



National workshop:

Generating environment, climate change and disasters indicators for use in policy decision-making in Grenada

17 - 19 Oct 2022

The geospatial dimension of environment, climate change and disaster statistics and indicators

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Content

- Introduction
- Geospatial dimension of environment statistics
- Georeferencing
- Data/information sources
- Conclusion



Introduction

Everything happens somewhere

Statistics and geographic information are crucial to improve measurements and broaden the vision of well-being in all the SDG's



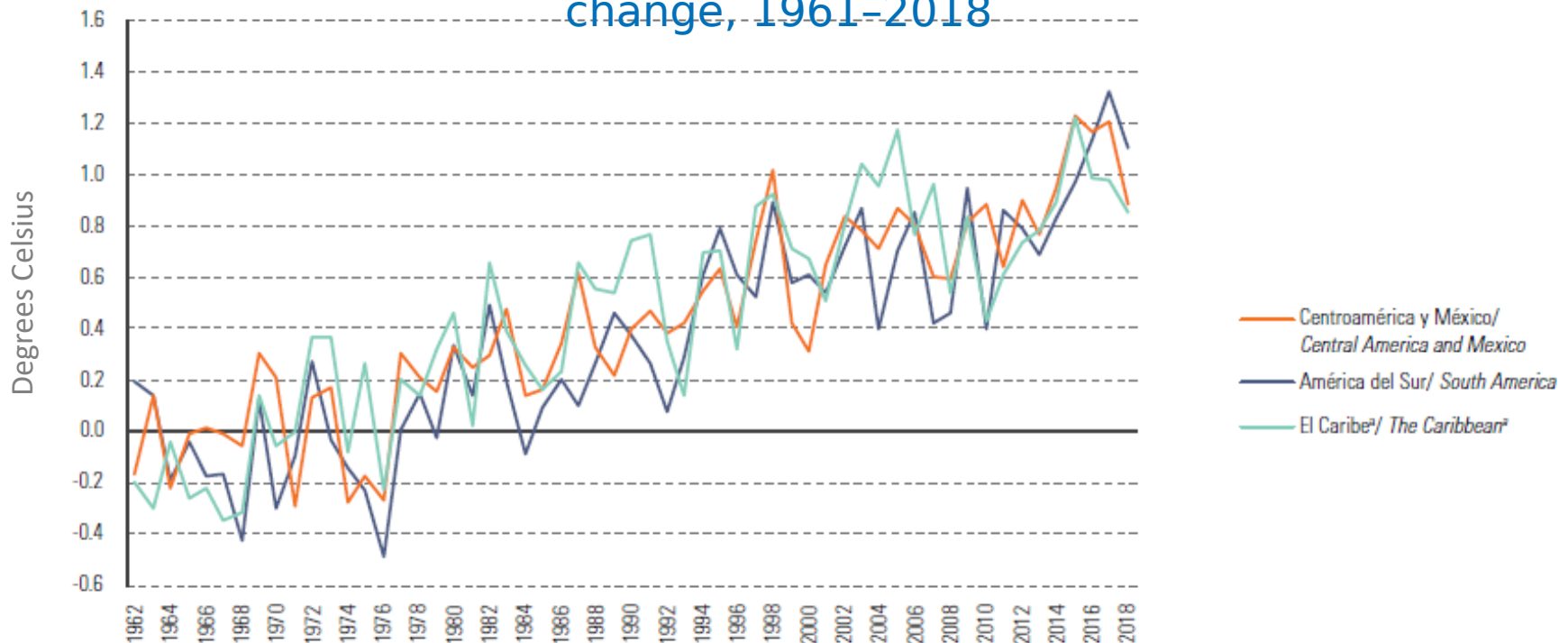
Source: Ocampo, R. (2015). The geospatial dimension of development [Slide]. Third Europe-Latin America Forum. Santiago, Chile.

Introduction

Climate change: A permanent concern

- Latin America and the Caribbean region is especially vulnerable to climate change due to its geographical and climatic situation, socio-economic characteristics, and the high sensitivity of its natural assets (ECLAC, 2015).

