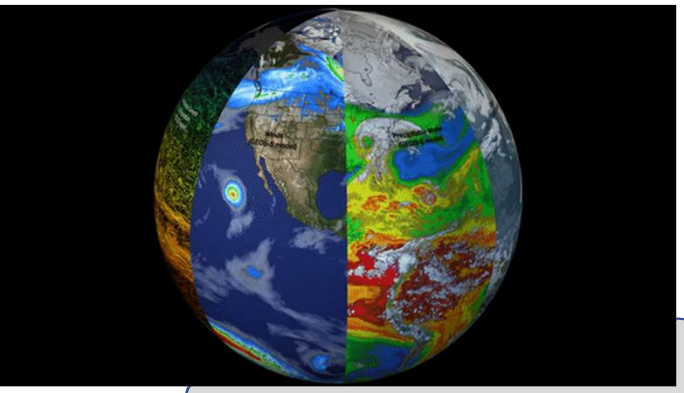


“Disrupting” the World Bank with Technology

Evolving Institutional Memory…

Nagaraja Rao Harshadeep (Harsh)

Global Lead (Disruptive Technology)

Environment, Natural Resources & Blue Economy Global Practice

WORLD BANK GROUP

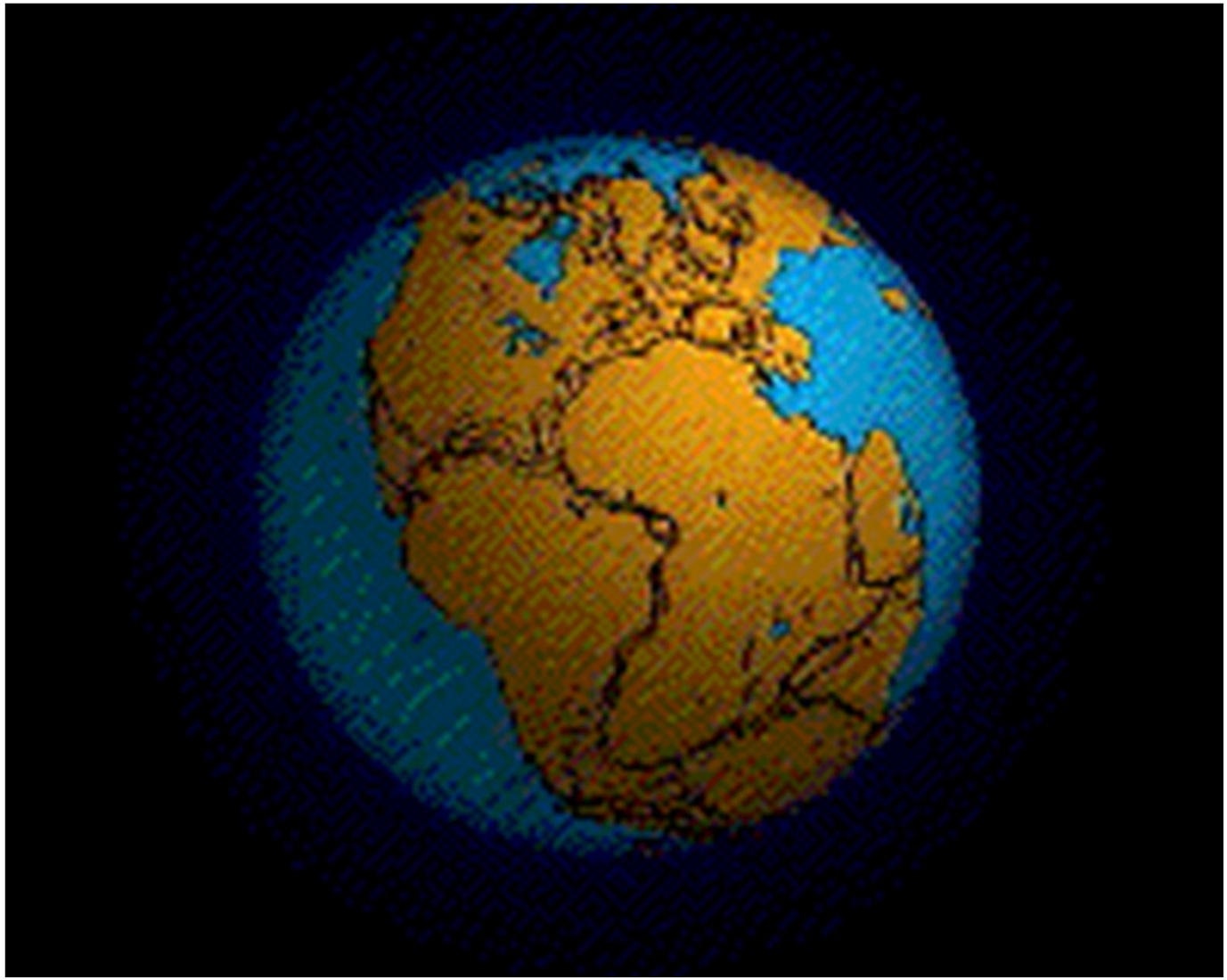
Aug 28, 2019

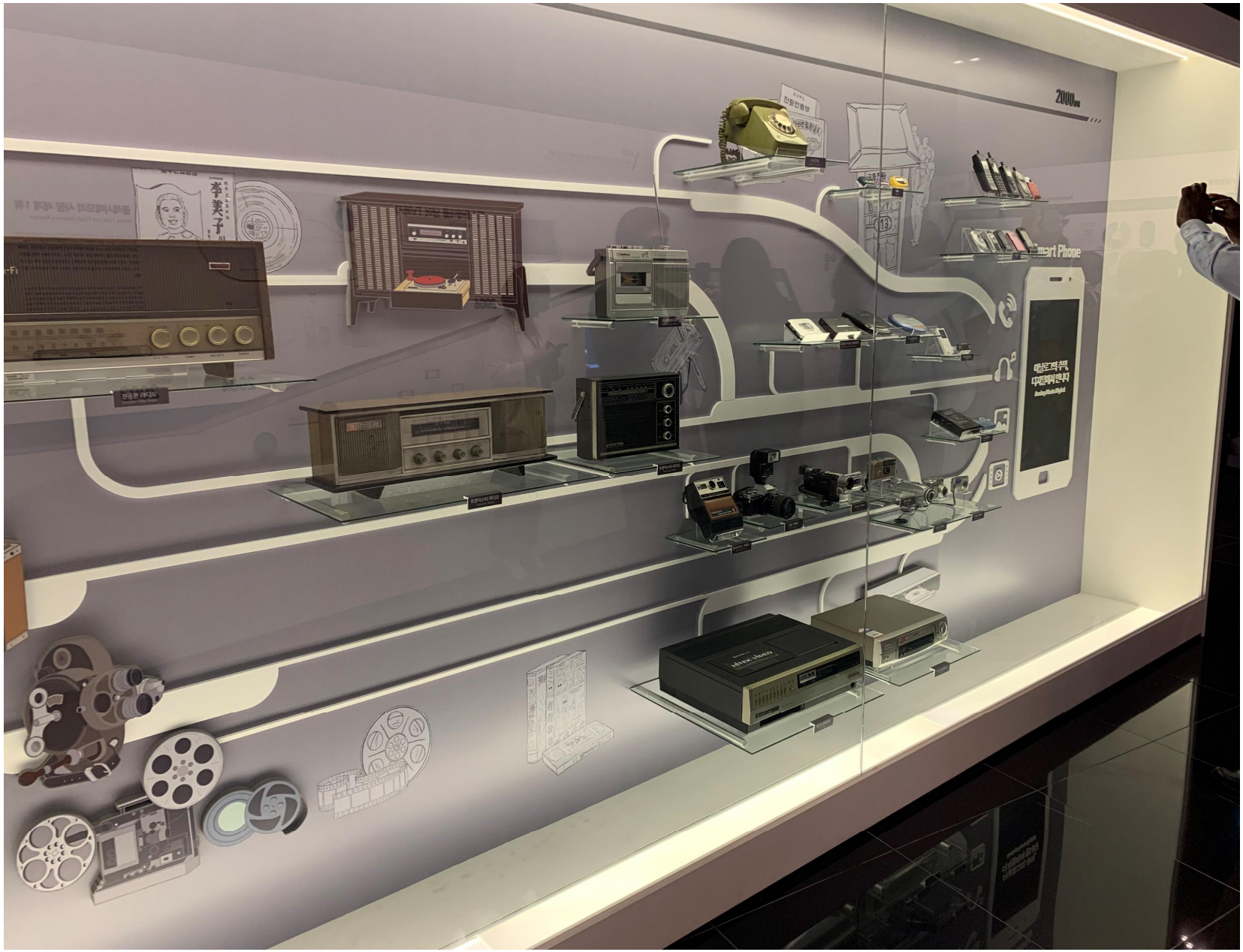
Institutional Memory of Innovation at the World Bank

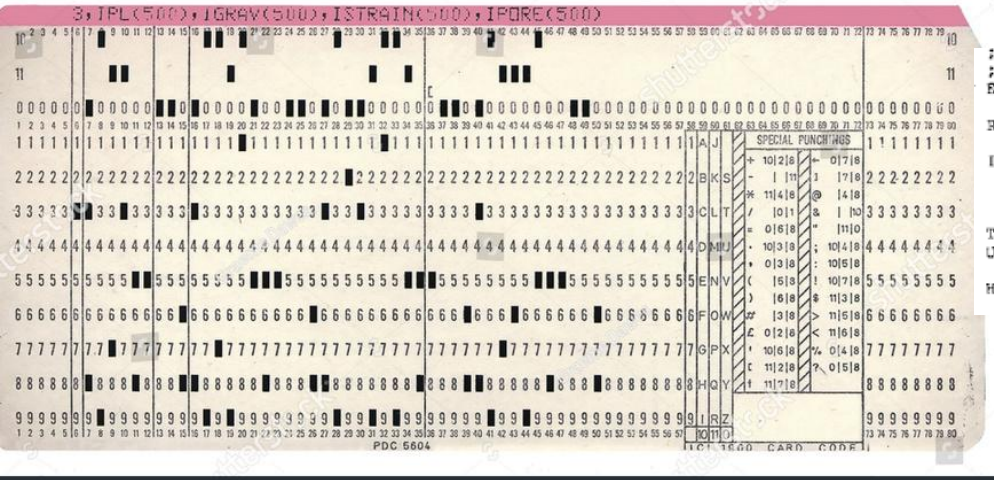
OLC K-POK Knowledge Exchange

Seoul, Korea

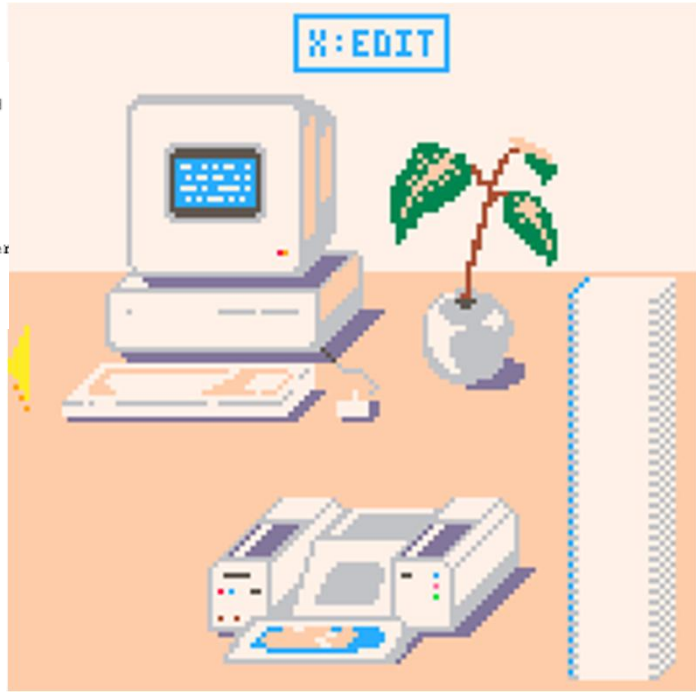
IN THE BEGINNING...




2000년
Smart Phone




```
; Example 2: Assembly Language
;
EXAMPLE2: MOV  DPTR,#50H        ;init pointer to 0050H
          MOV  R7,#0            ;init count = 0
REPEAT:   MOVX A,@DPTR          ;char = @pointer
          INC  DPTR             ;increment pointer
IF:       CJNE A,#'0',$+3       ;if char >= '0' AND
          JC   UNTIL            ;
          CJNE A,#'9'+1,$+3     ; char <= '9'
          JNC  UNTIL            ;
THEN:     INC  R7               ;then increment counter
UNTIL:    CJNE A,#0,REPEAT      ;char is 00H
          MOV  A,R7             ;store count in acc
HERE:     SJMP HERE
          END                   ;example 2
```

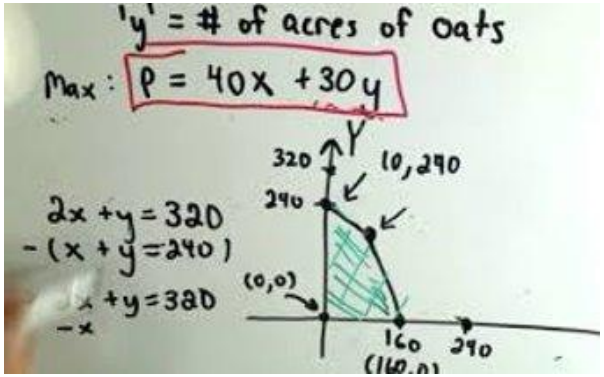


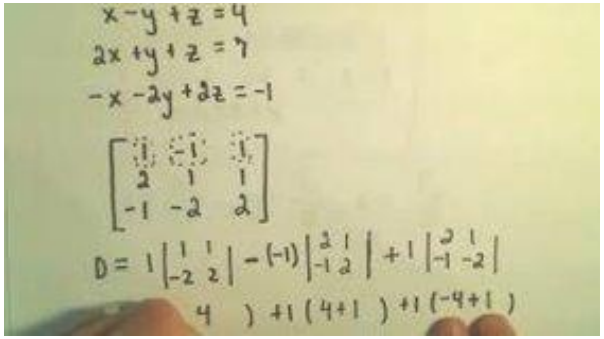
Data

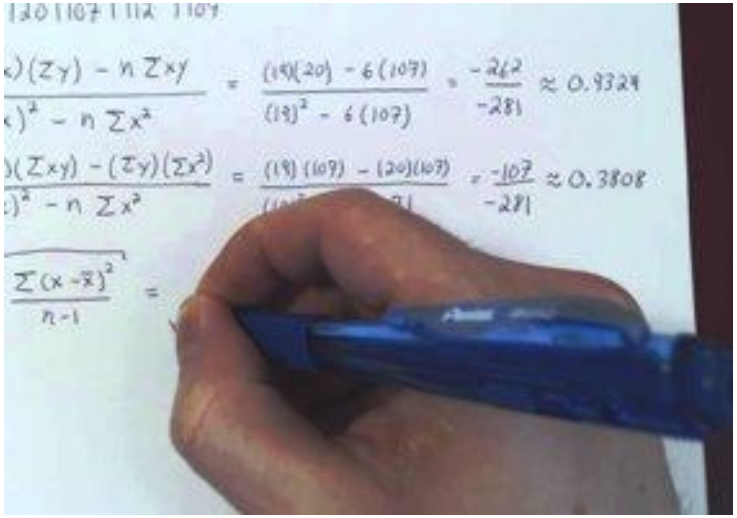
Then…

Analytics

Then…



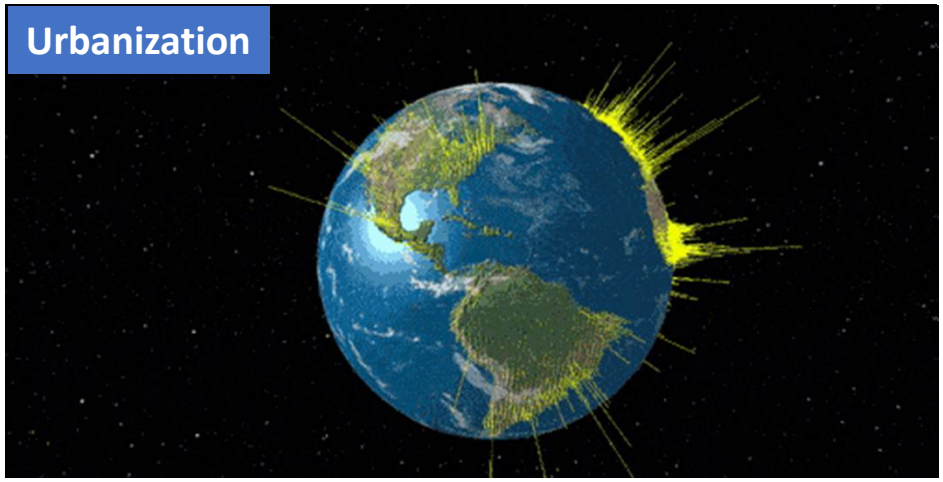




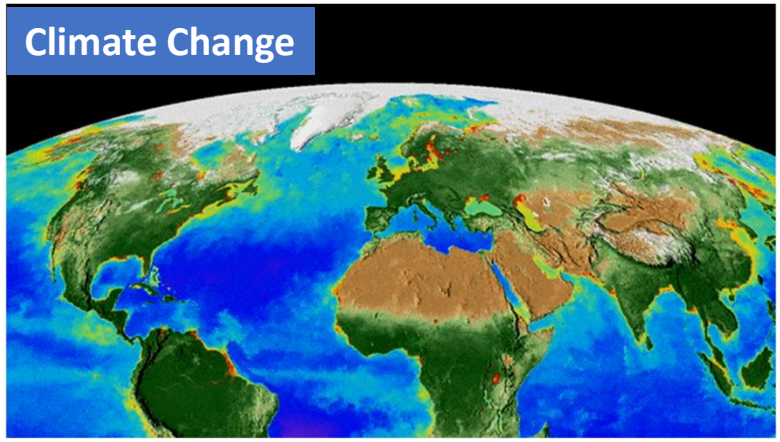
Some Graphics: Grant Milne, The World Bank

There are many ongoing changes…

Urbanization



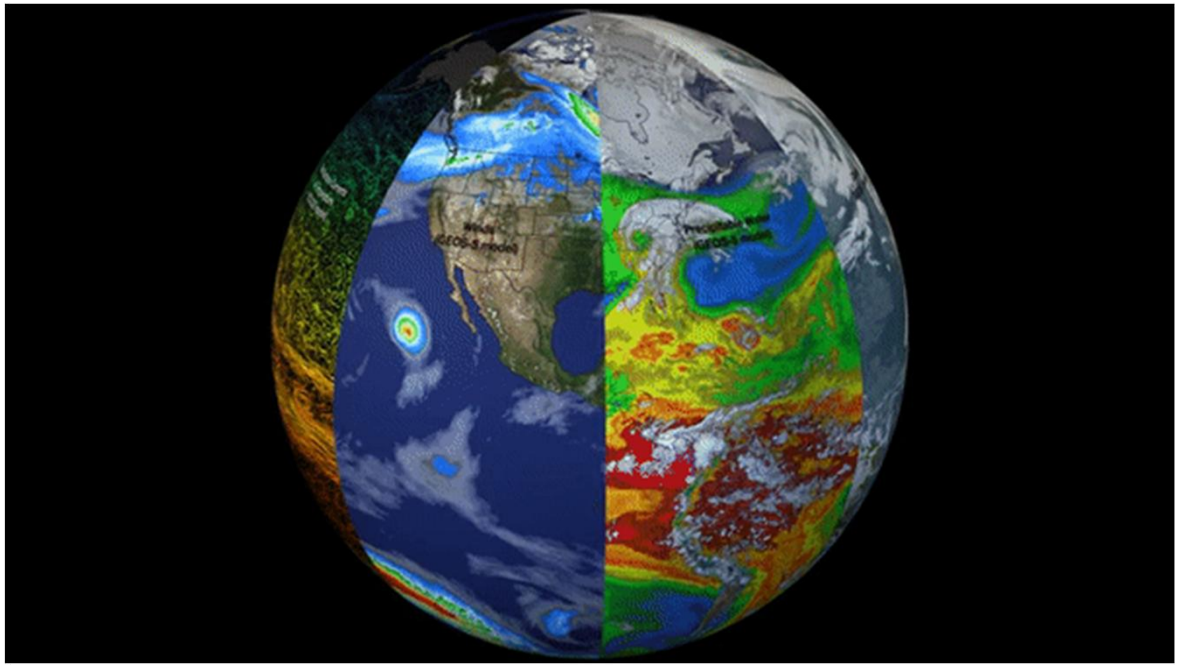
Climate Change

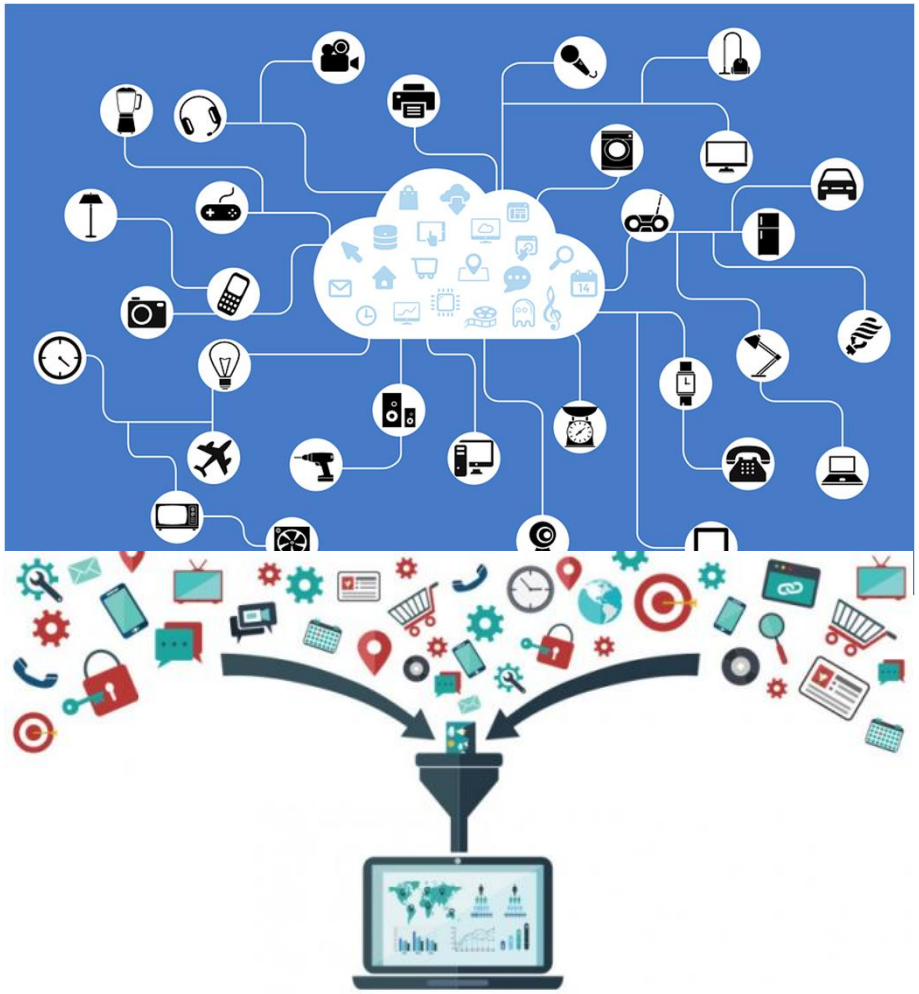


Rising Expectations

Disruptive Technology

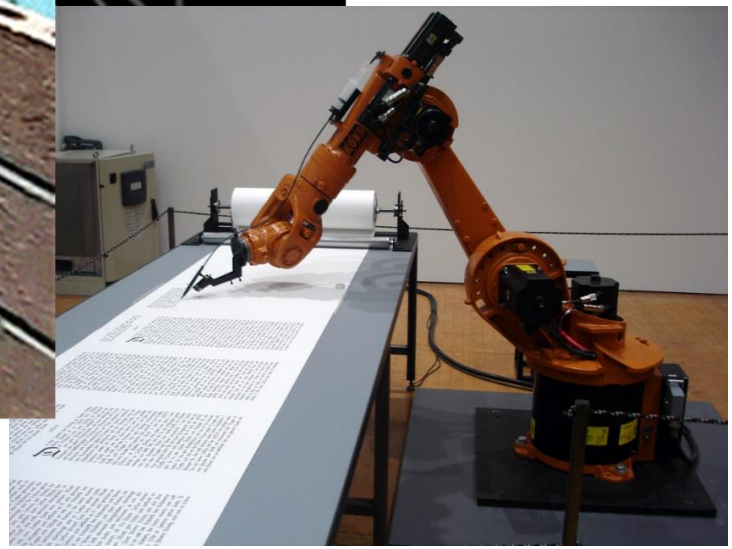
“DISRUPT” ANALYSIS





- ***Data Collection***: Monitoring/Surveys (in-situ sensors/IoT, Earth Observation, UAVs, crowdsourcing…); Digitization
- ***Data Management*** (telemetry, cloud services, open data, Blockchain, …)
- ***Data Analysis*** (Big data, Geospatial/AI/Machine Learning, modeling, script repositories …)
- ***Data Access*** (open data APIs, data visualization, gamification, mixed reality-AR/VR, …)
- ***Outreach:*** Platforms/Portals/Apps/e-books/Competitions

