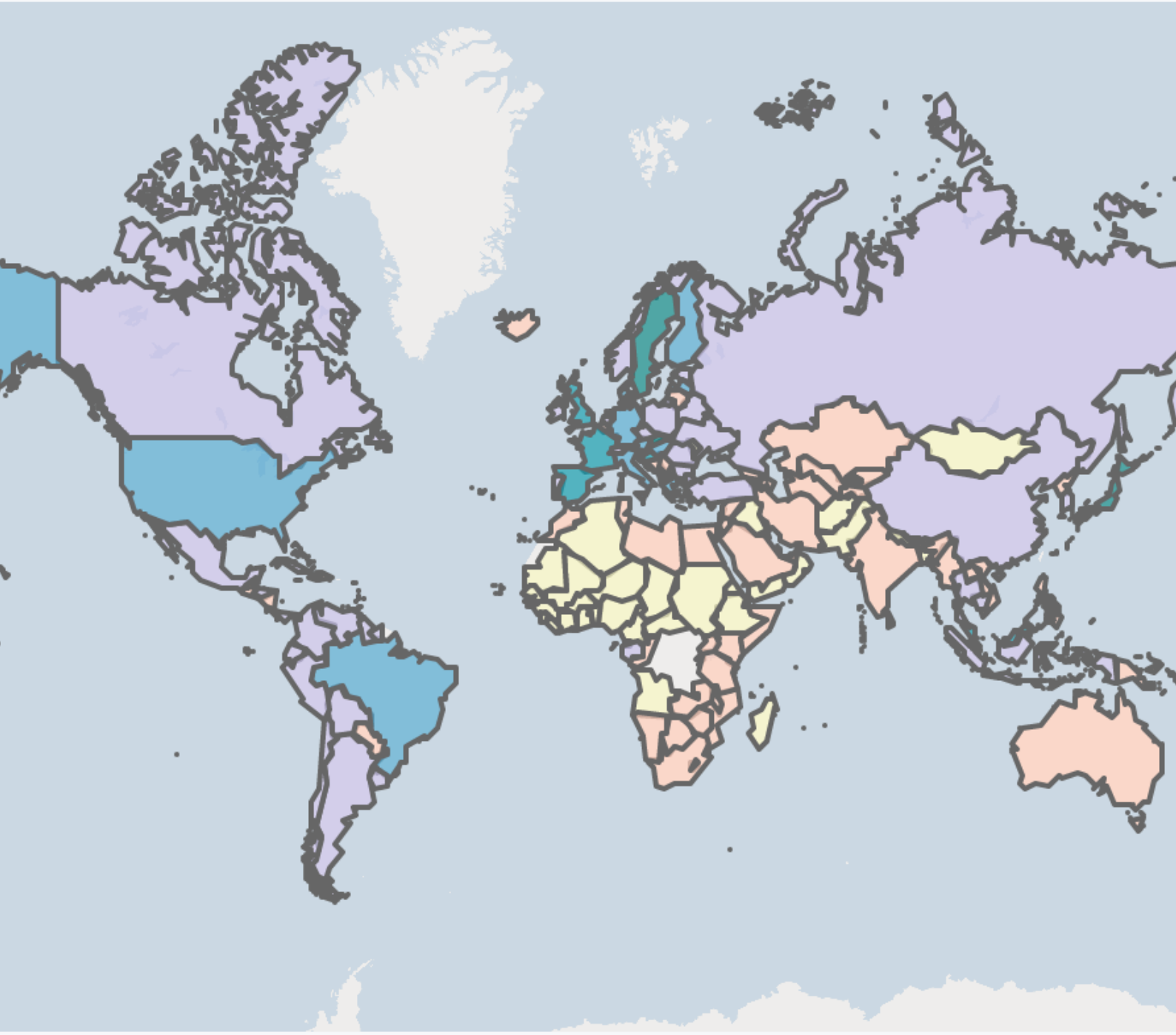


TOURISM SUSTAINABLE DEVELOPMENT INDEX

A SUSTAINABILITY PERFORMANCE INDEX IN ORDER TO IMPROVE TOURISM STRATEGIES

TSDI Index

www.tourism-sdi.org
MURMURATION SAS - contact@murmuration-sas.com

METHODOLOGY

THE TSDI-INDEX ENGAGE DESTINATIONS TO BECOME MORE SUSTAINABLE PLACES TO VISIT. BASED ON RELIABLE DATA, THE TSDI-INDEX HELPS GAIN EXPERT ADVICE TO IMPROVE STRATEGY AND DRIVE SUSTAINABLE DECISION MAKING FOR THE TOURISM OF THE FUTURE.

