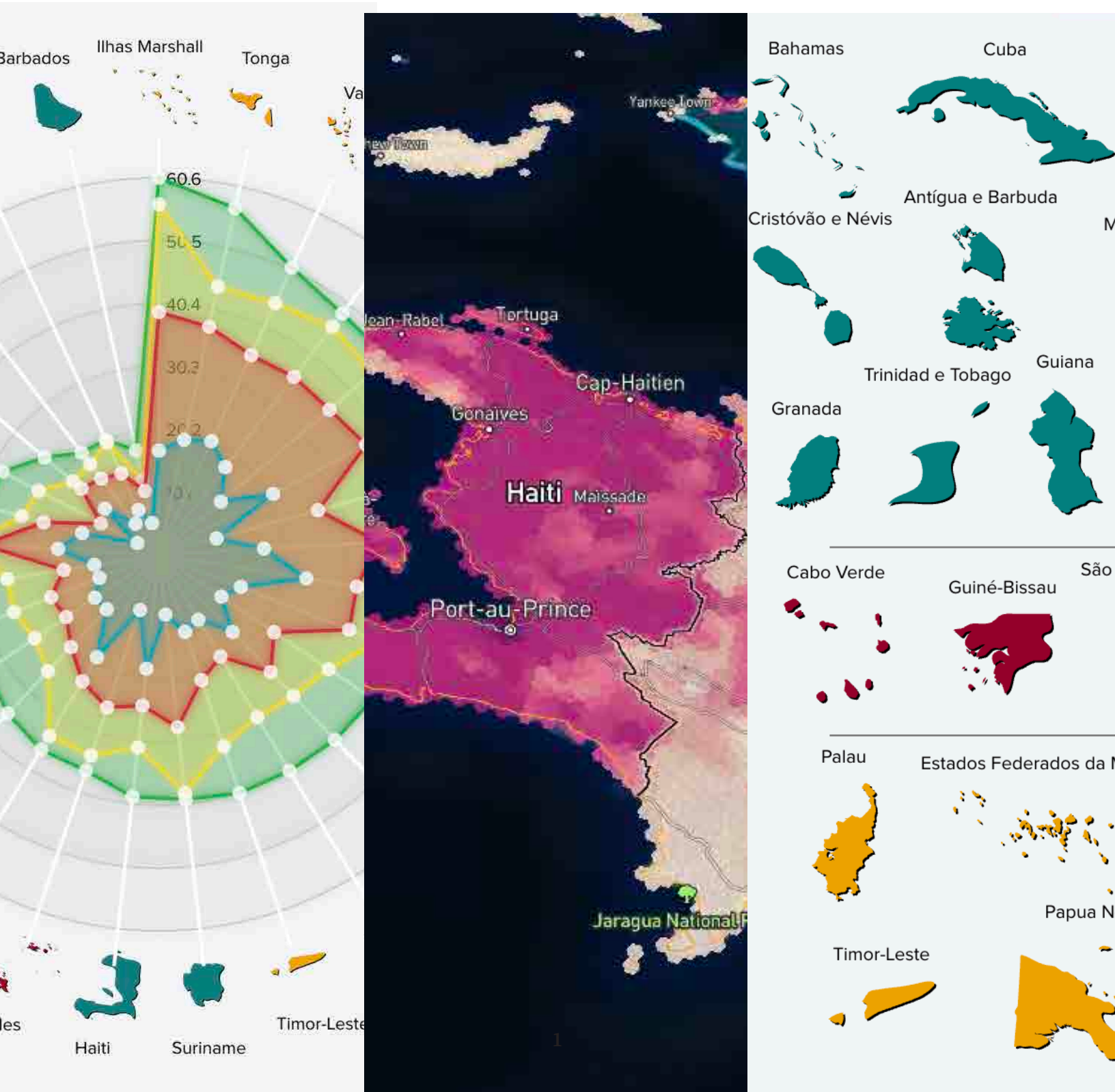
RISING UP FOR **SIDS**

Environmental Policy Innovation Center

UNDP SIDS DATA PLATFORM

User Manual v1.0

OCTOBER 2022



RISING UP FOR **SIDS**

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Acknowledgements:

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The UNDP works with SIDS to advance their national development priorities, respond to diverse challenges, and capitalize on emerging opportunities, including a strong presence in with a network of 9 multi-country offices and 13 stand-alone country offices that reach 50 SIDS. UNDP has responded to these needs of SIDS in several ways through key pillars that can kickstart green and blue recovery and accelerate sustainable development. UNDP has been supporting blue economies to unlock prosperity through an integrated approach rooted in sustainable finance and facilitating national blue economy strategies and local capacity-building. UNDP's integrated SIDS offer Rising Up for SIDS articulates a clear strategy to respond to their most pressing needs as well as bring forth innovative solutions to the complex developmental challenges they face for a better future for people and planet. UNDP's increased investment.

Climate

Blue

Digital Transformation

Thie SIDS Offer acts as a vehicle for recovery committing to enhancing current support in areas of climate action, blue economy and digital transformation, with innovative development finance as an enabling cross-cutting area.

data.undp.org/sids

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Introducing the
UNDP SIDS DATA PLATFORM

The UNDP Data Platform for Small Island Developing States is an open-source digital tool for accelerating development in SIDS by providing **policymakers, research institutions, country offices, and development partners** with access to updated, standardized, and comprehensive data. The platform is released in four languages – English, Spanish, French, and Portuguese – to make it more accessible and effective in capacity-building.

There are three main types of data within the SIDS data platform, including country-level development indicators, geospatial data, and data on the UNDP portfolio of projects and investment across the SAMOA Pathway priorities and SDGs. Our team has been developing interfaces within the platform to visualize, analyze, and export these data.

Country Profiles

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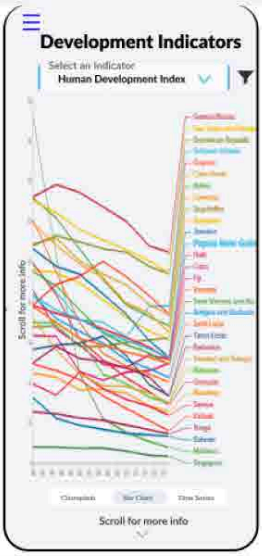
Development Indicators



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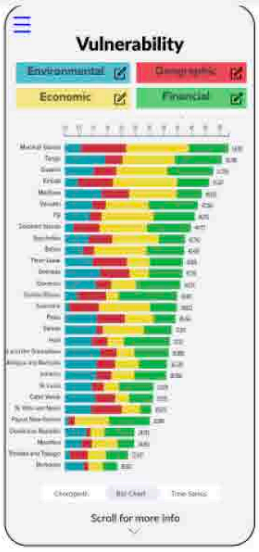
Multidimensional Vulnerability Index



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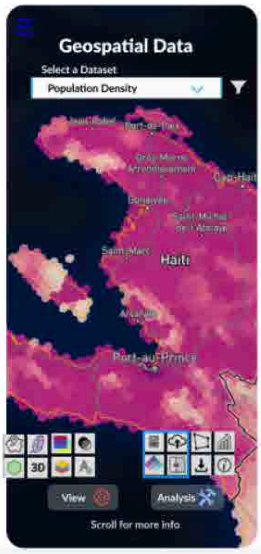
Geospatial Data



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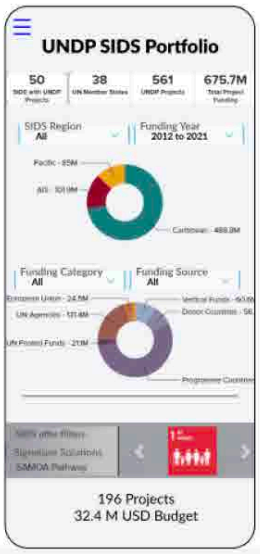
UNDP Portfolio



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1. Research to identify and compile data sources, which are often hidden and require expertise to find and access
2. These datasets then require extensive cleaning and standardization to be comparable and analyzable
3. We developed a visualization platform to interact with the indicator database and export automated analytic reports
4. We built a custom web GIS data platform for generating maps for monitoring and evaluation
5. We developed machine learning models to predict missing indicators in a time series
6. For release as an open-source digital tool we prepared that data as an API with data catalogues and documentation for access and use

Introduction: Data in SIDS

Central to all the integrated pillars of the SIDS Offer, data is a key enabler for Small Island Developing States (SIDS) to accelerate development. However, SIDS face challenges due to significant data gaps and in the discovery, access, analysis, and interpretation of data. In order to develop effective policy in the SIDS, there is a necessity to have access to comprehensive and updated qualitative and quantitative data. Thus, SIDS policymakers require access to leading digital tools designed with their specific needs in mind.

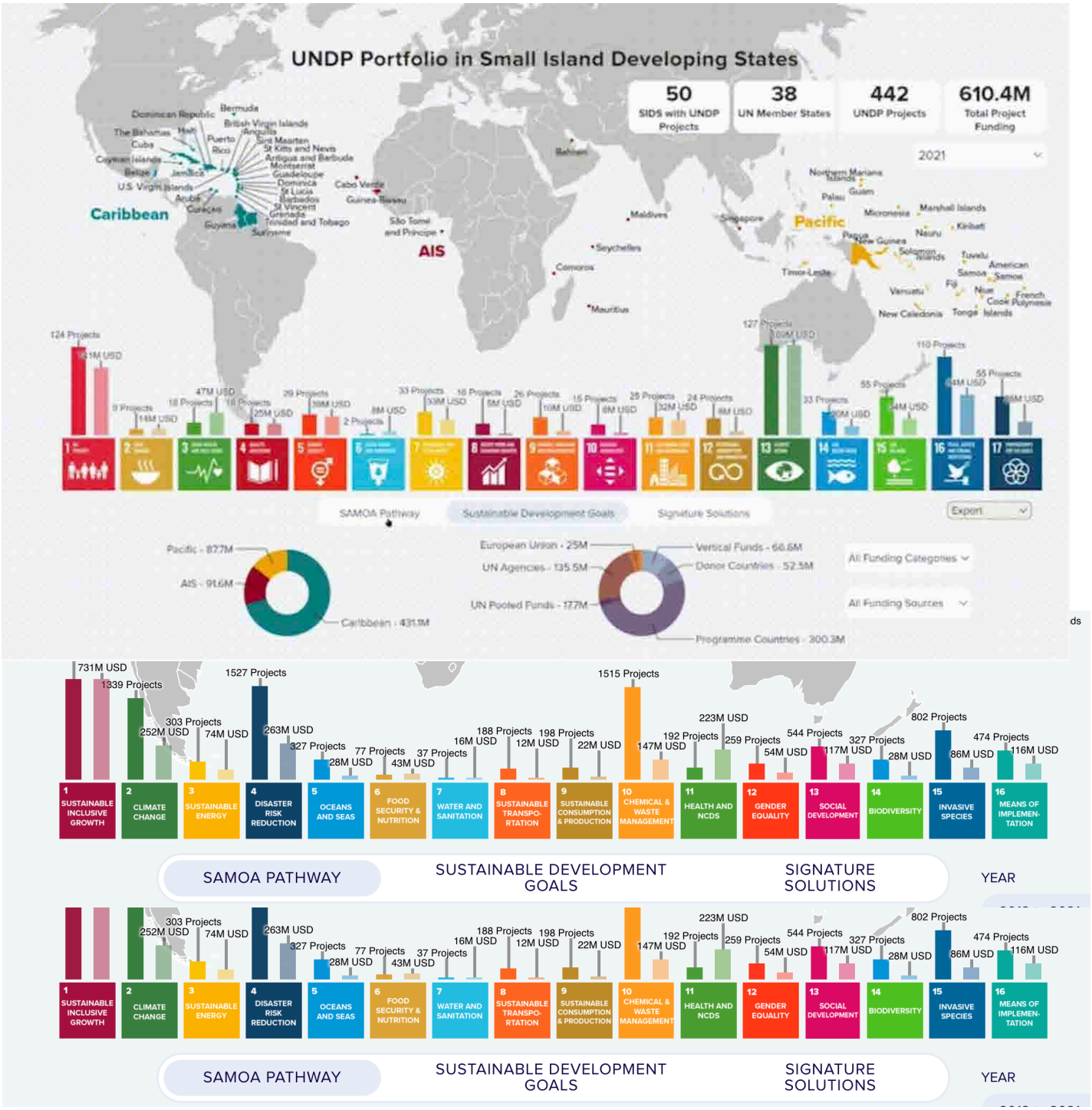
In order to achieve **the 2030 development agenda** and the **SAMOA Pathway priorities**, policy must be data-driven and based on integrated analyses of vulnerabilities and the methods we can use to address them. **Foundational data infrastructure** is crucial in enabling access to, analysis of, and sharing of data and innovations between and within SIDS. This includes national open data portals, spatial data infrastructures, and data communities, all made possible through the provision of digital tools, open data, and finance mechanisms to develop capacity of local research and innovation.