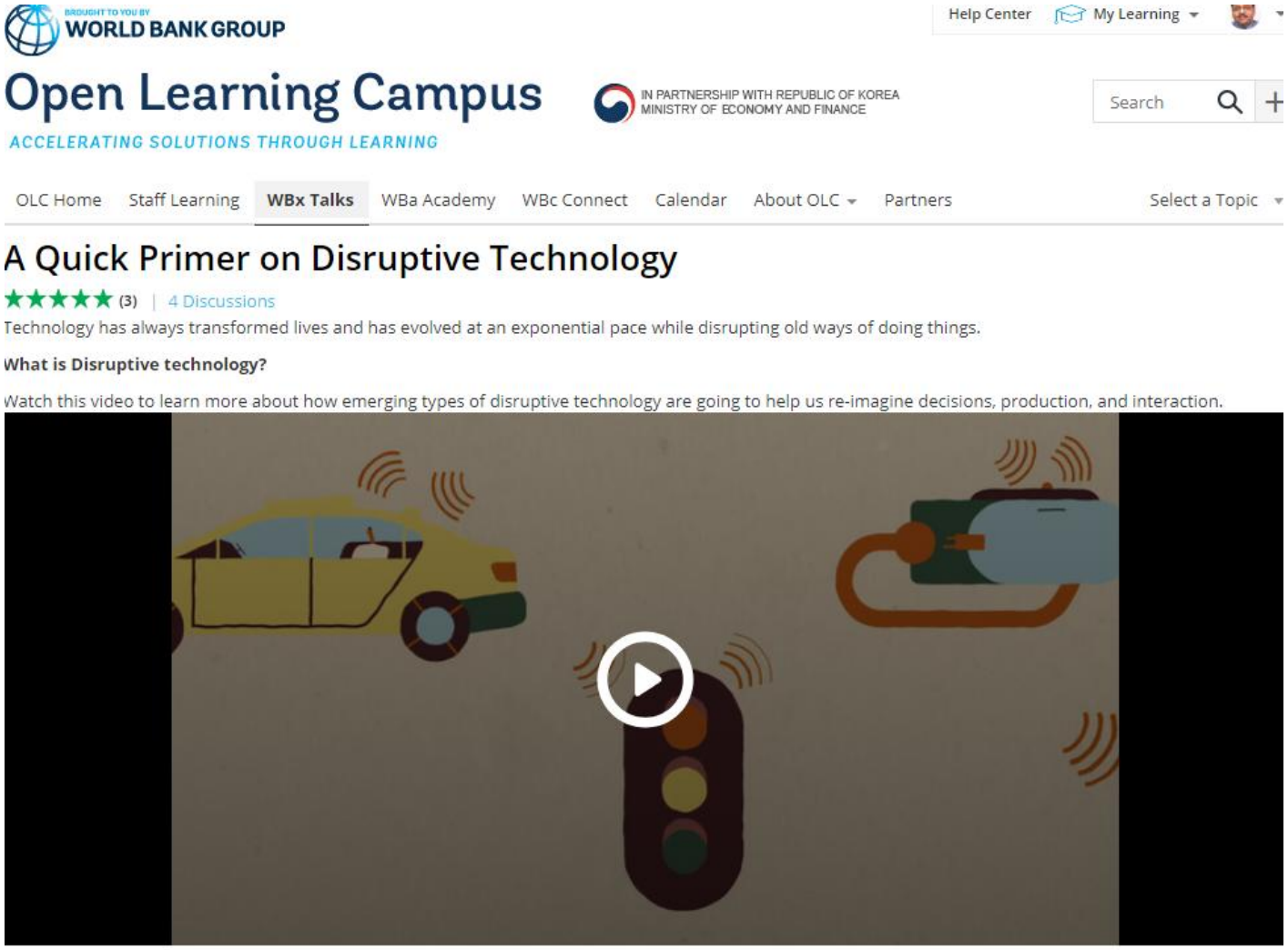
“DISRUPT” PRODUCTION



- 3D printing/additive manufacturing
- Automation/Robotics/automated transport
- Advanced materials/nanotech/biotech/clean tech/ smart energy/ smart farms…

“DISRUPT” INTERACTION

- Social Media
- Knowledge/Learning Platforms
- Crowdsourcing, gamification, competitions
- Mobile money, Fintech
- Maker movement/DIY/Tech Incubators
- Sharing economy



https://olc.worldbank.org/content/quick-primer-disruptive-technology

A new world of “Disruptive Technology”

“Disrupt” decision making

- ***Data Collection***: Monitoring/Surveys (in-situ sensors/IoT, Earth Observation, UAVs, crowdsourcing…); Digitization
- ***Data Management*** (telemetry, cloud services, open data, Blockchain, …)
- ***Data Analysis*** (Big data, Geospatial/AI/Machine Learning, modeling, script repositories …)
- ***Data Access*** (open data APIs, data visualization, gamification, mixed reality-AR/VR, …)
- ***Outreach:*** Platforms/Social Media/Portals/Apps/e-books/Competitions

“Disrupt” production

- 3D printing/additive manufacturing
- Automation/Robotics /automated transport
- Advanced materials/nanotech/ biotech/distributed energy/green tech…

“Disrupt” interaction

- Crowdsourcing, gamification, competitions (e.g. *hackathons*, *appathons*)
- Mobile money, Fintech
- Maker movement/DIY/Tech Incubators/OLC
- Sharing economy, Mobile learning

All Companies will be Data Companies…

90% of the World's data has been produced in the last 2 years…

Two-thirds of the jobs todays kids will pursue haven't even been invented yet…

- **IoT can add US$2.7-6.2 trillion annually by 2025…**
- **Autonomous transportation could have a US$7 trillion annual revenue stream…**
- **Blockchain will deliver US$3.1 trillion in value by 2030…**
- **AI will add US$15 trillion to the global economy by 2030…**
- **AR/VR will disrupt a US$30 trillion industry…**
- **3D printing will disrupt the US$30 trillion manufacturing sector…**
- **Robots could disrupt the US$15.5 trillion construction industry…**
- **Clean energy tech could be a US$50 trillion industry…**
- **The sharing economy could be $335 billion by 2025…**
- **Nanotechnology is already a US$1trillion industry…**
- **Fintech eyes US$124 trillion of transfer payments…**

Disruptive tech could change Development

Making "smart development" wrt climate, water and natural resources, energy, food, waste, mobility, knowledge, services, networks

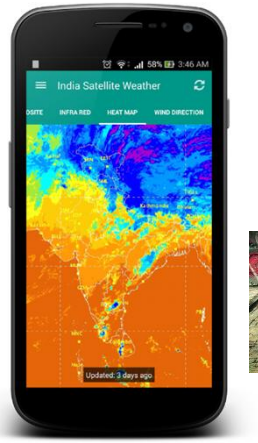
Online Services

Green Energy

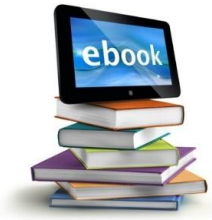
Broadband & Smartphone Access

Apps, e-services & e-learning

Planning



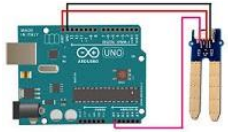
Access to a new world of Data, Information, Knowledge and Services



3D Printed Infrastructure

Sensors/IoT

(e.g. for soil moisture)



Drones/UAVs

(e.g. for monitoring, seeding, delivery)

Benefits of using emerging technology

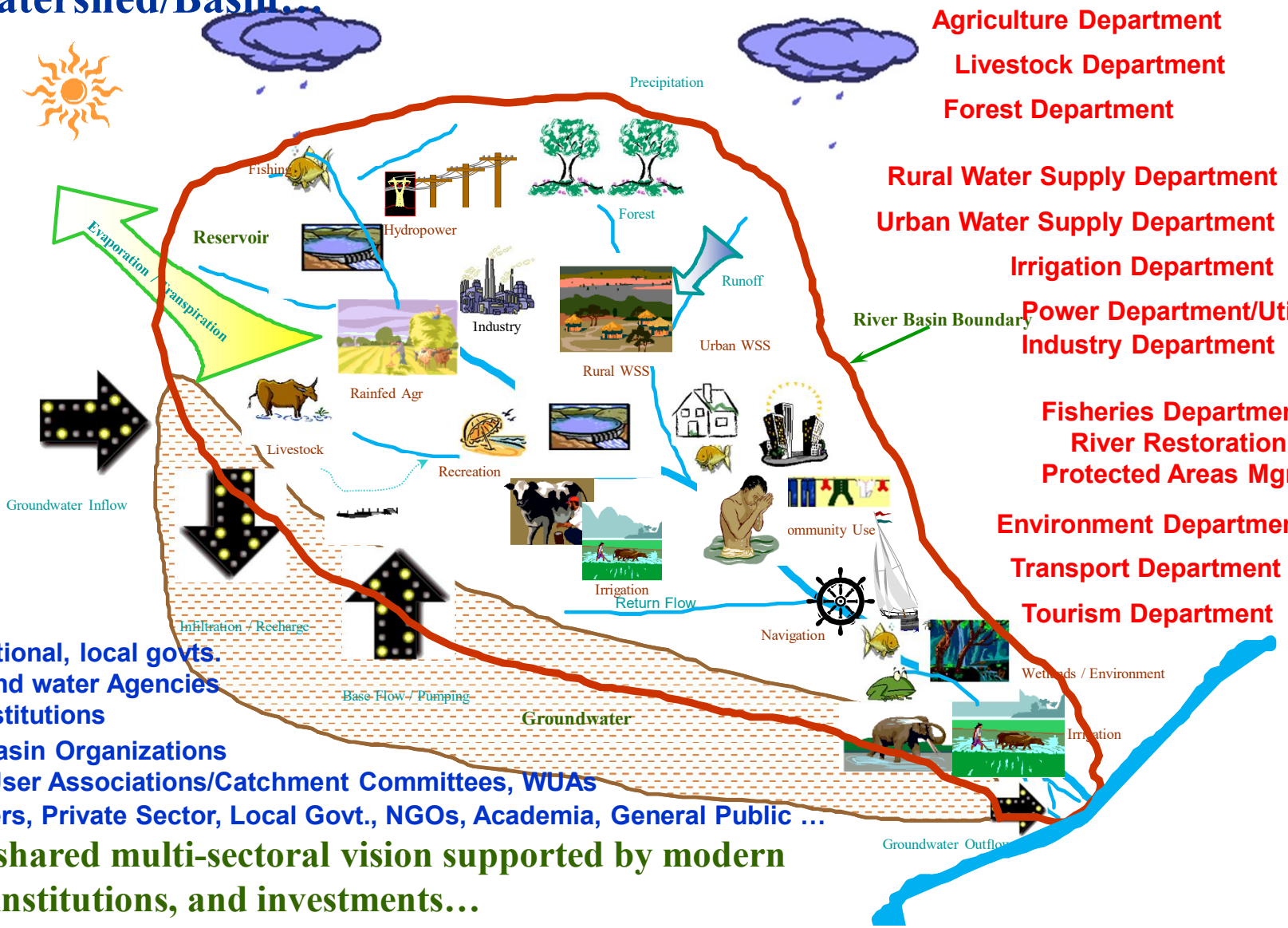
- Cheaper, faster, better, …
- More participatory, information-based decisions
- Do things not possible before, smaller world…

Risks of using emerging technology

- Traditional jobs becoming obsolete
- Changes in decision making
- Privacy, Cybersecurity, Pace of change…

Multiple sectors, multiple institutions, linked by water and natural resources…

A Typical Watershed/Basin…



Agriculture Department
Livestock Department
Forest Department

Rural Water Supply Department
Urban Water Supply Department
Irrigation Department
Power Department/Utilities
Industry Department

Fisheries Department
River Restoration
Protected Areas Mgmt.

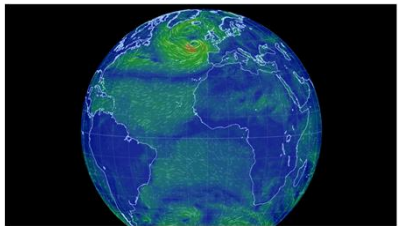
Environment Department
Transport Department
Tourism Department

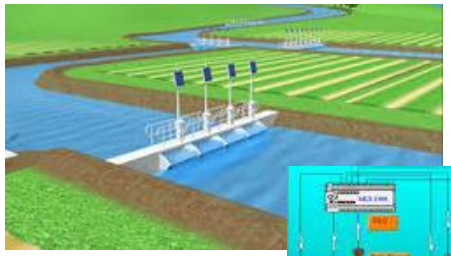
National, Sub-National, local govts.
Surface & Ground water Agencies
Investment Institutions
Basin/Sub-basin Organizations
Watershed User Associations/Catchment Committees, WUAs
Farmers, Private Sector, Local Govt., NGOs, Academia, General Public …

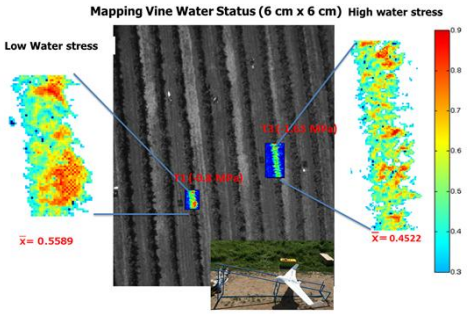
…Need for a shared multi-sectoral vision supported by modern information, institutions, and investments…

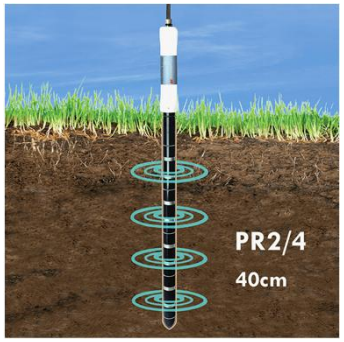
Disruptive Tech can change individual “sectors”

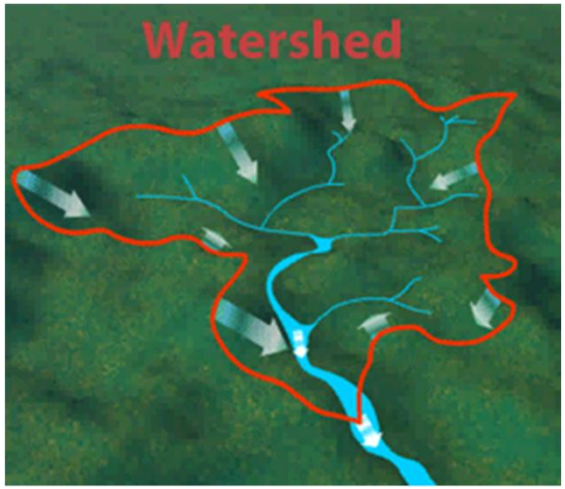
Doing things differently…









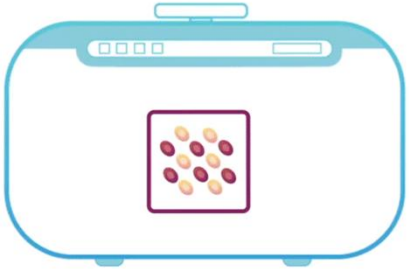


Disruptive Tech can change individual “sectors”

Doing different things…

Platforms

CHANGE THE WAY
WE PRODUCE MEAT



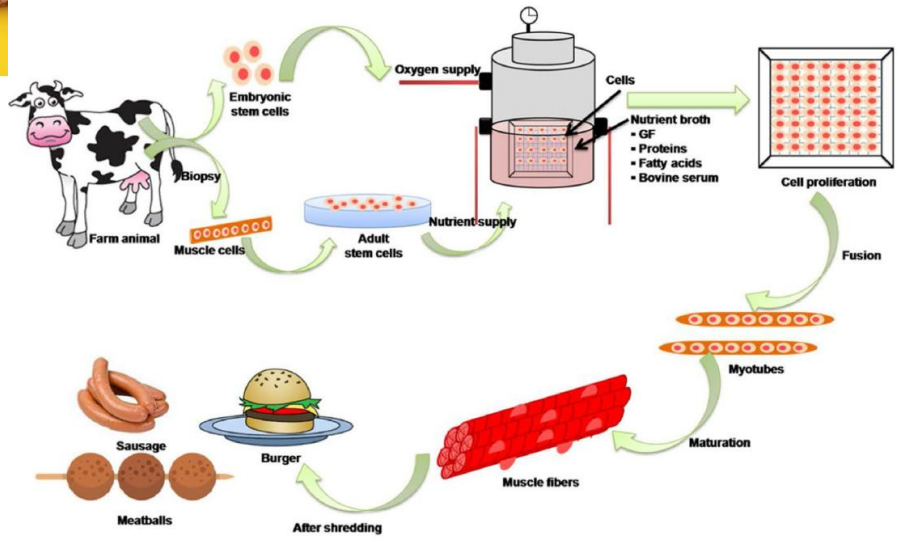
Watch This Space!

04.01.15

The $325,000 Lab-Grown Hamburger Now Costs Less Than $12

A real burger made without the cruelty and pollution is now within reach.

[TOP PHOTO: NEVODKA VIA SHUTTERSTOCK]

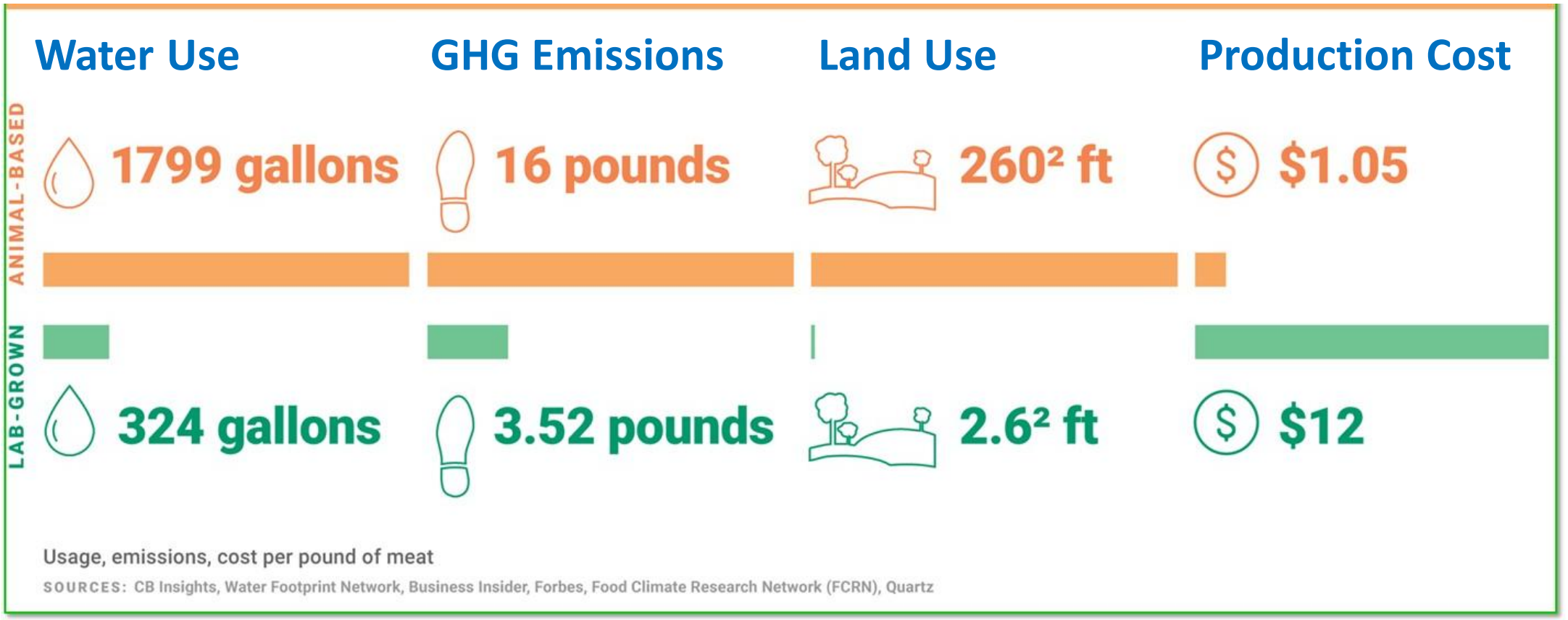


Many multi-sectoral implications (incl. for the Amazon!)

A third of global agricultural water use is for fodder!

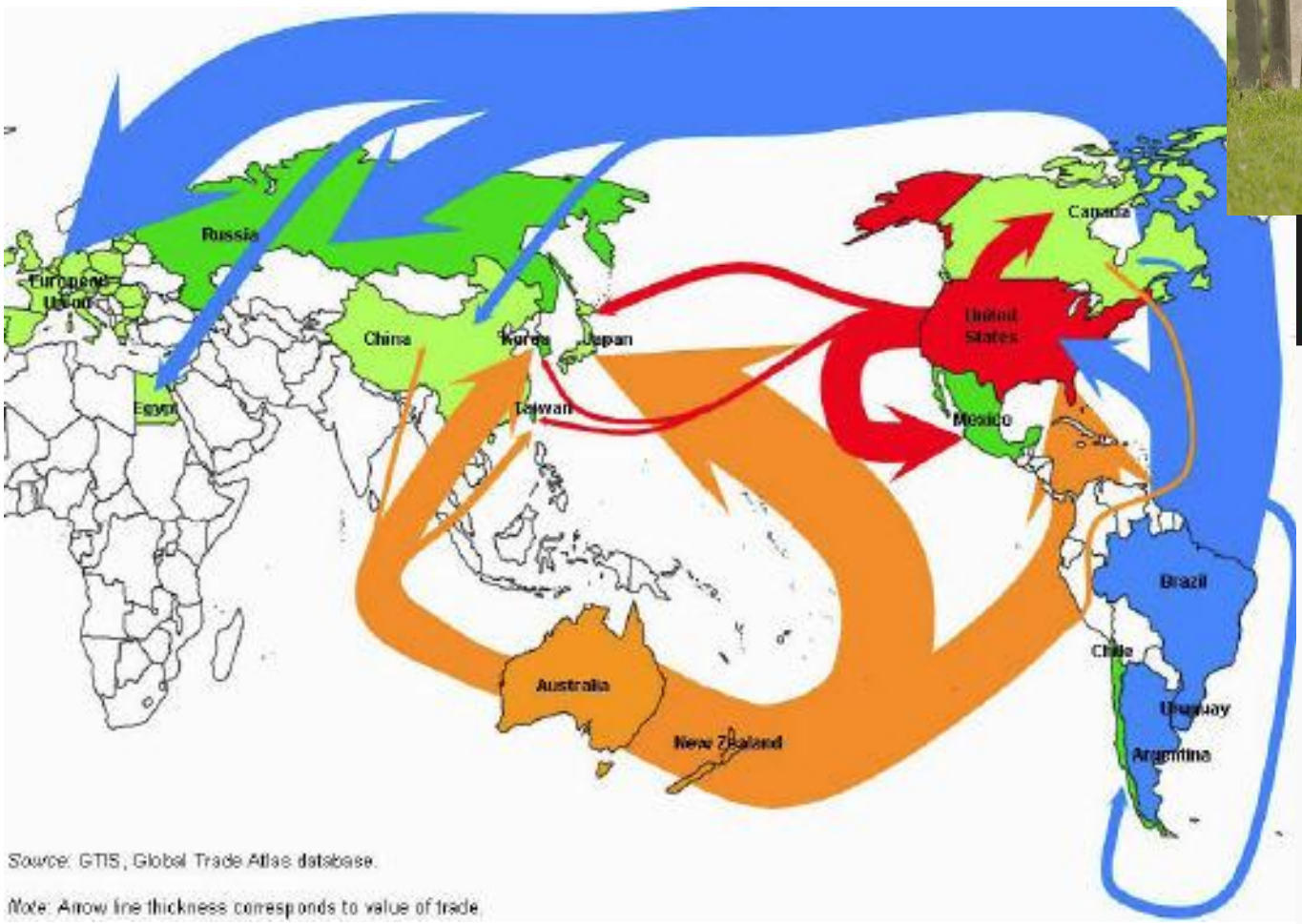
~

70% of agricultural land is used for pasture (~28m km^2)!



Livestock:

- Supports 1.3 billion people
- 40% of global value of agricultural output



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'Cultured meat' could spell end of traditional cattle farming within decades, scientist behind lab-grown beef burger says

AM By the National Reporting Team's Dominique Schwartz

Posted 27 Mar 2015, 1:08am

The Dutch scientist who served up the world's first laboratory-grown beef burger says "cultured meat" could spell the end of traditional cattle farming within decades.

That is the confronting message Maastricht University Professor Mark Post has for the Northern Territory Cattlemen's Association, which is holding its annual conference in Darwin.

"I do think in 20, 30 years from now we will have a viable industry producing alternative beef and there will be a growing market for it and eventually a really large market," he said.

PHOTO: Professor Post believes the lab-grown beef could be produced for $80 a kilogram.

