Measuring Progress II Towards Achieving the Environmental Dimension of the SDGs- Methodological Brief

Authors: Alison Fairbrass [a], Aidan O'Sullivan [b], Paul Ekins [a], Jillian Campbell [c]

[a]: Institute for Sustainable Resources, University College London (UCL); [b]: Energy Institute, UCL; [c]: UNEP

Background

In March 2019, the United Nations Environment Programme (UN Environment) launched a report called *'Measuring Progress Towards monitoring the environmental dimension of the SDGs*', which analysed the state of the environmental dimensions of sustainable development based on the Sustainable Development Goal (SDG) indicators, including the availability of statistical and spatial data. This report highlighted the strengths of the SDGs in having raised the profile of the environmental dimension of development and providing a framework to monitor it. It also highlighted weaknesses of the environmental SDG indicators including a lack of methods and data for a large proportion of the environmental SDG indicators.

UN Environment are now preparing the second iteration of the *Measuring Progress* report. This report will investigate the relationship between policy frameworks and progress towards achieving the SDG targets, indicating areas where more effort is needed to achieve the environmental dimension of the 2030 Agenda. This Brief details the methodological approach and preliminary results that will form the backbone of the second *Measuring Progress* report.

Theory of change

Using the SDG indicators as a framework, we analyse the relationship between actions that countries are taking that have impacts (both positive or negative) on the environment, the state of the environment in countries, and the secondary social impacts of the state of the environment, based on the DPSIR (Drivers, Pressures, State, Impact, Response) causal framework (Figure 1). We focus on human/social Impacts of the State of the environment only. We adopt the concept of 'Drivers of Change' from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services' Global Assessment[1] to define the actions that are included in this analysis. Due to the complexity of the causal relationships between components of the DPSIR framework, we focus on direct, rather than indirect, drivers of change in this analysis. This includes Responses that are likely to positively impact the environment, such as protection and sustainable management of forests (SDG indicator 15.2.1 Sustainable forest management), Drivers that, under current patterns of production and consumption, are likely to negatively impact the environment, such as economic growth (SDG indicator 8.1.1 GDP per capita), and Pressures, such as pollution (SDG indicator 12.4.2 Hazardous waste generation).

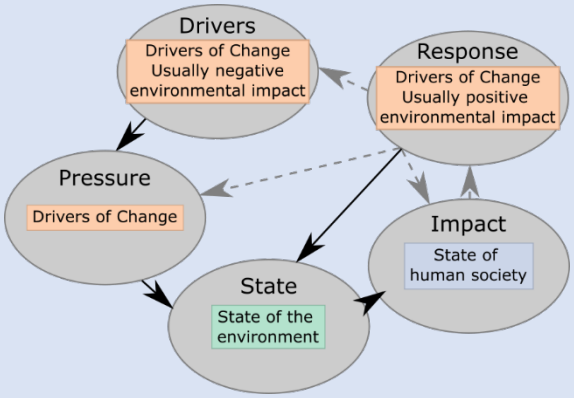

Figure 1 The DPSIR approach used in this analysis. Relationships that are investigated in this work are indicated with coloured boxes and complete arrows.

[1] Watson, R. T. *et al. The global assessment report on biodiversity and ecosystem services. Summary for policymakers*. https://ipbes.net/global-assessment (2019).

Methodological approach

A data-driven approach has been taken to the second *Measuring Progress* report whereby the relationship between SDG indicators and their underlying data is used to identify topics to explore in the report, which is broken into five stages (Figure 2):

Stage 1: Based on our theory of change, we classify each of the 231 indicators in the SDG framework as being related to direct drivers of change, the state of the environment or the state of human society.

Stage 2: Based on scientific evidence and expert consultation, we identify potential synergies between pairs of indicators to investigate the relationship between drivers of change and the state of the environment, and secondary relationships between the environment and the state of human society.

Stage 3: We select indicator pairs for investigation based on the availability of their underlying data.