Data is the bridge between the digital and real worlds, and thus further investment in data infrastructure is essential to make use of the advances in machine intelligence and computational analytics. Accelerating data needs to be done in parallel with ongoing digital transformation and energy transitions in SIDS, since well-connected and electrified networks are necessary to gather and communicate data in the spatial and temporal resolution necessary for data-driven policymaking. This **data ecosystem in SIDS** will continue to progress with advancements inmachine learning and geospatial technologies - key tools to move beyond classical analytics for more nuanced development insights.

It is important to recognize both the limitations of data and the risks involved with digital transformation and the transition into a data-driven society. Because of the diverse and complex geographic and socioeconomic settings of SIDS, challenges such as underrepresentation or maladaptation from data-driven analyses can be amplified. As stewards of the ocean, data is key to amplifying SIDS' voices as they continue to shift global perspectives. We must join forces with SIDS to strengthen capacity to benefit from the opportunities that data can provide, through increased investment in SIDS' data-driven transformative development.

1. UNDP Portfolio

The UNDP SIDS Offer Portfolio has an interface to visualize the UNDP portfolio by budget allocation across the SDGs, as well as the SAMOA Pathway priorities and the six UNDP Signature Solutions. You can also filter by region, year, funding category, and donor. For example, we can see which projects the Global Environment Facility has funded in the Pacific region between 2012 and 2021.

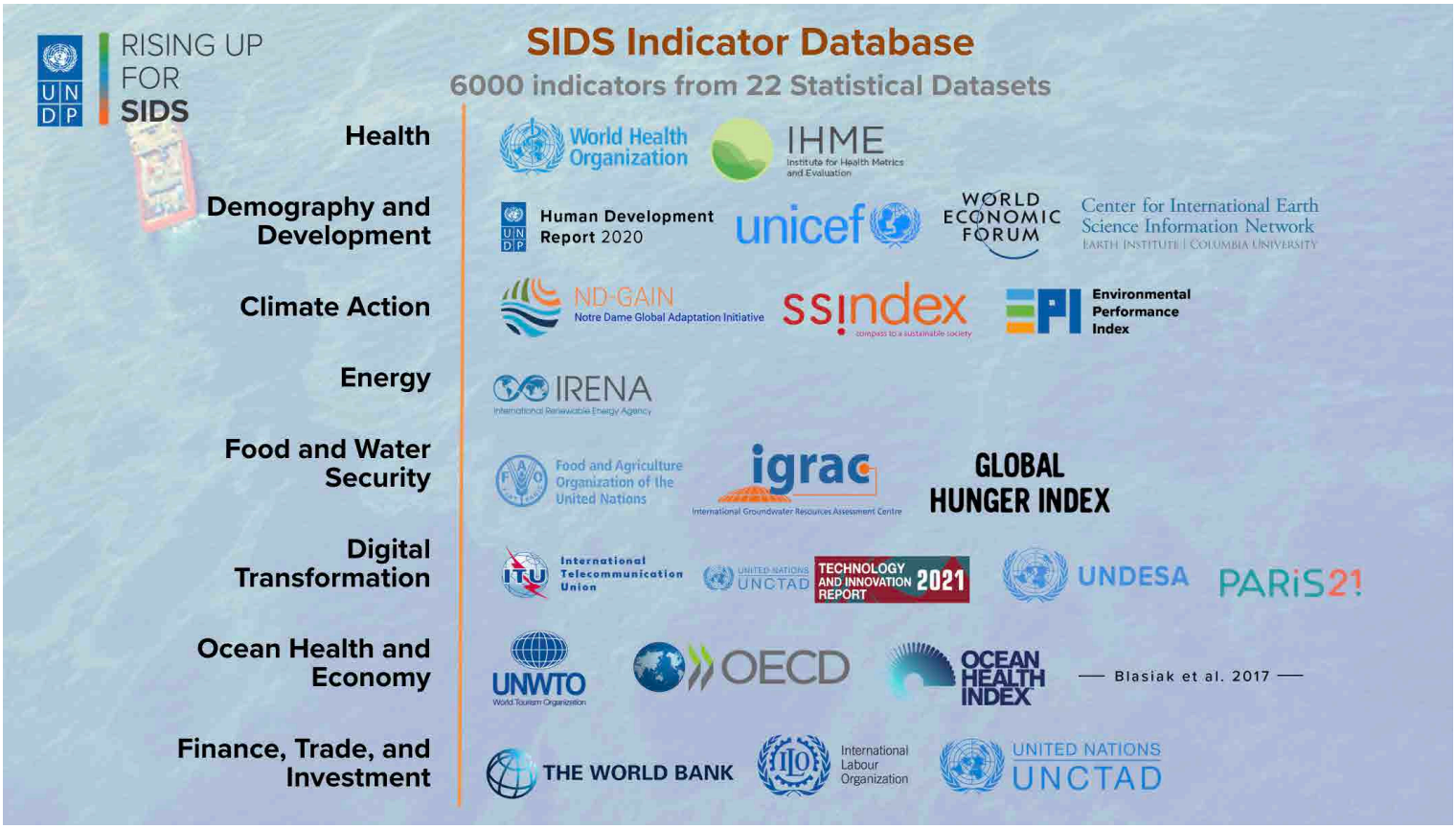


2. Country-Level Indicators

SIDS Indicator Database

One of the key values of the platform is our database of indicators and the visualization and analytic toolkit. Country-level indicators play a key role in vulnerability assessments, accountability and transparency, and monitoring development progress through the development of multidimensional indices used in structural reforms.

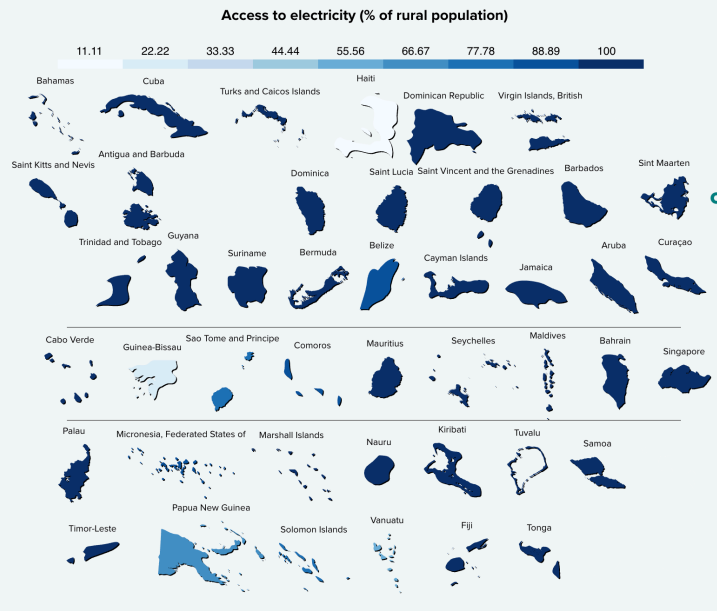
We have compiled and standardized a database of over 4000 indicators from many different public datasets including from more than 20 statistical databases and research studies. We have curated the data to feature reliable, accurate and comprehensive information across the many sectors of development most relevant to SIDS. This process involved a standardization and compilation effort for the data and metadata, including manually compiling information about each indicator and remapping the data to a new data standard designed specific to SIDS.



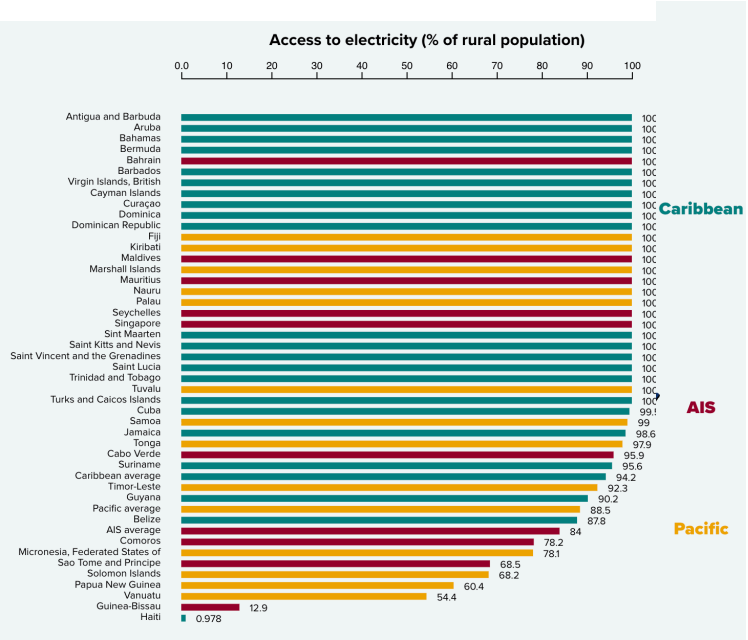
Indicator Visualizations

The web platform features interactive visualizations which allow users to select specific indicators and map them across countries with available data. The data can be sorted by dataset, category, and subcategory, and then visualized as a choropleth map, a global view, bar chart, time series, and a multi-indicator view.

