Measuring Global Awareness of Nature

ontheedge
CONSERVATION

About this report

The report “*Measuring global awareness of nature*” represents the first step by **On the EDGE Conservation** towards the use of the internet to understand our perceptions of nature in more detail and larger scale than ever before.

We use globally relevant metrics like Google searches and Wikipedia views

to understand how salient different parts of nature are globally and how much attention is given to different components of biodiversity across different countries, in order to understand how much progress was made towards the first Aichi target of the **Convention for Biological Convention**, which focuses on awareness of nature and solutions to conserve biodiversity.

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About On the Edge Conservation

On the EDGE Conservation brings together storytellers and scientists to create new narratives for nature.

Combining creativity and scientific inquiry – inspiring content and impact measurement – it is redefining how to communicate the value of the natural world in a way that changes people's attitudes.

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For more information about **On the Edge Conservation** see: www.ontheedge.org

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Cover Image - Cusco, Peru; Cloud Forest in Peru. Panoramic view of the tropical jungle on the northeast slope of the Andean mountain range.

Executive summary

Increasing societal engaging with biodiversity and its conservation, is key for promoting conservation initiatives. Consequently, the 2010 framework of the Convention for Biological Diversity specified in its first target that:

“by 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably”.

While there is general skepticism regarding the progress made towards the 20 CBD targets set in 2010, there has been no comprehensive analysis of the progress towards this first target at the global and the national levels.

We harnessed vast and readily available online data to gain insight into trends of people's interest towards biodiversity and potential conservation actions to sustain it. Specifically, we analyzed people's Google use patterns in the past decade, across 193 countries globally, exploring about 550 terms relating to wildlife; biomes; biodiversity concepts; and conservation actions. This yielded about 2 million data points from 2013 to 2020.

We found that when combined across terms and averaged across countries internet searches for biodiversity have increased worldwide in the last decade. However, this is predominantly driven by an increase in interest in a small number of charismatic animals.

The interest in conservation actions has however not shown a similar overall increase in the past decade.

Nevertheless, 29 countries, harboring 35% of the world's population, did show increases for both awareness of biodiversity and the actions needed to safeguard it, thus showing progress towards this CBD target.

Our results show that there was some success in achieving the first part of Aichi target 1 – *“people are aware of the values of biodiversity”*. However, the second part of target 1 – *“people are aware of the steps they can take to conserve and use it sustainably”* – has been largely missed.

These results suggest that we need new ways to better communicate the importance of biodiversity and the ongoing biodiversity crisis to the public. These are likely to include more effective use of more future proof digital channels, such as mobile games and social media, which can have a wide reach while retaining the ability to target.

Key figures

121
countries saw
increases in
biodiversity awareness

32
countries saw
increases in awareness
of conservation
solutions

29
countries saw
increases in both

75%
of the worldwide
increase in biodiversity
awareness was driven
by the interest in
animals, in particular
mammals

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Ngorongoro Conservation Area, northern Tanzania;
Young Masai Warrior sitting inside the crater of
Ngorongoro Conservation Area watching the sunrise

Introduction

The vital importance of understanding human decision-making patterns in order to conserve biodiversity is now widely accepted amongst conservation scientists¹. Yet, the existing knowledge around human perceptions of nature is much more limited than our understanding of wildlife behaviour and ecology.

The causes for this are both intrinsic to the complexity of issue but also linked with methodological limitations.

The study of human perceptions of nature is made inherently complex as it brings together not only the enormous diversity of life on Earth but also the vast heterogeneity between different human groups and the increasing speed at which societies change over time^{2, 3}. Moreover, measuring societal perceptions and interest in species usually requires extensive and costly social surveys with limited geographic coverage⁴. In this context, and contrary to wildlife ecology and behaviour, where for decades long term monitoring has been recognized as critical, there are very few, long-term and large-scale datasets of human perceptions of wildlife.

As a result, critical decisions around the allocation of conservation effort across species and regions of the globe are still being made in most cases without a valid understanding of the human dimensions that surround the species involved⁵.

With increasing pressures on nature and limited resources, closing this gap will be critical for meaningful planning of conservation actions at the scale needed to reverse the ongoing extinction crisis.

In 2010, the Convention for Biological Diversity (CBD), an international agreement to improve the conservation and use of biodiversity, set 20 targets to be achieved by 2020 (Box 1). The first target, upon which the success of all other targets depends⁶, was that: *“by 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably”*.

On 2020 Global Biodiversity Outlook⁷, the CBD evaluates that all Aichi Biodiversity Targets were missed. Regarding Aichi Target 1, the report states that *“there is no globally consistent information showing trends in awareness and willingness to act on biodiversity”*.