Fundamental Project Design Implications

Solar-covered Canals

Floating Solar

27 September 2018

Official launch of the Ultra-sonic algae control devices and algae monitoring stations in Lake Qaraoun

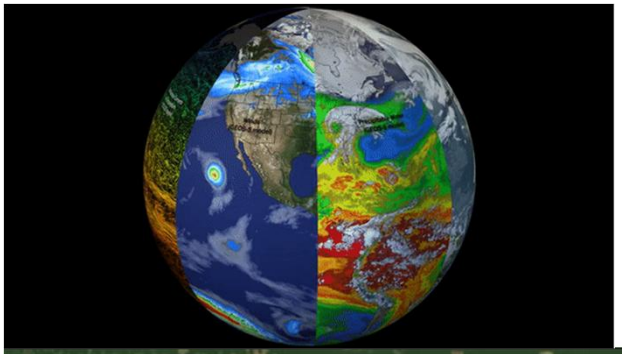
Wed. 19 September 2018 - by Lidi Remmelzwaal

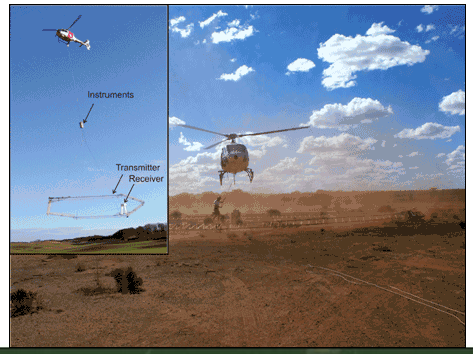
We have NO data…

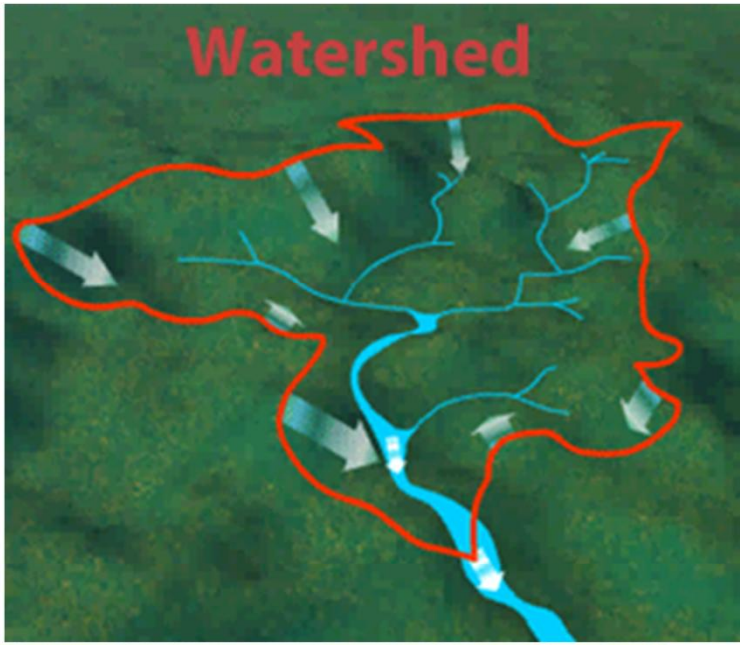
Of course we have data…

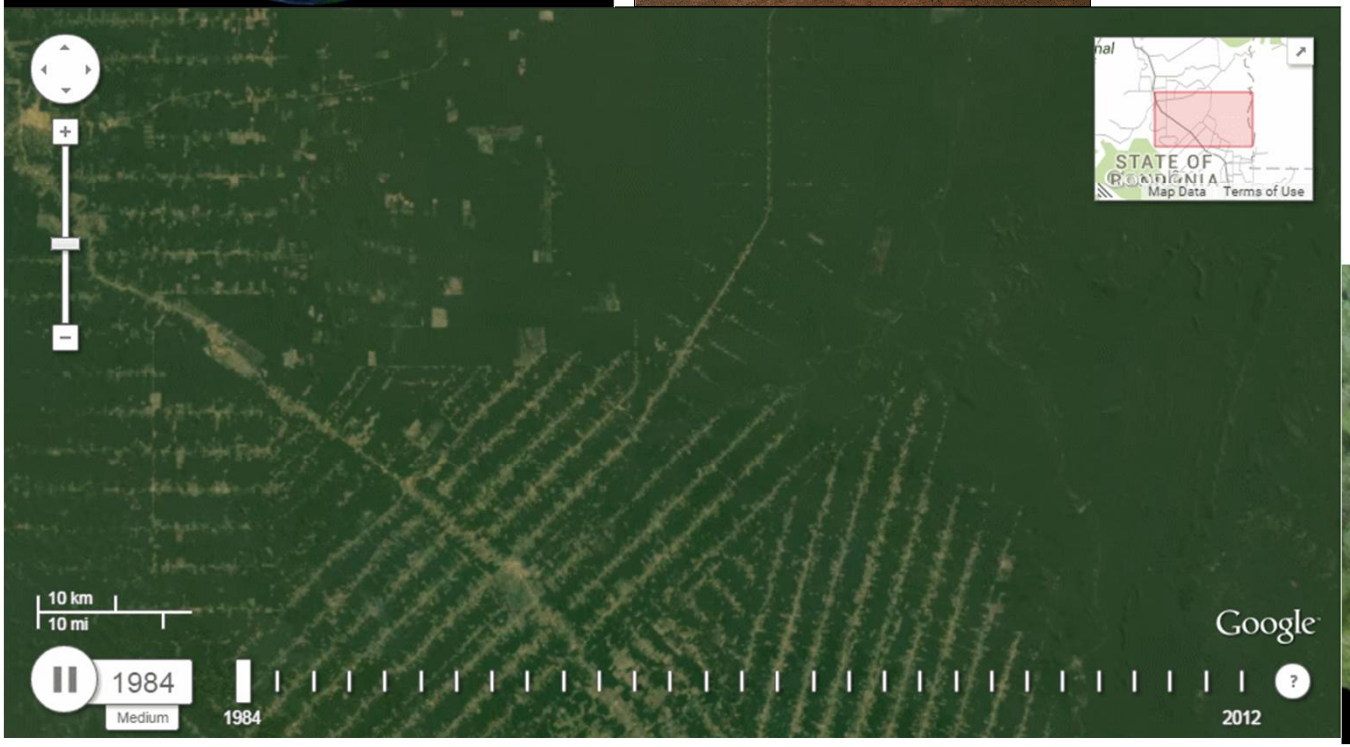
Data, data everywhere…

Big Data – In the Sky

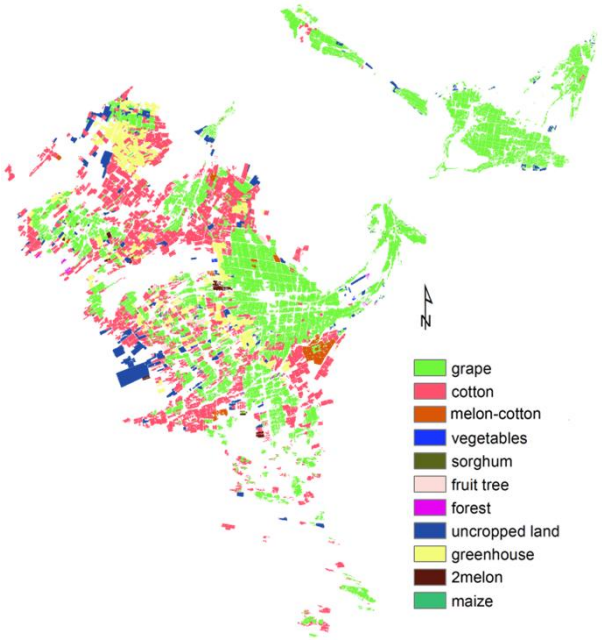




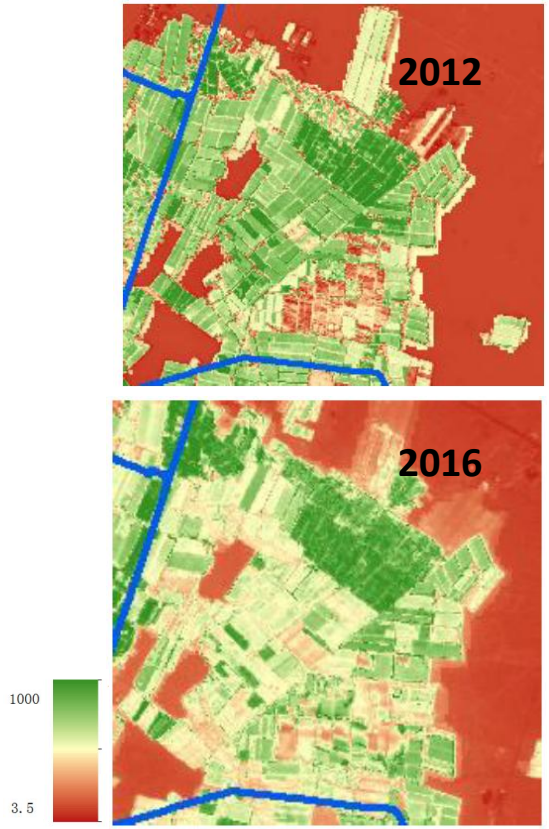




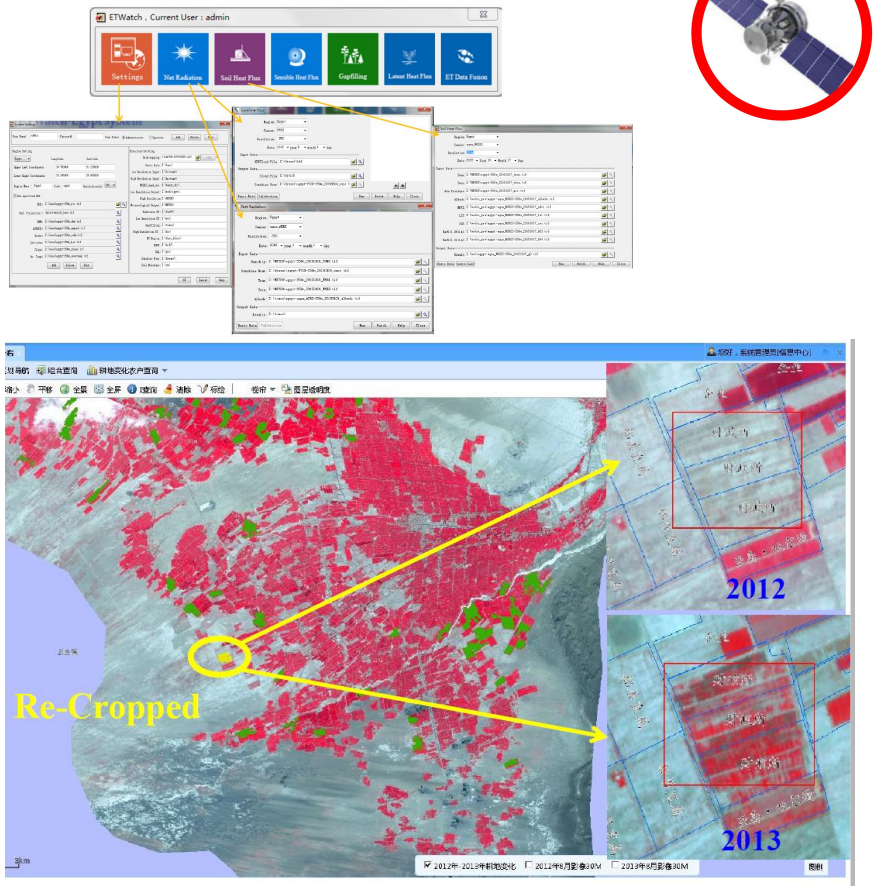
Estimating Evapotranspiration



Changes of Crop Pattern



Changes of ET



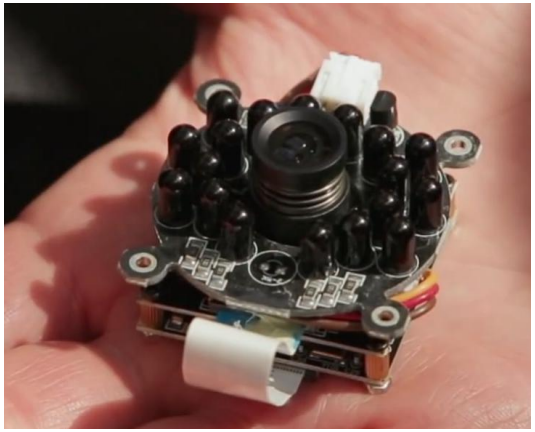
Reduction of Irrigated Land

Source: Si Gou, The World Bank & Prof. Bingfang Wu, Chinese Academy of Sciences

WORLD BANK GROUP
Water

Big Data – on the ground…

In-Situ Sensors

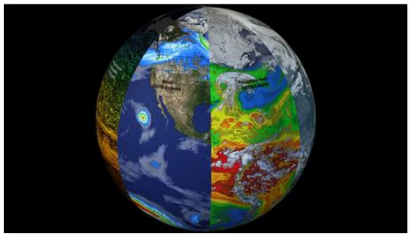
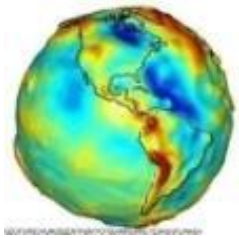
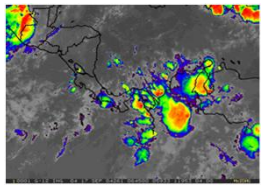


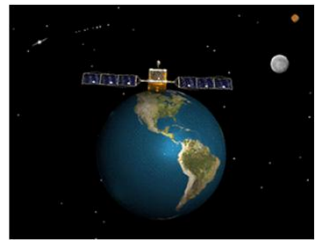
Wisdom of the Crowd

© Can Stock Photo - csp40143088

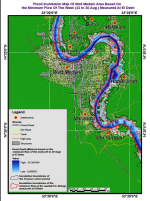
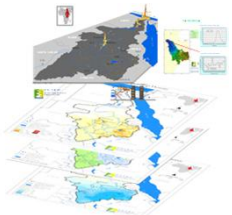
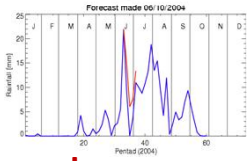
Citizen Science
Citizen Engagement
E-Surveys/Service Ratings

"Top-Down" Data Acquisition System



Satellite & UAV Earth Observation

GIS & other datasets

Data Rescue

Data Management

Analytics/Models/Visualization

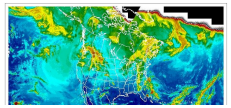
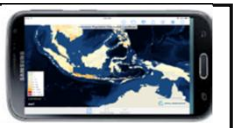
Open Data/APIs
Big Data

Platforms

Cloud Services

Machine Learning/AI

Crowdsourcing

Web Portals/Apps/e-books



Stakeholder Alerts

Operational Control Rooms





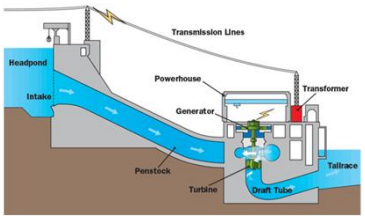


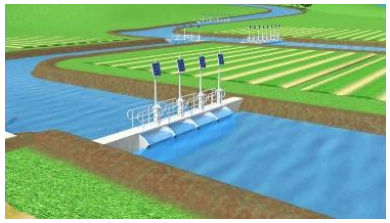

Manual Monitoring

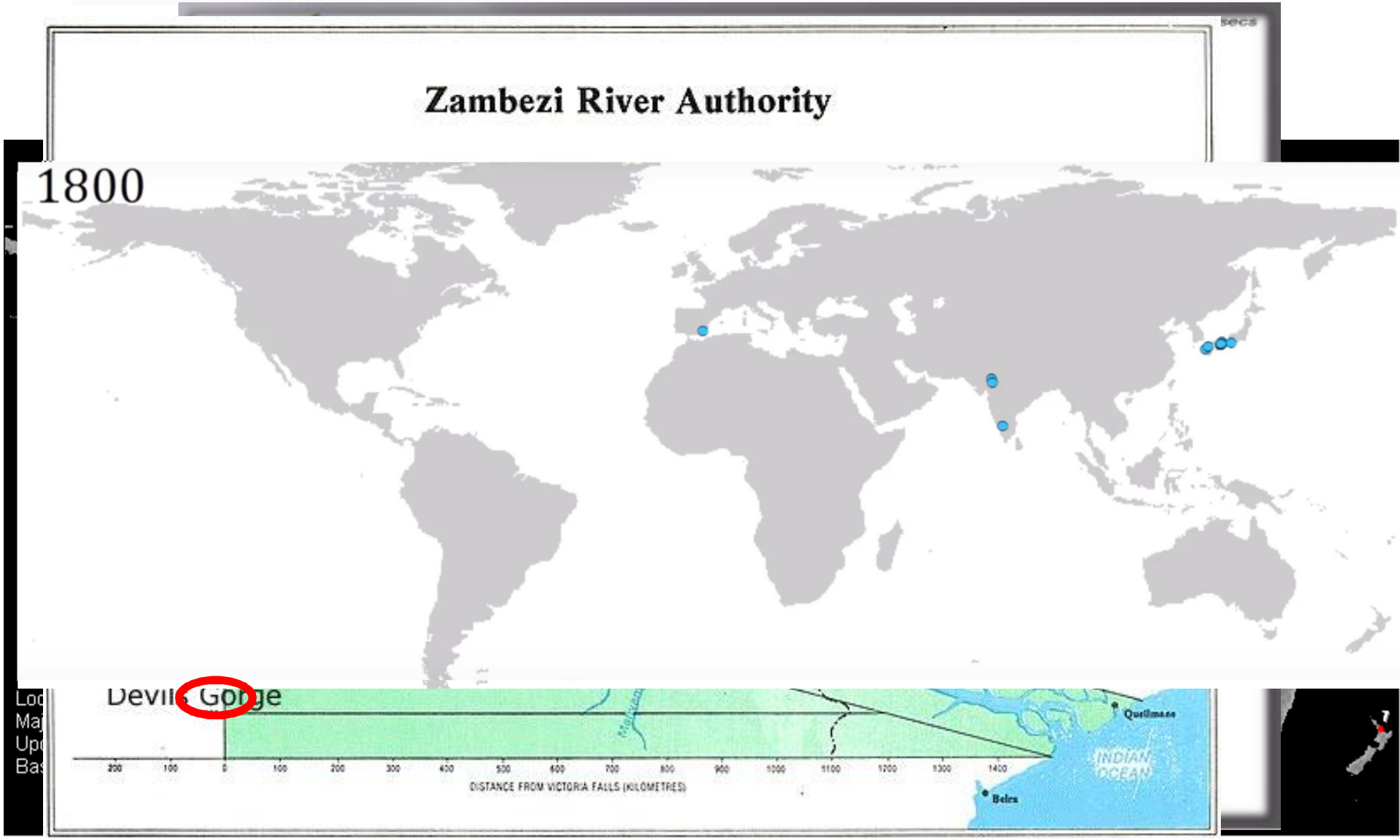
Automated Monitoring

"Bottom-up" Data Acquisition System → IoT

Illustrative Decisions to be Supported



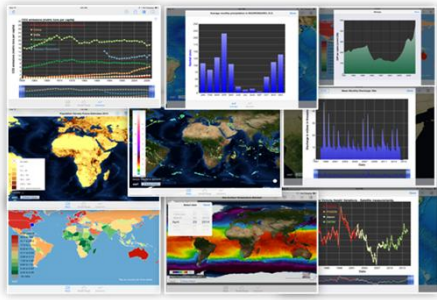


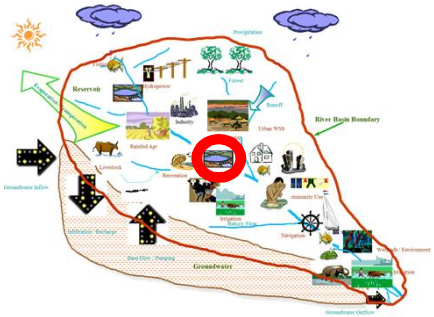


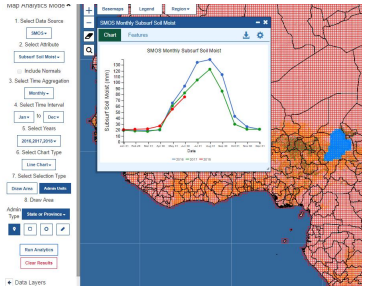
Illustrative Interactive Dashboards

Example for a Hydropower Dam Operation

Decisions to be Supported: When to release? How much to release?







Climate

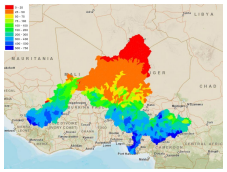
- Rainfall in upstream watershed (GPM, in-situ gauges/radar, CHIRPS, …) – current & historical
- Weather forecasts (short-term, seasonal); Storm tracks
- Snowmelt estimates (if relevant)…

Flows

- Current and historical flows (from in-situ observations, satellite estimates where possible)
- Dam inflow forecasts (e.g. from GEOGLOWS Global Streamflow Forecasting, local forecasts)…

System Levels

- Current and historical levels of this dam's reservoir as well as other storages in system (e.g. from satellite, in-situ gauges)…



Downstream

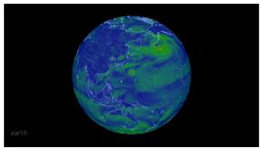
- Irrigation status (crops, crop stage from earth observation and in-situ)
- Soil and sub-surface soil moisture, groundwater (from earth observation and in-situ)…

Other Data & Analytics

- Inundation forecasts
- Power demands and supply forecasts
- Systems water infrastructure needs
- Systems model to explore E&S implications of alternative dam operations
- Hi-resolution Satellite data

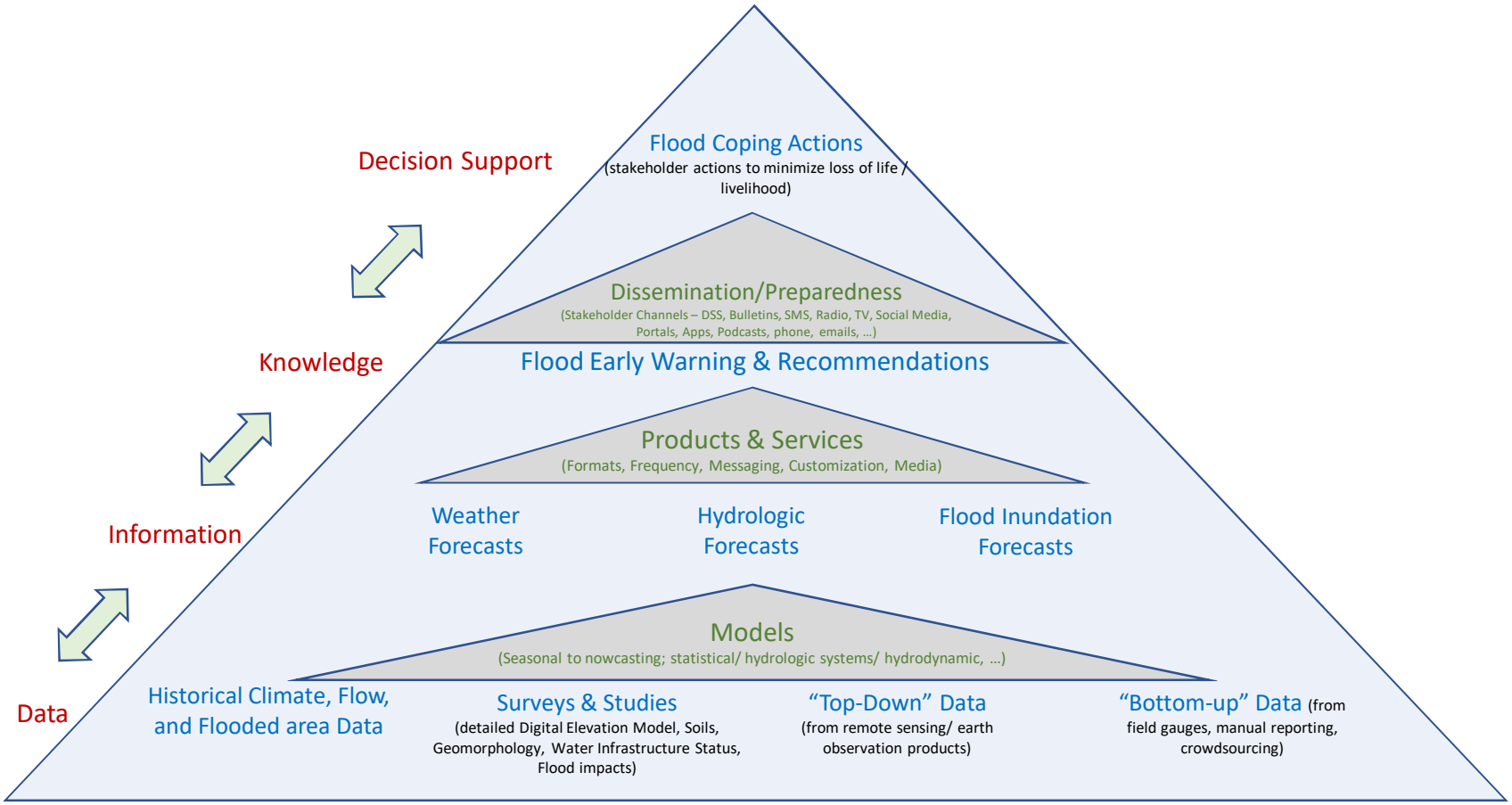
…

Need to draw upon global and other accessible data and analytic services to make interactive maps, graphs, and analytics for such decision support dashboards that are accessible on portals, apps, e-books, touchscreens, etc.



The Data Value Chain

Example: Deciding on Coping with Floods



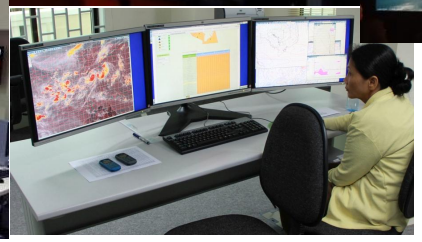
Modernizing Institutions (e.g. "Water Centers")

Collaborative Workspaces/Internships

Audio/Video-Conferencing/ Distance Learning/ Helpdesk

Computer Training Room

Document, Map & Digital Library



Situation/ Decision Rooms

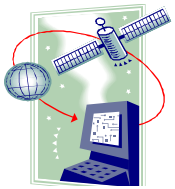
Innovation Marketplace

Competitions (e.g. Hackathons)

Collation ⟷ **Analysis** ⟷ **Use**

Knowledge Repository

Monitoring Hub



Knowledge Tools/Products

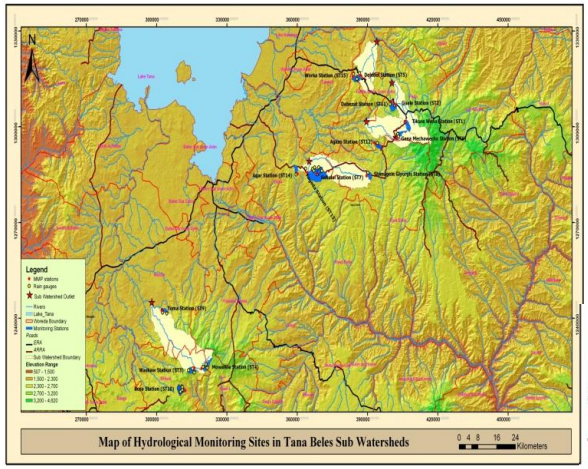
Targeted Research

Outreach & Capacity-Building

Institutional Support

Meaningfully Involving Communities

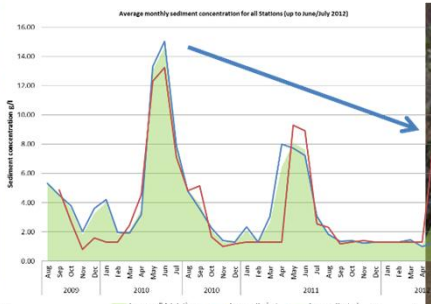
(incl. Community Monitoring in Tana-Beles Project, Ethiopia)



	2009	2010	2011	2012	Total
Staff	3132	11812	12409	6522	33875
Turbidity	3131	12069	12469	6624	34293
Rain	3116	>12777	>15000	>15000	>47000
Flow					>500
Sed samples	1425	4176	3139	1216	9956

Secchi Jug for turbidity

Sediment Concentration Analyses



Ethiopia: Tana and Beles Integrated Water Resources Management Project

Thanks JB for some of the photos!