We work with pioneering satellite data in order to help national and regional destination manage their tourism strategies and improve their sustainability performance in order to innovate and transform tourism industry.

In this project, we are aiming at the development of a unique sustainable development indicator for the tourism industry. This indicator has to be resilient regarding data gaps and at the same time flexible to accommodate heterogeneous and new data sources throughout time. Moreover, the indicator has to be meaningful from a scientific perspective and reflect the correlation between the economic development of the tourism activity and its environmental impact.

THE COMPUTATION PROCESS : TWO PHASES TO PRODUCE RELIABLE DATA

WHICH DATA PROCEED ?

The International Standard for country codes and codes for their subdivisions ISO 3166 aims to work on **189 countries.**

CO2 emissions per capita per year : Global carbon project data

Water quality Aqueduct : Global Maps 3.0 Land Copernicus product

Air quality : CAMS near-real-time data from ECMWF

Urbanisation : GHS-SMOD

Vegetal forest cover : HDRO calculations based on data on forest area from the World Bank

METHODOLOGY

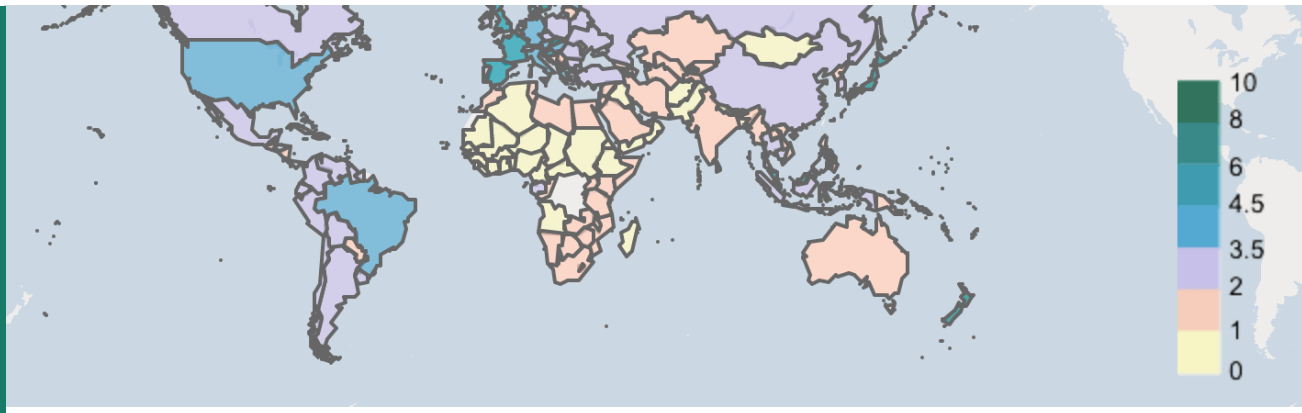
Vegetal forest cover : HDRO calculations based on data on forest area from the World Bank (2020.a)

Proximity to protected areas : Protected planet database

International inbound tourists : World Development Indicators database, World Bank (2020.a)

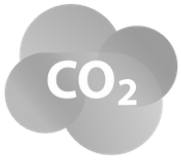
Education index (inequality adjusted) From the HDI education index and based on inequality in education data from HDR 2020