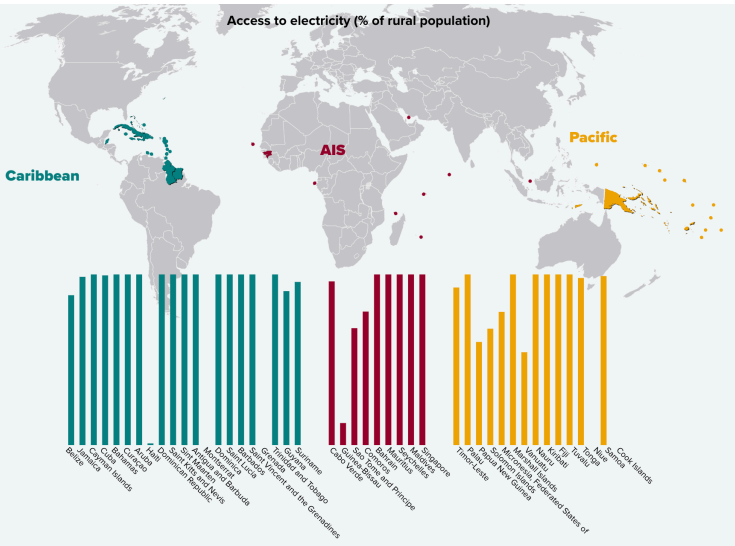
Choropleth



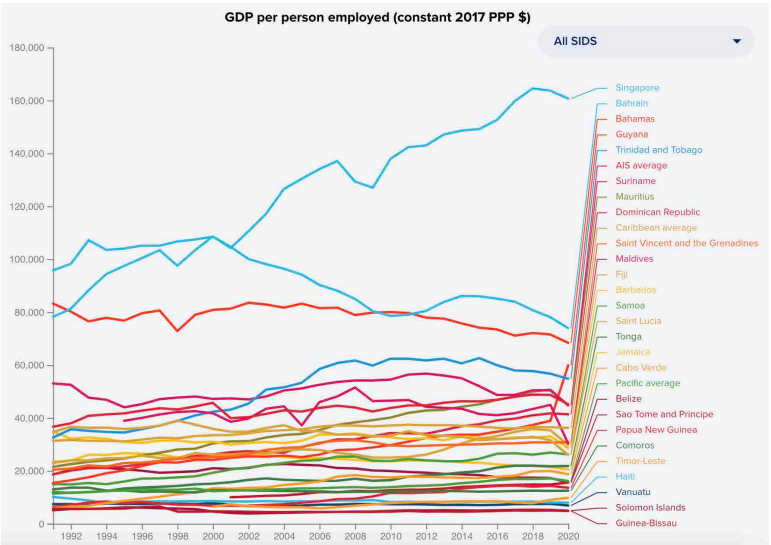
Bar Chart



Global View



Time Series



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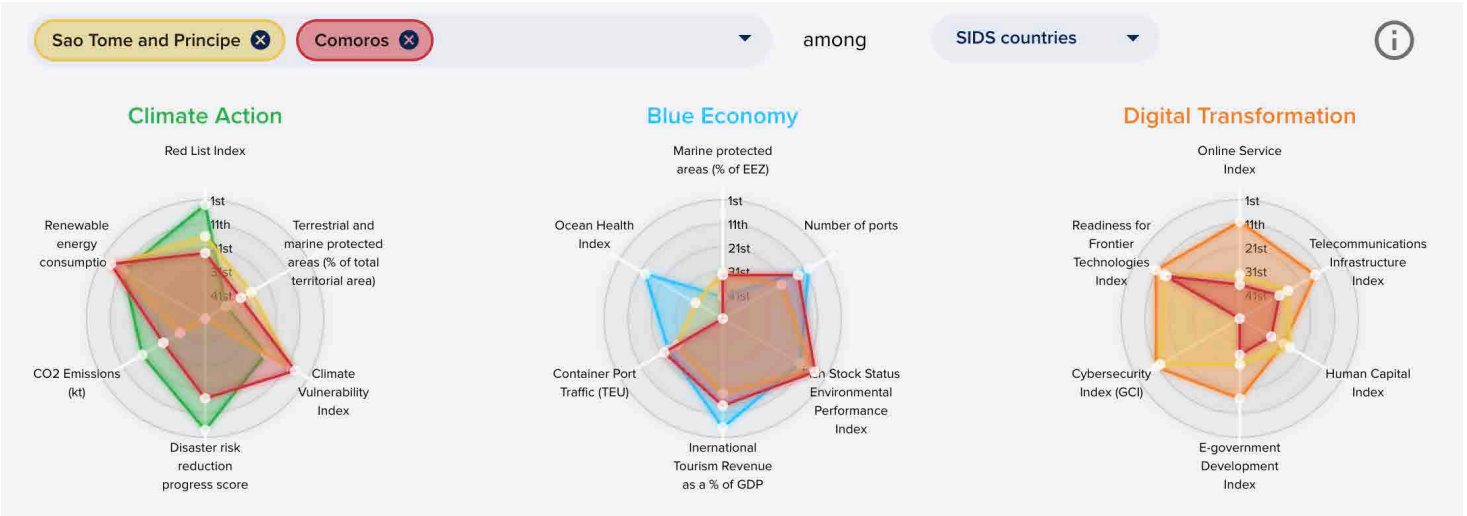
3. Country Profiles

With these indicators we have also curated country profiles with key development data across the pillars of the UNDP's SIDS Offer, as well as financial information and vulnerability indices. Here you can overlay additional countries to compare values amongst the SIDS and regional or global values.

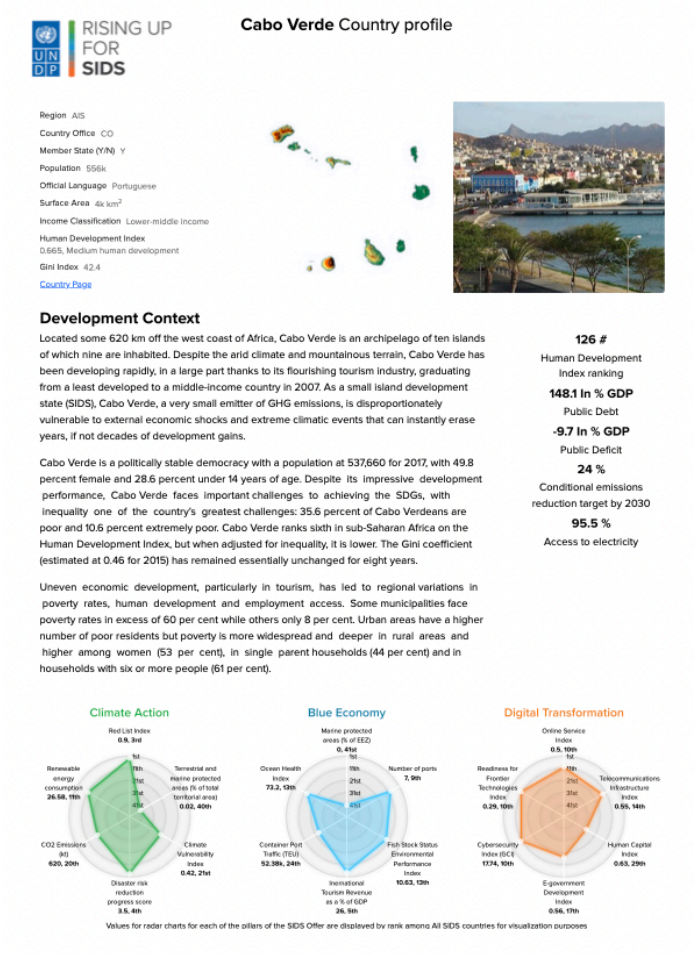
Overlay other country data

Radar chart values are ranked among SIDS, global, or within the relevant SIDS region.



Automated Country Reports

This country profile data is all available for export as automated country development profiles.



RISING UP FOR SIDS

Cabo Verde Country profile

Region AIS
Country Office CO
Member State (Y/N) Y
Population 556k
Official Language Portuguese
Surface Area 4k km²
Income Classification Lower-middle income
Human Development Index
0.665, Medium human development
Gini Index 42.4
Country Page

Development Context

Located some 620 km off the west coast of Africa, Cabo Verde is an archipelago of ten islands of which nine are inhabited. Despite the arid climate and mountainous terrain, Cabo Verde has been developing rapidly, in a large part thanks to its flourishing tourism industry, graduating from a least developed to a middle-income country in 2007. As a small island development state (SIDS), Cabo Verde, a very small emitter of GHG emissions, is disproportionately vulnerable to external economic shocks and extreme climatic events that can instantly erase years, if not decades of development gains.

Cabo Verde is a politically stable democracy with a population at 537,660 for 2017, with 49.8 percent female and 28.6 percent under 14 years of age. Despite its impressive development performance, Cabo Verde faces important challenges to achieving the SDGs, with inequality one of the country's greatest challenges: 35.6 percent of Cabo Verdeans are poor and 10.6 percent extremely poor. Cabo Verde ranks sixth in sub-Saharan Africa on the Human Development Index, but when adjusted for inequality, it is lower. The Gini coefficient (estimated at 0.46 for 2015) has remained essentially unchanged for eight years.

Uneven economic development, particularly in tourism, has led to regional variations in poverty rates, human development and employment access. Some municipalities face poverty rates in excess of 60 per cent while others only 8 per cent. Urban areas have a higher number of poor residents but poverty is more widespread and deeper in rural areas and higher among women (53 per cent), in single parent households (44 per cent) and in households with six or more people (61 per cent).

126 #
Human Development Index ranking

148.1 ln % GDP
Public Debt

-9.7 ln % GDP
Public Deficit

24 %
Conditional emissions reduction target by 2030

95.5 %
Access to electricity

Climate Action

Blue Economy

Digital Transformation

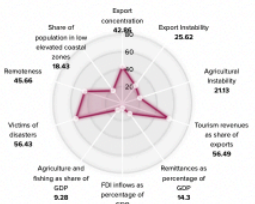
Values for radar charts for each of the pillars of the SIDS Offer are displayed by rank among All SIDS countries for visualization purposes

Successes in Development

Cabo Verde is an African model of democracy, stability and share of the population with access to education (93% enrolment 2018), water (86%, 2018) and electricity (92.2%, 2019) which has made the Sustainable Development Goals the backbone of its economic, social and cultural planning. With significant support from the United Nations in Cabo Verde and other development partners, national authorities presented the Strategic Plan for Sustainable Development (PEDS) 2017-2021, resulting from a participatory process that lays the foundation for sustainable development in Cabo Verde to build a better future for all. The PEDS is in line with the 2030 Agenda principles and the Sustainable Development Goals. In 2018, Cabo Verde presented the Voluntary National Review (VNR) on implementing the SDGs in Cabo Verde.