Tech-enabled Competitions/Expos

Hackathon/Appathon/Design Competition
Technical Expos
X-Prize

Tangible Landscape

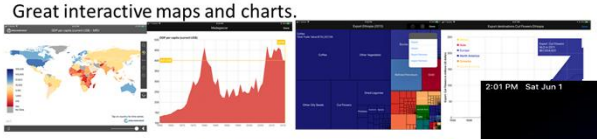

Tangible Landscape + Immersive Virtual Reality
Watch later
Share
0:48
0:57 / 2:30
YouTube

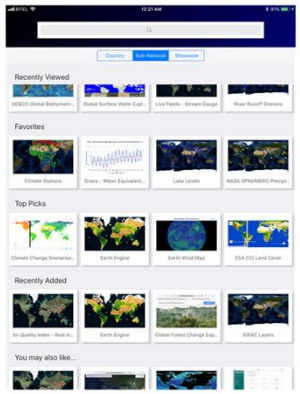
Spatial Agent App

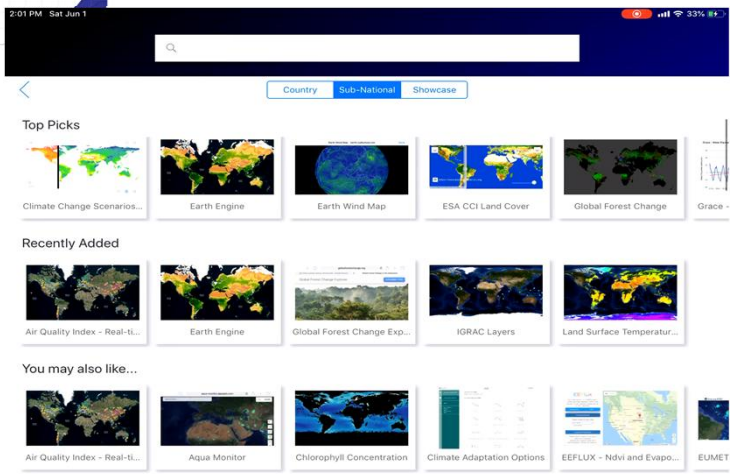
A new world of data and analytics at your fingertips!

Country-Level

Check out global data from WDI, MIT Atlas on Trade, etc. Great interactive maps and charts.

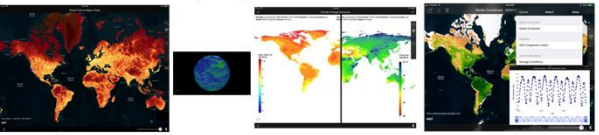


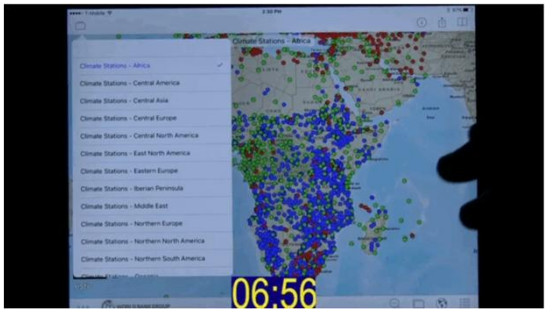


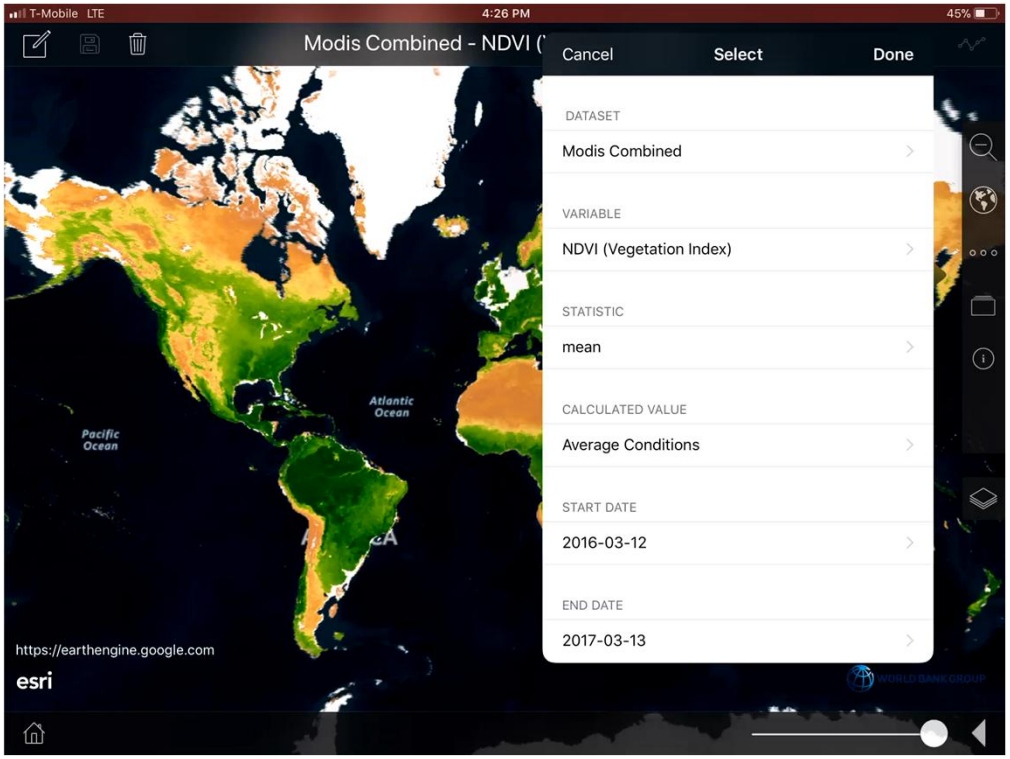


Sub-National

Check out thousands of global datasets from NASA, UN, ESA, GEO, etc. Great interactive tools, including use of the Google Earth Engine API for live cloud computing.







Showcase

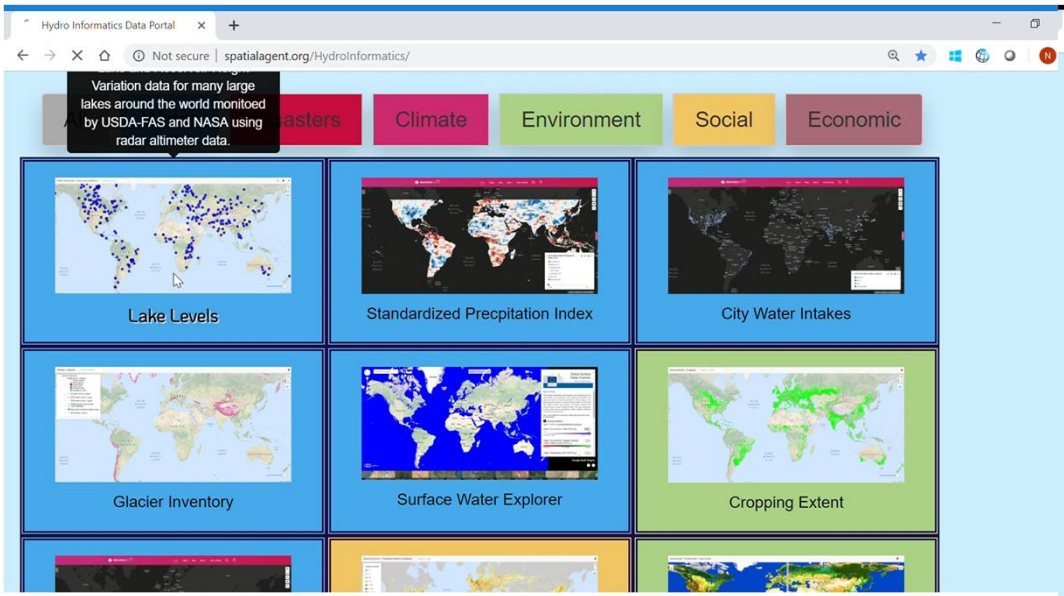
Check out great showcase data on Mekong Delta, Poverty, Forecasts, etc. for selected areas and specialized themes

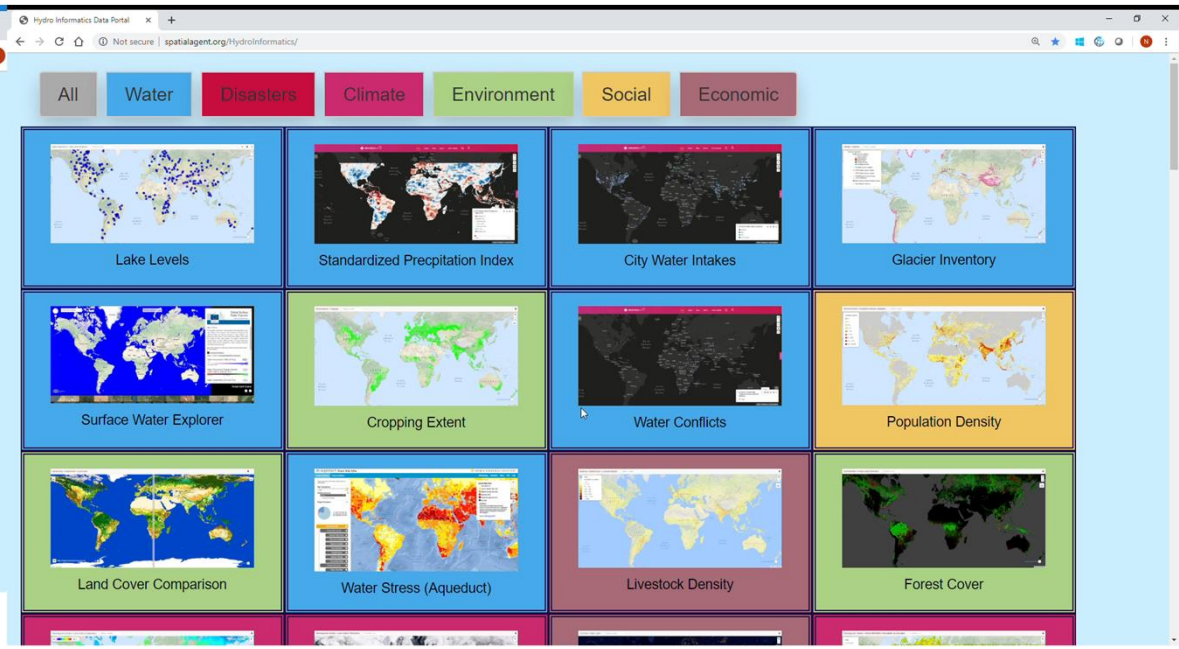
Download free from: http://apps.worldbank.org OLC Resource Page and Blog

iOS (iPad and iPhone): search "Spatial Agent" on Appstore or from http://apple.co/2eVu5xJ

Android Draft version

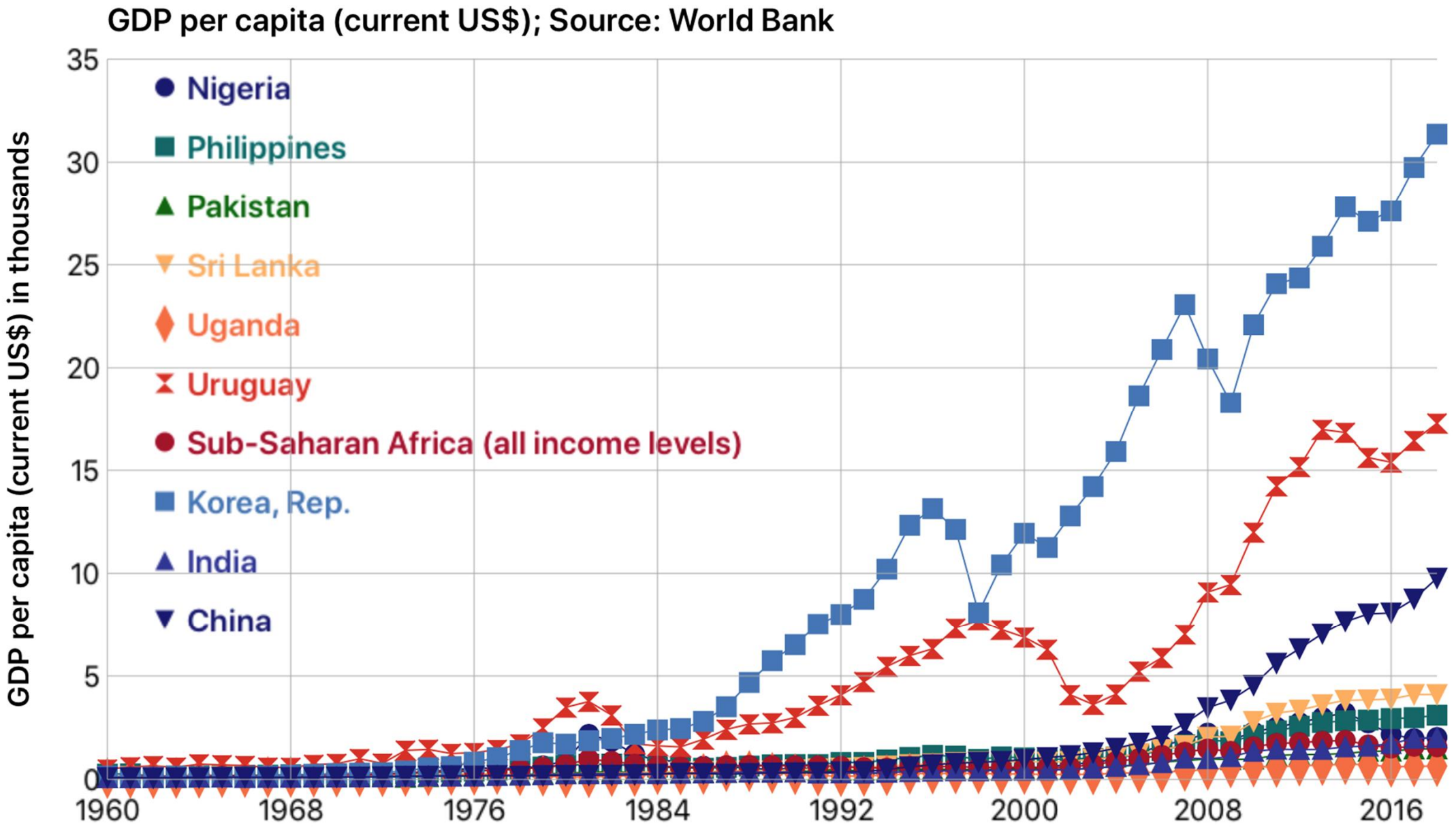
Contact: harsh@worldbank.org



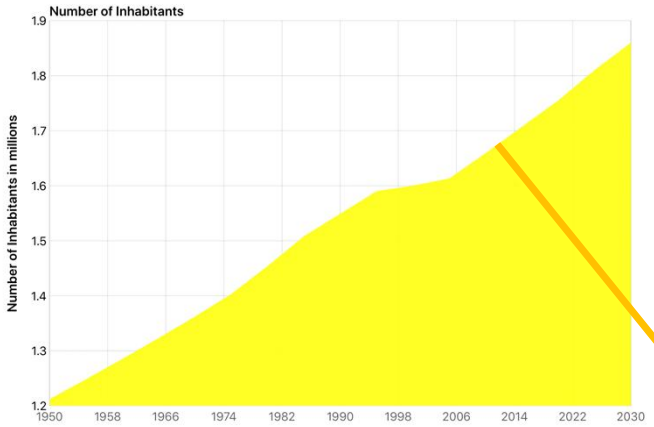


Try our new draft global ***HydroInformatics Platform*** *to illustrate open services…*

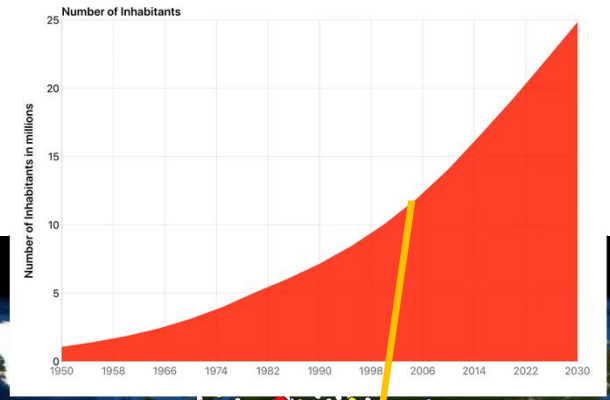
http://spatialagent.org/HydroInformatics


GDP per capita (current US$); Source: World Bank
GDP per capita (current US$) in thousands
35
30
25
20
15
10
5
0
1960
1968
1976
1984
1992
2000
2008
2016
Nigeria
Philippines
Pakistan
Sri Lanka
Uganda
Uruguay
Sub-Saharan Africa (all income levels)
Korea, Rep.
India
China

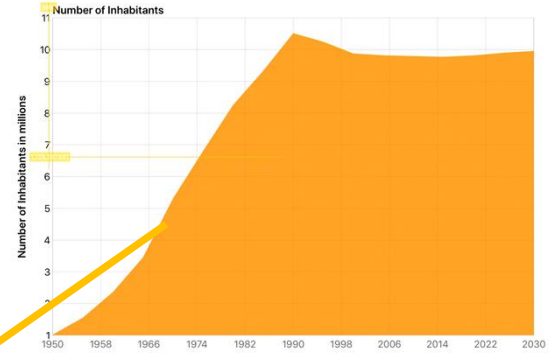
Montevideo Done

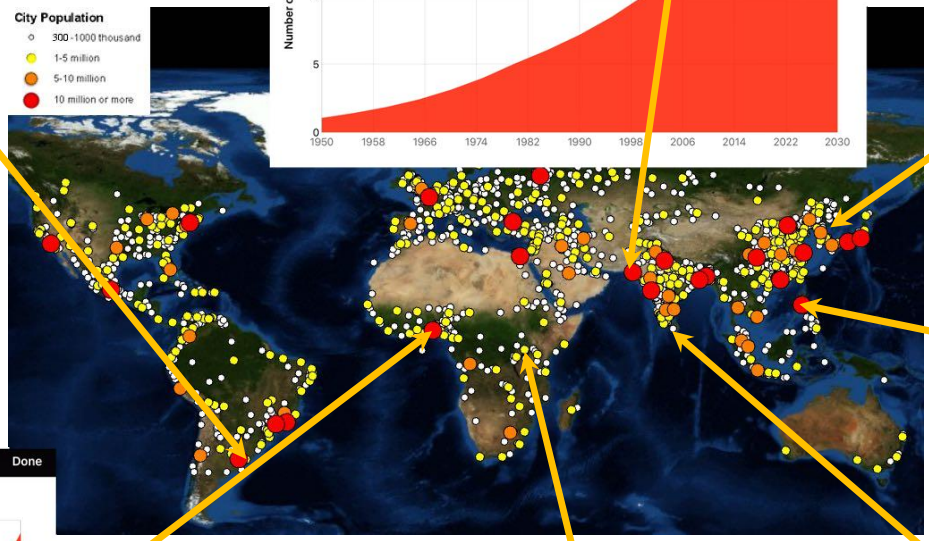


Karachi Done



Seoul Done





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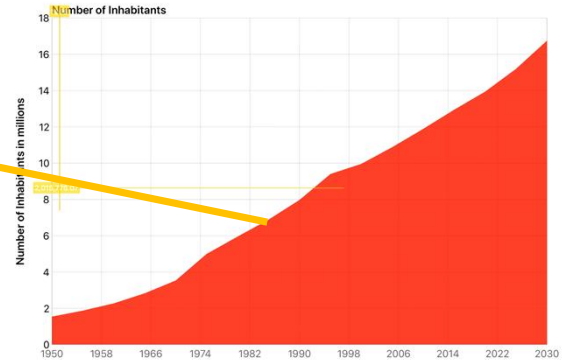

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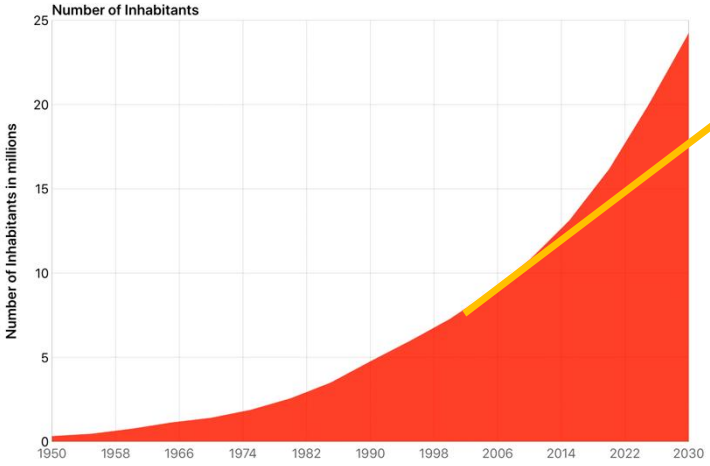
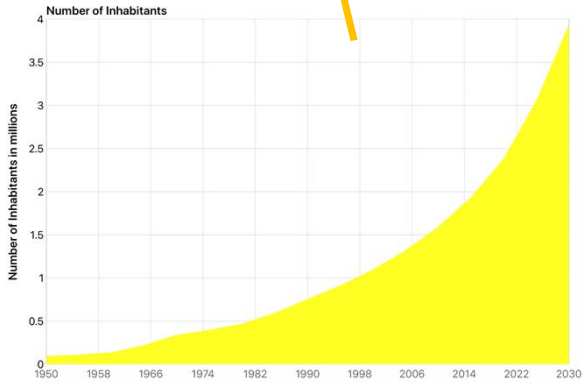


Kampala Done



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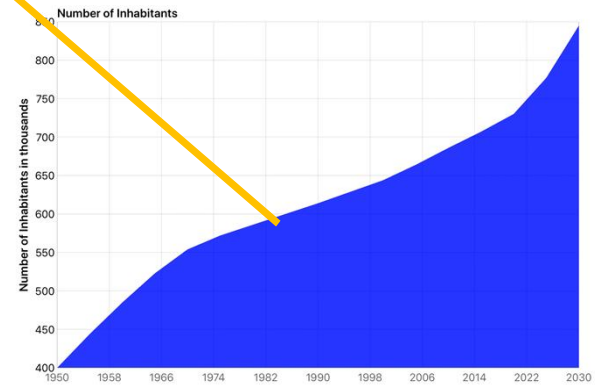

