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SERVIR-Mekong Applications for Sustainable Power Planning in the Lower Mekong

ACEF2021 Side Event: Applying New Integrated Resources Planning and Data Visualization into Sustainable Power Planning in the Mekong Subregion

June 16, 2021



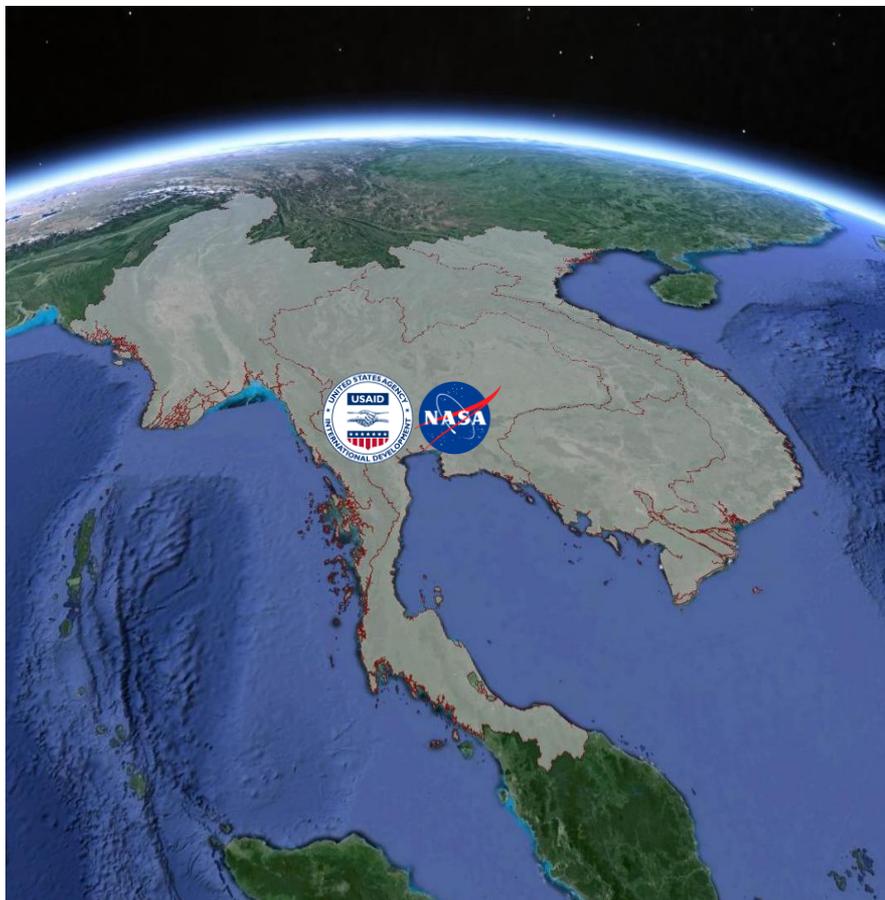


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What is **SERVIR-Mekong**

1. Partnership between NASA and USAID
2. Hosted by the Asian Disaster Preparedness Center (ADPC)
3. Aimed at long term sustainability of the geospatial hub at ADPC
4. Utilizing satellite data and geospatial data analytics to address disaster and climate issues