However, these conclusions were derived from multiple and inconsistent surveys, each sampling only a handful of countries⁸. Thus, it has until now not been possible to evaluate the success towards Aichi target 1.

Box 1*The Aichi Biodiversity Targets*

Created at the 1992 Rio Earth Summit, the **Convention for Biological Diversity (CBD)** is a global agreement between nations to promote the conservation and sustainable use of the world's biodiversity. At their 10th **Conference of the Parties**, held in October 2010 in Nagoya, Aichi Prefecture, Japan, CBD released their **Strategic Plan for Biodiversity**, with 20 targets for the improvement of biodiversity use and conservation, that were to be achieved by the end of that decade.

These targets included promotion of awareness of biodiversity in governments and society; reduction of habitat destruction, over exploitation and pollution; prevention of species extinction; promotion of sustainable use of natural resources; restoration of ecosystems and their services; among others. In their 2020 **Global Biodiversity Outlook**, the CBD reported that not a single target was fully achieved.

The increasing digitization of every aspect of human life offers us the opportunity to access data on human interests; through their online activities⁹. An emergent method to gauge the public interest in many different topics is culturomics, i.e. the quantitative study of cultural trends using digital data sources¹⁰. Search engines such as Google are used daily to find information on a variety of topics, and can provide valuable information on public interests. This is also true for biodiversity related topics, such as species names or more general biodiversity concepts^{11, 12}.

Previous attempts have been made to leverage search engine data to evaluate progress towards Aichi target 1: examining Google Trends.

One study¹³ examined trends only for a single search term ("*biodiversity*"). Another study¹² developed a more sophisticated indicator using multiple search terms, but their analysis was limited to a single year. A third study explored the trends in searches only for specific organisms using Wikipedia data, but their analysis could not be carried out at the country level¹⁴.

We argue that a more complete country-level evaluation of Aichi target 1 is needed to provide a better picture of the progress towards the awareness of biodiversity and actions that can be taken to preserve it.

This is particularly key at this time, when a new set of global targets for this decade for the Convention for Biological Diversity are being negotiated.

Measurement

We evaluated progress towards Aichi target 1 by examining Google searches for a wide variety of biodiversity topics.

We downloaded Google Trends data for biodiversity related topics for all 193 member states of the United Nations, from 2013 to 2020¹⁵. We started our analysis in 2013 due to a change in the Google Trends methodology that went into effect on September 2012.

Google Trends measures the salience of searches for specific topics made in Google, corrected for overall searches.

Each topic is associated to a specific identifier, allowing trends to be computed across languages.

Figure 1

→ Internet usage between 2005–2020

The biodiversity topics we selected fit in four broad categories:

(see appendix for detailed list of search terms)

The first three categories were grouped and used to evaluate the first part of Aichi target 1 (“the values of biodiversity”), while the last was used to evaluate the second part (“the steps they can take to conserve and use it sustainably”).

One Wildlife

500 most viewed taxonomic entities (the hierarchical categories grouping organisms, e.g. species, families, orders) on Wikipedia. Pathogenic microorganisms were excluded, as they indicate an interest in public health, rather than biodiversity conservation

Two Biomes

15 keywords based on World Wildlife Fund’s list of terrestrial biomes

Three Biodiversity

20 keywords based on CBD’s Biodiversity Glossary

Four Conservation actions

27 keywords based on International Union for Conservation of Nature’s Conservation Actions Classification Scheme.

Photo; Tim Flach;
Golden SnubNose©

Sulawesi, Indonesia

Results

Global trends for taxonomic entities, biodiversity concepts and total aggregate increased steadily during the whole period (Figure 2), while trends for biomes fluctuated with little directional change (Figure 2).

Figure 1

→ Global aggregate of Google Trends between 2013 and 2020 for topics related to biodiversity awareness

“Overall” represent the aggregate of the three other categories.

Data source — Google Trends

- 1.0 Trends score
- Wildlife global trends
 - Biodiversity global trends
 - Biomes global trends

Figure 2

→ Wildlife

→ Biodiversity

→ Biomes

Figure 2 continued

➔ Overall

When examining results by country, trends in taxonomic entities increased globally, with few exceptions (Figure 3).

The trends in biodiversity concepts were more heterogeneous, with exceptions in Africa, South and West Asia (Figure 3). The trends for biomes showed much shallower changes throughout the period (Figure 3). The total aggregate of trends showed an increase in interest for most regions of the world, with some exceptions in Africa and Central Asia.

