Assessing diverse values of nature requires multilingual evidence

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The Values Assessment report[1,2] (hereafter, the assessment), published in 2022 by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), is an admirable milestone in synthesising the ways people express the values of nature and clarifying how nature values are considered in decision-making. The assessment was based on more than 50,000 sources of evidence; however, the documents reviewed by the assessment are almost exclusively in English, with only 4% of the evidence in non-English languages. Languages are widely recognised to be a key mediating factor between human-nature relations and the plurality of nature's values[3]. Much scientific evidence is still published in non-English languages[4,5,] and excluding non-English-language evidence can introduce biases in evidence synthesis[6]. Therefore, a comprehensive multilingual synthesis is needed to capture all relevant data and understand the values reflecting the full range of the world's cultures.

Nature's values and language are intimately interrelated. Over millennia, people across the world interacted with different natural environments and developed distinct cultures, languages, and values of nature. Languages are a symbolic representation of individual and community identity, encompassing historical and cultural backgrounds as well as ways of living and thinking[7]. For instance, linguistic theories argue that ecological characteristics of the environment, such as rainfall and land cover, have partly shaped languages over time[8,9]. On the other hand, the conceptualisations and values of nature are socially constructed attitudes and perceptions, which are influenced by language, culture, context, worldviews, and life goals[1,10]. The intertwined relationship between nature, language, and culture is demonstrated in the Basque Country, Spain, where Euskara language speakers expressed their relationships with a mountain forest differently from those living in the same area but spoke French or Spanish[3]. In countries where English is not widely spoken, such scientific knowledge is often published in a non-English language to inform local society and societal problems[5]. As such, ignoring non-English-language literature when synthesising evidence on nature's values can overlook multiple views and understandings of nature and potentially misinform policy and decision making.

Lack of multilingualism in evidence synthesis

We thus question the approach used in the assessment, as it was almost exclusively monolingual, with 96% of the evidence in English. To synthesise evidence, the assessment used 29 review protocols, of which only 45% proactively searched evidence in at least one non-English language and only 17% in at least two non-English languages (Fig. 1). The non-English languages included in the review protocols are also biased, with almost no protocols covering languages in Asia and

Russia, which are known to publish much evidence on biodiversity conservation[4,11]. One common barrier to including non-English-language literature in systematic reviews is the lack of language skills[12]. However, this is not the case here, as the authors of the assessment collectively speak more than 45 languages[13] and are affiliated to institutions in countries where at least 39 official languages are spoken, including languages underrepresented in the assessment, such as Japanese, Korean, and Russian (Fig. 1). Literature in those languages could have been systematically searched either by the authors themselves or through developing collaboration. The IPBES assessment review processes are open to anyone from any country in the world, who can provide relevant knowledge for the assessment. This assessment received contributions from indigenous people and local communities, eleven governments, and 210 external people, including knowledge in five additional languages (Dene, Kichwa, Maori, Sápara, and Shuar). However, such voluntary processes would not ensure an unbiased, systematic synthesis of evidence sourced from all relevant languages. We thus highlight the importance of proactively involving linguistically diverse experts from the beginning of the review process and developing review protocols for all relevant languages.

Multilingual evidence synthesis is crucial for informing cross-scale and global environmental governance[14]. For instance, ignoring non-English-language evidence can introduce biases in the conclusions drawn[6] and overlook relevant evidence from regions where addressing problems is particularly needed[4]. To capture all relevant evidence, the languages used in searching and screening should reflect the geographic scope of the review. However, the geographical coverage of the evidence used in the assessment was far from representative. Overall, a very small proportion of the evidence came from Asia and the Pacific (8%), Latin America and the Caribbean (5%) and Africa (4%) (see methods of [1]). The Asia Pacific, for example, is home to 60% of the world's population, where over 2,000 languages are spoken[15], and a diversity of cultures exist. However, only six of the 29 protocols in the assessment included three of the non-English-language spoken in this region (French, Japanese, Portuguese, Fig. 1). As a result of these limitations, the assessment acknowledged that *'only a part of the vast spectrum of humanity's diverse perspectives is reflected in the report'*[1].