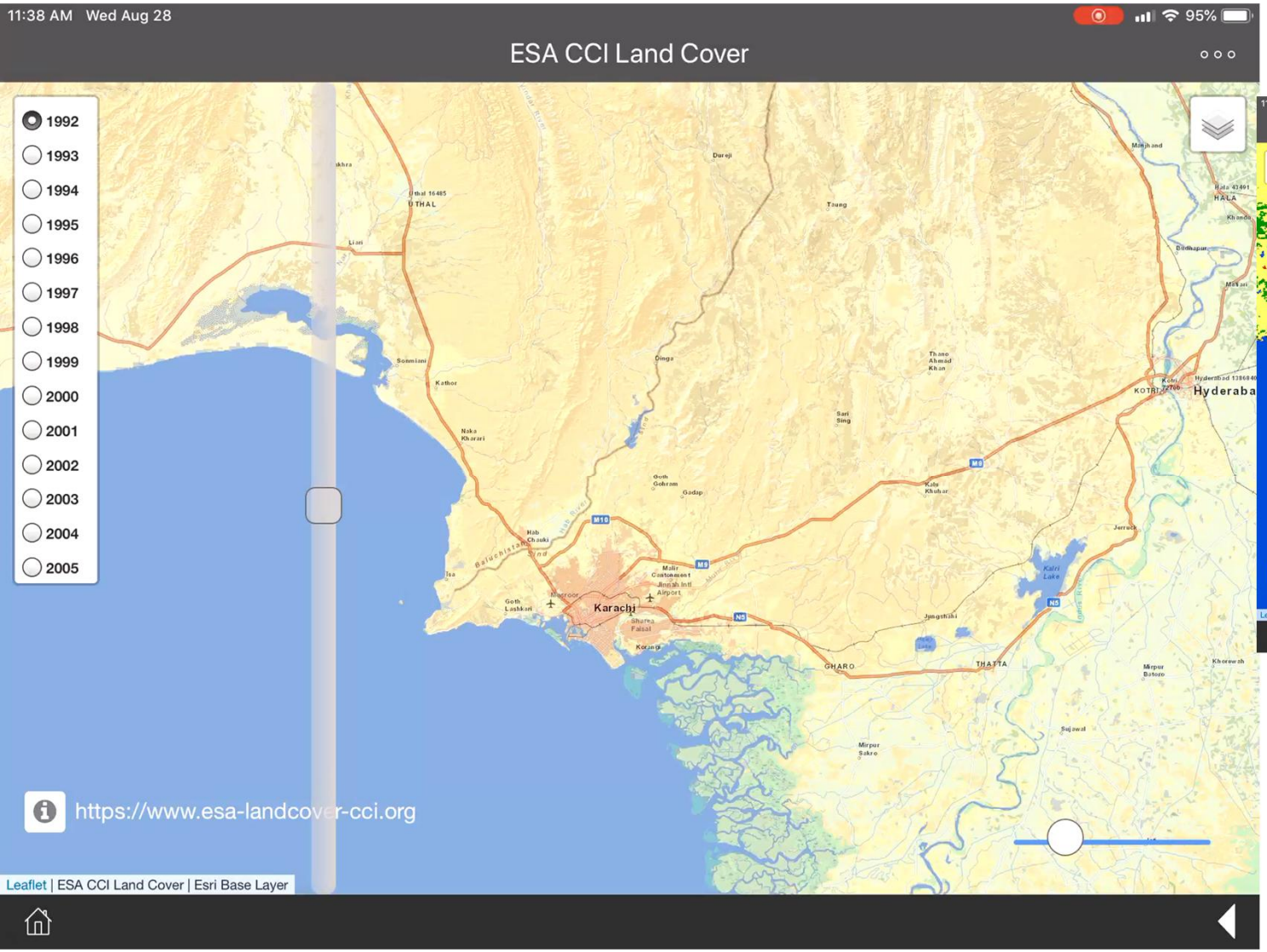

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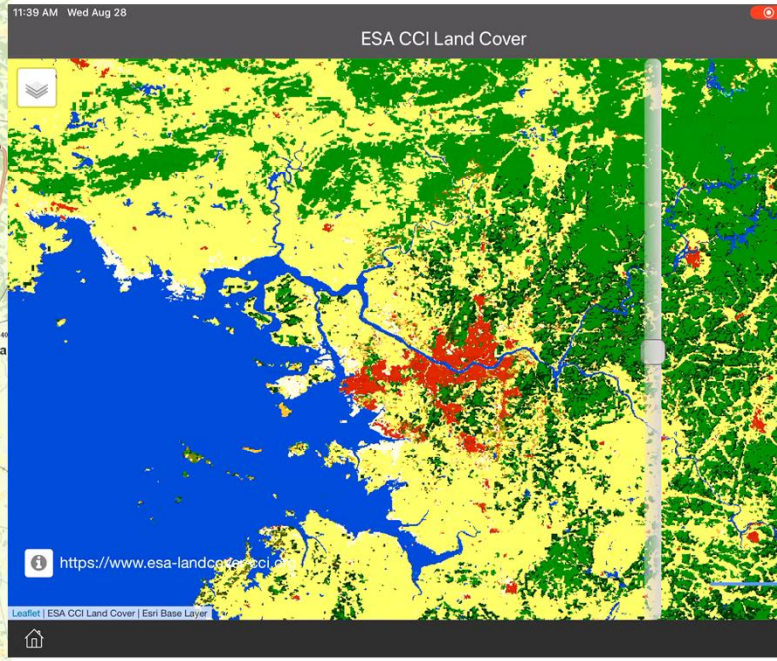
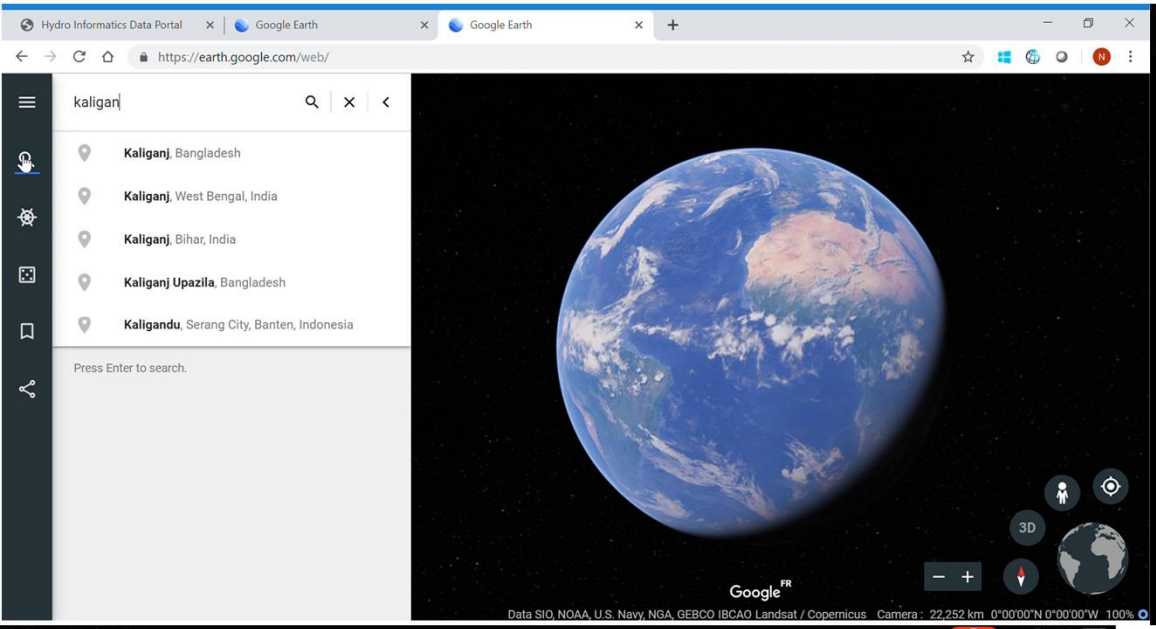
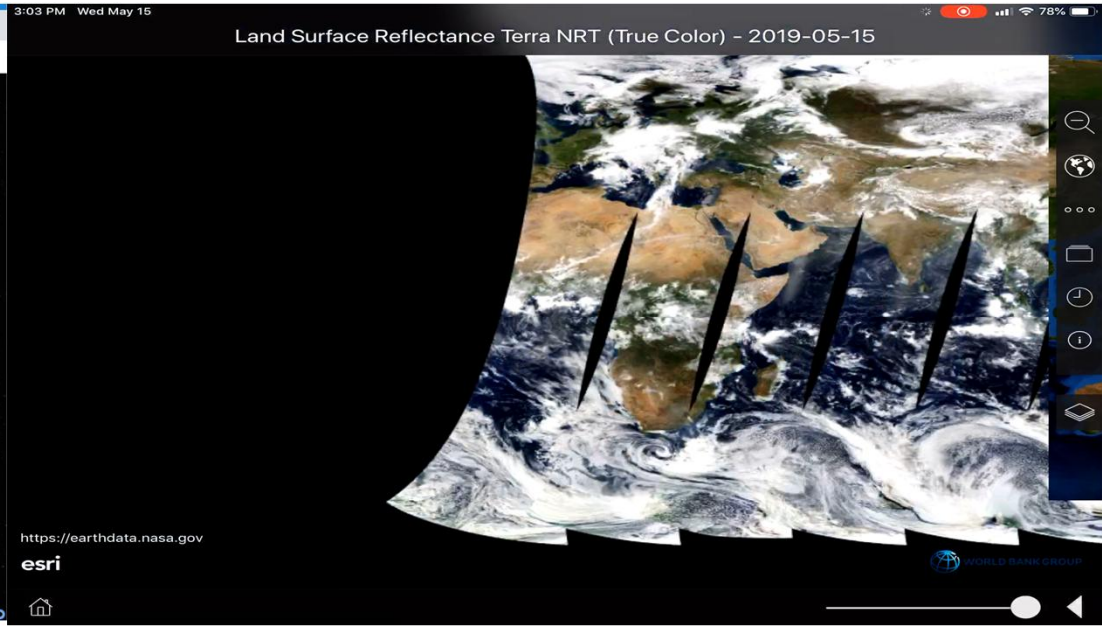
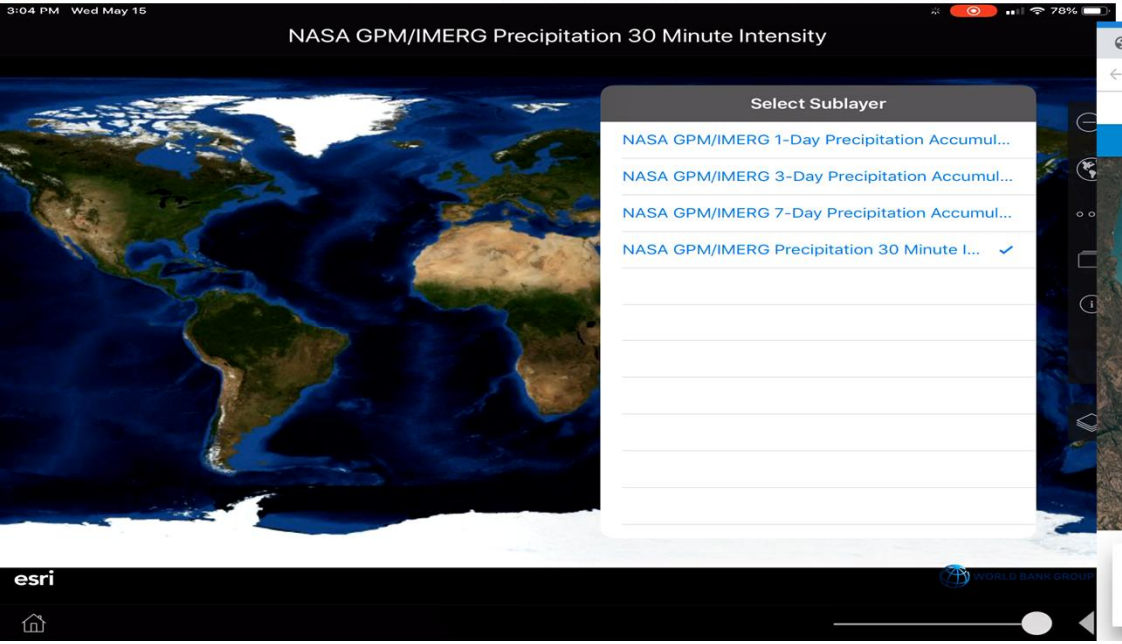


Seoul


Hydro Informatics Data Portal
Google Earth
Google Earth
https://earth.google.com/web/
kaligan
Kaliganj, Bangladesh
Kaliganj, West Bengal, India
Kaliganj, Bihar, India
Kaliganj Upazila, Bangladesh
Kaligandu, Serang City, Banten, Indonesia
Press Enter to search.
3D
Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO IBCAO Landsat / Copernicus Camera : 22,252 km 0°00'00"N 0°00'00"W 100%


3:03 PM Wed May 15
78%
Land Surface Reflectance Terra NRT (True Color) - 2019-05-15
https://earthdata.nasa.gov
esri
WORLD BANK GROUP


3:04 PM Wed May 15
78%
NASA GPM/IMERG Precipitation 30 Minute Intensity
Select Sublayer
NASA GPM/IMERG 1-Day Precipitation Accumul...
NASA GPM/IMERG 3-Day Precipitation Accumul...
NASA GPM/IMERG 7-Day Precipitation Accumul...
NASA GPM/IMERG Precipitation 30 Minute I...
esri
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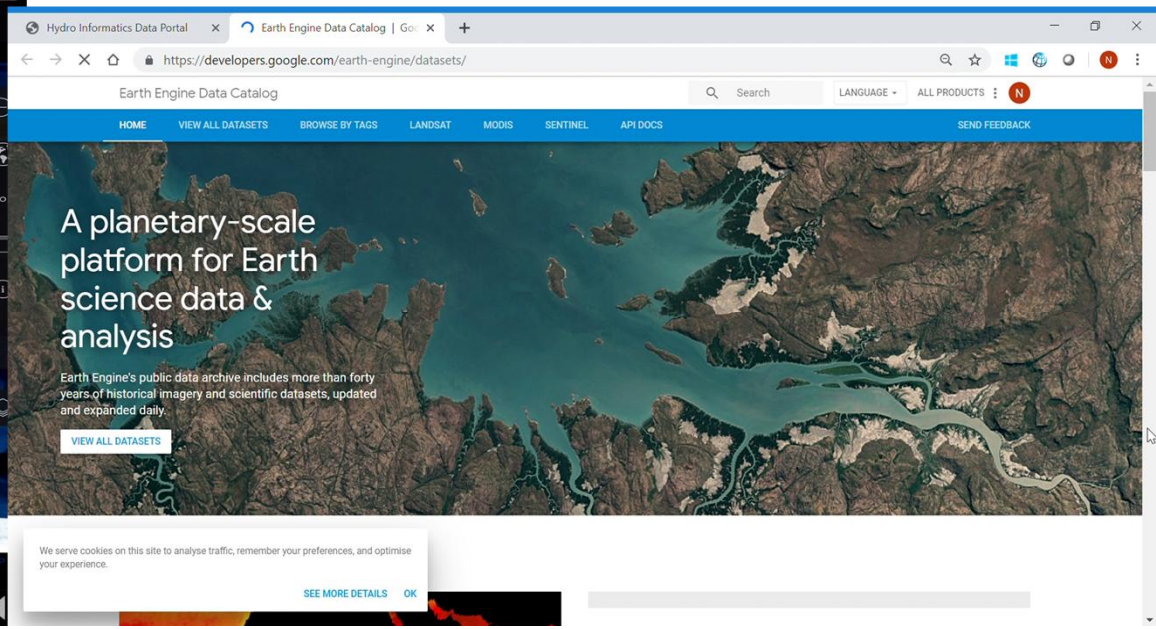
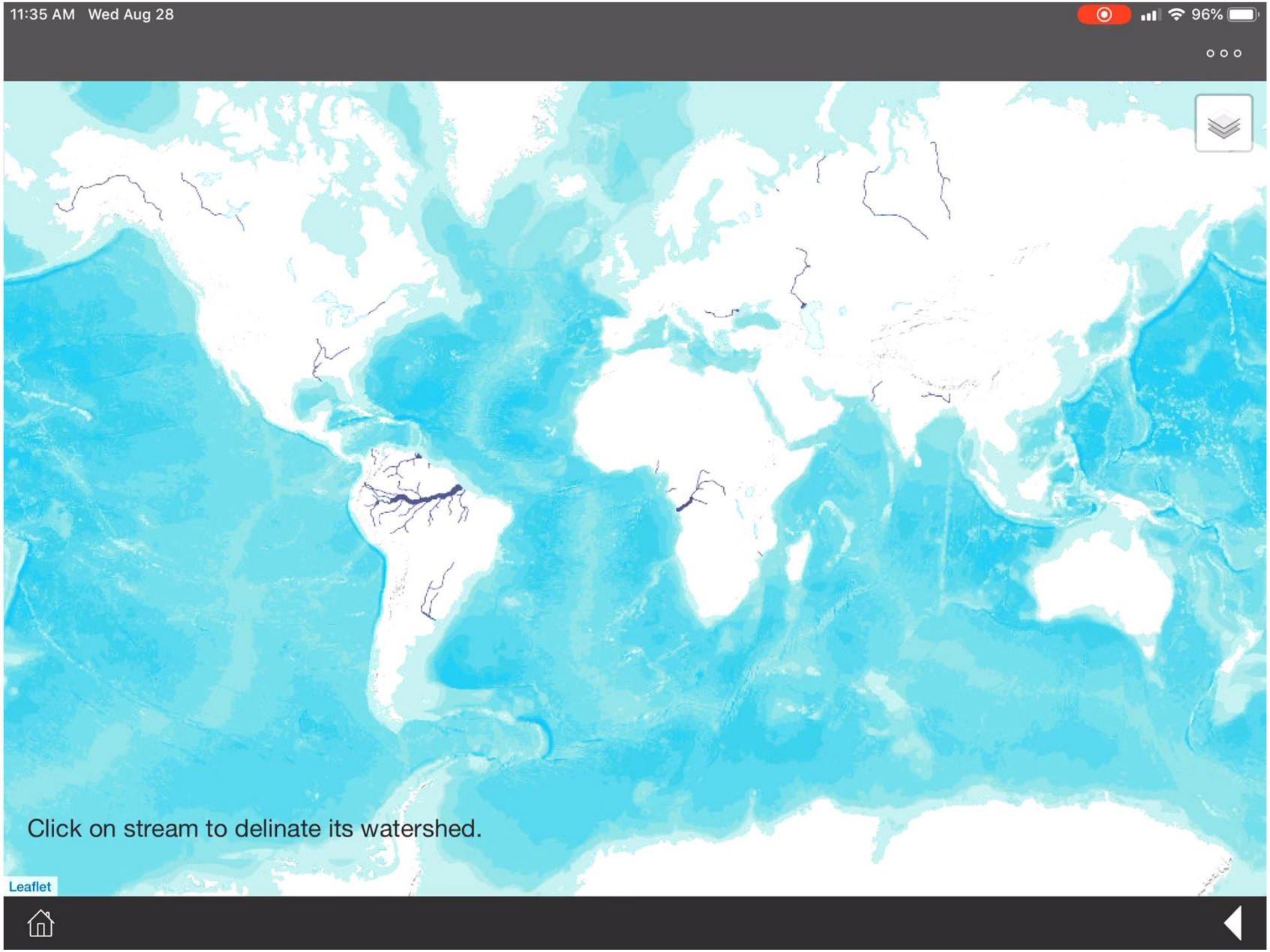
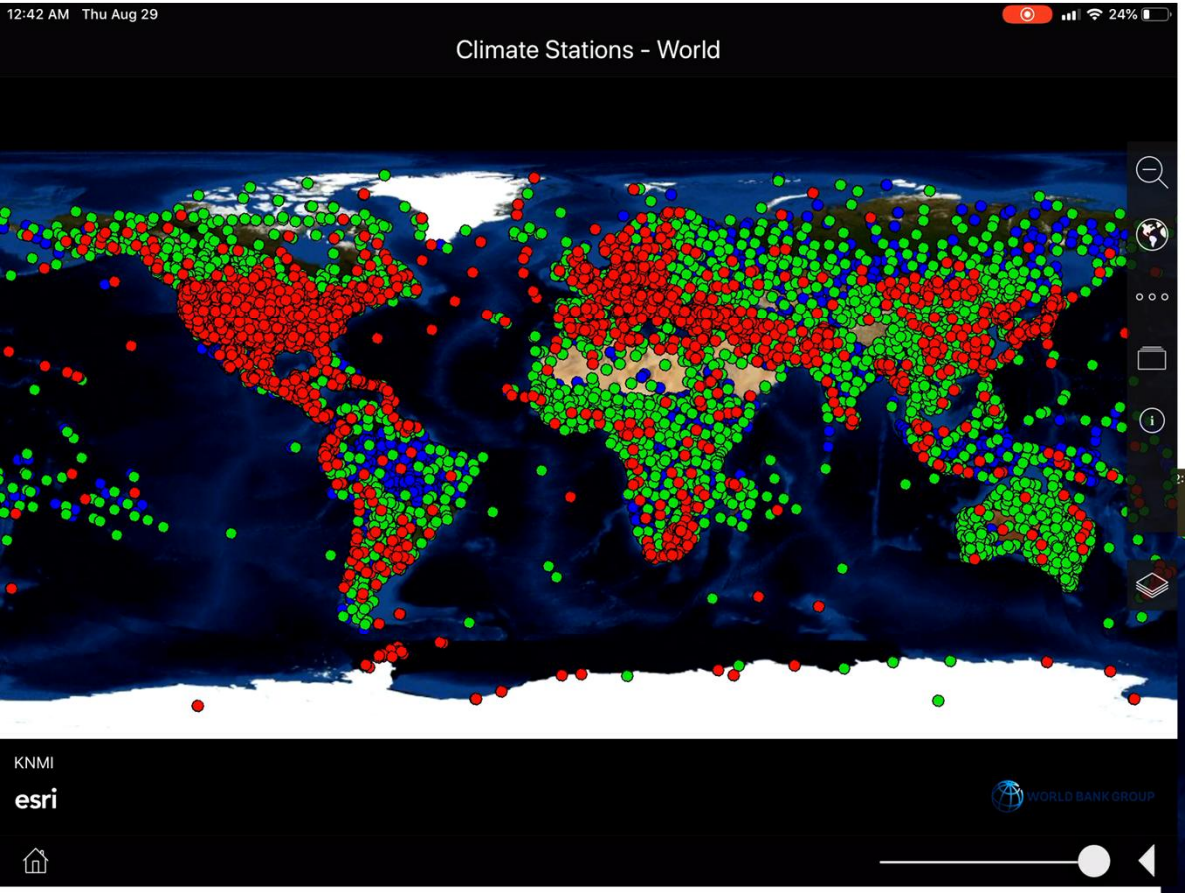

Hydro Informatics Data Portal
Earth Engine Data Catalog | Go
https://developers.google.com/earth-engine/datasets/
Earth Engine Data Catalog
Search
LANGUAGE
ALL PRODUCTS
HOME
VIEW ALL DATASETS
BROWSE BY TAGS
LANDSAT
MODIS
SENTINEL
API DOCS
SEND FEEDBACK
A planetary-scale platform for Earth science data & analysis
Earth Engine's public data archive includes more than forty years of historical imagery and scientific datasets, updated and expanded daily.
VIEW ALL DATASETS
We serve cookies on this site to analyse traffic, remember your preferences, and optimise your experience.
SEE MORE DETAILS
OK


11:35 AM Wed Aug 28
96%
Click on stream to delinate its watershed.
Leaflet


12:42 AM Thu Aug 29
24%
Climate Stations - World
KNMI
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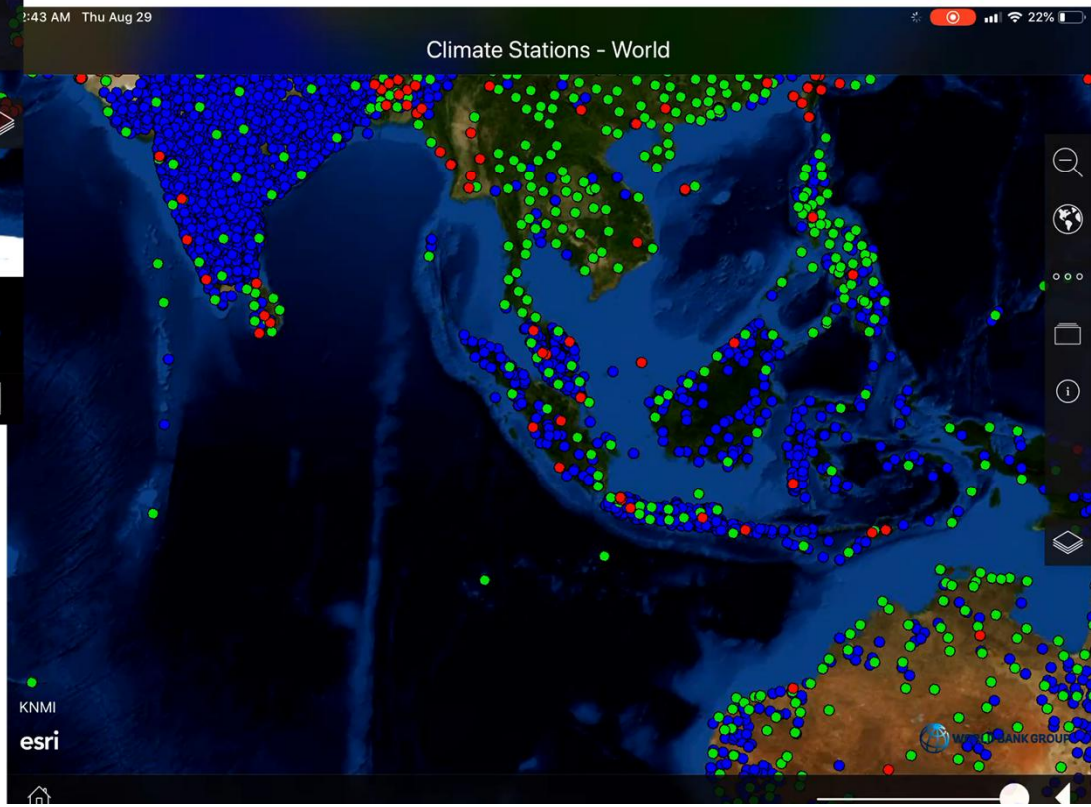
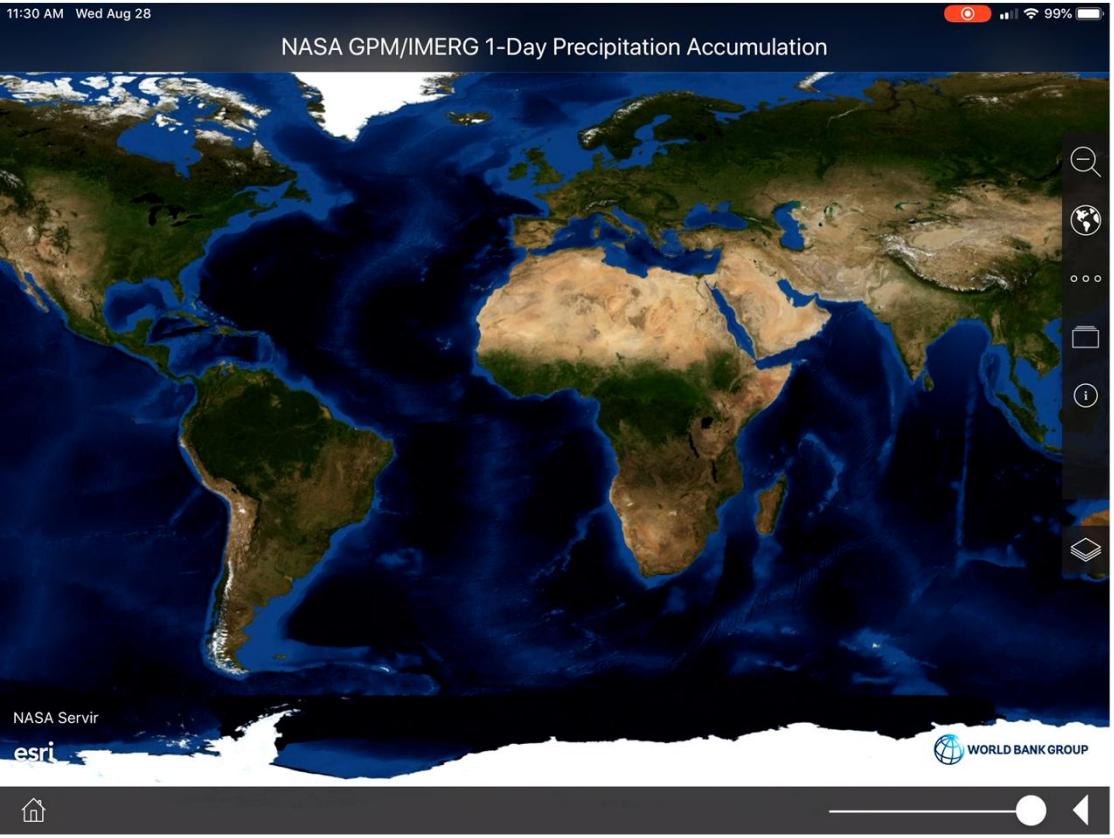