Figure 2

→ Slopes for Google Trends between 2013 and 2020 for topics related to biodiversity awareness, across the globe

“Total” represent the aggregate of the three other categories

Data source — Google Trends

Green indicates an increase over time, while red indicates a decrease over time

Figure 3

→ Wildlife

→ Biodiversity

→ Biomes

Figure 3 continued

➔ Overall

Green indicates an increase over time,
while red indicates a decrease over time

Tim Flach;
Marine Iguana Abstract ©

Trends in awareness of conservation actions rose slowly until 2019, when a sharp drop occurred (Figure 4), but the overall trend was not significantly different from zero. When examining results by country, trends showed widespread decreases in Latin America, Eastern Europe, Africa, Central and South Asia (Figure 5).

Figure 4
→ Global aggregate of Google Trends between 2013 and 2020 for topics related to conservation actions
Data source — Google Trends

Figure 5

→ Slopes for Google Trends between 2013 and 2020 for topics related to conservation actions, across the globe

Data source — Google Trends

Green indicates an increase over time, while red indicates a decrease over time

The worldwide increase in biodiversity awareness was driven mostly by searches for taxonomic entities (75% of the variation in trends). Of these taxa, the most influential were mammals, with 70% of the variation in the trends for taxonomic entities, followed by plants, with 13%, and invertebrates, with 9%.

Of the top 10 species level taxa with most views in Wikipedia (the criteria we used to select wildlife search terms for our Google Trends analysis), all were large-bodied mammals commonly use as conservation flagships and six were classified in threatened categories by the International Union for Conservation of Nature: *lion* (*Panthera leo*), *tiger* (*Panthera tigris*), *giant panda* (*Ailuropoda melanoleuca*), *blue whale* (*Balaenoptera musculus*), *polar bear* (*Ursus maritimus*) and *koala* (*Phascolarctos cinereus*).

Globally, 62% of countries (121 countries) achieved the first part of Aichi target 1, while only 16% (32 countries) achieved the second part, and 12% (29 countries) achieved both. The countries that achieved both parts of Aichi target 1 were: Algeria, Arab Republic of Egypt, Azerbaijan, Bosnia and Herzegovina, China, Croatia, Finland, Greece, Israel, Jordan, Moldova, Morocco, North Macedonia, Pakistan, Peru, Portugal, Russian Federation, Serbia, Slovak Republic, Sweden, Thailand, Turkey, United States of America and Vietnam. While Liberia,

Mauritania, Syria, Tunisia and Yemen also did achieve both goals of the target according to our analysis, the data for these countries is more limited making us less confident of the results. About 35.1% of the world's population (2.7 billion people) live in the 24 countries that we believe have fulfilled Aichi target 1. However, about half of this population resides in China, for which the Google Trends data is less reliable and so these results need to be interpreted with caution. Still, we believe our results suggest that a sizable portion of the world's population has increased their awareness of biodiversity and the means to protect them.

Overall, our results show mixed progress towards Aichi target 1: the interest in biodiversity has increased widely, driven mostly by charismatic wildlife, while the interest in conservation actions has not increased. Nonetheless, countries housing about a third of the world's population have shown progress for both targets.

Key figures

62%

of countries achieved the first part of Aichi target 1

16%

of countries achieved the second part of Aichi target 1

12%

of countries achieved the first and second parts of Aichi target 1

35%

of the world's population live in the 24 countries that we believe have fulfilled Aichi target 1.

Ut que omniensis eniscia vent qui dolores eos
ni sitatem. Onserio cus, nimi, nihil ipient.

→ Population of Top 29 countries

■ Total population
* limited data

Galapagos Islands, Ecuador; Two flightless cormorants and a marine iguana on Fernandina Island

The promise of the Internet

While the use of internet searches for gauging public interest has its limitations¹⁶, such as inequalities in internet access worldwide (*Figure 6, Box 2*), our results are more informative than previous surveys, which suffered from a severely limited sampling and inconsistent methodologies. More detailed on the ground studies should be conducted in regions with less internet access, to confirm the general trends uncovered here.

Box 2

Advantages and disadvantages of internet activity data

The increased digitization of every aspect of modern life provide a wealth of data about our online activities. These data can be used to answer a variety of questions. Such digital data grant us comprehensive low-cost information, when compared to traditional surveys. However, concerns have been raised about the representativeness of such data, as the access to internet is highly unequal across and within countries (*Figure 5*). Moreover, ethical issues over privacy and ownership of these data are still not settled.

More work needs to be done to increase awareness of the actions required to

conserve biodiversity, especially in developing economies. This effort could greatly benefit from the use of flagships species, as the interest in charismatic wildlife has greatly increased and was robust to the emergence of other topics such as the COVID-19 pandemic. Wildlife is the most concrete and basic element of biodiversity, so it is expected that the general public is more interested in it than in more academic concepts. This interest could be leveraged to increase awareness of more abstract and complex biodiversity topics, by showing examples of how such concepts are applied to the conservation of these charismatic species.