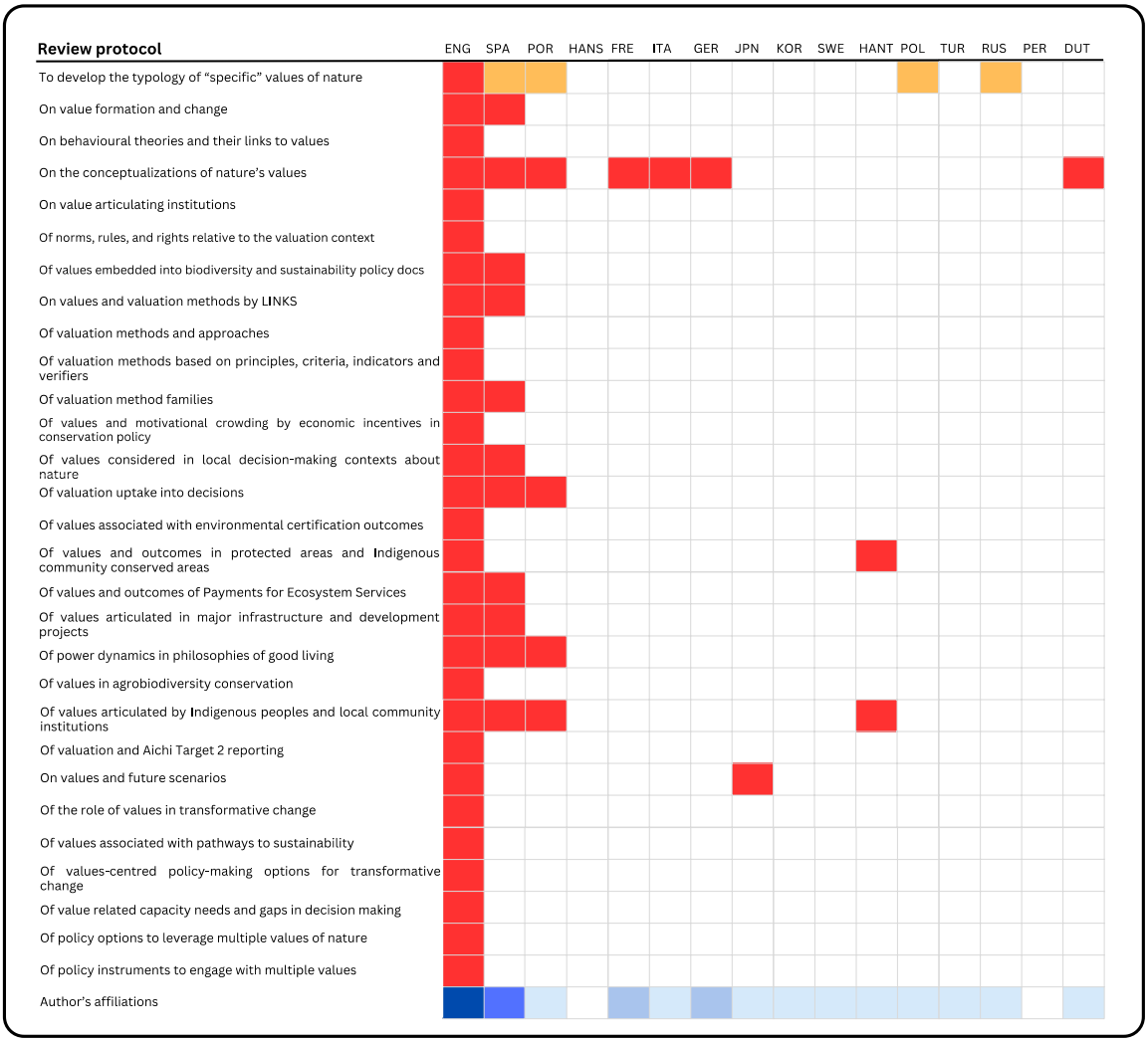

Fig. 1. Languages of evidence actively searched/screened (i.e., languages of search string, shown in red) and those not actively searched/screened but incorporated (i.e., languages of evidence that a search in other languages identified, in orange) in 29 review protocols of the Values Assessment report by the IPBES[1]. The 16 languages shown are those for which the amount of scientific literature available on biodiversity conservation was assessed[11], with more literature available in languages on the left. Languages are shown with ISO 639-2 codes; ENG = English, SPA = Spanish, POR = Portuguese, HANS = simplified Chinese, FRE = French, ITA = Italian, GER = German, JPN = Japanese, KOR = Korean, SWE = Swedish, HANT = traditional Chinese, POL = Polish, TUR = Turkish, RUS = Russian, PER = Persian, DUT = Dutch. LINKS = Local and Indigenous Knowledge Systems. The bottom row shows the proportion of authors of the assessment that are affiliated with a country where each language is spoken as an official language, based on the CIA World Factbook (https://www.cia.gov/the-world-factbook/field/languages/. Darker blue means a larger proportion of authors.

Recommendations for effective multilingual collaboration

The good news is that there is a solution to effectively conducting multilingual evidence synthesis and making the assessment truly representative and comprehensive (Fig. 2), which we have established. We also highlight when artificial intelligence (AI) can be used to address the lack of necessary language skills. Multilingual evidence synthesis starts with selecting the languages to include (Fig. 2). One option for a global synthesis is to cover the 16 languages that publish large volumes of scientific evidence[11] (shown in Fig. 1). Next step is to recruit collaborators, which can be done by asking colleagues or on relevant social networks, email lists, blogs, or websites (https://engage.cochrane.org). We recognise that the IPBES has internal protocols and rules for selecting their experts; we suggest using the diversity of languages spoken by experts as a new criterion for recruiting and selecting experts. During recruitment, expectations and responsibilities from both sides should be clear and transparent to avoid misunderstandings down the pipeline. For instance, it is important to reward collaborators' intellectual and time investment by, if it is an academic article, offering co-authorship of the final output. Once collaborators are on board, they should develop a common understanding of the synthesis goal and methods by reading clear guidelines and conducting training. Creating structured and organised protocols with collaborators' input is beneficial to ensure that the same methods are used across languages when searching and screening evidence and extracting information from the literature[16]. Search strings should be determined with native speakers of each language to ensure that the meaning of the term is not lost[17]. If native speakers of a relevant language are not available, machine translation can help, but we suggest verifying the accuracy of translations with native speakers. Searching non-English-language evidence also requires using relevant and reliable literature search systems/databases, such as SciELO (https://scielo.org/) for Spanish and Portuguese, J-STAGE (https://www.jstage.jst.go.jp/) for Japanese, KoreaScience (https://www.koreascience.or.kr/) for Korean, and CNKI (https://cnki.net/) for simplified Chinese. AI tools can also help literature screening and data extraction to aid human collaborators and reduce time-intensive labour in manual screening. Last, the success of the entire process relies on efficient communication between the project leads and all collaborators to, for example, clarify procedural concerns or any other queries that might arise.