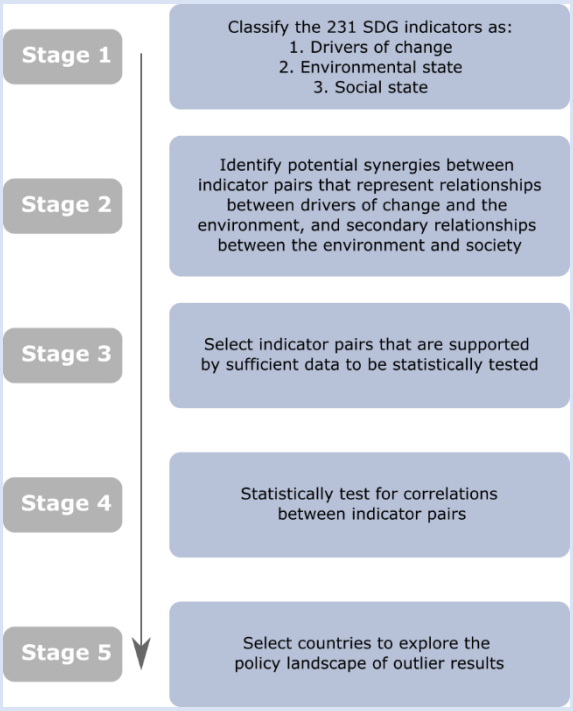

Figure 2. Overview of the methodological approach

Stage 4: To investigate the relationship between indicator pairs, we use Pearson's correlation coefficient to estimate the correlation between pairs of indicators. We control for confounding factors of population, GDP, and geographical region using a linear regression model. We conduct a hypothesis test on the correlation coefficients to assess whether having accounted for the influence of these confounder variables there is still sufficient evidence for a relationship between the variables with the significance level of $\alpha = .05$. The model framework allows us to calculate an R^2 value which gives a measure of how good the model is and how much of the variance in the dependent variable the model captures. We set a threshold of $R^2 = 0.2$ as a means of having further confidence in the validity of there being a statistically significant relationship between the indicator pairs.

Stage 5: Based on the results of the statistical analysis, outlier countries that appear to be outperforming other countries in relation to some indicators are selected. Their national policies will be explored to understand their positive performance.

Results

Preliminary results of this analysis are presented below (Figures 3 and 4). We identified a number of significant and non-significant relationships between indicators across 19 SDG indicators from seven SDG Goals. We are currently investigating a number of additional relationships which are denoted by a question mark (?) in Figures 3 and 4.