Cabo Verde elected the development of human capital as the main accelerator of sustainable development and young people are the most important segment, with increasing elderly population. The country made remarkable progress in the last 4 years on education, becoming one of the few countries with free primary and secondary education. Reforms to promote technical and professional education from the 9th grade onwards will contribute to the massification of the professional qualification of young people. With these reforms coupled with those underway in higher education, and with investment in health for all, the aim is to develop human capital, to accelerate economic growth and reduce inequality and poverty. We urge the international community to accompany the country's efforts, within the framework of the strategic plan for human capital development.

Multidimensional Vulnerability



Values for each indicator for vulnerability are normalized among all countries with available data on a scale from 0 to 100

Finance

GDP Growth (annual %)	-0.86 (2020)
GDP per capita (current US$)	3.06k (2020)
Inflation, GDP deflator (annual %)	-14.78 (2020)
Current account balance (% of GDP)	-16.67 (2020)
Real interest rate (%)	9.14 (2020)
Central government debt, total (% of GDP)	No Data
Bank capital to assets ratio (%)	No Data
Personal remittances, received (% of GDP)	14.3 (2020)
External debt stocks (% of GNI)	93.9 (2019)
Foreign direct investment, net inflows (BoP, c...	107.81M (2...
Foreign direct investment, net outflows (BoP, c...	3.99M (2...
Net ODA received per capita (current US$)	277.38 (2019)
Net ODA received (% of GNI)	7.87 (2019)
Trade (% of GDP)	84.69 (2020)

Challenges in Development

An archipelago of ten volcanic islands with no permanent water courses, no natural forests, limited mineral resources and scarce in areas suitable for agriculture (only 12% of its territory is arable land), Cabo Verde is particularly exposed to increasingly extreme weather events, desertification of land and persistent droughts, occasional but severe and highly damaging heavy rains (most recently in September 2020), and sea-level rise. As a consequence, the archipelago faces severe adaptation challenges associated with, among others, water resource scarcity, food and energy security. The access to affordable and sustainably-sourced energy and water, the protection of the islands' delicate unique biodiversity and soils, sustainable development and the deployment of socio-ecological resilience within the planetary boundaries are a matter not just of policy choice but of survival.

Cabo Verde is also facing significant capacity constraints, limited fiscal space and insufficient domestic finance to respond adequately to challenges posed by climate change. This has been compounded by the economic fallout of the COVID 19 global pandemic and exacerbating the already existing high debt to GDP ratio. Although Cabo Verde has made remarkable progress in poverty reduction over the last decade, poverty remains widespread (35% of the population as recently as 2015). The COVID 19 pandemic has caused the biggest recession in Cabo Verde's modern history affecting virtually all economic sectors, including notably tourism, which is of strategic importance. While Cabo Verde's islands are in no way self-sufficient – the vast majority of goods, including essential foods, are imported. People are exceedingly vulnerable to shocks in supply chains caused by economic or digital disruptions, extreme weather events, or most recently the COVID 19 pandemic.

Access the SIDS Indicator API

This database is then compiled into a comprehensive data product and API of publicly available data-sets from a broad base of partner agencies and research publications. The API allows direct access to the database so that SIDS can build their own dashboards to monitor development progress.

The indicator dataset can be accessed at github.io/

datasetCode-indicatorCode-dimensionCode

The data is available as a csv or as a json, with metadata included

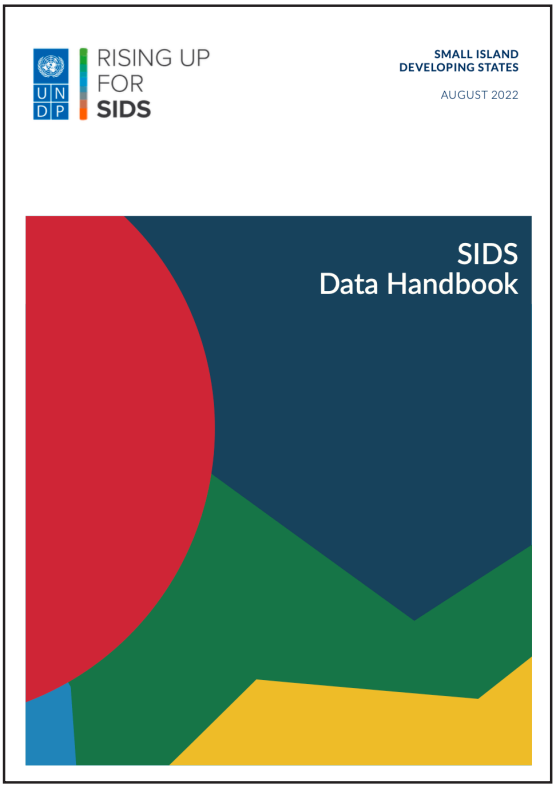
The data is either clipped to SIDS or available at a global level

Released under a license

SIDS Indicator Catalogue

NEPA requires that tribes be treated as stakeholders similar to state and local governments. The challenge is that this guidance is often left up to interpretation by field staff, which can lead to inconsistencies in how staff engage with tribes. While CEQ's action plan underscores principles of tribal sovereignty and recognizes the need for Nation-to-Nation engagement with tribes, it could do more to put in place standards for tribal engagement. The CEQ has commendably led roundtables that include opportunities for tribes to offer perspectives on NEPA and to generate specific recommendations. As outlined in the January 2021 memorandum, CEQ should follow up on this effort with a review every year to track how recommendations are being implemented and if they are improving outcomes for tribes around the NEPA process.

Access the **SIDS Indicator Catalogue**



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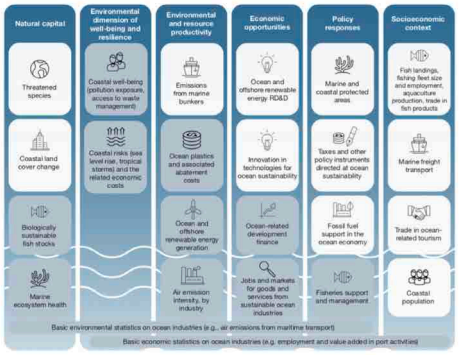
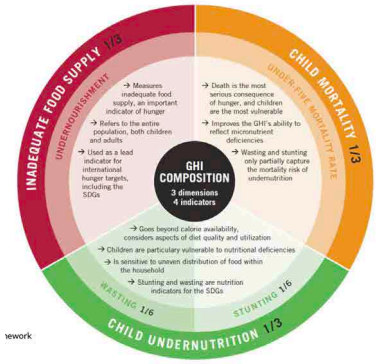
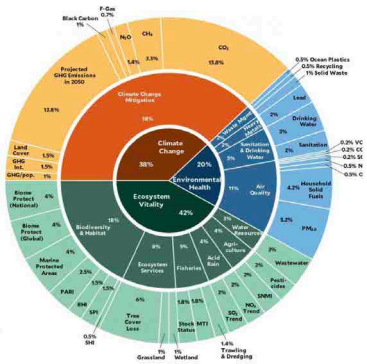
Ocean Health Index



Global Hunger Index



Environmental Performance Index



Ocean Health Index

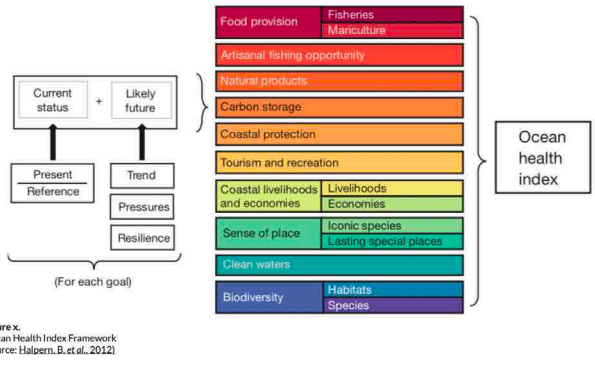
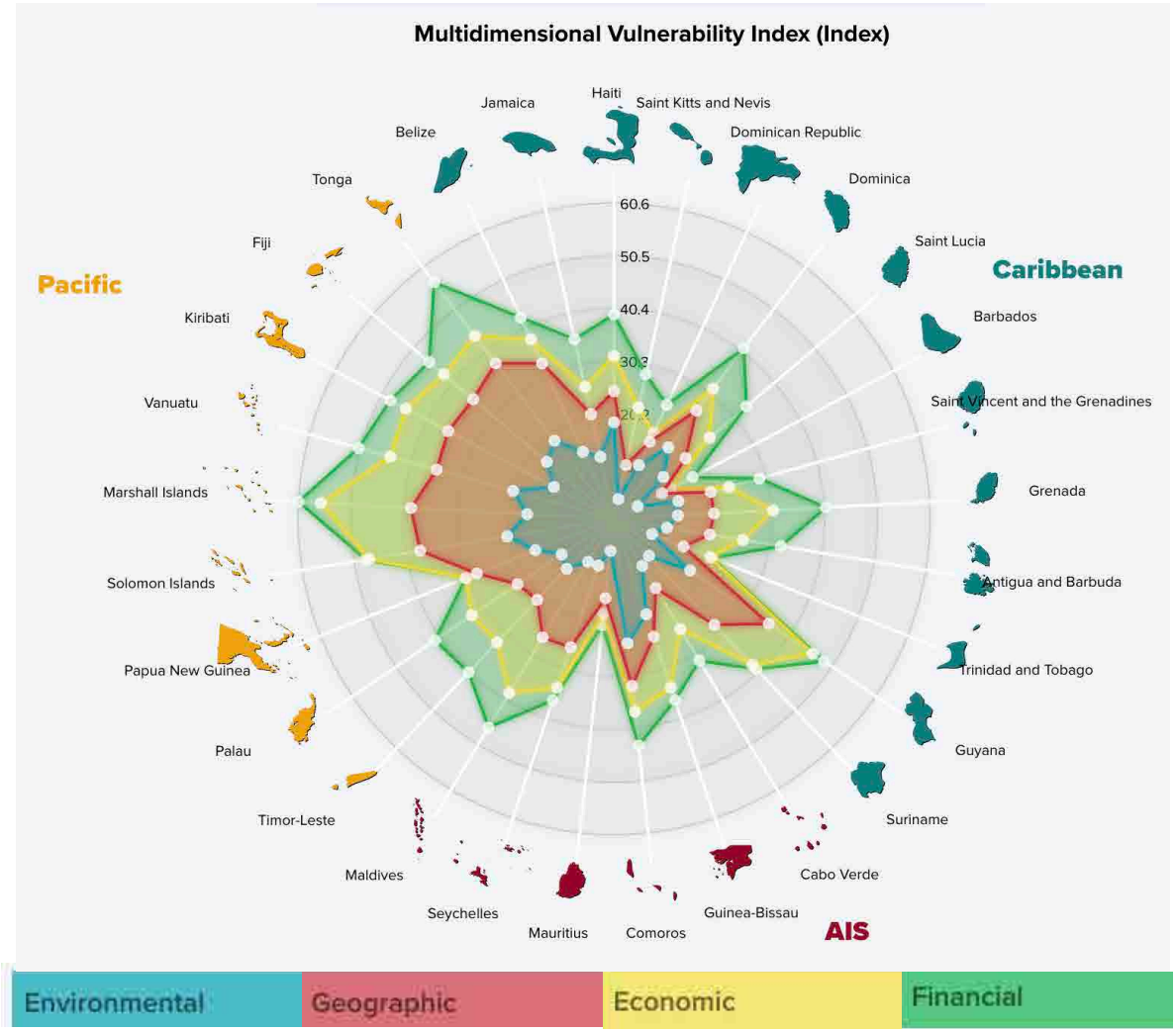


Figure x.
Ocean Health Index Framework
(source: Halpern, B. *et al.*, 2012)

4. Multidimensional Vulnerability

In response to the unique context of SIDS and the acute lack of finance exacerbated by the COVID-19 pandemic, UNDP is supporting SIDS in developing a **Multidimensional Vulnerability Index (MVI)** to reflect traditional as well as emerging risks facing SIDS and other developing countries.