Latin America and the Caribbean: mean annual temperature change, 1961-2018



^[A] FAO, Base de datos estadísticos (FAOSTAT) [en línea] <http://www.fao.org/faostat/es/#home>.

^a Incluye Cuba y la República Dominicana.

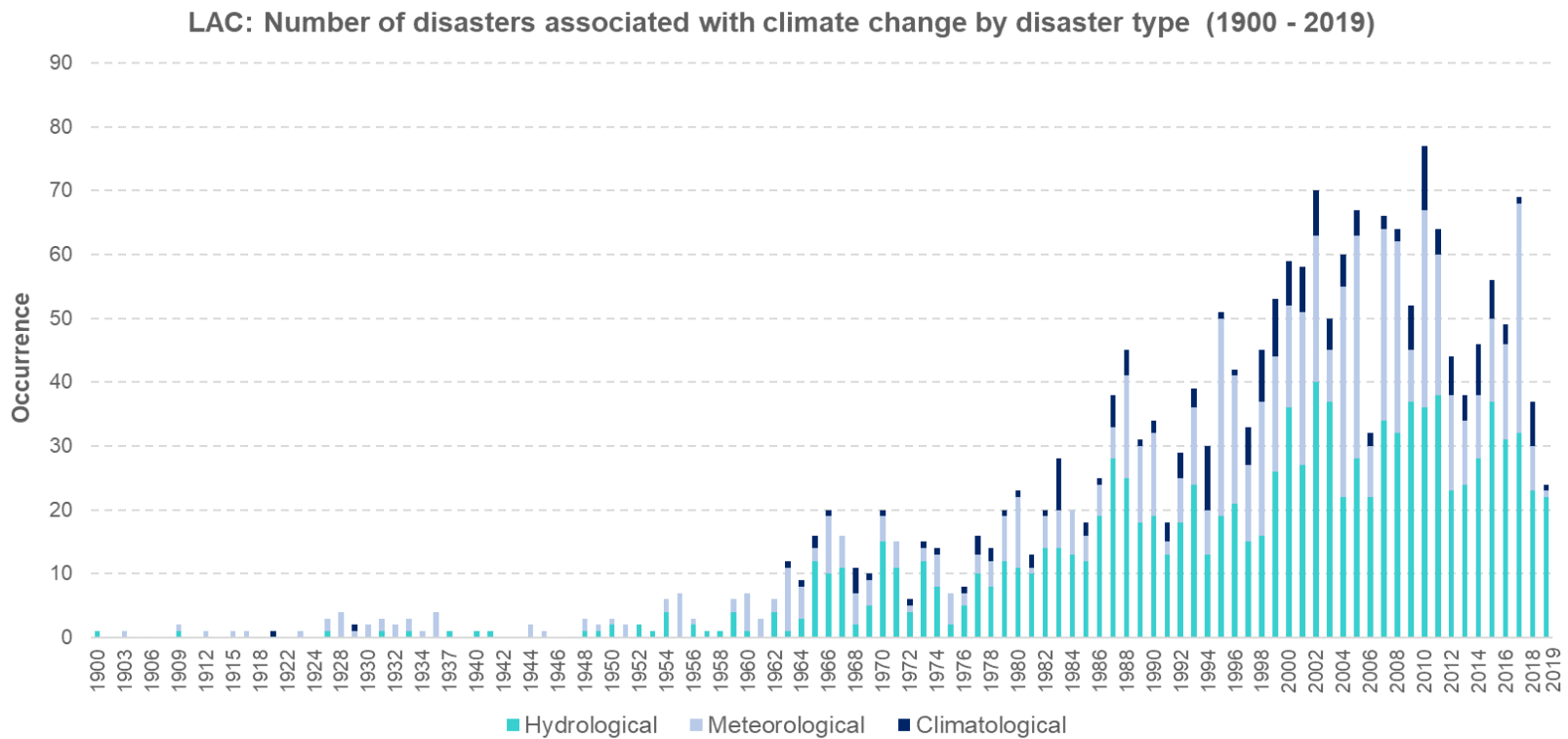
^[A] FAO, Database for Statistical Data (FAOSTAT) [online] <http://www.fao.org/faostat/en/#home>.