2:43 AM Thu Aug 29
22%
Climate Stations - World
KNMI
esri


11:30 AM Wed Aug 28
99%
NASA GPM/IMERG 1-Day Precipitation Accumulation
NASA Servir
esri
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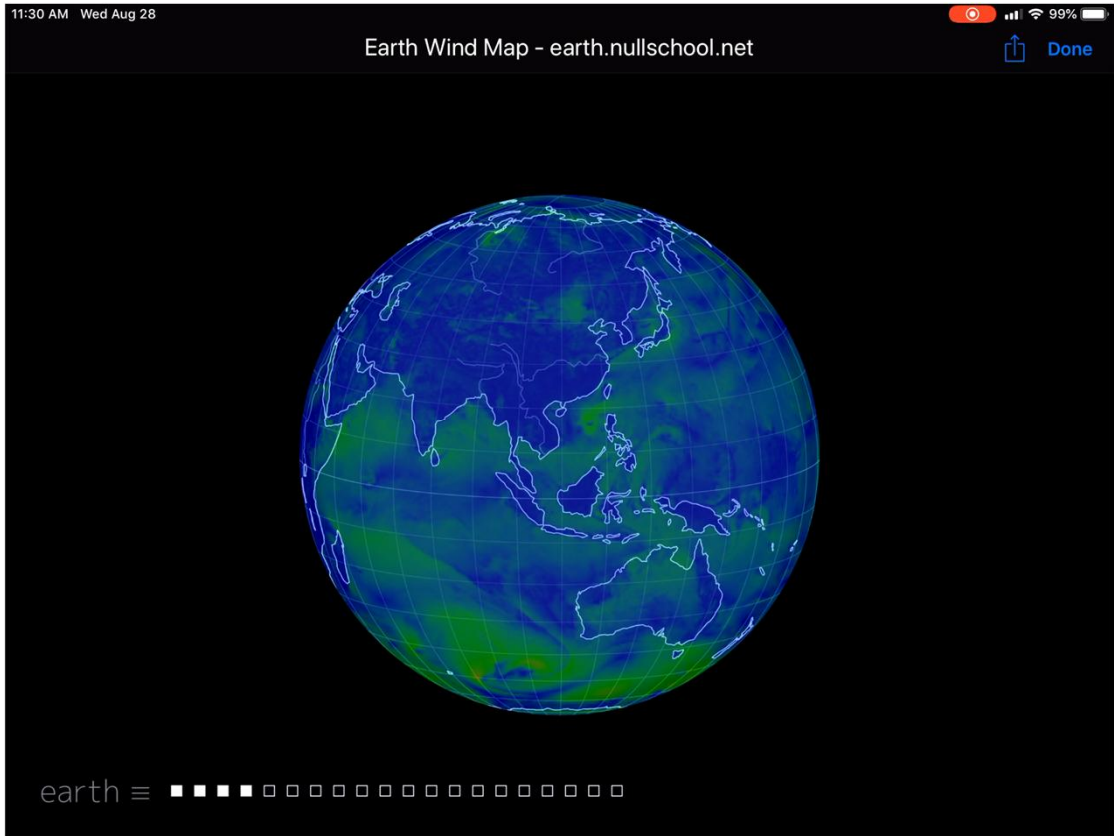
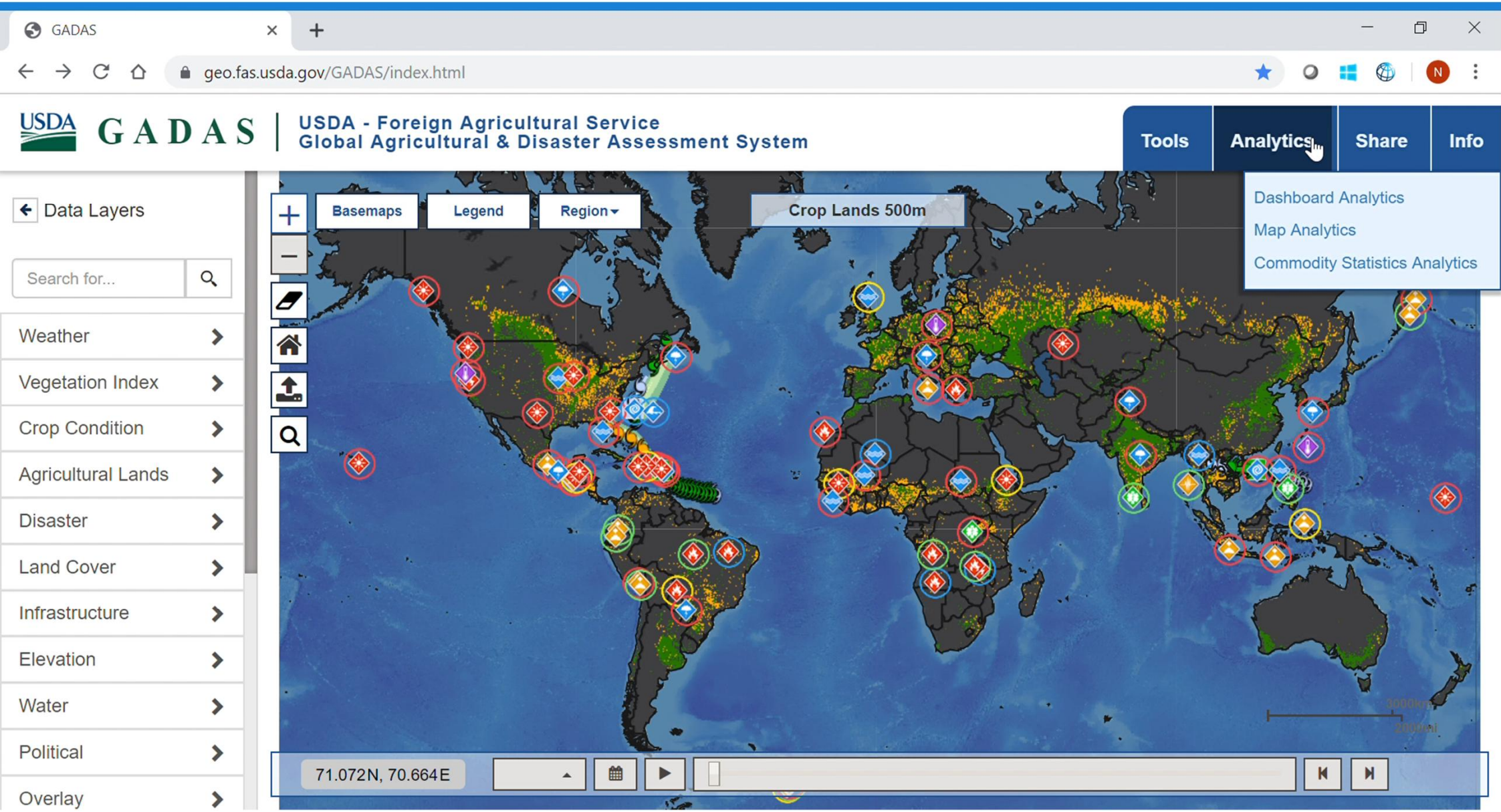
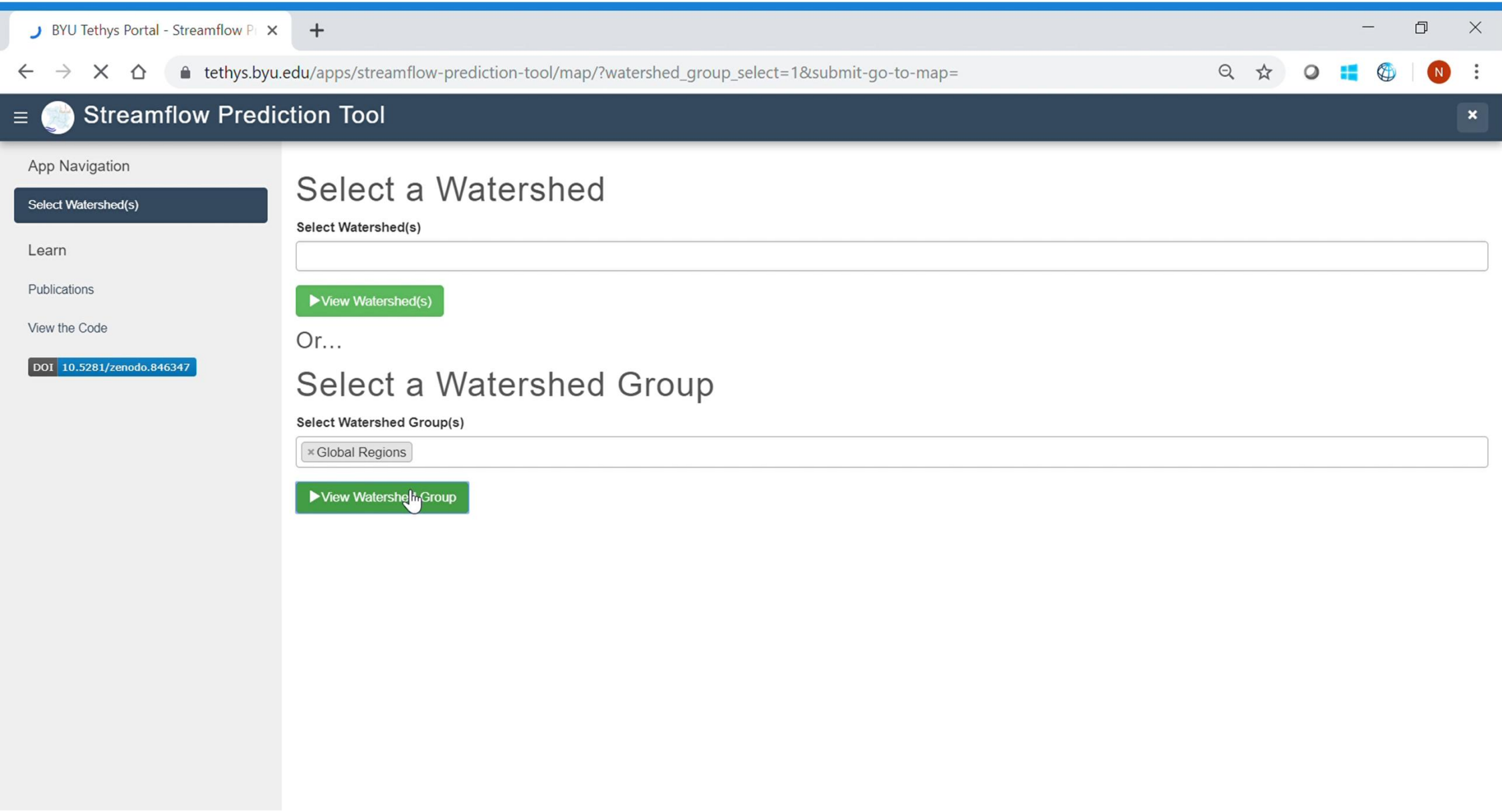

11:30 AM Wed Aug 28
99%
Earth Wind Map - earth.nullschool.net
Done
earth


GADAS
geo.fas.usda.gov/GADAS/index.html
USDA GADAS
USDA - Foreign Agricultural Service
Global Agricultural & Disaster Assessment System
Tools
Analytics
Share
Info
Dashboard Analytics
Map Analytics
Commodity Statistics Analytics
Data Layers
Search for...
Weather
Vegetation Index
Crop Condition
Agricultural Lands
Disaster
Land Cover
Infrastructure
Elevation
Water
Political
Overlay
Basemaps
Legend
Region
Crop Lands 500m
71.072N, 70.664E


BYU Tethys Portal - Streamflow P
tethys.byu.edu/apps/streamflow-prediction-tool/map/?watershed_group_select=1&submit-go-to-map=
Streamflow Prediction Tool
App Navigation
Select Watershed(s)
Learn
Publications
View the Code
DOI 10.5281/zenodo.846347
Select a Watershed
Select Watershed(s)
View Watershed(s)
Or...
Select a Watershed Group
Select Watershed Group(s)
Global Regions
View Watershed Group

BYU Tethys Portal - Streamflow P

tethys.byu.edu/apps/streamflow-prediction-tool/map/?watershed_group_select=1&submit-go-to-map=

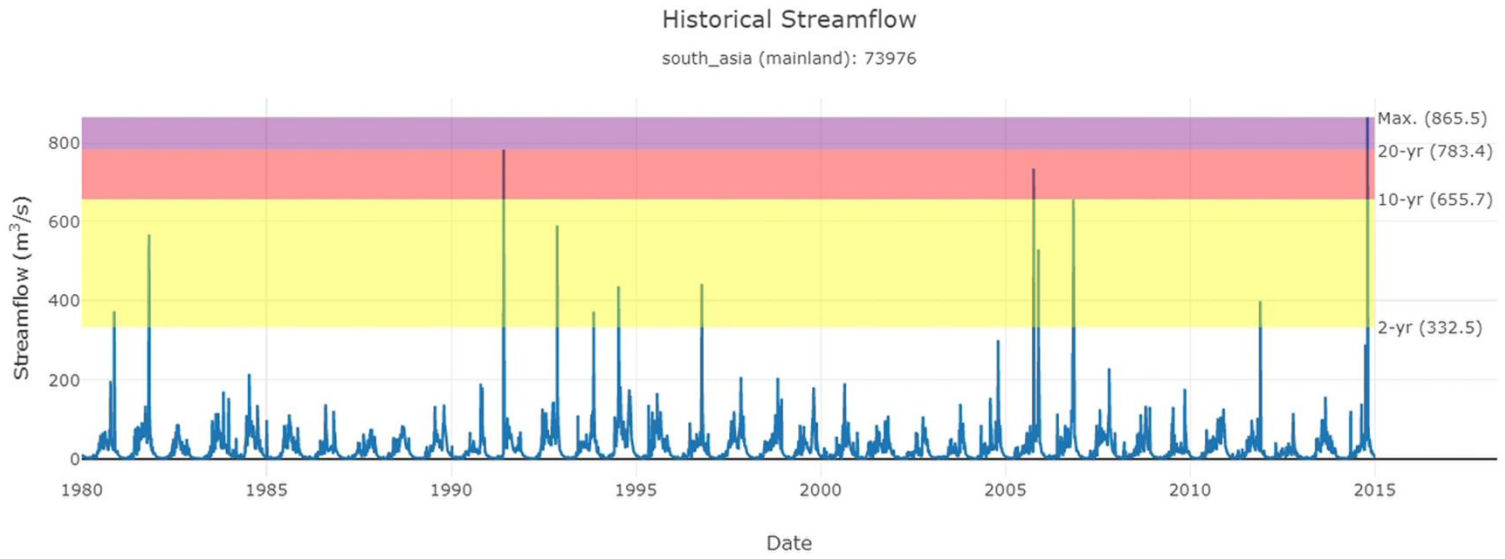
Streamflow Prediction Tool

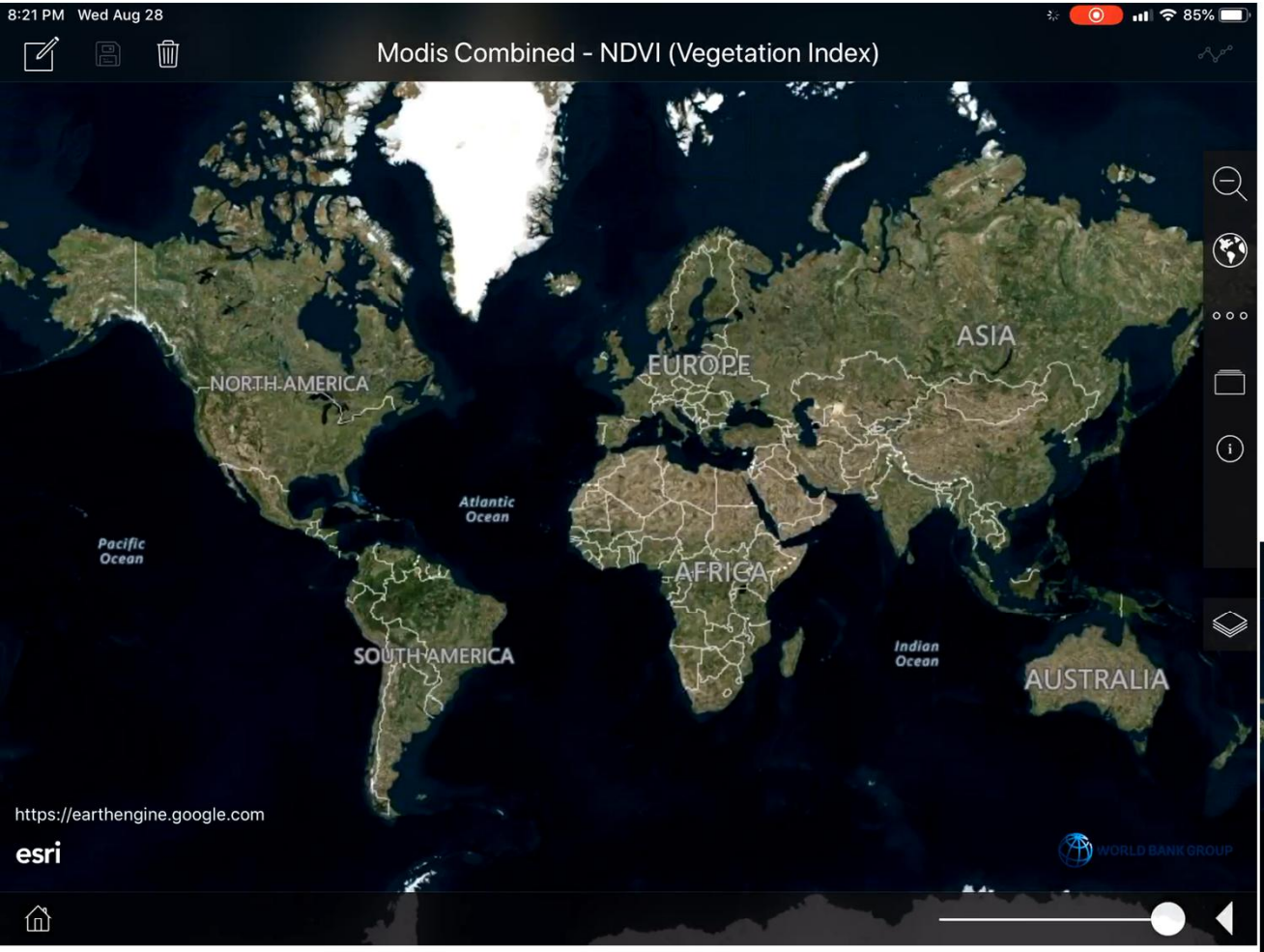
Table of Conte

Global Regions
- Drainage Line
- Boundary
- 20-Year Return Pe
- 10-Year Return Pe
- 2-Year Return Per

Units: Metric

Forecast | Historical | Flow-Duration | Daily Season | Monthly Season | Download




8:21 PM Wed Aug 28
85%
Modis Combined - NDVI (Vegetation Index)
NORTH AMERICA
EUROPE
ASIA
Atlantic Ocean
Pacific Ocean
AFRICA
SOUTH AMERICA
Indian Ocean
AUSTRALIA
https://earthengine.google.com
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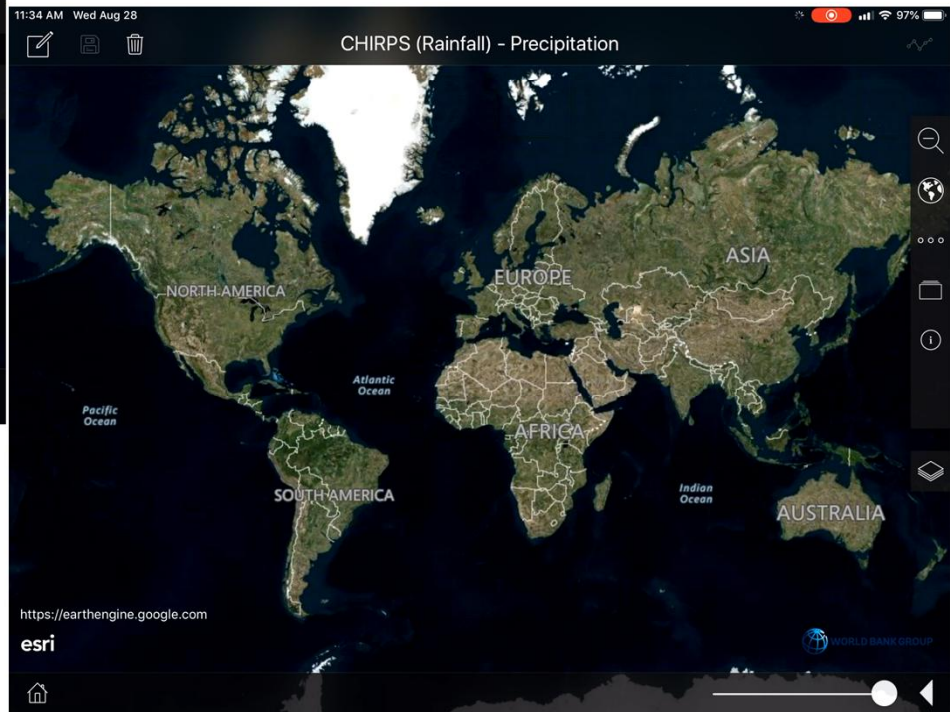
11:34 AM Wed Aug 28
97%
CHIRPS (Rainfall) - Precipitation
NORTH AMERICA
EUROPE
ASIA
Atlantic Ocean
Pacific Ocean
AFRICA
SOUTH AMERICA
Indian Ocean
AUSTRALIA
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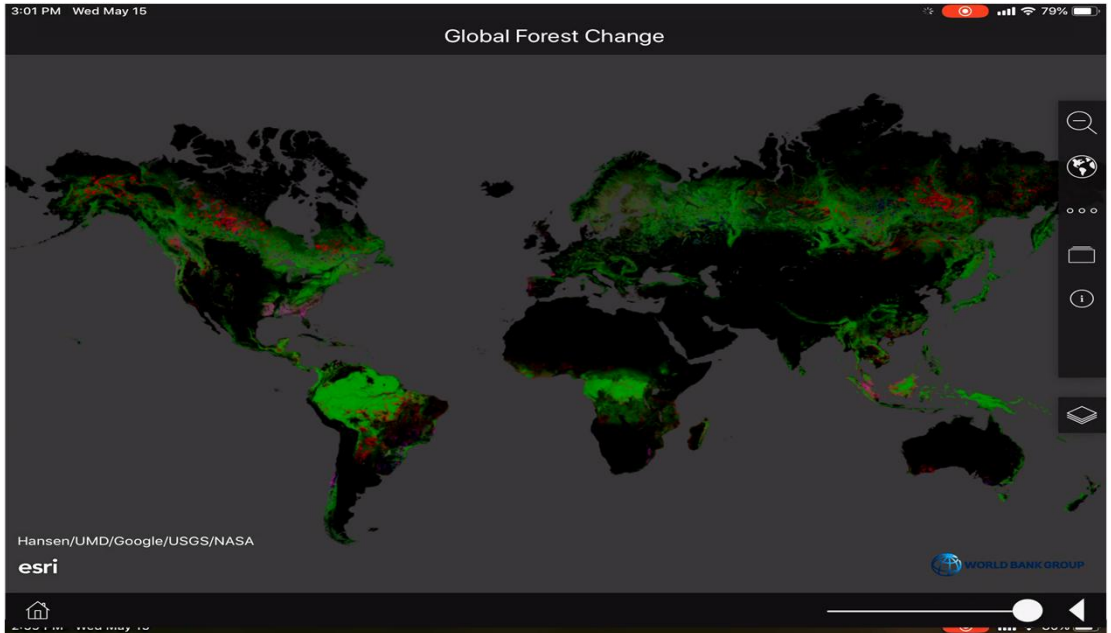
3:01 PM Wed May 15
79%
Global Forest Change
Hansen/UMD/Google/USGS/NASA
esri
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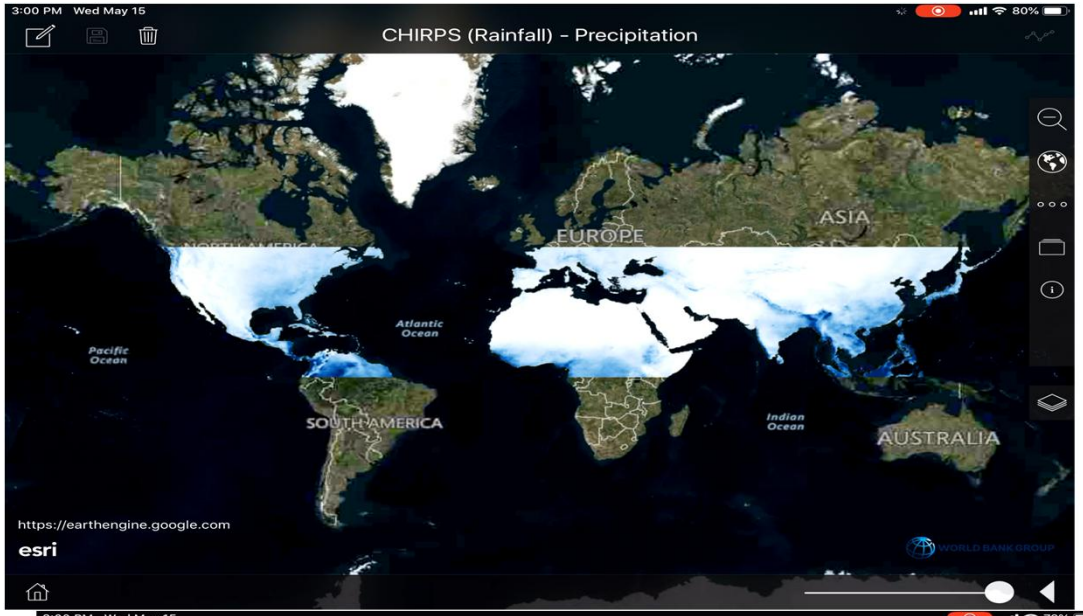
3:00 PM Wed May 15
80%
CHIRPS (Rainfall) - Precipitation
EUROPE
ASIA
Atlantic Ocean
Pacific Ocean
SOUTH AMERICA
Indian Ocean
AUSTRALIA
https://earthengine.google.com
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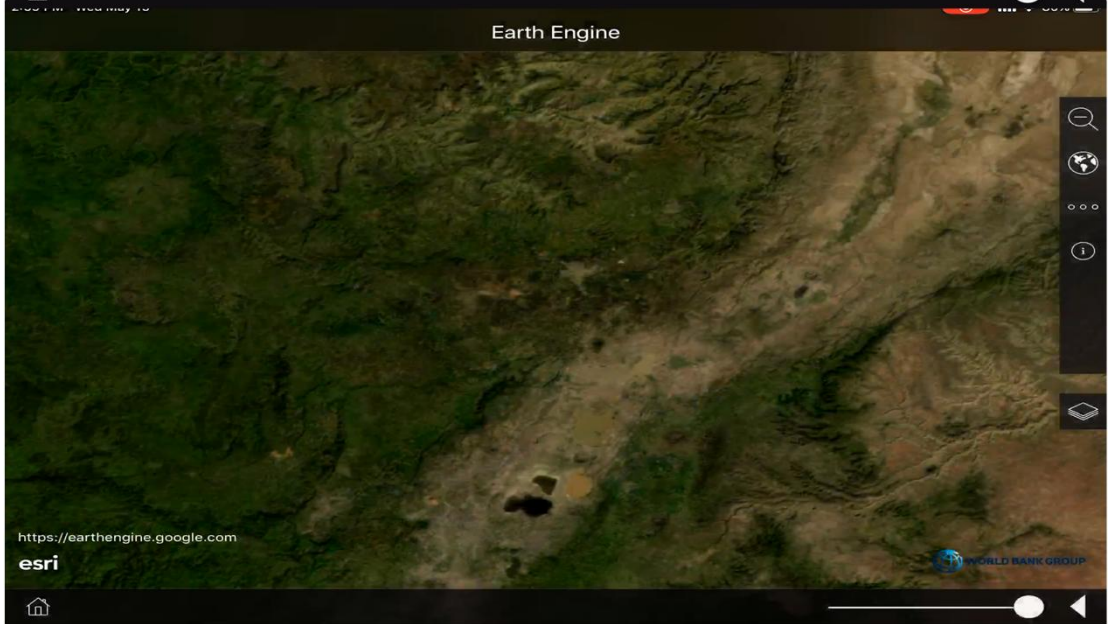
Earth Engine
https://earthengine.google.com
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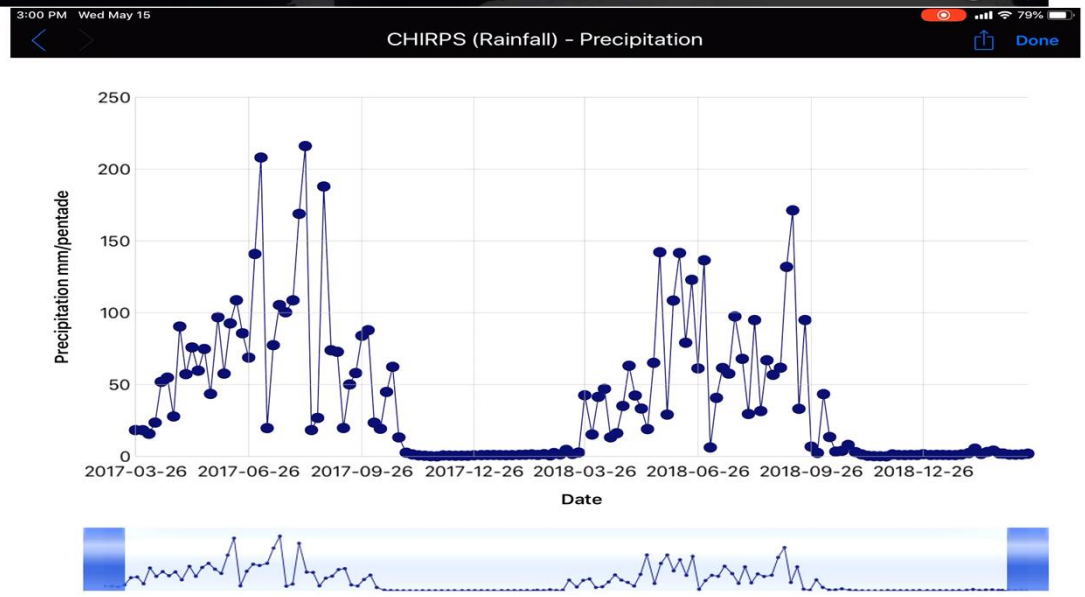
3:00 PM Wed May 15
79%
CHIRPS (Rainfall) - Precipitation
Done
Precipitation mm/pentade
250
200
150
100
50
0
2017-03-26
2017-06-26
2017-09-26
2017-12-26
2018-03-26
2018-06-26
2018-09-26
2018-12-26
Date