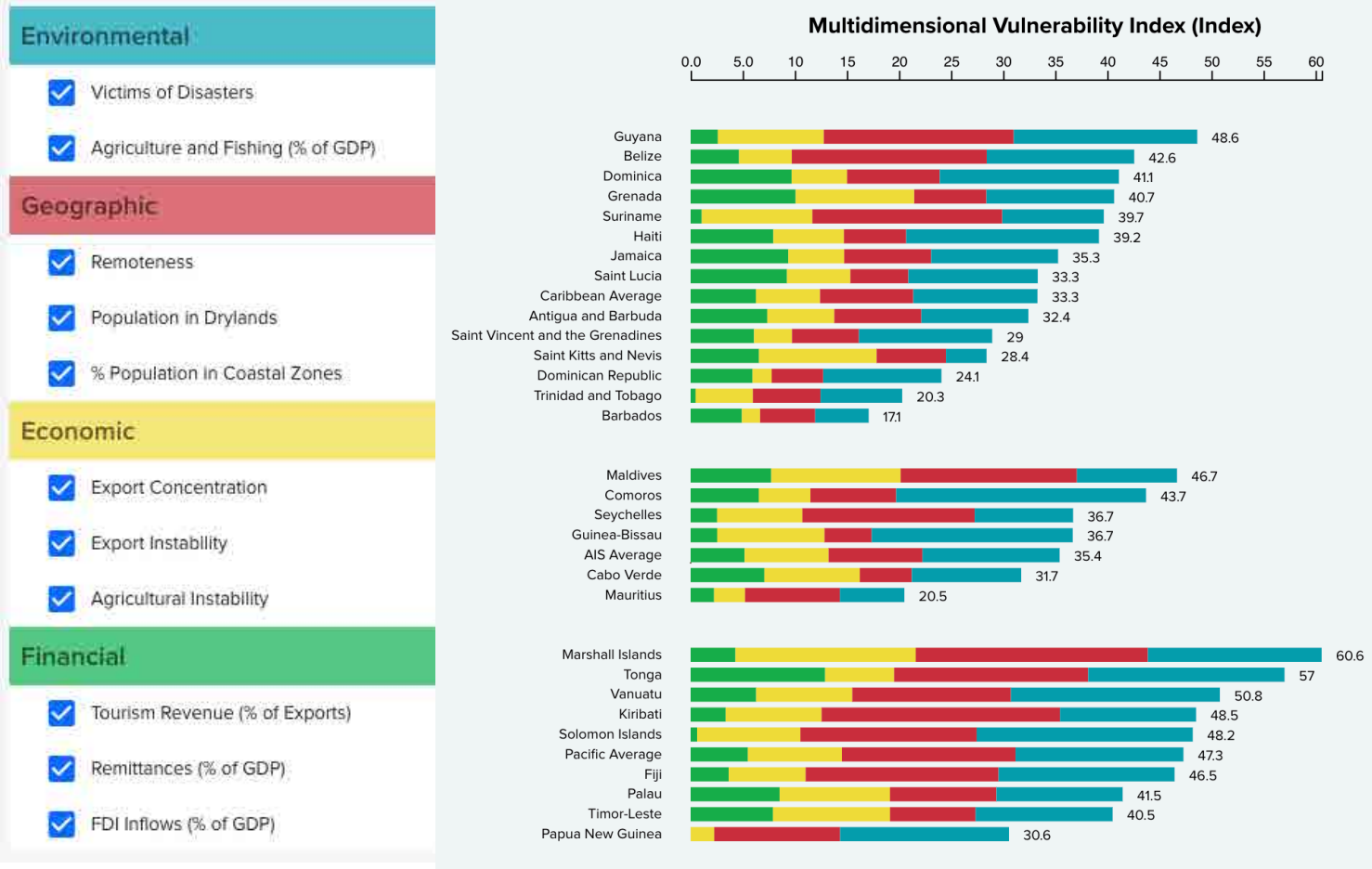
The MVI responds to calls from SIDS for reassessment of eligibility for concessional financing beyond income level to accurately capture the vulnerability SIDS face, based on four dimensions of vulnerability: **environmental**, **geographic**, **economic**, and **financial**.



Using 11 indicators for 128 countries (including 34 SIDS), the MVI demonstrates that all but five SIDS are far more vulnerable than their income level would suggest. Furthermore, a simulation comparing SIDS to LDCs demonstrates that, if the MVI were used as a financing criterion (rather than just income per capita), they would save close to 1.5% of GDP annually on servicing their long-term external public and publicly guaranteed (PPG) debt. In the long-term, the MVI can be used as a policy planning tool, for targeting investments to increase productive capacity in SIDS, and thus increase their self-sufficiency and resilience and reduce their vulnerability to future external shocks.

Customizable MVI

Our approach for presenting a multidimensional vulnerability index is to build a live and dynamic tool that allows users to customize the indicators that contribute to vulnerability. This method allows users to conduct their own vulnerability analysis of the categorical and specific factors of vulnerability in each of the SIDS, in dimensions of environmental, geographic, economic, and financial vulnerability. This data presented in a parametric interface with a customizable version of the MVI to analyze the contributions of each indicator towards SIDS' vulnerability. This supports comparisons of indices between countries and regions, as well as between the MVI and the Economic and Environmental Vulnerability Index (EVI) which is currently used as part of the three criteria for inclusion in the Least Developed Countries (LDC) category.



Against this context, it is proposed to add three indicators – tourism revenues, remittances, and FDI– to the eight existing indicators of the EVI.

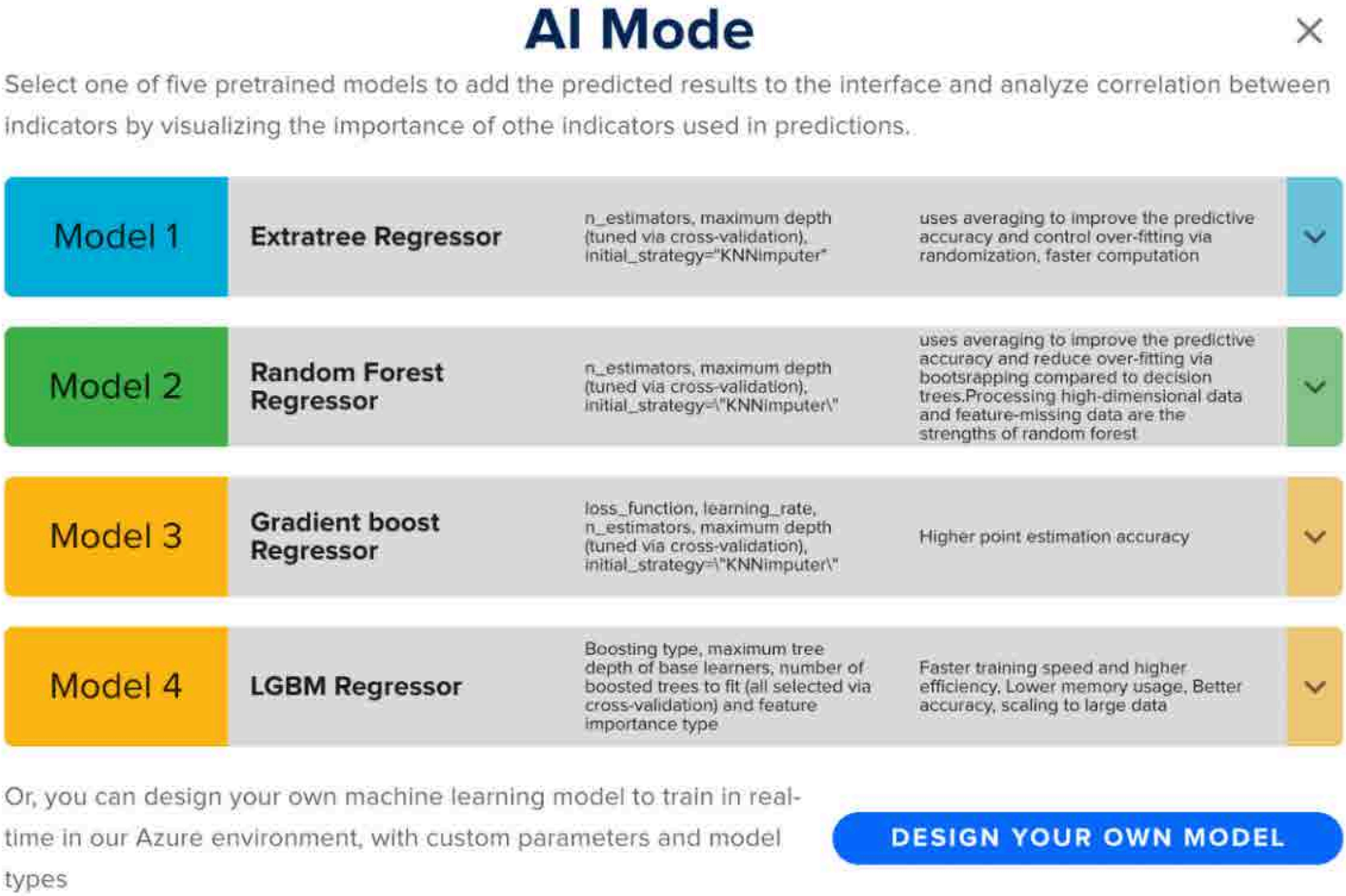
In terms of the degree of vulnerability, the 126 countries in the sample can be grouped into four quartiles using the range (44 points) between the lowest and highest score:

- Low Vulnerability: Countries with MVI values below 21. There is only one SIDS — Barbados — among these 17 countries
- Medium Vulnerability: Countries with MVI values between 21 and 32. Of these 59 countries, only five (8.5%) are SIDS (Papua New Guinea, Dominican Republic, Mauritius, Nauru, and Trinidad and Tobago)
- High Vulnerability: Countries with MVI values between 32 and 43. Of these 42 countries, 21 (50%) are SIDS

5. Machine Learning

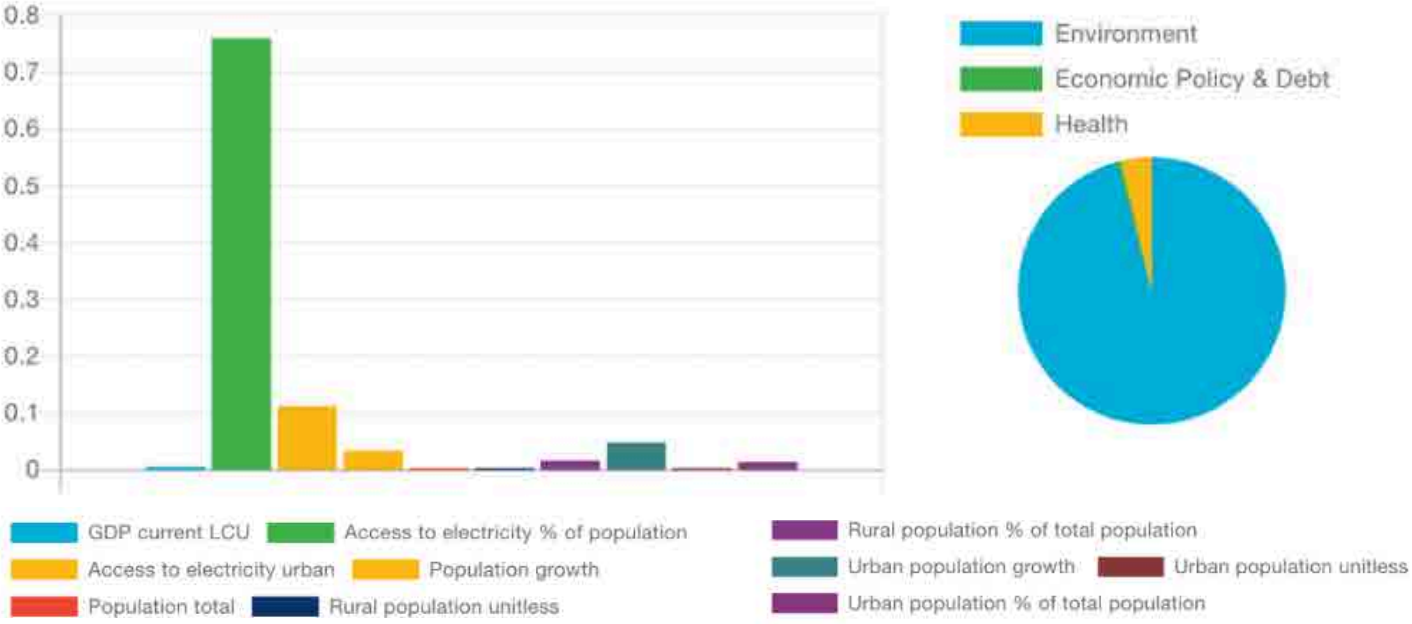
One significant challenge in the utility of country-level indicator data especially for SIDS is the large amount of missingness in the datasets, which makes it difficult to make comparisons between countries, develop multidimensional indices, or effectively track development progress. To address these challenges the SIDS Data Platform presents imputation features to gap-fill the indicator dataset by using other indicators as features in a predictive model. Imputation models offer different methodologies for filling these gaps, as well as provide a measure of uncertainty on the indicators used to allow users to get a sense of model performance and bias and identify correlations with other indicators. These models are presented in two forms, in precomputed and real-time modes, which have different utility for users of the platform.

ML Mode 1 – Precompute mode
In the precomputed mode, users can select from one of several pretrained models to add the predicted results to the web interface. These models are specifically designed by our team to represent some of the above modeling approaches and are optimized over a relatively small feature and hyperparameter space to provide a good overview of the approaches.



Feature Importance

Feature importance is visualized to show indicator correlations and identify proxy indicators.



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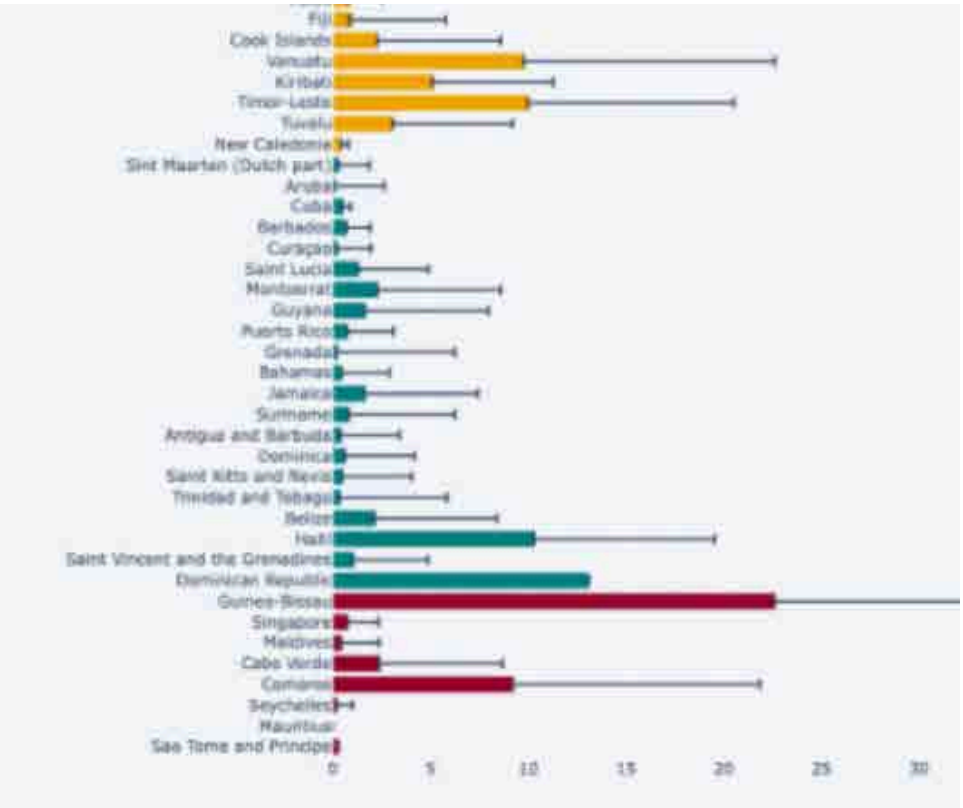
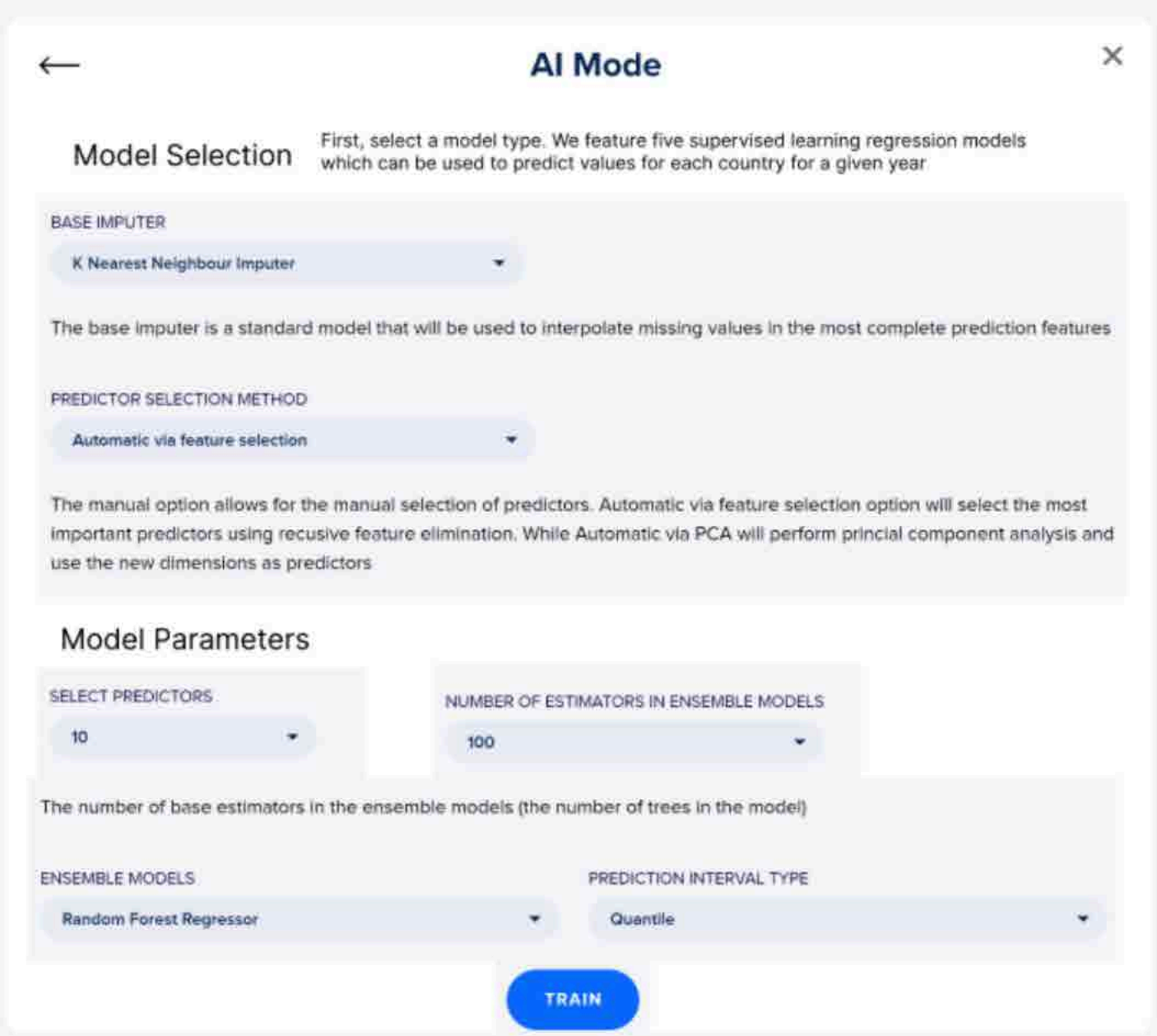