^a Includes Cuba and the Dominican Republic.

Introduction

Climate change: Impacts and risks

- Evidence of the impacts of climate change in LAC shows that these effects are already significant and, with a high probability, will be more intense in the future (IPCC, 2013).



The geospatial dimension of environment statistics

- The phenomena captured through the environment statistics occur on the earth's surface
- Phenomena happen in geographical spaces that do not always coincide with administrative limits
- They present gradients that go from a planetary to a local scales



The importance of where

When looking at a map, we start turning that map into information by analyzing its content —finding patterns, assessing trends and making decisions. This process is called “spatial analysis.”

Using spatial analysis, you can combine information from many independent sources and derive new sets of information. And by employing time series, you can detect changes over time.

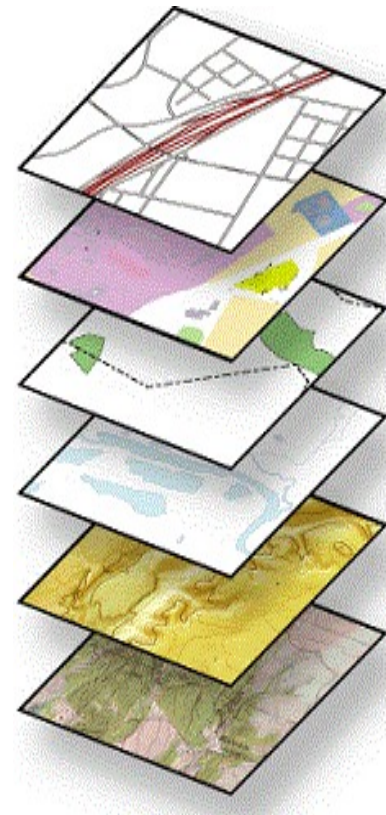


Georeferencing

- *Geographic shapes - lines, points, polygons. Georeferencing is an attribute of the data.*
- *The integration of databases (layers) in a Geographic Information System (GIS) implies the precise location of the objects / entities*