Figure 6

Figure 6 continued

Looking into the future

Looking at the next decade, greater efforts are needed to address the challenge of mainstreaming biodiversity and reframing our relationship with nature. The digital channels that have emerged in the last decade will be key to achieve higher levels of awareness, and more importantly change attitudes, social norms, and behaviours.

At On the Edge Conservation we work at the intersection of art and science to better communicate the importance of nature through mobile games, animation, virtual influencers, and other up and coming digital channels. We believe these new ways of communicating about biodiversity are needed to generate a seismic shift in our societal attitudes, norms, and behaviours towards biodiversity and stem the ongoing extinction crisis.

Yet, our analysis suggests the vast majority of countries failed to increase awareness for biodiversity and the solutions to conserve it, as described in Aichi Target 1 of the CBD and agreed to by nearly every country in the world. As we look at establishing a new target framework for this decade, it is crucial that we see this need reflected in the targets we hope to achieve by 2030.

The current first draft of the post-2020 global biodiversity framework does not include a target around people's attitudes, norms, or behaviours towards biodiversity. This is a critical gap that must be corrected, as we know that it is human decision making that drives all major threats to biodiversity and as such these human elements cannot be sidelined. Efforts such as the one presented here, could form a critical part of the monitoring framework of such indicators, all at a low cost to the parties and if undertaken by a third party organization such as On the Edge Conservation, allowing for transparent and independent reporting.

In terms of exploring the power of the internet, and the wealth of information it harbors, we at On the Edge Conservation are working to go beyond the current report.

While the analysis presented here gives us new insights into awareness and interest around biodiversity and its conservation we will aim next to measuring attitudes, norms and ultimately behavior towards nature at a global scale.

Using techniques such as sentiment analysis, which consists of automatically extracting text and quantifying the emotions expressed in it¹⁷, we will be able for the first time to gain a global understanding of human perceptions of biodiversity through time. These new research avenues will be critical to ensure an understanding of our evolving relationship with the natural world that can help shape conservation policy and practices on the ground and globally.

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Appendix

Search terms list:

1. Taxonomic entities: 500 most viewed taxonomic entities on Wikipedia. Pathogenic microorganisms were excluded, as they indicate an interest in public health, rather than biodiversity conservation.
2. Biomes (based on World Wildlife Fund's list of terrestrial biomes): *"Tropical and subtropical moist broadleaf forests", "Tropical and subtropical dry broadleaf forests", "Tropical and subtropical coniferous forests", "Temperate broadleaf and mixed forests", "Temperate coniferous forests", "Taiga", "Tropical and subtropical grasslands, savannas, and shrublands", "Temperate grasslands, savannas, and shrublands", "Flooded grasslands and savannas", "Montane grasslands and shrublands", "Tundra", "Mediterranean forests, woodlands, and scrub", "Sclerophyll forests", "Deserts and xeric shrublands", "Mangrove"*.
3. Biodiversity concepts (based on CBD's Biodiversity Glossary): *"Biodiversity", "Nature", "Natural environment", "Natural resources", "Sustainability", "Biome", "Ecosystem", "Species", "Fauna", "Flora", "Extinction", "Genetic diversity", "Pollution", "Overexploitation", "Habitat loss", "Habitat fragmentation", "Land use change", "Alien species", "Invasive species", "Climate change"*.
4. Conservation actions (based on International Union for Conservation of Nature's Conservation Actions Classification Scheme): *"Protected area", "National park", "Nature Reserve", "Wilderness Area", "Natural Monument", "Habitat restoration", "Species reintroduction", "Ex situ conservation", "Captive breeding", "Seed bank", "Environmental education", "Environmental awareness", "Environmental legislation", "Environmental law", "Environmental policy", "Green economy", "Payments for ecosystem services", "Ecotourism", "Protected landscape area", "Marine protected area", "Endangered species recovery plan", "Wildlife conservation", "Wildlife corridor", "Environmental resource management", "Forest management", "Species translocation", "Wildlife management"*.

Regression analysis

We summed Google Trends for the search terms in each of the four topics and re scaled the result to range from 0 to 1, for each country. We then fitted a linear regression of Google Trends against year and used the slope coefficient of the model as a score of progress for each country, testing if this coefficient was significantly different from zero with a F-test. All analyses were made in program R.

Munnar, Kerala, South India; Around 1,600 metres above sea level in the Western Ghats range of mountains.