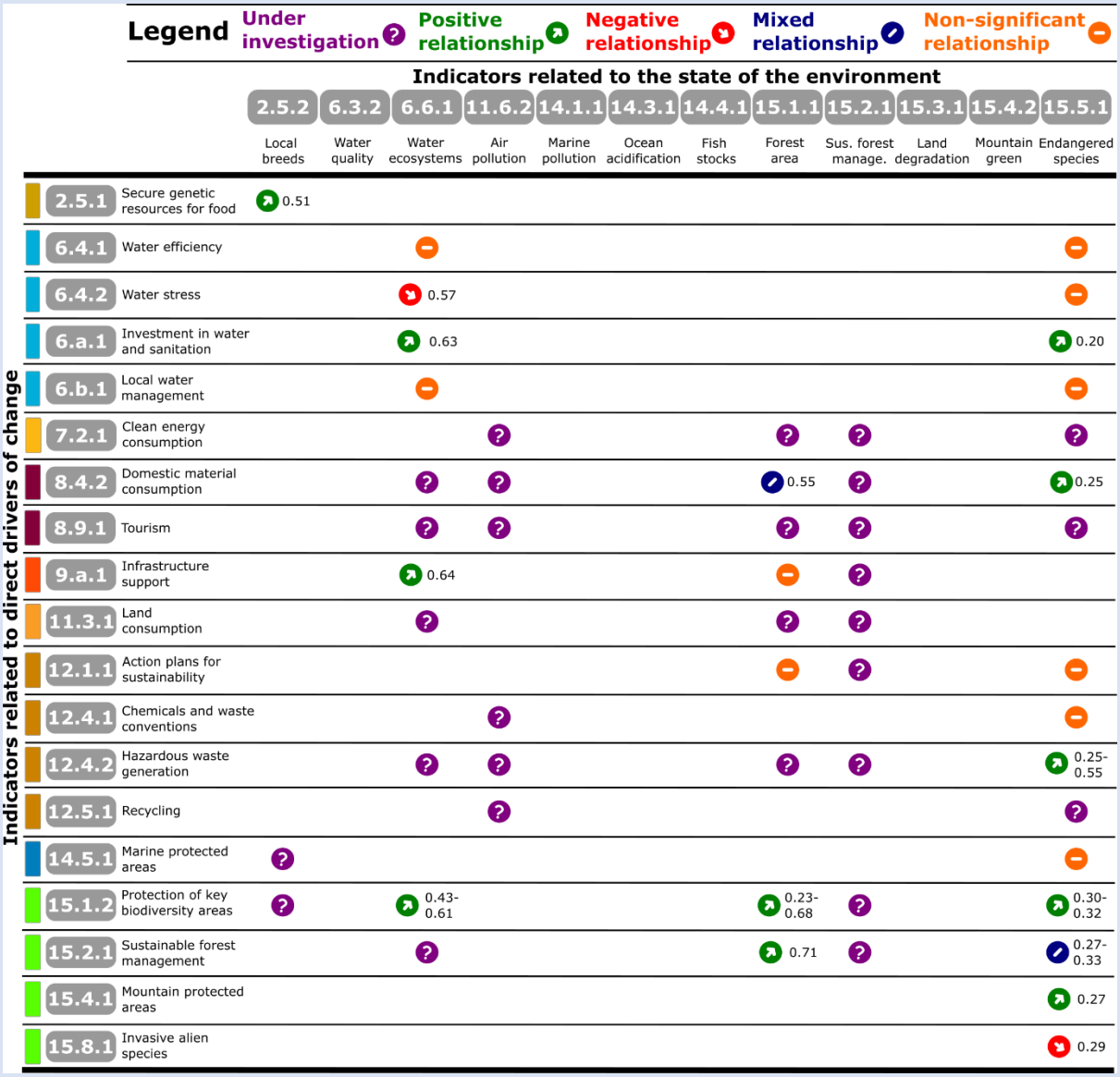

Figure 3. Results of the correlation tests between pairs of SDG indicators and their underlying sub-indicators. Blank cells denote indicator pairs which were not tested either due to a lack of data or lack of evidence for potential synergies. R^2 model values are provided alongside symbols denoting significant relationships. 'Mixed relationship' denotes indicator pairs where models of their sub-indicators produced both positive and negative significant results. Indicator 15.2.1 includes sub-indicators that are related to both drivers of change (e.g. sustainably certified forests) and environmental state (e.g. forest biomass) and therefore this indicator is included on both axes of the plot.

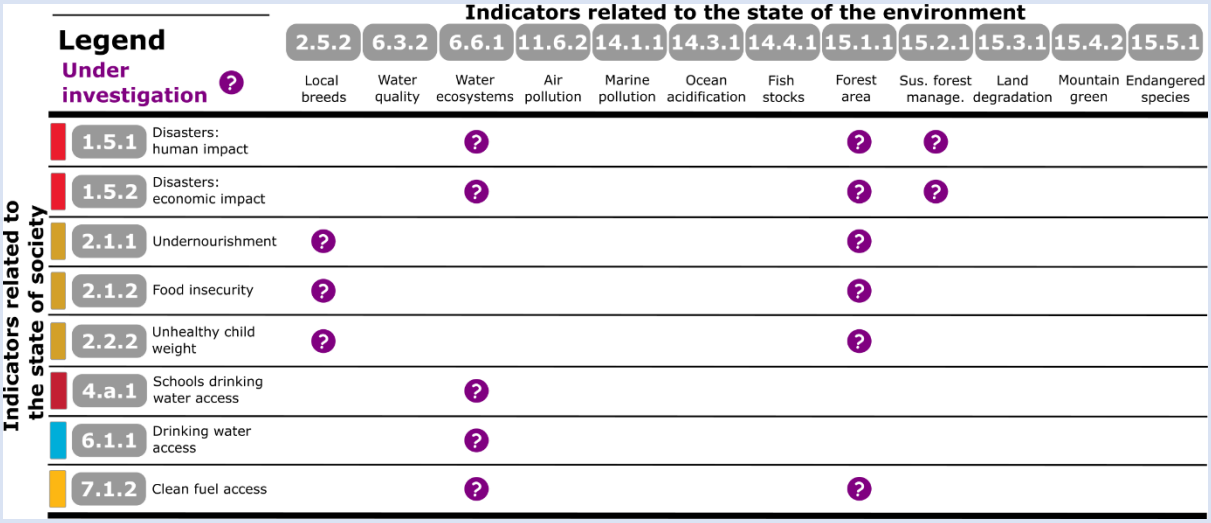

Figure 4. Results of the correlation tests between pairs of SDG indicators and their underlying sub-indicators. Blank cells denote indicator pairs which were not tested either due to a lack of data or lack of evidence for potential synergies.

Outlier countries

Based on these results we identify a number of outlier countries whose underlying data suggests that, in respect to some indicators, they are outperforming other countries in terms of their Responses (the first of the two indicators mentioned in the bullet points below) and the State of their environment (the second of the two bullet points). The experts are encouraged to consider whether they could offer insights into the policy contexts of these countries that may explain these results:

- Conservation of plant genetic resources (2.5.1) and extinction risk of domestic species (2.5.2) in the **United Kingdom, Ukraine, Bulgaria, South Africa,** and **United Republic of Tanzania**.
- Investment in water and sanitation (6.a.1) and water body extent (6.6.1) in **Brazil** and **Azerbaijan**.
- Infrastructure support (9.a.1) and water body extent (6.6.1) in **China** and **Brazil**.
- Protection of Key Biodiversity Areas (15.1.2) and water ecosystem extent (6.6.1) in **China** and **Brazil**.
- Protection of Key Biodiversity Areas (15.1.2) and species extinction risk (15.5.1) in **Poland, Belarus** and **Serbia**.
- Protection of Key Biodiversity Areas (15.1.2) and forest area (15.1.1) in **Gabon, Dominican Republic, Cuba, Bhutan, Vietnam, China, most of the Eastern European group of Member States, Greece, France** and **Italy**.
- Sustainable forest management (15.2.1) and forest area (15.1.1) in **China**.
- Forest protection (15.2.1) and species extinction risk (15.5.1) in **Belarus**.