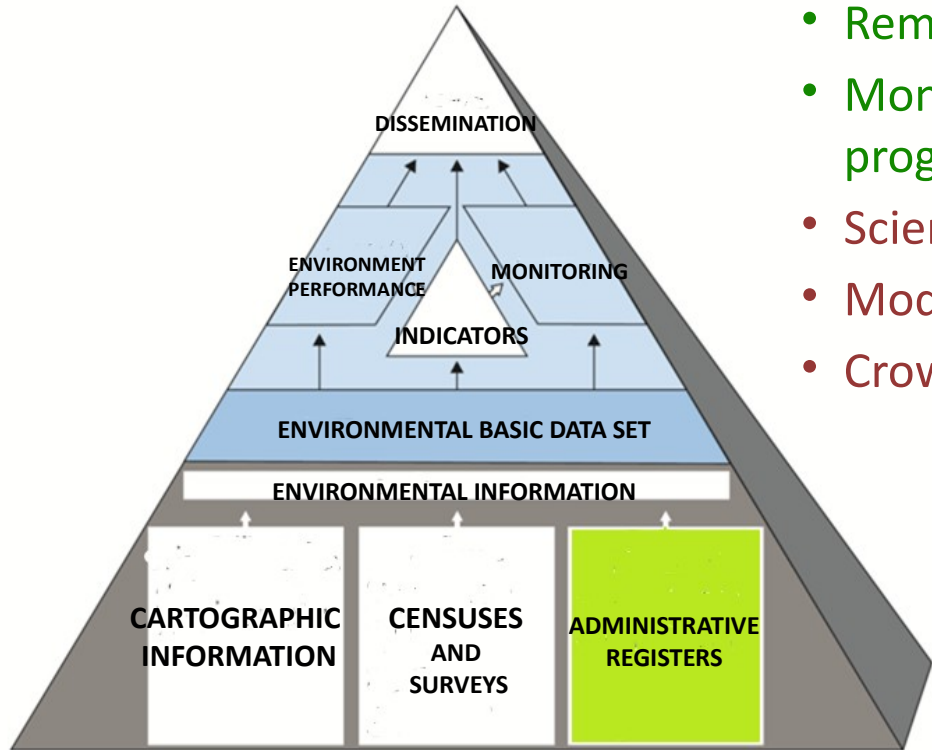


- The possibility of overlay and correlate different layers of GIS data allows spatial relationships with other entities (topology) and temporal patterns.
- It is also possible to perform calculations, **build indicators**, analyze distributions, prepare thematic maps, and obtain new variables.



Data/information sources

- Cartography
- Census and surveys
- Administrative records
- Remote sensing
- Monitoring stations and field monitoring programs
- Scientific research
- Modelling and Estimation
- Crowd sourcing

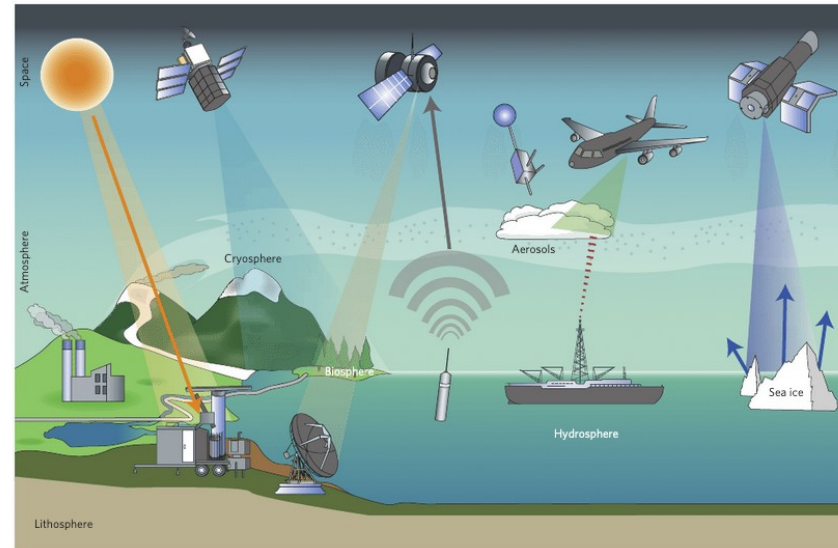


Data sources and georeferencing

- In censuses and surveys, the use of mobile capture devices (tablets or similar) with global positioning capacities (GPS) allows the georeferencing of units through the geographic location of a point, line, or polygon, in these dwellings, economic establishments or agricultural holdings, during the same data collection process.



- Remote sensing offers a broad spectrum of geo-referenced environmental data that provides a synoptic view of the different components of the environment.
- Data is obtained in digital format from instruments that measure the electromagnetic response of the different elements over the earth's surface.
- These data are subject to be processed applying classification techniques supported by field validations



NASA products

Product Gallery Hurricane Dorian

- Event Specific Products
- Relevant Near Real-Time Products and Dashboards
- Story Map

