely, increasing the

35 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 awareness of biodiversity through conveying accurate and well-structured information, this short paper shares the 'nature

40 stripes' approach 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 population abundance around the world for 1970-2016. The LPI links closely to ecosystem function and ecological process

45 and as a measure 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 LPI provides an 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

50 attention and start conversations and action around biodiversity loss.

Conditional formatting of the LPI data allows each data point to be assigned 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

55 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, such that the declining trend in the LPI was 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

60 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.

65   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

70   be overlayed (Figure 1). Or, as shown in Figure 1, the stripes can be combined with iconic and colourful species, such as the Toucan. There are many opportunities to use the nature stripes to prompt emotions, trigger meaning and tell a story. 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 Zone at COP27.

75   **3 Discussion**

Sadly, climate warming and biodiversity loss face a battle for attention against well-funded opposition. This takes place in a modern world where attention spans shorten within a myriad of 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

80   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

85   in a different form, using colour which always add meaning, while retaining simplicity. With the potential for creative overlays, for example with collaboration with artists, there is 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

90   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).

95 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 from organisations such as the UN and IPBES that the failing human relationship with nature is an underlying cause of the environmental crises. Greening the grey, or 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.

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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

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

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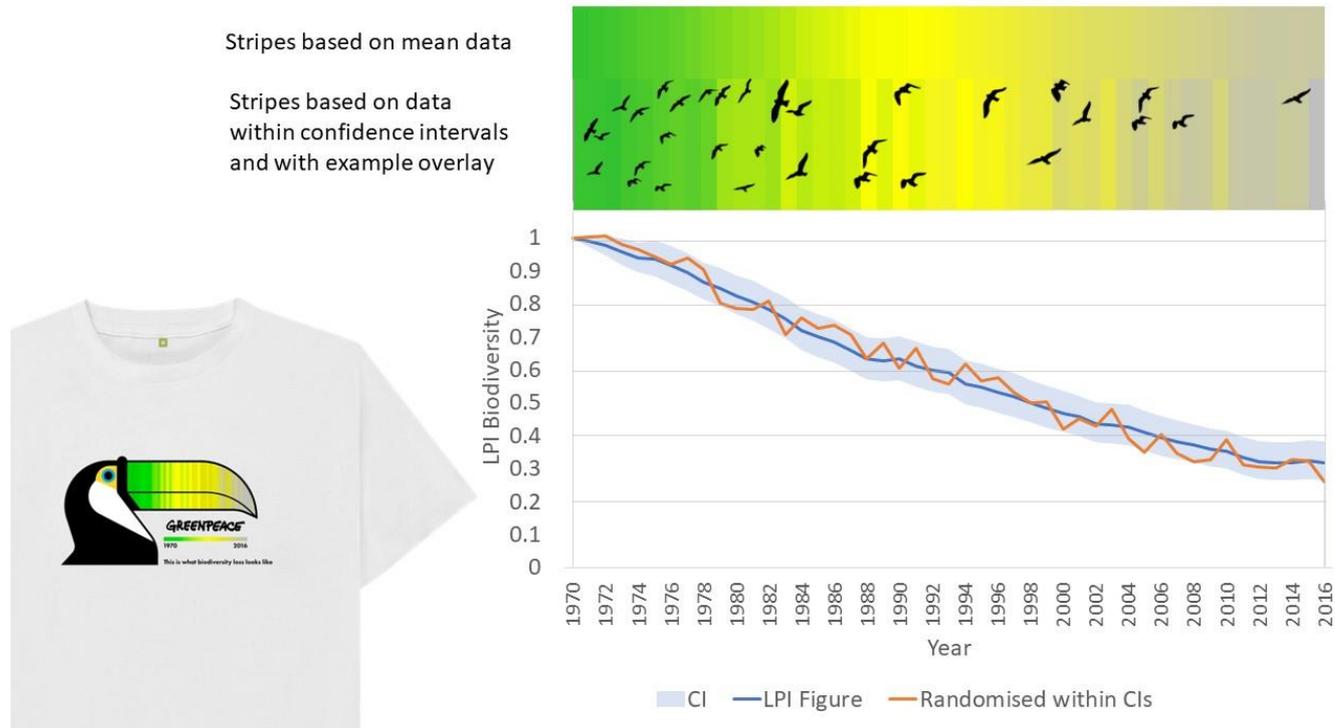
155 **Figure 1. LPI mean and 'striped' data in traditional line chart form and represented with stripes, together with overlay and use example - a Greenpeace t-shirt (Greenpeace/teemill).**