3:06 PM Wed May 15
77%
Flood Exposure
Select Sublayer
Flood Events
Flood Exposure
Flood Hazard
Flood Hazard Frequency and Distribution
Flood Proportional Economic Loss Risk Deciles
Flood Total Economic Loss Risk Deciles
Urban Rural Extents in the 10m Low Elevation Z...
United Nations UNEP
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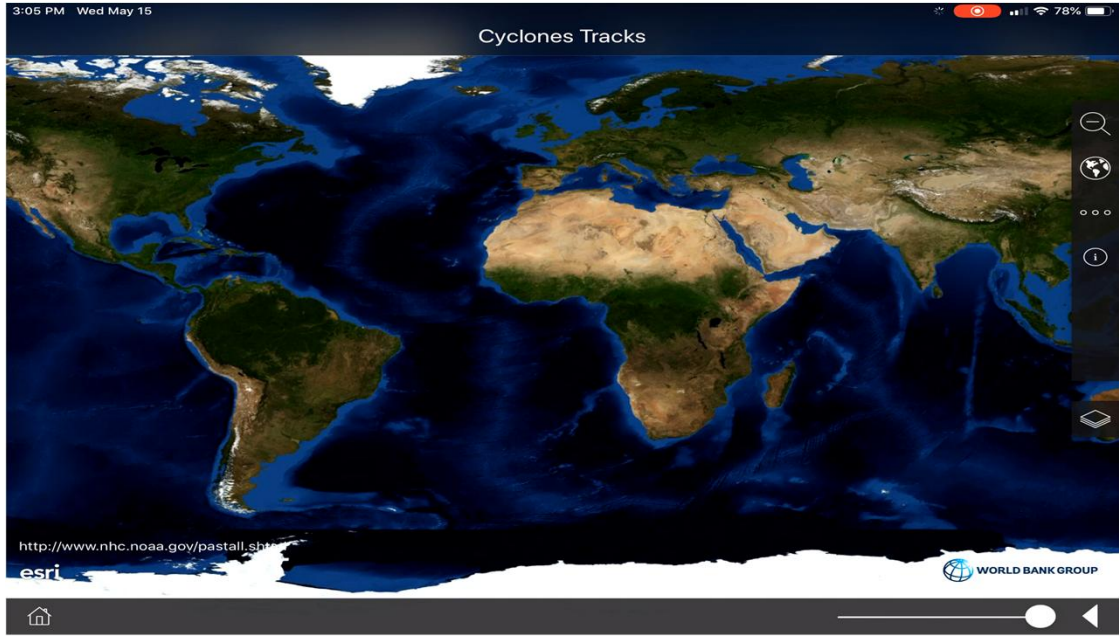
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78%
Cyclones Tracks
http://www.nhc.noaa.gov/pastall.sht
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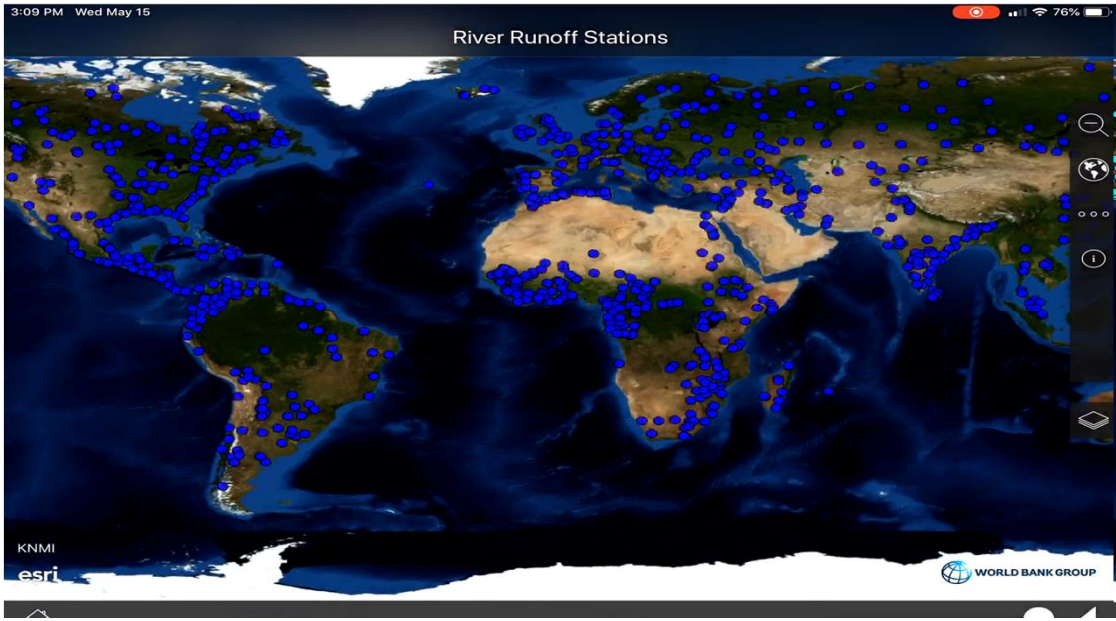
3:09 PM Wed May 15
76%
River Runoff Stations
KNMI
esri
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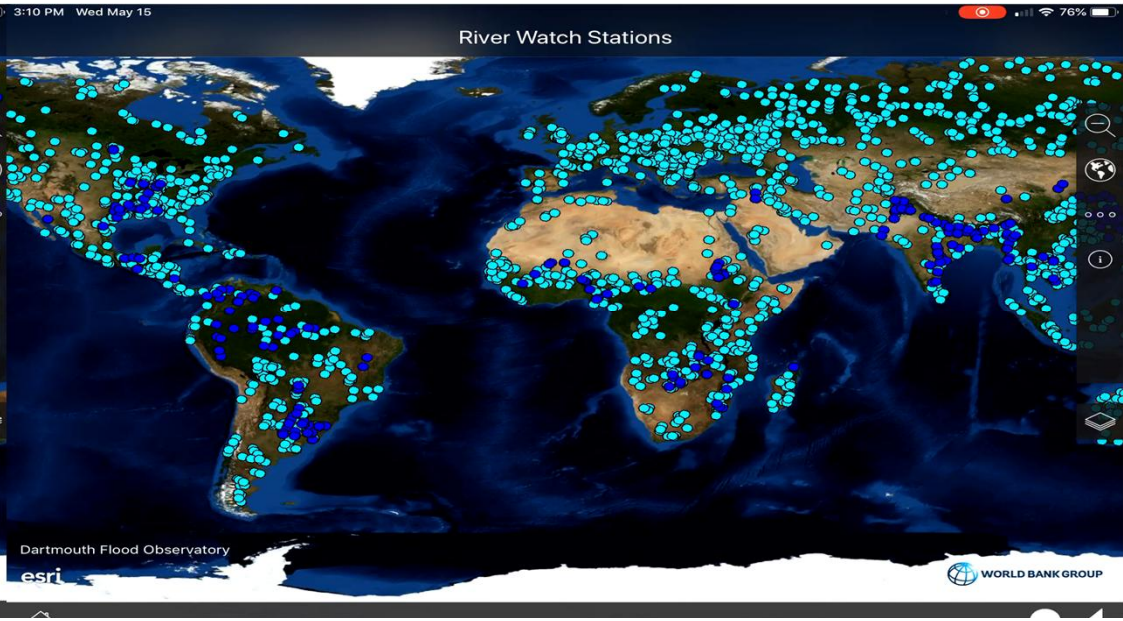
3:10 PM Wed May 15
76%
River Watch Stations
Dartmouth Flood Observatory
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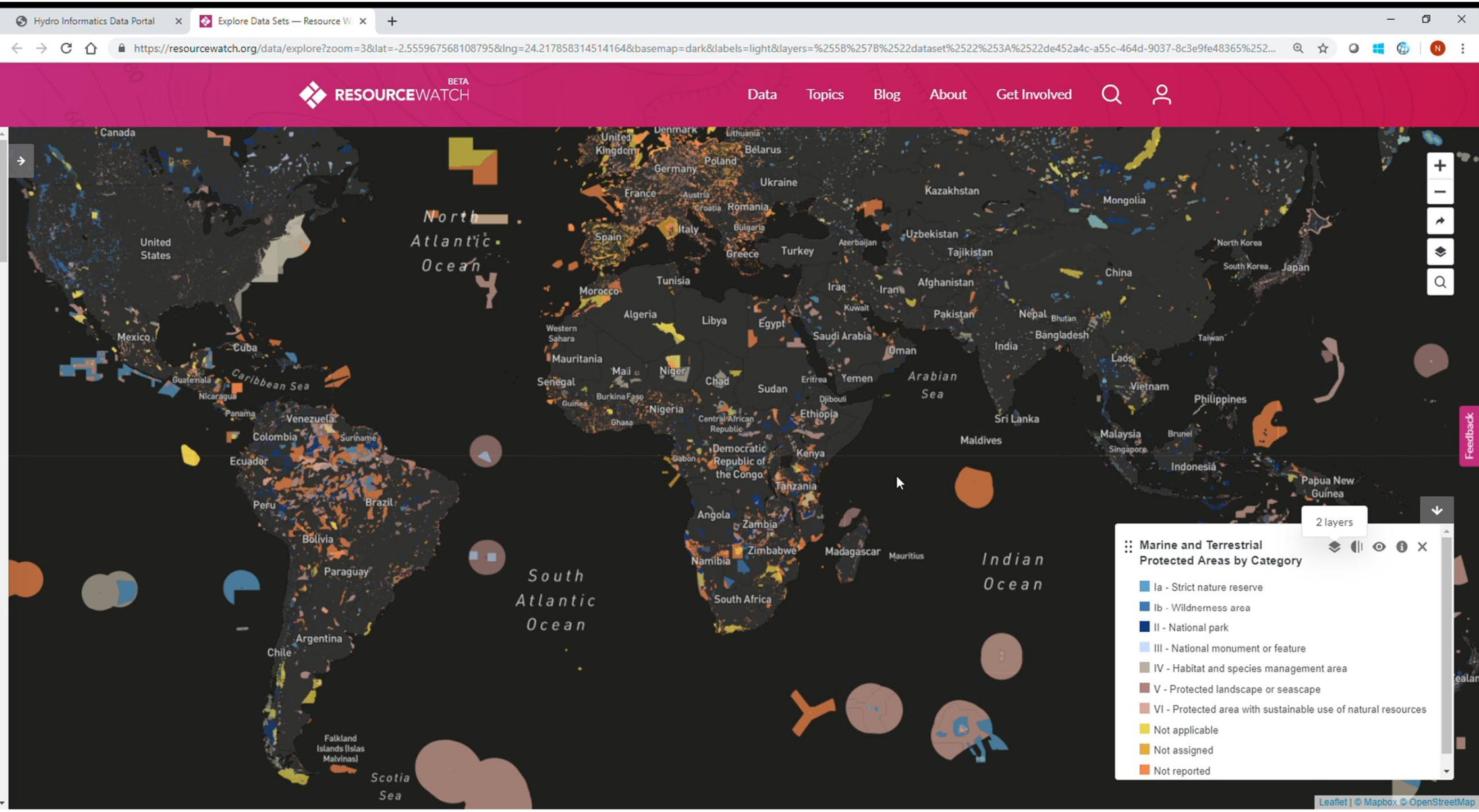
Hydro Informatics Data Portal
Explore Data Sets — Resource W
https://resourcewatch.org/data/explore?zoom=3&lat=-2.555967568108795&lng=24.217858314514164&basemap=dark&labels=light&layers=%255B%257B%2522dataset%2522%253A%2522de452a4c-a55c-464d-9037-8c3e9fe48365%252...
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South Atlantic Ocean
Indian Ocean
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Caribbean Sea
Scotia Sea
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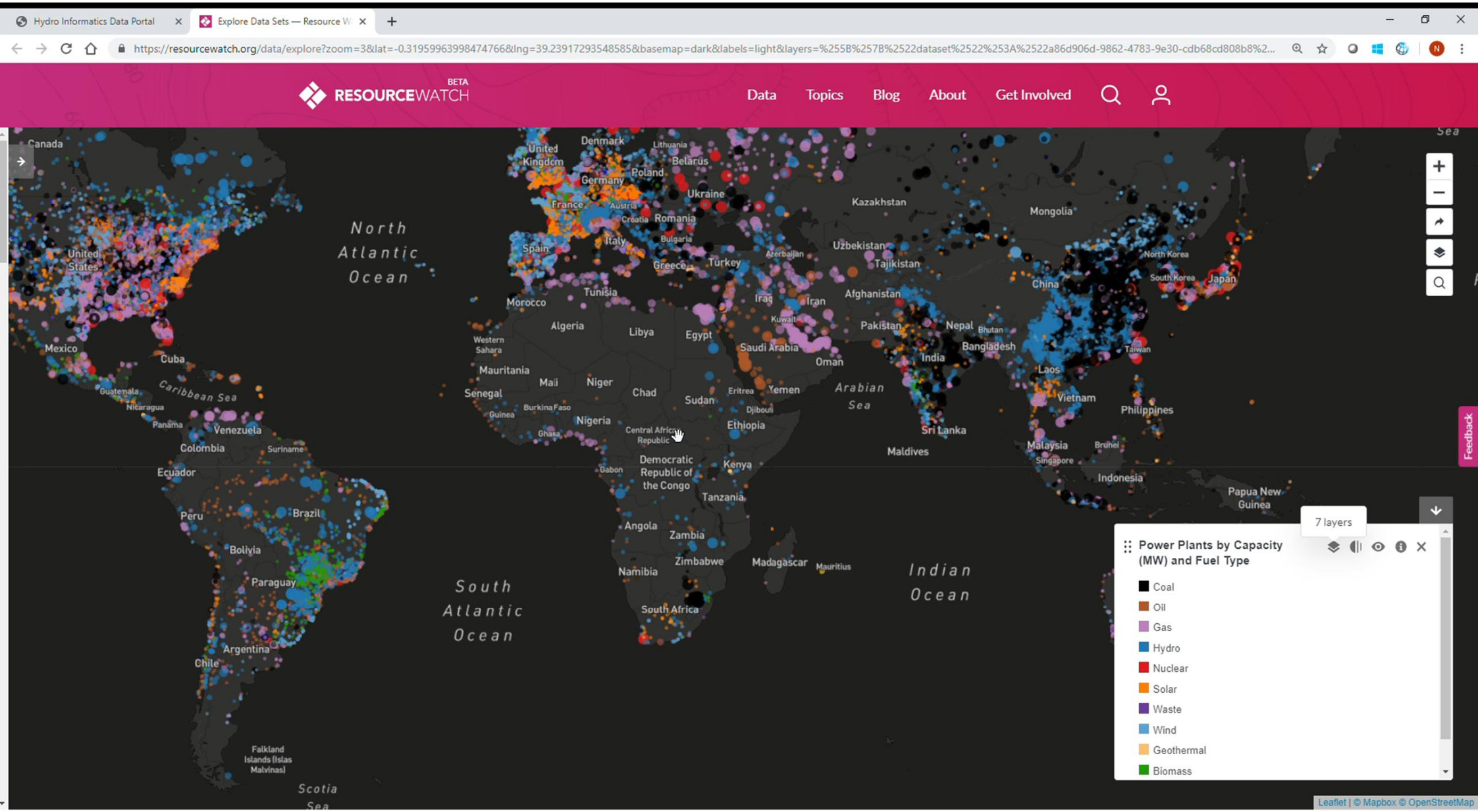
Colombia
Suriname
Ecuador
Peru
Brazil
Bolivia
Paraguay
Argentina
Chile
Falkland Islands (Islas Malvinas)
United Kingdom
Denmark
Lithuania
Belarus
Germany
Poland
Ukraine
France
Austria
Croatia
Romania
Bulgaria
Spain
Italy
Greece
Turkey
Azerbaijan
Kazakhstan
Mongolia
Uzbekistan
Tajikistan
North Korea
South Korea
Japan
China
Afghanistan
Iraq
Iran
Kuwait
Pakistan
Nepal
Bhutan
Bangladesh
India
Taiwan
Laos
Vietnam
Philippines
Sri Lanka
Maldives
Malaysia
Singapore
Brunei
Indonesia
Papua New Guinea
Tunisia
Morocco
Algeria
Libya
Egypt
Western Sahara
Mauritania
Mali
Niger
Chad
Sudan
Eritrea
Yemen
Saudi Arabia
Oman
Senegal
Guinea
Burkina Faso
Nigeria
Ghana
Central African Republic
Ethiopia
Djibouti
Gabon
Democratic Republic of the Congo
Kenya
Tanzania
Angola
Zambia
Zimbabwe
Namibia
South Africa
Madagascar
Mauritius
2 layers
Marine and Terrestrial Protected Areas by Category
Ia - Strict nature reserve
Ib - Wildnerness area
II - National park
III - National monument or feature
IV - Habitat and species management area
V - Protected landscape or seascape
VI - Protected area with sustainable use of natural resources
Not applicable
Not assigned
Not reported
Feedback
Leaflet | © Mapbox © OpenStreetMap


Hydro Informatics Data Portal
Explore Data Sets — Resource W
https://resourcewatch.org/data/explore?zoom=3&lat=-0.31959963998474766&lng=39.23917293548585&basemap=dark&labels=light&layers=%255B%257B%2522dataset%2522%253A%2522a86d906d-9862-4783-9e30-cdb68cd808b8%2...
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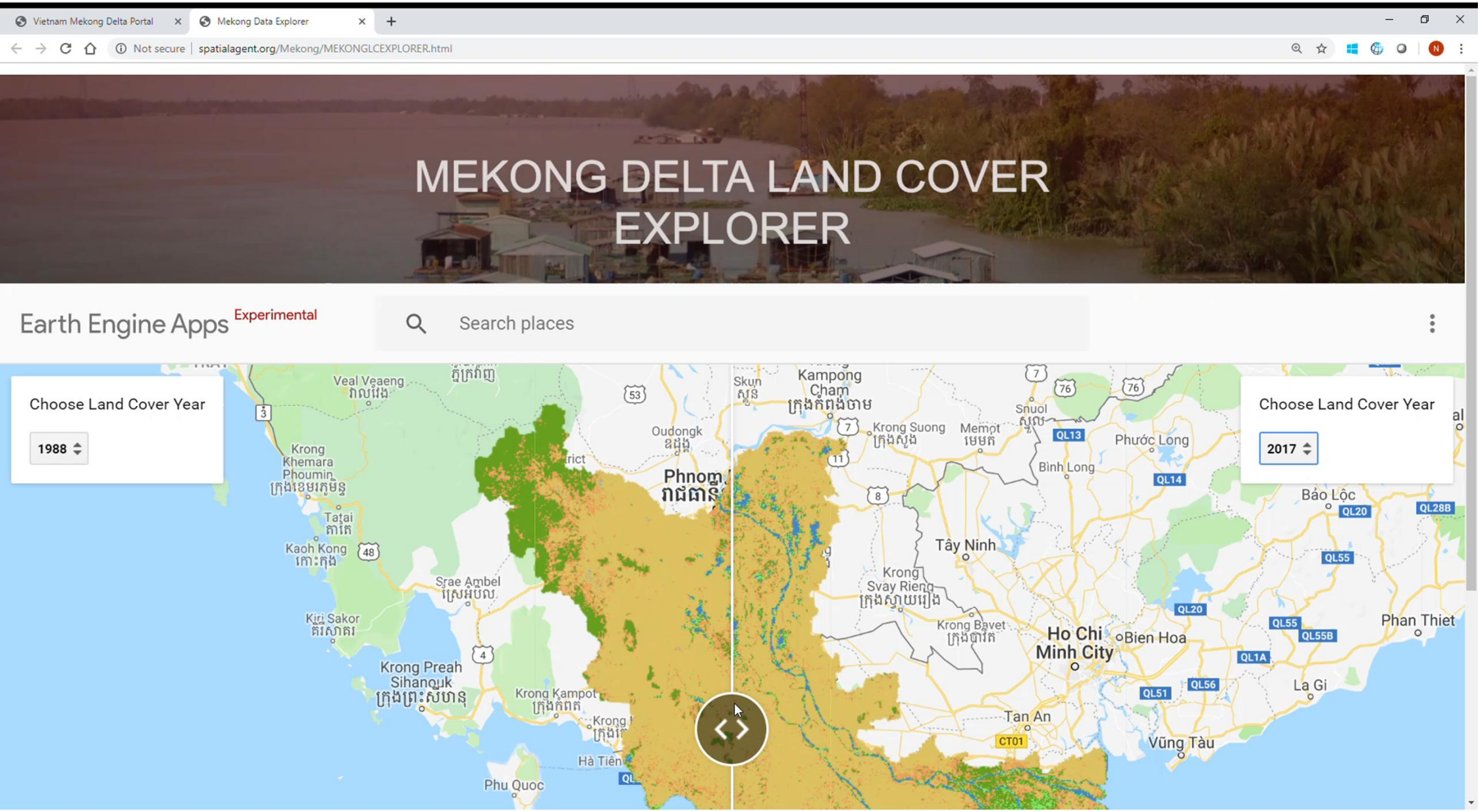
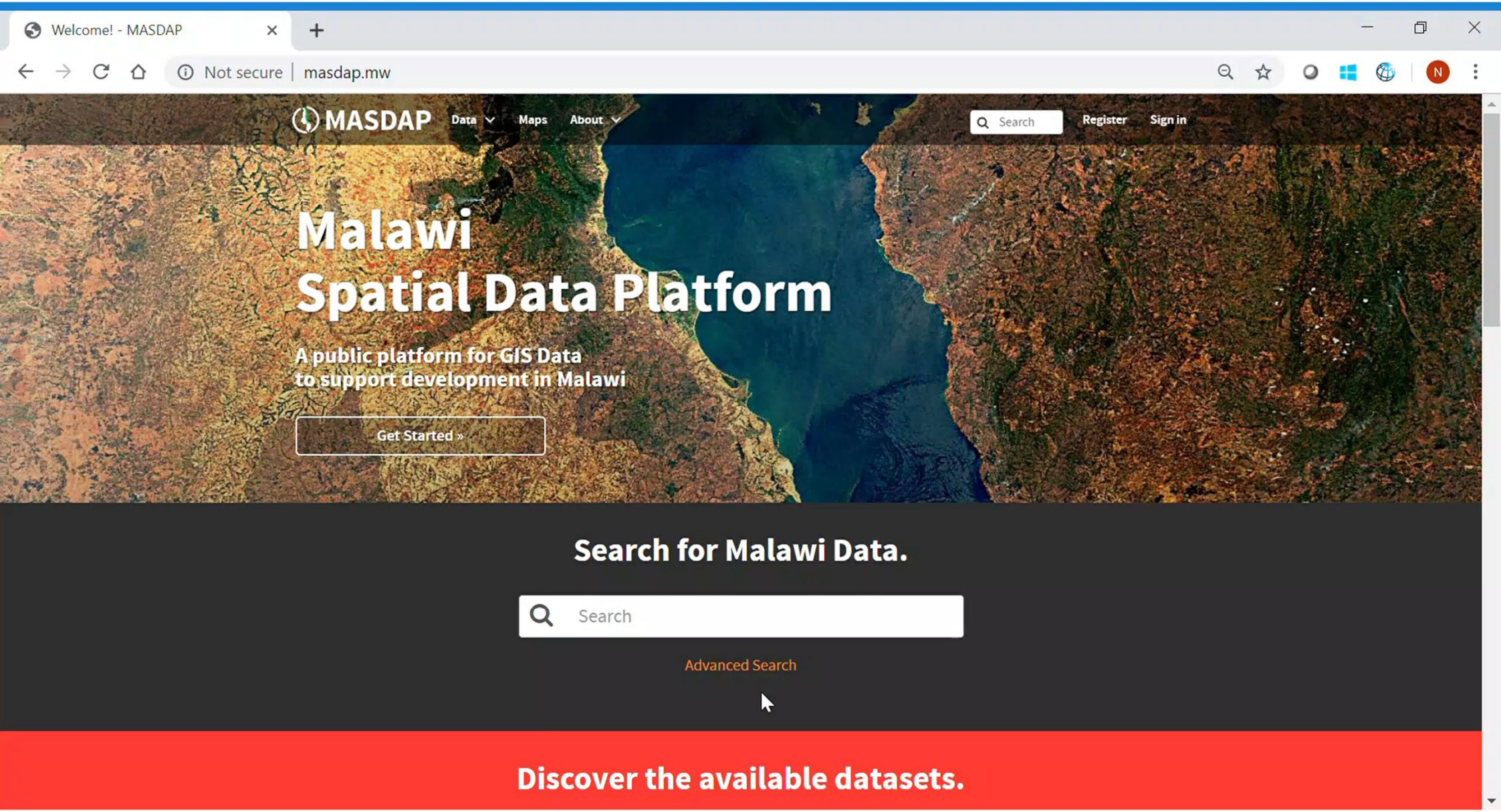
South Atlantic Ocean
Indian Ocean
Arabian Sea
Caribbean Sea
Scotia Sea
Canada
United States
Mexico
Cuba
Guatemala
Nicaragua
Panama
Venezuela
Colombia
Suriname
Ecuador
Peru
Brazil
Bolivia
Paraguay
Argentina
Chile
Falkland Islands (Islas Malvinas)
United Kingdom
Denmark
Lithuania
Belarus
Poland
Germany
Ukraine
France
Austria
Croatia
Romania
Bulgaria
Italy
Spain
Greece
Turkey
Azerbaijan
Kazakhstan
Uzbekistan
Tajikistan
Mongolia
China
North Korea
South Korea
Japan
Afghanistan
Iraq
Iran
Kuwait
Pakistan
Nepal
Bhutan
Bangladesh
India
Taiwan
Laos
Vietnam
Philippines
Sri Lanka
Maldives
Malaysia
Brunei
Singapore
Indonesia
Papua New Guinea
Morocco
Tunisia
Algeria
Libya
Egypt
Western Sahara
Saudi Arabia
Oman
Yemen
Eritrea
Djibouti
Sudan
Chad
Niger
Mali
Mauritania
Senegal
Guinea
Burkina Faso
Ghana
Nigeria
Central African Republic
Ethiopia
Kenya
Gabon
Democratic Republic of the Congo
Tanzania
Angola
Zambia
Zimbabwe
Namibia
South Africa
Madagascar
Mauritius
7 layers
Power Plants by Capacity (MW) and Fuel Type
Coal
Oil
Gas
Hydro
Nuclear
Solar
Waste
Wind
Geothermal
Biomass
Feedback
Leaflet | © Mapbox © OpenStreetMap