DISASTERS NASA Products for Hurricane Dorian 2019 Search

Hurricane Dorian 2019

ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian

ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian

ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian

ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian

Near Real-Time Products: Tropical Cyclones

Near Real-Time Products for Tropical Cyclones

Total Rainfall (GPM) from 8/30/19 to 9/4/19 for Hurricane Dorian

RGB Composite Imagery (Copernicus Sentinel-1) for Hurricane Dorian

True Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian

Natural Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian

True Color Imagery (Landsat 8) for Hurricane Dorian

Panchromatic Band Imagery (Landsat 8) for Hurricane Dorian

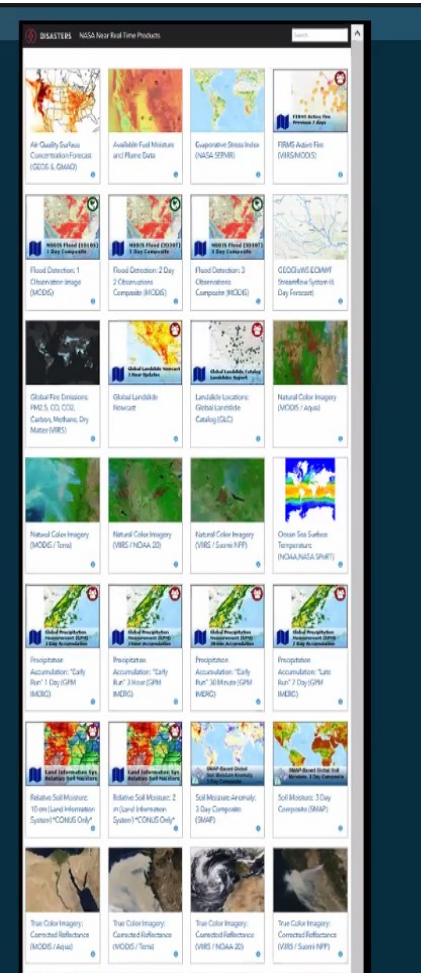
Natural Color Imagery (Landsat 8) for Hurricane Dorian

Day Night Band Imagery (VIIRS) for Hurricane Dorian (mosaic)

NASA products

Near Real-Time Products

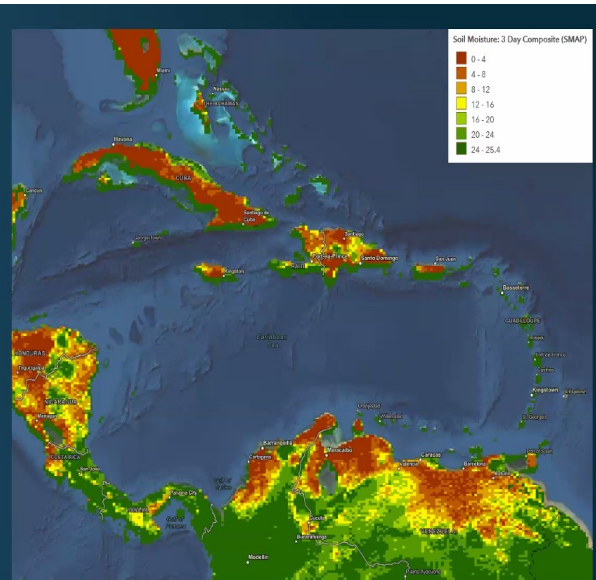
- Global unless noted otherwise
- Coarser resolution
- Automatically updated every few hours to daily or weekly
- Many products for the Caribbean
 - Black Marble Nighttime Blue/Yellow Composite
 - FIRMS Active Fire Points (MODIS, VIIRS)
 - Global Landslide Nowcast
 - Flood Detection – 2, 3 Observations (MODIS)
 - Precipitation Accumulation – 30 min, 3 hour, 1 day (GPM IMERG)
 - Soil Moisture and Soil Moisture Anomaly – 3-Day Composite (SMAP)
 - Evaporative Stress Index – weekly
 - Global Fire Emissions – Daily (VIIRS)
 - True Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)
 - Natural Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)



Data/information sources

Soil Moisture

- Soil Moisture Active Passive (SMAP) derived product
- 3-Day Composite
- 25.4mm = saturated
 - Red = dry
 - Green = wet
- Resolution: .25°
 - Best for larger Countries