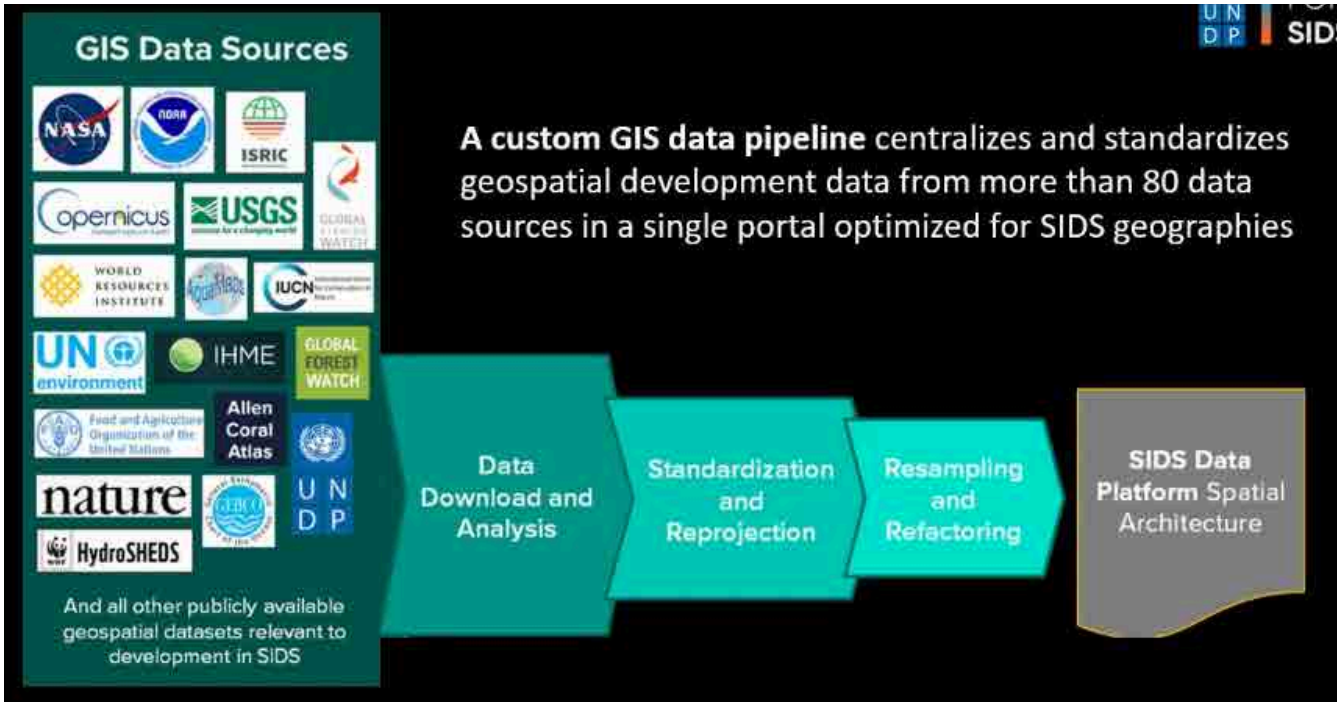
The missing data imputation models included on this data platform are supervised learning algorithms that take a given indicator as a target/dependent variable and use a subset of other indicators, with the least amount of missing values, as predictors (independent variables) to predict for missing values. They are developed not just to fill in gaps in datasets but also to highlight relationships between indicators using different measures such as correlations and feature importance/predictive strength.
The majority of the algorithms are decision tree based (boosted or bagged) ensemble models including random forest regressor, gradient-boost regressor and extra-tree regressor. These algorithms have historically shown high performance on structured tabular data. In addition, they provide simplicity in terms of interpretation, reduced sensitivity to hyperparameter tuning and resistance to problems that arise from high dimensional data.

Initially, algorithms with a year-by-year imputation modeling approach will be made available in this mode as they require the least amount of training time. The algorithms with the other two modeling ap-



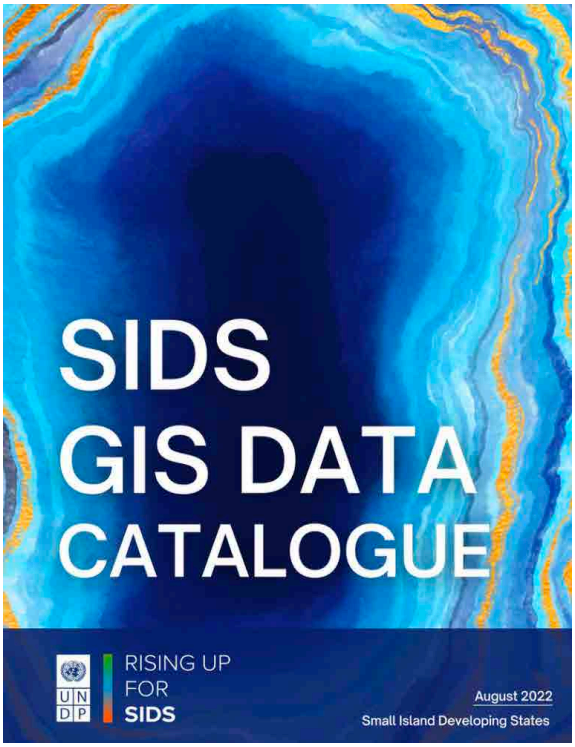
6. Geospatial Data

In the GIS field there is a great challenge in utilizing geospatial data because of the wide variety of formats and data types. We have developed a data pipeline to standardize and resample a geospatial database at several resolutions so they can be used for analytics, including a broad set of data including from NASA SEDAC, USGS, IHME, journal articles in Nature, the Copernicus Climate Data Store, and many other sources. By standardizing and centralizing this data, the platform aims to significantly lower the barrier of entry for geospatial studies in the SIDS.



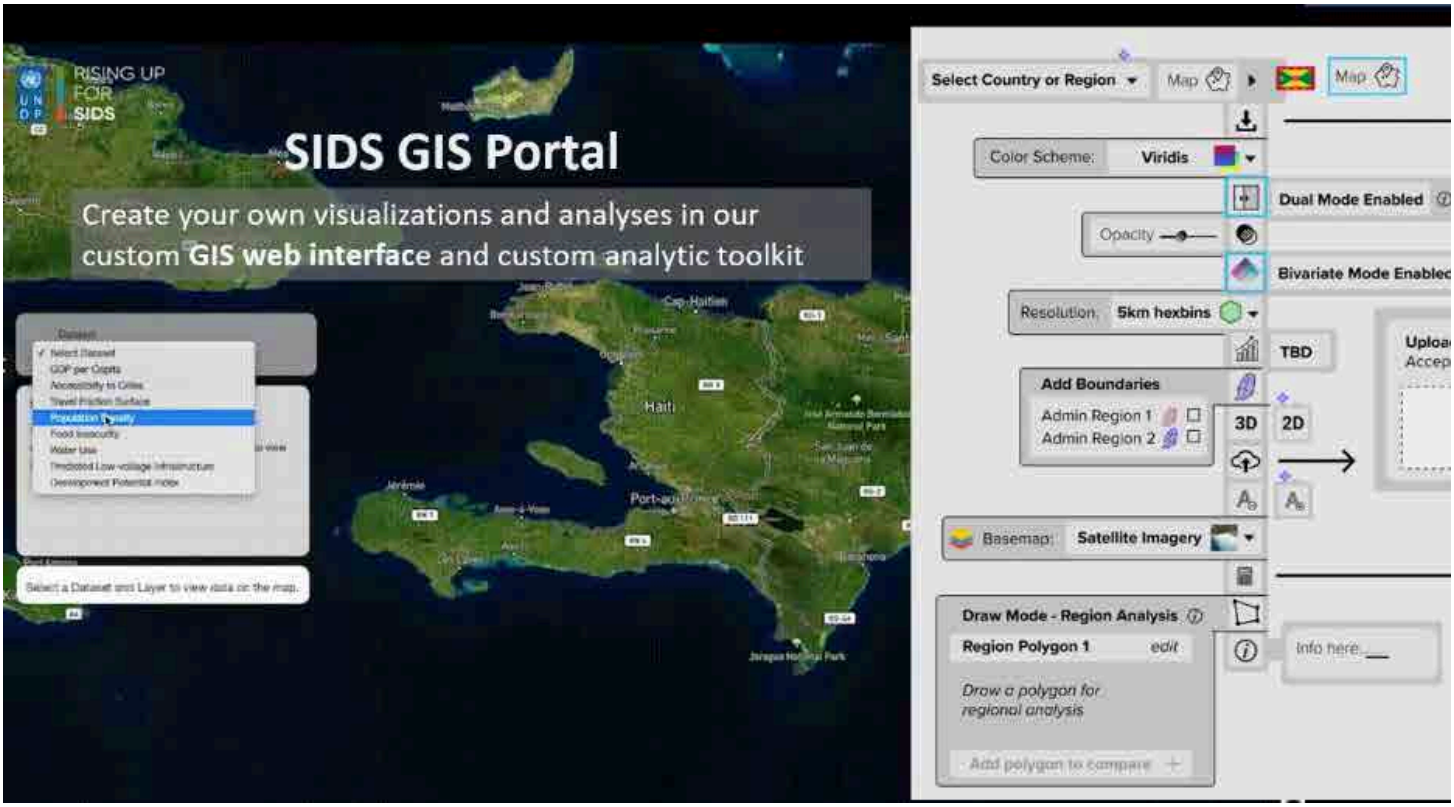
NEPA requires that tribes be treated as stakeholders similar to state and local governments. The challenge is that this guidance is often left up to interpretation by field staff, which can lead to inconsistencies in how staff engage with tribes. While CEQ's action plan underscores principles of tribal sovereignty and recognizes the need for Nation-to-Nation engagement with tribes, it could do more to put in place standards for tribal engagement. The CEQ has commendably led roundtables that include opportunities for tribes to offer perspectives on NEPA and to generate specific recommendations. As outlined in the January 2021 memorandum, CEQ should follow up on this effort with a review every year to track how recommendations are being implemented and if they are improving outcomes for tribes around the NEPA process and if they are improving outcomes for tribes around the NEP- for tribes around the NEPA