Vietnam Mekong Delta Portal
Mekong Data Explorer
Not secure | spatialagent.org/Mekong/MEKONGLCEXPLORER.html
MEKONG DELTA LAND COVER EXPLORER
Earth Engine Apps
Experimental
Search places
Choose Land Cover Year
1988
Choose Land Cover Year
2017
Veal Veaeng
Skun
Kampong Cham
Oudongk
Krong Suong
Memot
Snuol
Phnom
Krong Khemara Phoumin
Tatai
Kaoh Kong
Srae Ambel
Kiri Sakor
Krong Preah Sihanouk
Krong Kampot
Hà Tiên
Phu Quoc
Tây Ninh
Krong Svay Rieng
Krong Bavet
Ho Chi Minh City
Bien Hoa
Bình Long
Phước Long
Bảo Lộc
Tan An
Vũng Tàu
La Gi
Phan Thiet
QL13
QL14
QL20
QL28B
QL55
QL55B
QL1A
QL56
QL51
CT01


Welcome! - MASDAP
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MASDAP
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Maps
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Sign in
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Spatial Data Platform
A public platform for GIS Data
to support development in Malawi
Get Started »
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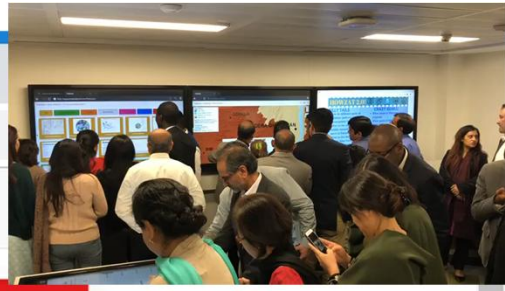
Search
Advanced Search
Discover the available datasets.



Pakistan

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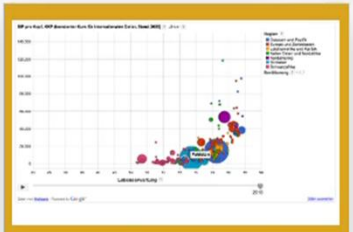
Pakistan Digital Platform, The World Bank (Draft)

All | Environmental | Social | Economic | Climate | Water | Disasters

World Bank Projects

Interactive Portfolio Visualization

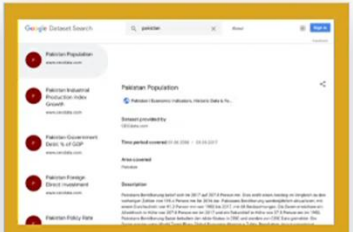


Pakistan Development Data

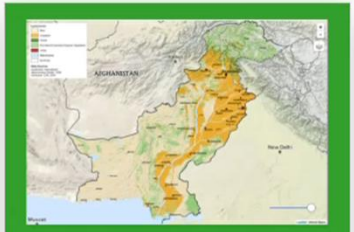
Pakistan at a Glance

GADAS (Agr)

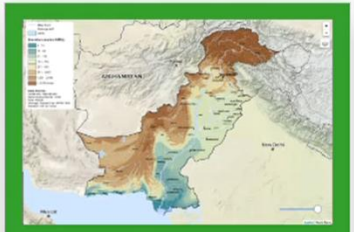
FAOSTAT



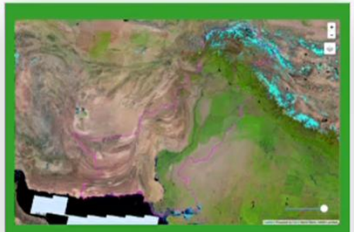
Google DataSearch



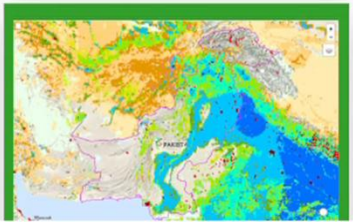
Land Cover (Satellite)

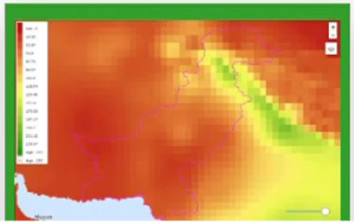


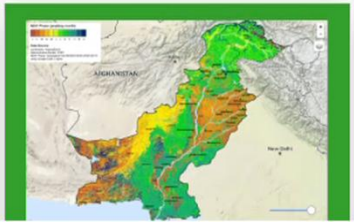
Topography



Landsat Vegetation Analysis







Pakistan

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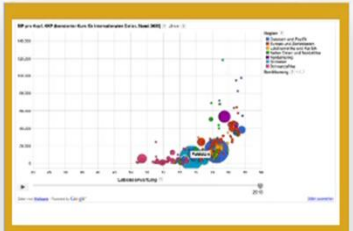
All | Environmental | Social | Economic | Climate | Water | Disasters

World Bank Projects

Interactive Portfolio Visualization

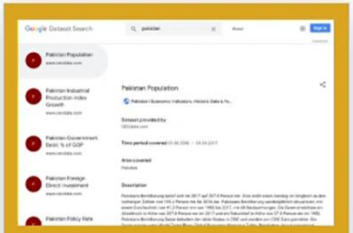


Pakistan Development Data

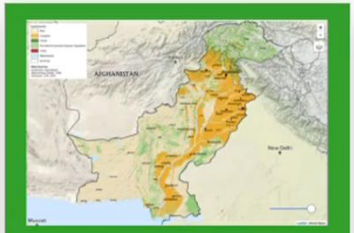
Pakistan at a Glance

GADAS (Agr)

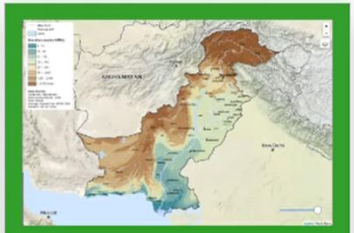
FAOSTAT



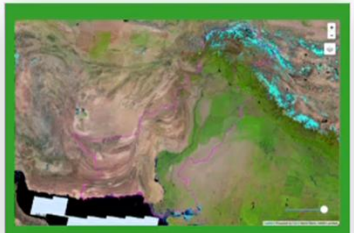
Google DataSearch



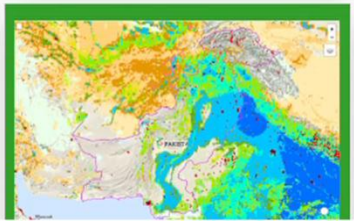
Land Cover (Satellite)

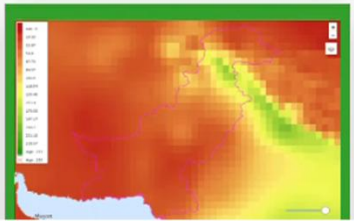


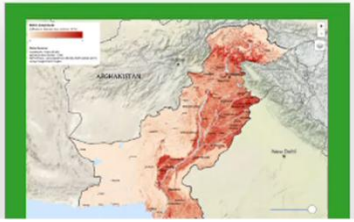
Topography

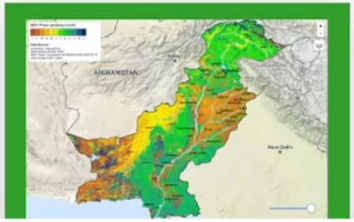


Landsat Vegetation Analysis







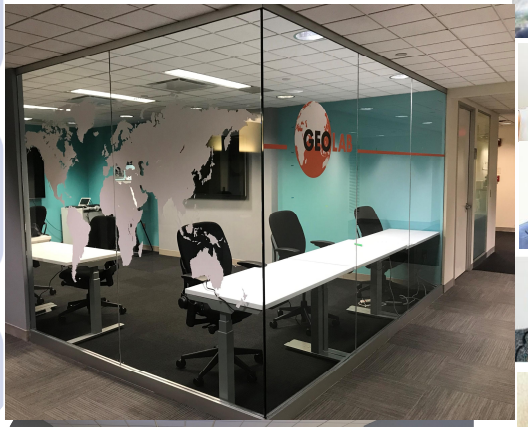


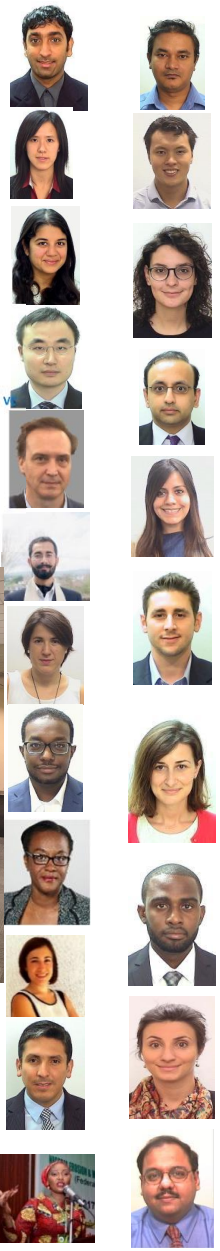
Disruptive Technology

WORLD BANK GROUP

Disruptive KIDS (Knowledge, Information & Data Services) Helpdesk

Rapid research	• Interactive Literature and Multi-media reviews
Data analysis and visualization	• Customized Google Earth Engine analytics • Interactive visualizations: maps, animations, portfolio charts
Presentation/ Packaging	• Infographics; Google Earth Flythroughs • Interactive Storymaps; Interactive Dashboards/Data Portals • Quick E-books
Training/Outreach	• Facilitating Disruptive Tech BBLs and other training (for teams and clients) • Search for relevant training for staff and clients on disruptive tech • Disruptive KIDS Newsletter
Interface with other teams and experts	• Link with Internal Tech-related Groups • Disruptive Tech Network • External experts (e.g. NASA, ESA, GEO, tech firms, academia, CSOs, client agencies, etc.)





Current Technology Support Institutional Landscape at the World Bank

Disruptive Technology Network

Digital Agricultural Technology

Open Source Software Group

Digital Development

ITS Technology & Innovation Lab

GEMS

Open Learning Campus (OLC)

Enterprise Architecture

GDLN

WBG Library Network

Analytical & Geospatial Working Group

Disruptive KIDS (Knowledge, Information & Data, Services) Helpdesk

2030 Group

KM

4IR

GOST

Digital ID

GAFSP

Data Collaboratives

SD DataLab

DT4D

Geospatial Community of Practice

Presidential Delivery Initiative

GovTech

WDI

Innovation Labs

DT Legal

...

City Resilience Program

GCS (incl. VR)

Visitor Center

DECDG

Development Data Hub

Regional Hubs (e.g. Singapore, Korea)

AgObservatory

Smart Supervision App

Spatial Data Infrastructure

Competitions

HydroInformatics Platform

Partnerships with ESA, NASA, GEO, etc.

Basin Planning

Data Standards

Monitoring Equipment

Policies & Institutions

Cloud Analytics

Groundwater Management

Drought Preparedness

Earth Observation

Pollution Management

Nature-based Infrastructure

Water Infrastructure Systems Coordination

Flood Management

Watershed Management

Water Security Dashboards

Climate Adaptation

Operational Basics & Recent Advances

Evolving Global Good Practices

Lessons Learned

Government Implementation Experiences

Private Sector Perspectives

Online courses, e-books

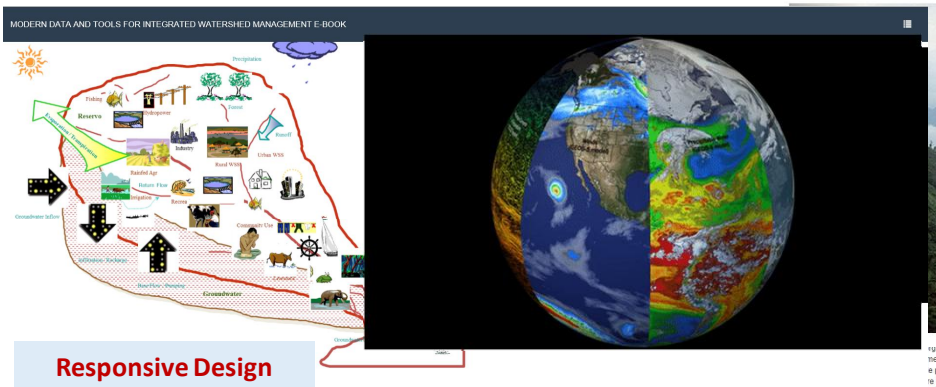
Professional Networking

Videoconference/Collaborative Digital Networks

Virtual Seminars on Key Topics from Global Experts

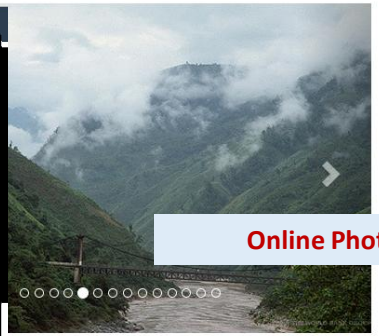
Virtual Desktop Participation; e-learning

Illustrative Elements of an E-book

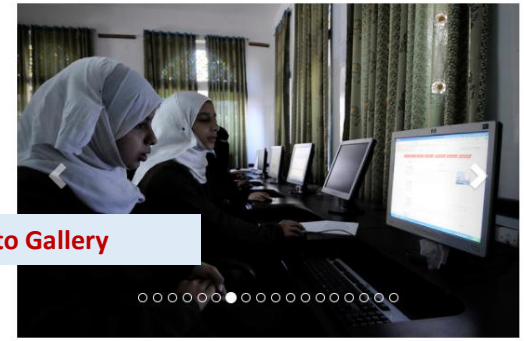


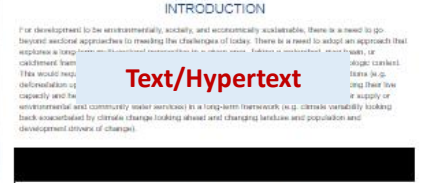
Responsive Design

[NASA-WB e-book on EO for WRM](#) (on OLC)



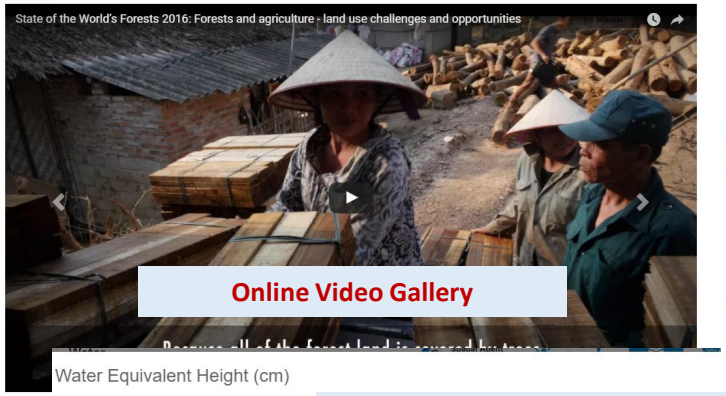
Online Photo Gallery





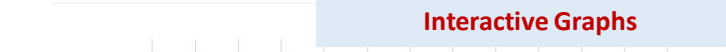
Text/Hypertext

Interactive Presentation Slides

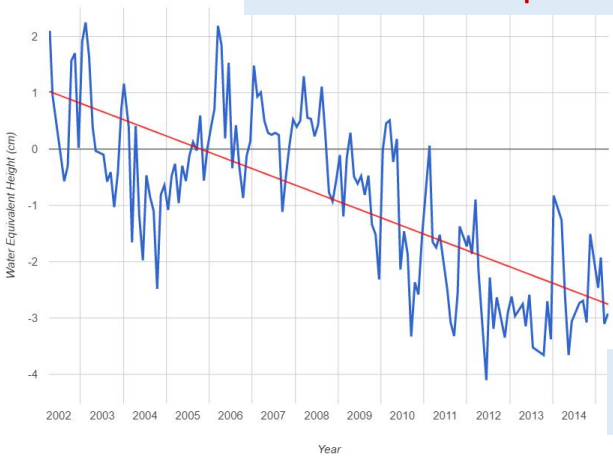


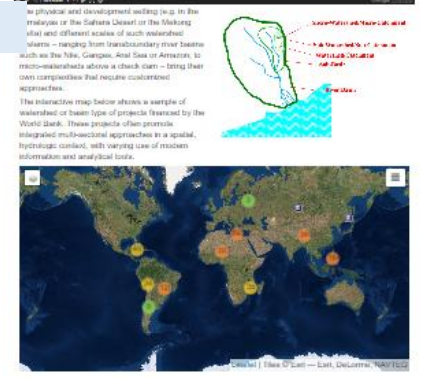
Online Video Gallery

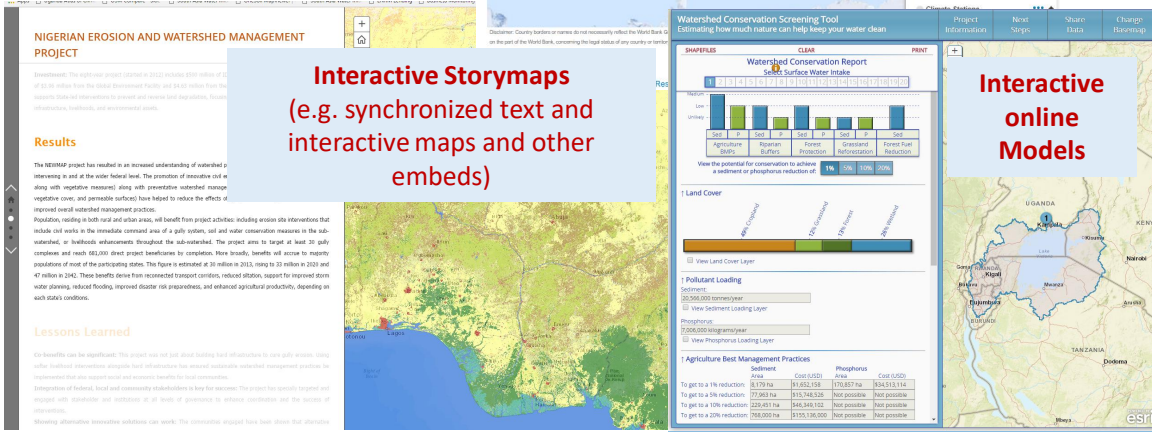
Interactive Map & Data Services
(e.g. web version of Spatial Agent)



Interactive Graphs







Interactive Storymaps
(e.g. synchronized text and interactive maps and other embeds)

Interactive online Models

Interactive Spatial Gateways
(e.g. World Bank financed Projects)

"Disrupting" Development

An Interactive Primer on Disruptive Technology in Development

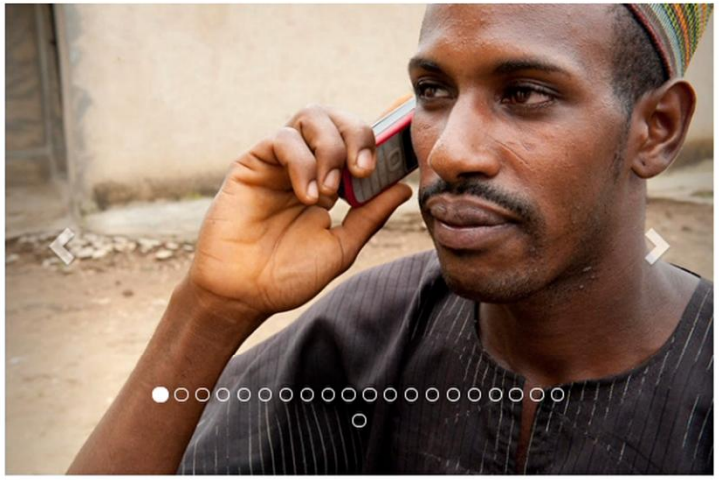


Table of Contents

Geospatial Dashboards

Interactive e-Atlas/Dashboard Drafts

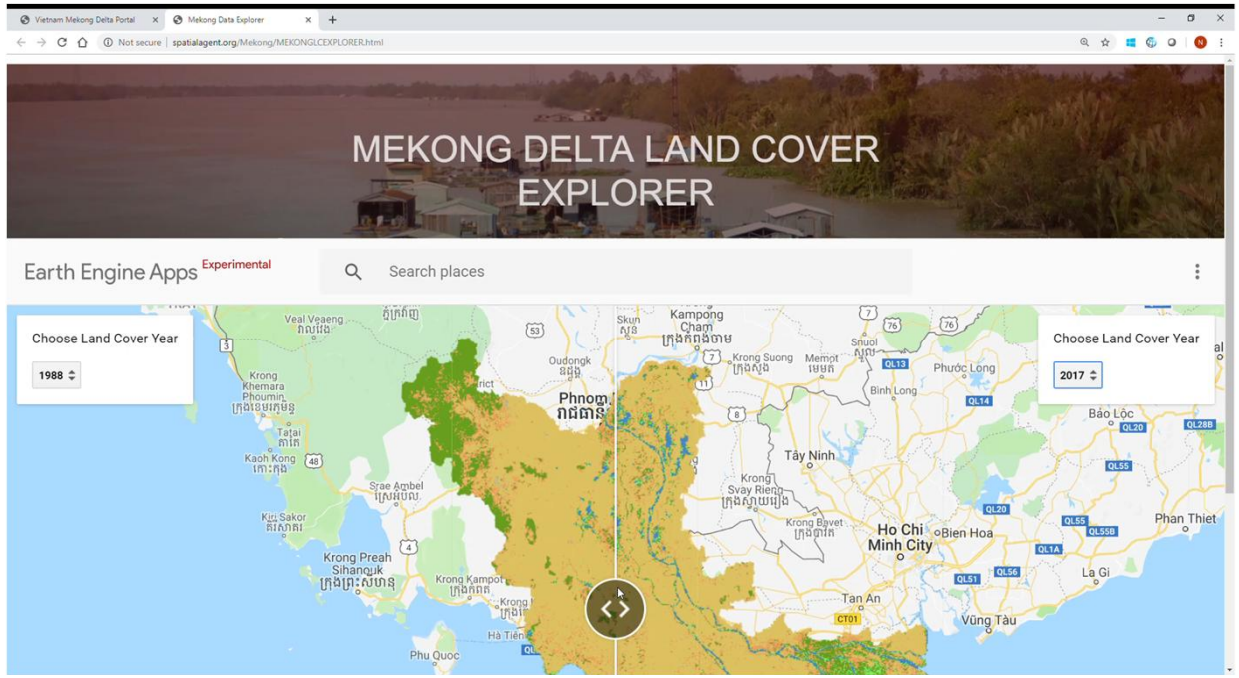
(Use Chrome Browser):

- Global HydroInformatics
- Draft Open Pollution Data Initiative
- Pakistan
- Ethiopia
- Sudan
- Mekong Delta
- Lake Victoria
- Namibia
- Uganda
- Kerala
- Peru
- Bhutan
- Africa
- Sri Lanka
- Somalia
- West Africa Coastal Areas
- Central Asia
- Nigeria
- Sierra Leone
- EU Poverty

The **Spatial Agent** app – download from http://apps.worldbank.org or directly from iOS AppStore (recently updated)/Android Version (much older- being updated)

OLC Spatial Agent tutorial/webinar (links to factsheet, webinar, illustrative graphics, interactive tutorial, etc.)

Web-version prototype for Water (being scaled-up – this is the web version where you can overlay layers)



Interactive E-books

Interactive e-books (to package information in interactive ways - use Chrome browser – navigation on top-right, pls note - many still in draft):

- Disruptive Tech Primer
- NASA-WB Earth Observations e-book (jointly done with NASA – and on the Bank's Open Learning Campus)
- In-Situ Monitoring Systems (example of a simple interactive database)
- Smart Cities e-book (some interactive maps/data here)
- Illegal Wildlife Trade e-book (see interactive charts here)
- ICT and Forests e-book (interactive storymap example here)
- Technology in SD (see d3 filter example here)
- Modern Information Tools for Watersheds (used for a training event)
- California Water Resources
- Water Accounting
- Model Primer

“Disrupt” Agriculture…

- There is a fast-moving world of technologies out there that we should be aware of – ***both to benefit from and cope with the changes!***

- Disruptive technologies both ***enable*** and ***require*** us to work across sectors – need to step outside our “comfort zone”!!!

- Time to **reimagine agri-food** fundamentally in a disruptive age!

Disrupt or Be Disrupted!

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