Evaporative Stress Index

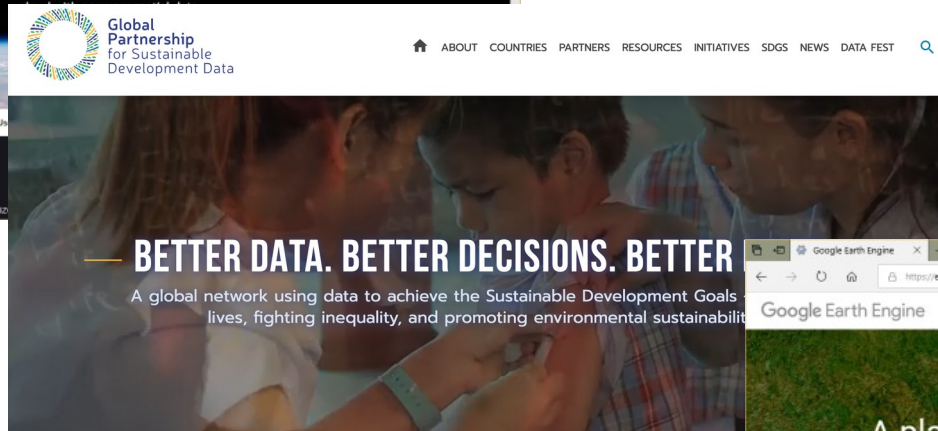
- Weekly product
- Yellow to Red = Dry, stressed vegetation
- Latency = ~2 weeks
- Resolution: 5km



Data availability through other platforms

Amazon Web Services:

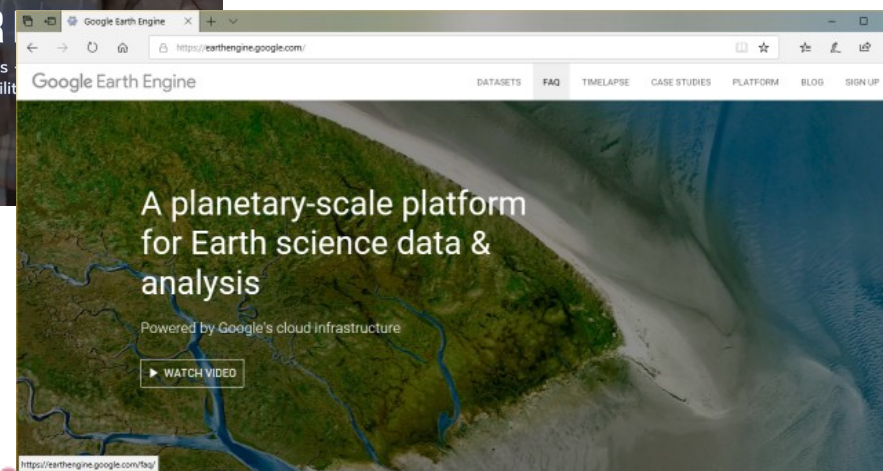
<https://aws.amazon.com/earth/>



<http://www.data4sdgs.org/>

Google Earth Engine

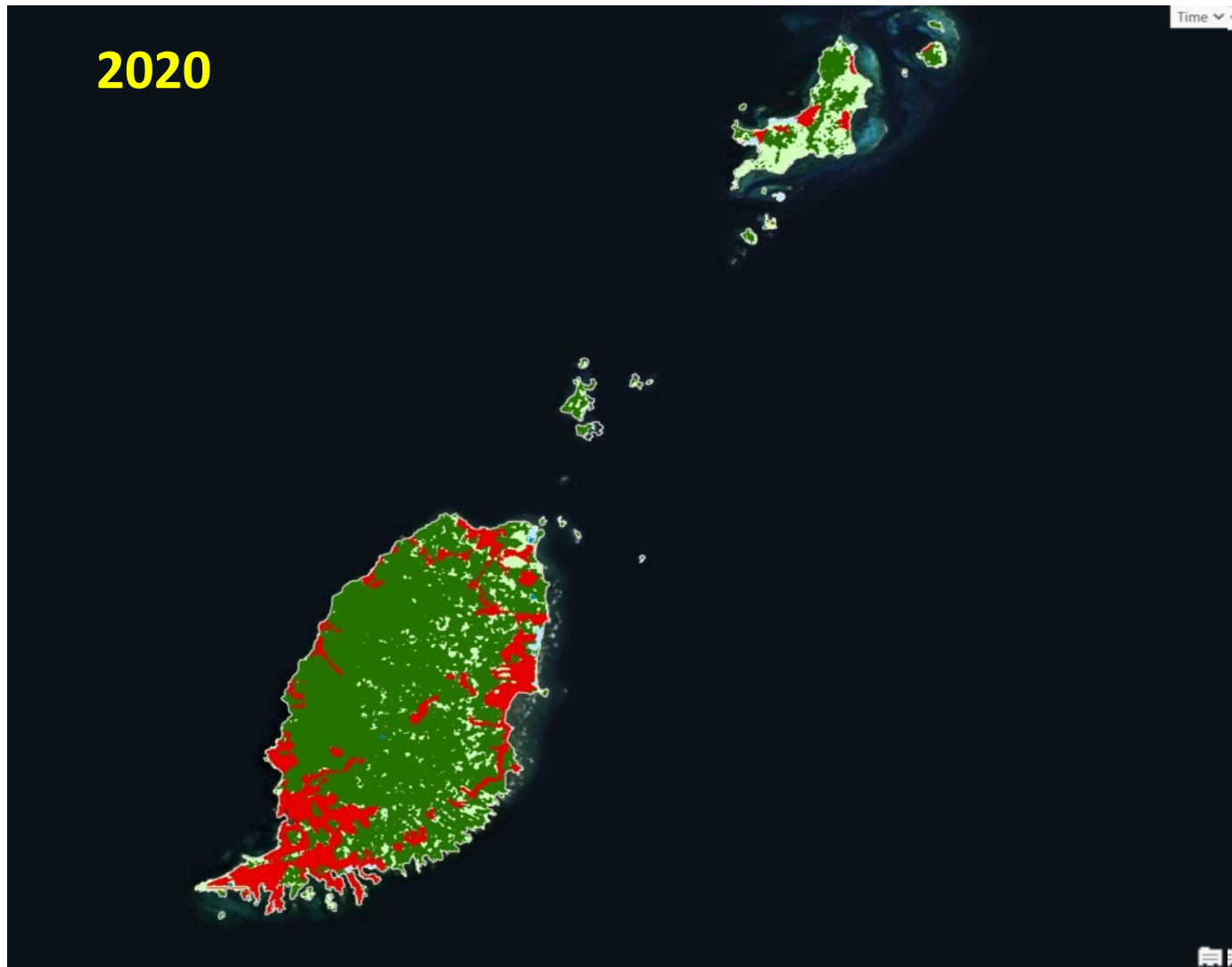
<https://earthengine.google.com/>



GlobeLand30

GlobeLand30, the 30-meter resolution global land cover data product, was developed by the Ministry of Natural Resources from China.

The availability is for: 2000, 2010 and 2020.