Life expectancy at birth UNDESA (2019a) from HDR 2020



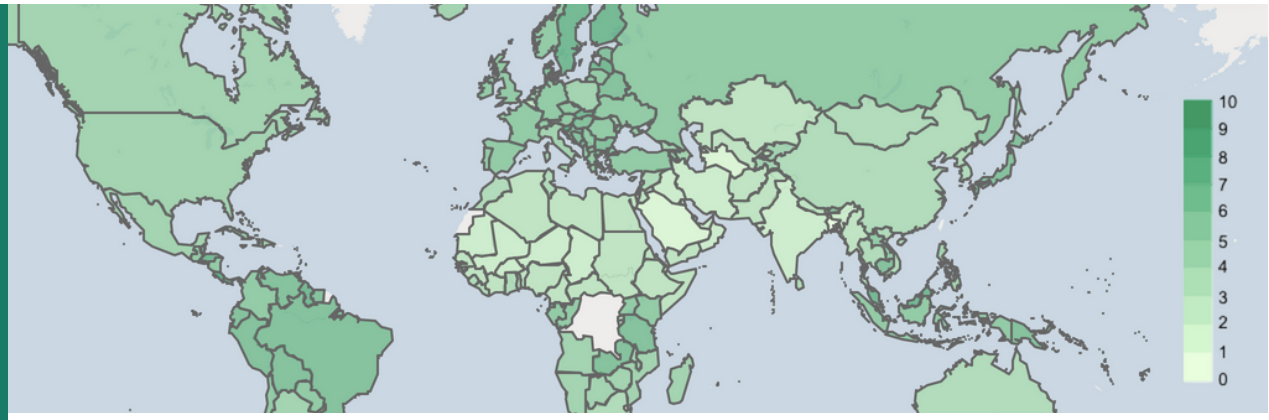
Apart from a few exceptions, every indicator values are **standardized between 0 and 10**.

In the environmental part of the equation, the value of the **CO2** is stronger than the other indicators since it is the most important pollution proxy as of today.

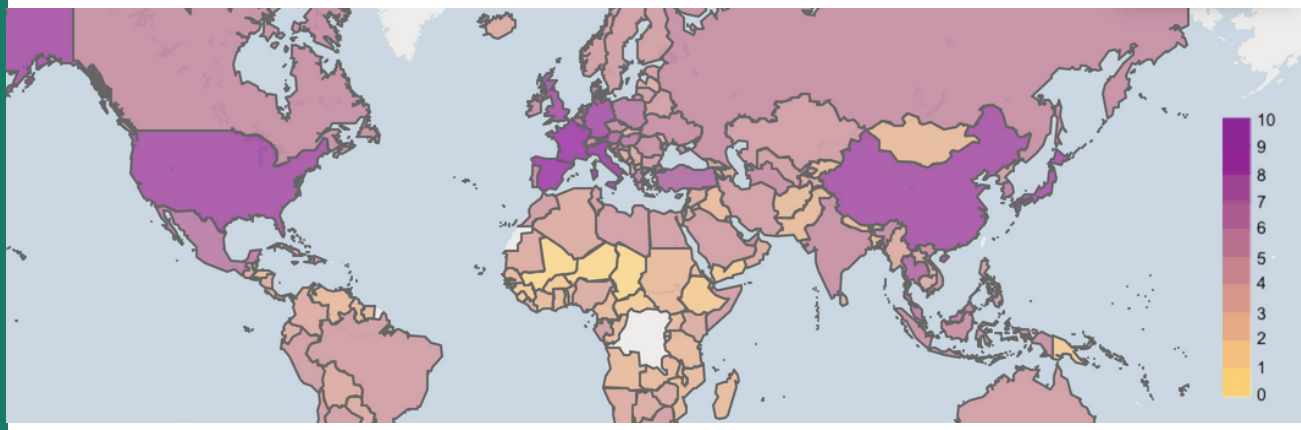


METHODOLOGY

SECONDARY COMPUTATION



GREEN INDEX : The vegetal variable is computed by adding the protected areas proximity indicator and the standardized forest land in percentage values. The result is also standardized between 0 and 10.



HUMAN INDEX : The tourism indicator is computed by multiplying the number of international inbound tourists and urbanisation indicator

METHODOLOGY

BOUNDARIES

Fixing the boundaries is the toughest part since we cannot apply the same method to each variable. For CO2, for example, it is rather simple, we use the 2 tons value, computed as the number under which we must be, in order to stay in the 1.5°C scenario. For others, we chose to use the median, or the mean, value of the indicator as our boundary.

Sometimes depending on the distribution of our values, none of these solutions seems to fit and we start looking at the quartiles for a more accurate cut-out.