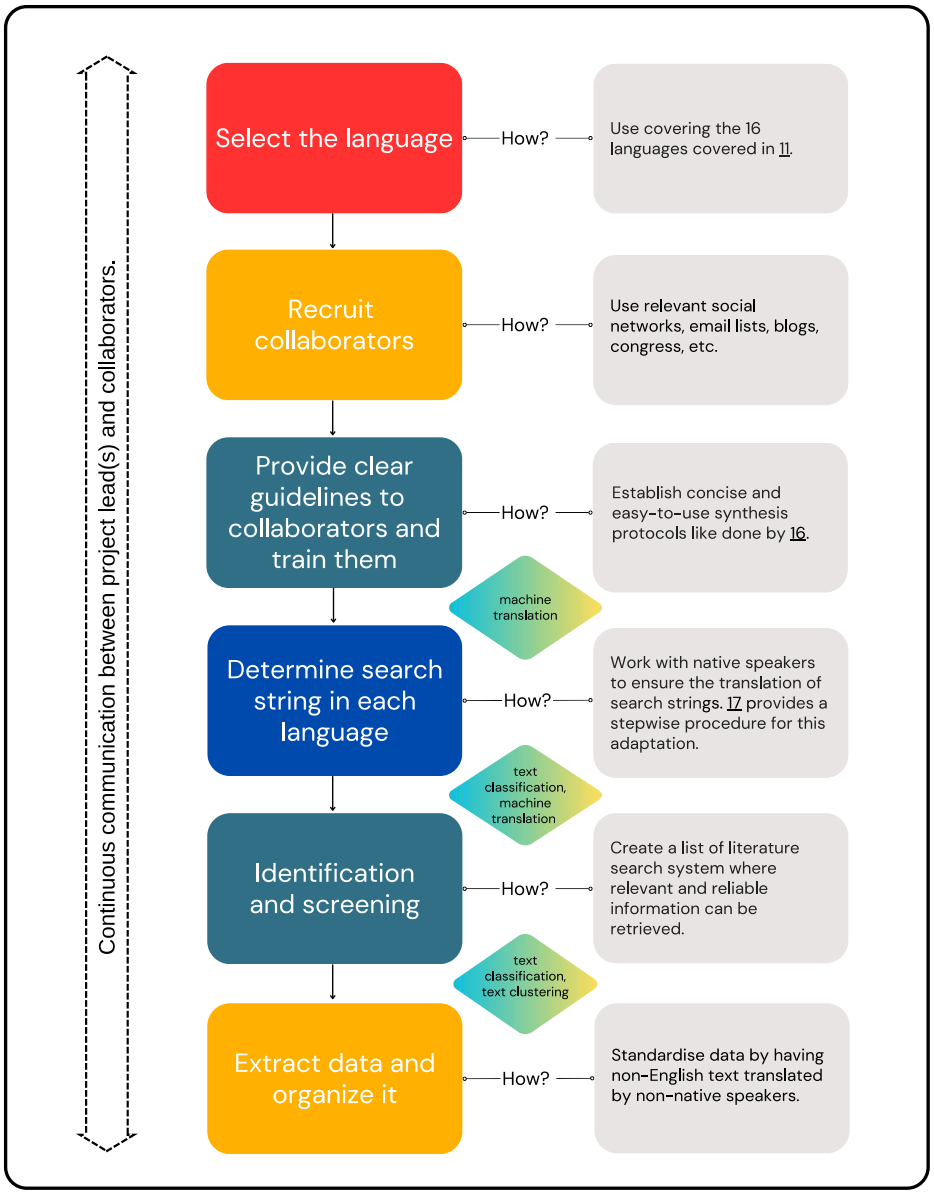

Fig. 2. How to develop effective collaborations and use artificial intelligence (AI) tools for multilingual evidence synthesis.

The Values Assessment is an admirable global initiative that assesses thousands of documents to understand nature's values across cultures. However, to capture diverse views and values of nature across the globe, an even more extensive multilingual evidence synthesis is crucial. The practical approaches to conducting multilingual evidence synthesis proposed here should help to make the assessment and other similar initiatives more comprehensive and informative for addressing ongoing and future global challenges.

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Competing interests

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