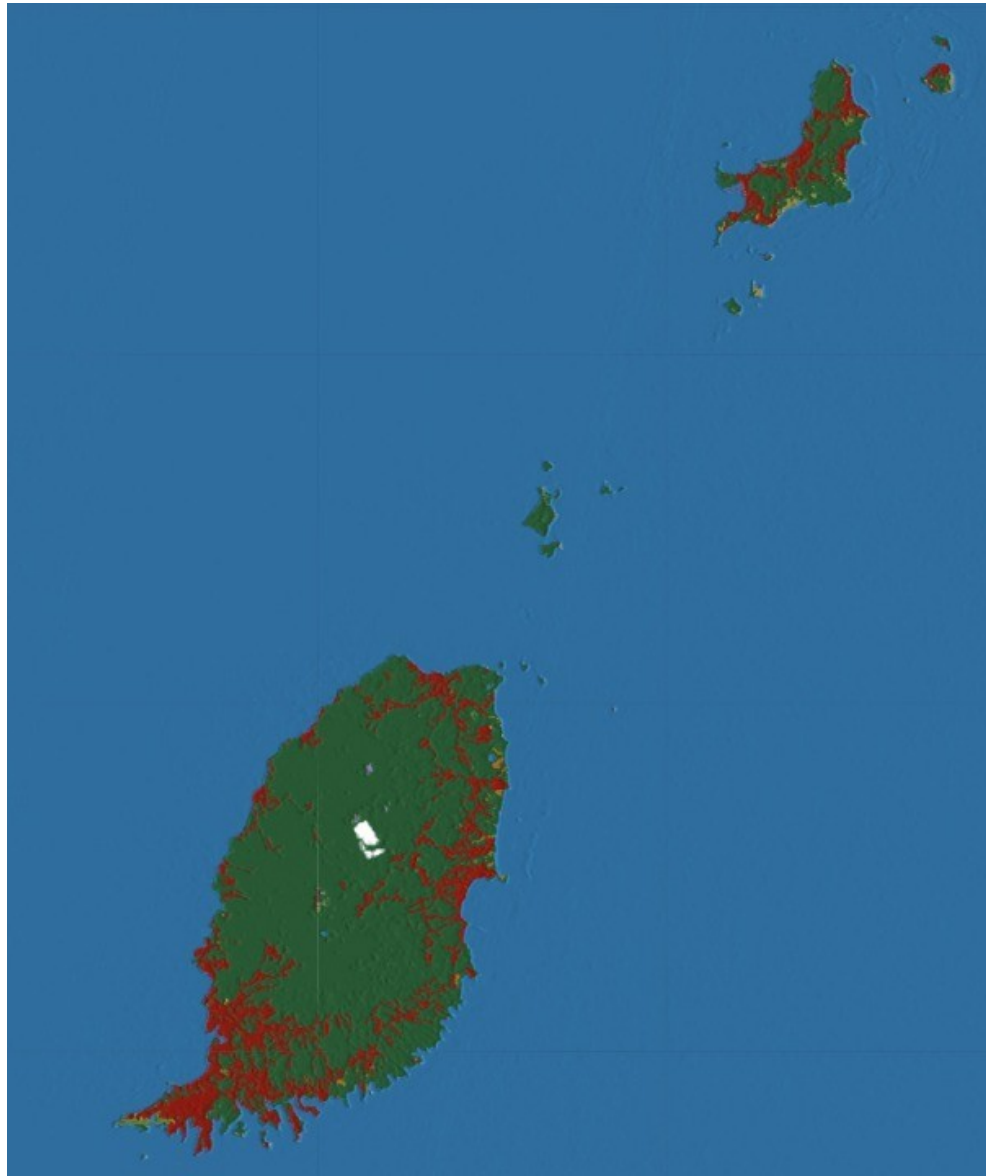


Landcover Class	
■	Artificial Surfaces
■	Cultivated land
■	Bare Land
■	Permanent snow and ice
■	Grassland
■	Shrubland
■	Forest
■	Wetland
■	Water bodies

Clase	Año	Superficie Km ²	%
Bosque	2000	294.63	81.95
Bosque	2010	257.56	71.64
Bosque	2020	238.67	66.38

	Area km ²	Cultivated land		Forest		Grassland		Shrubland		Wetland		Water bodies		Tundra		Artificial Surfaces		Bare Land		Permanent snow and ice	
		km ²	%	km ²	%	km ²	%	km ²	%	km ²	%	km ²	%	km ²	%	km ²	%	km ²	%	km ²	%
Grenada	2000	359.53	0.00	0.00	294.63	81.95	19.95	5.54	1.66	0.46	1.00	0.28	0.41	0.11	0.00	25.71	9.92	0.00	0.00	0.00	0.00
	2010	359.53		0.00	257.56	71.64	57.01	15.86	0.49	0.14	0.77	0.21	0.21	0.06	0.00	35.26	9.81	0.07	0.02		0.00
	2020	359.53		0.00	238.67	66.38	45.14	12.55	0.45	0.13	2.99	0.83	0.34	0.09	0.00	65.14	18.12	0.07	0.02		0.00

Dynamic World Landcover 2020



Conclusion

Location intelligence is the ability to analyze and find spatial patterns in data to provide powerful insights for understanding our world and communicating our needs.

This is possible through a combination of local data and advanced geospatial tools.





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Thank you for your attention!

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