INTERNATIONAL STANDARD DEVIATION

Within the computation of the TSDI equation appears a deviation problem that causes the "human/economic" variable to weigh more than the environmental variable in the last part. For this matter, we had to compute every pair of variables for all countries and standardize them as well in order to have a meaningful end result. It was interesting to see the ranking change by giving more weight to one value or the other.

MURMURATION

EXPLORING NEW METRICS TO ACT FOR A CHANGE

TSDI Index is an adjustement of developement index for the tourism sector. Among this metric there is a new generation of dashboards including Biodiversity Pressure (**GREEN Index**), as well as metrics that adjust the human and economic components (**HUMAN Index**). Together, they aim to make normative judgements about countries and help them improve their environmental strategies.

$$TSDI = \frac{\text{HUMAN}}{\text{GREEN}}$$

RESULTS

QUICK READ

- The here-below countries are ranked by their TSDI value, Costa Rica being the first.
- The "*Env*" variable is to read *"the smaller the better".* Costa Rica is the first for this variable (GREEN INDEX)
- The "*HumanTouri*" variable is the opposite *"the greater the better".* France is the first for this variable (HUMAN INDEX)

LIST OF THE 20 FIRST COUNTRIES WORLDWIDE

-1. Costa Rica ---> Env: 0.693 HumanTouri: 3.851 TSDI: 5.56
2. Sweden ---> Env: 1.18 HumanTouri: 4.709 TSDI: 3.99
3. Slovenia ---> Env: 1.18 HumanTouri: 4.357 TSDI: 3.69
4. Slovakia ---> Env: 1.06 HumanTouri: 3.861 TSDI: 3.64
5. New Zealand ---> Env: 1.18 HumanTouri: 4.252 TSDI: 3.6
6. Japan ---> Env: 2.38 HumanTouri: 8.203 TSDI: 3.45
7. Malaysia ---> Env: 1.94 HumanTouri: 6.335 TSDI: 3.27
8. Bahamas, The ---> Env: 1.18 HumanTouri: 3.551 TSDI: 3.01
9. France ---> Env: 3.42 HumanTouri: 10.0 TSDI: 2.92
10. Fiji ---> Env: 1.06 HumanTouri: 2.998 TSDI: 2.83
11. Spain ---> Env: 3.3 HumanTouri: 9.047 TSDI: 2.74
12. United Kingdom ---> Env: 3.02 HumanTouri: 8.284 TSDI: 2.74
13. Croatia ---> Env: 2.26 HumanTouri: 5.958 TSDI: 2.64
14. Austria ---> Env: 3.02 HumanTouri: 7.412 TSDI: 2.45
15. Dominica ---> Env: 0.78 HumanTouri: 1.878 TSDI: 2.41
16. Hungary ---> Env: 2.62 HumanTouri: 6.239 TSDI: 2.38
17. Finland ---> Env: 1.82 HumanTouri: 4.166 TSDI: 2.29
18. Germany ---> Env: 3.86 HumanTouri: 8.847 TSDI: 2.29
19. Italy ---> Env: 4.18 HumanTouri: 9.147 TSDI: 2.19
20. Denmark ---> Env: 2.9 HumanTouri: 6.001 TSDI: 2.07

DATA for all countries are available, contact us : contact@murmuration-sas.com

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Water quality: https://land.copernicus.eu/global/products/lwq

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CO2 : http://energyatlas.iea.org/#!/tellmap/1378539487 https://www.iea.org/subscribe-to-data-services/co2-emissions-statistics

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Education and social outcomes : Only known countries (2017 2016 2015). https://stats.oecd.org/viewhtml.aspx?datasetcode=EAG_ESO&lang=en

Highly specific indicators to crunch: https://databank.worldbank.org/source/world-development-indicators

Life expectancy : http://hdr.undp.org

Number of hotels :OpenStreetMap data, crunched on QGIS, with QuickOSM plugin : https://plugins.qgis.org/plugins/QuickOSM/From : https://www.openstreetmap.org/#map=5/51.500/-0.100

Country size : https://unstats.un.org/unsd/demographic/products/dyb/dyb2012/Table03.pdf

TSDI Index

A PROJECT INVOLVED BY

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