Access the **SIDS Indicator Catalogue**



GIS Visualization and Analysis Tools

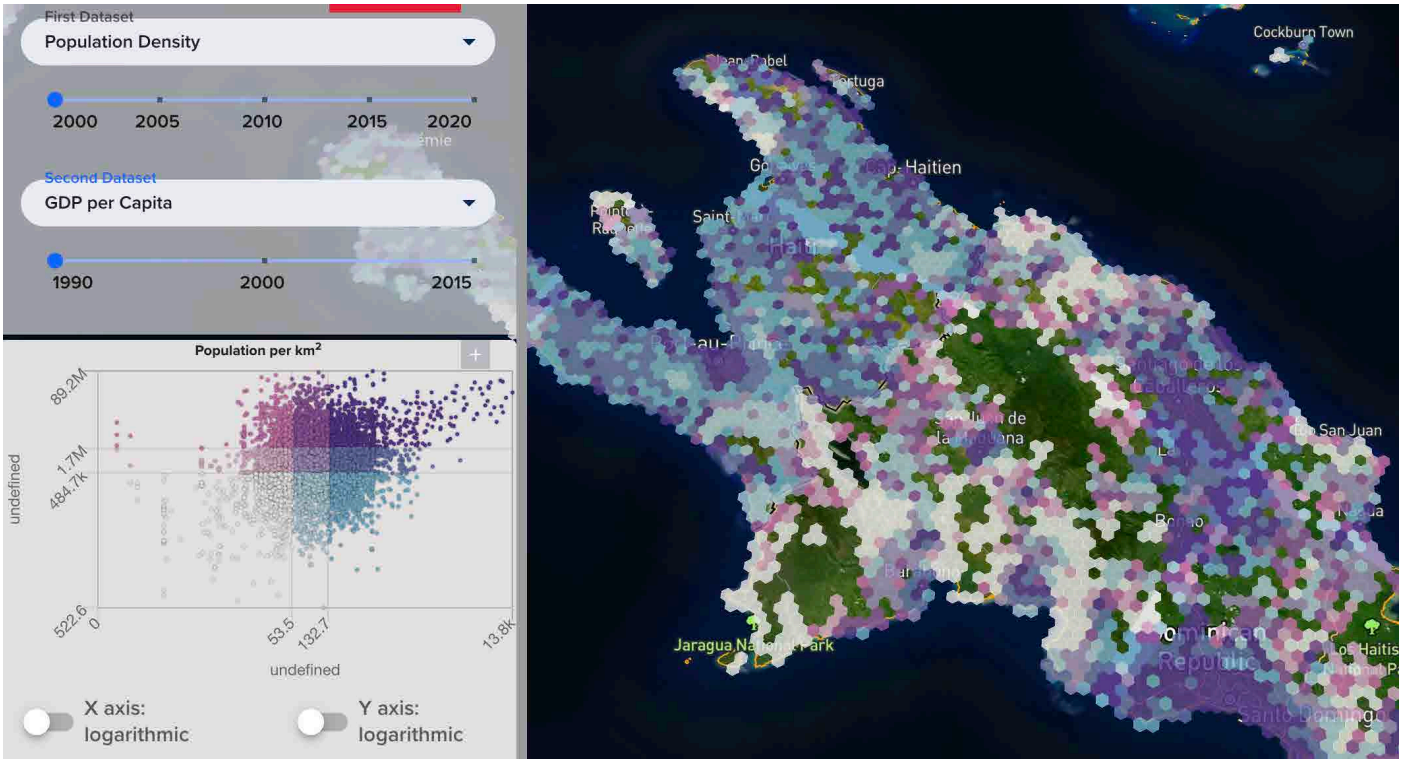
A user can select from our database of features including socioeconomic data such as population density, access to markets, and GDP, as well as development potential indices such as the potential for wind or solar power. By selecting an SDG or SAMOA Pathway Priority, a user can filter datasets to just one area of interest.



Additional visualization and analysis tools allow users to build their own maps and export these visuals for communication and reporting. Beyond visualization, we are building a suite of analytics tools that make use of our rich database of geospatial information for development analyses.

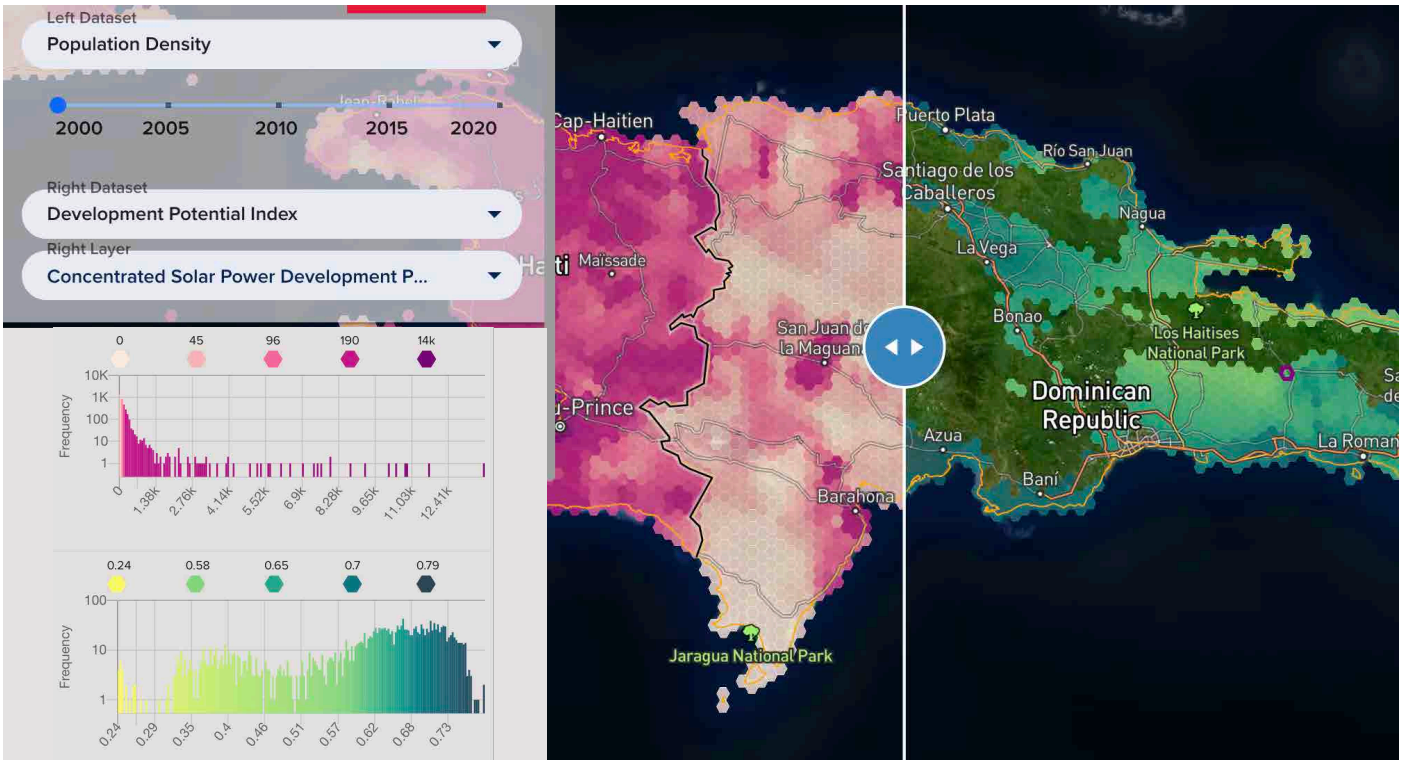
Bivariate Mode

Analytic features include Bivariate, Dual, and Draw mode.



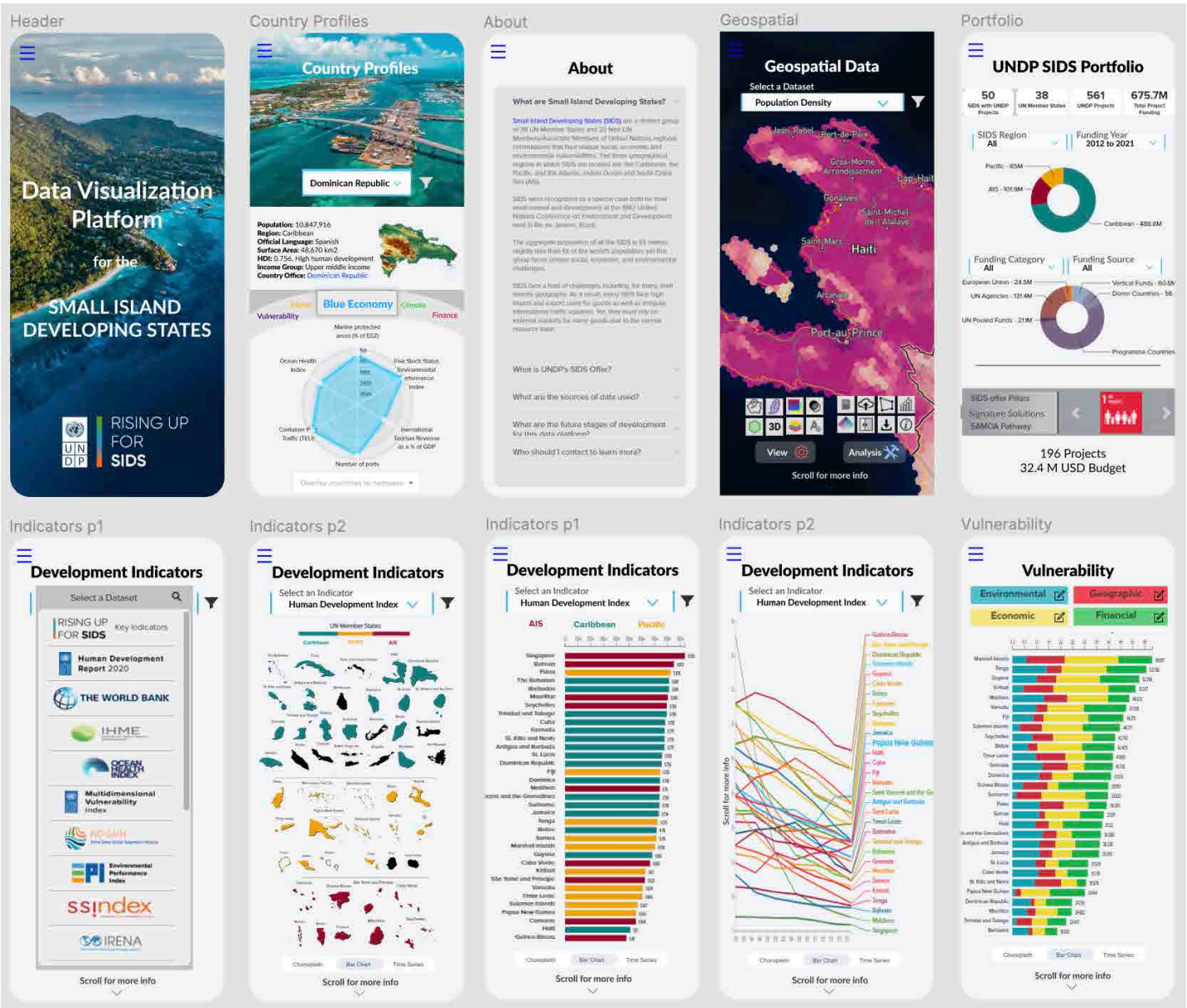
Dual Mode

Analytic features include Bivariate, Dual, and Draw mode.



7. Mobile Interface

For each page of the SIDS Data Platform we have also implemented a mobile version so the platform can be made available to more users, and to enable quick access to these datasets and tools.



Languages

English, Portuguese, French, and Spanish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