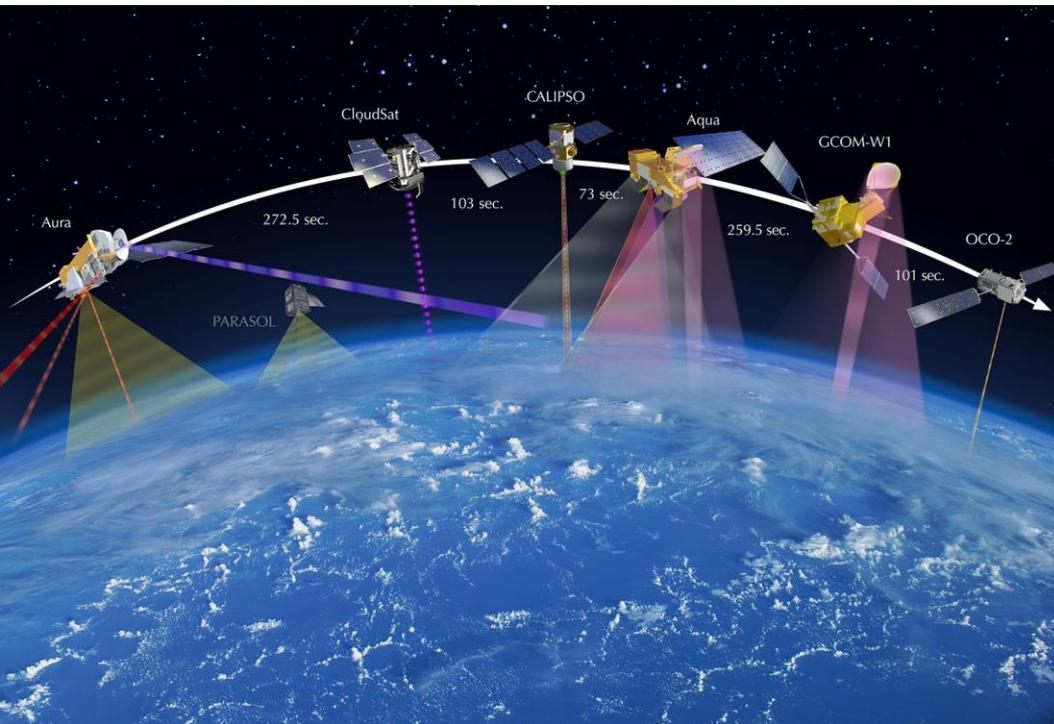


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Why Satellite Earth Observations

- Satellites scan a large area of the Earth's surface in one pass, and repeatedly.
- Satellite-derived data include surface water, soil moisture, temperature, water level, land cover types, air pollution, and many more.





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Satellite Applications for Sustainable Power Planning



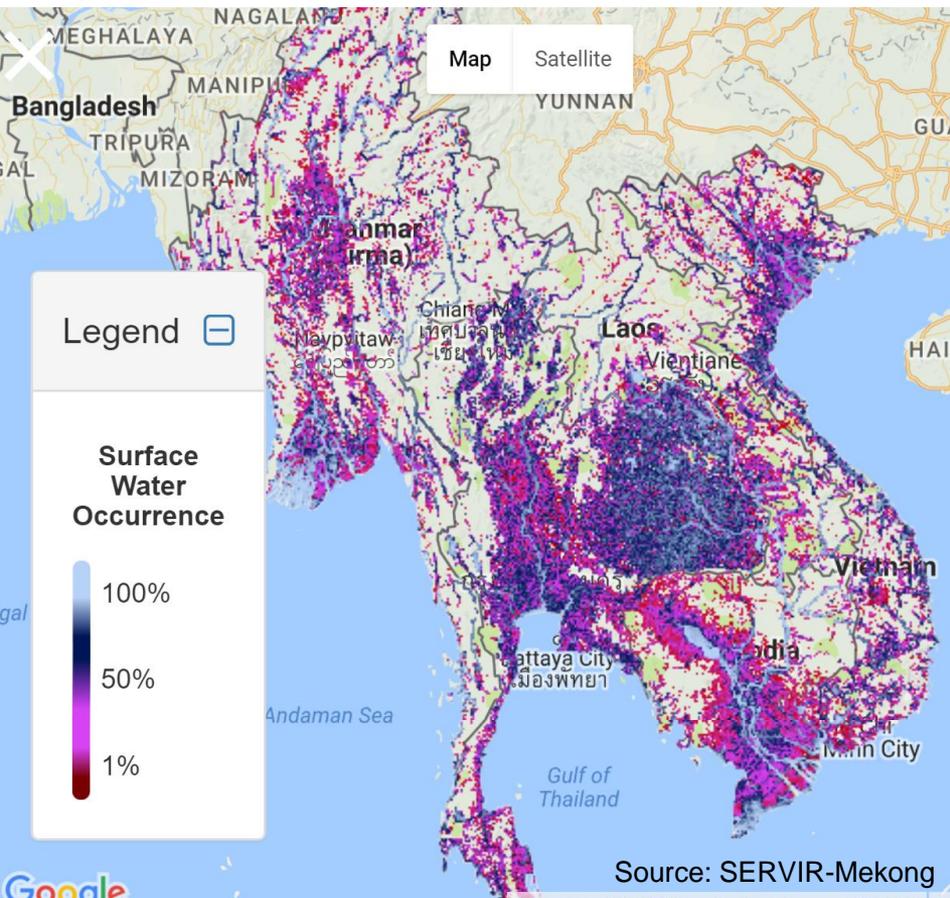


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Flood Risk Assessment and Risk Mitigation Planning

Over 40 years of satellite-derived flood occurrence frequencies inform energy decision makers on the high risk areas and guide actions for mitigating the flood risk at the sites of energy infrastructures.





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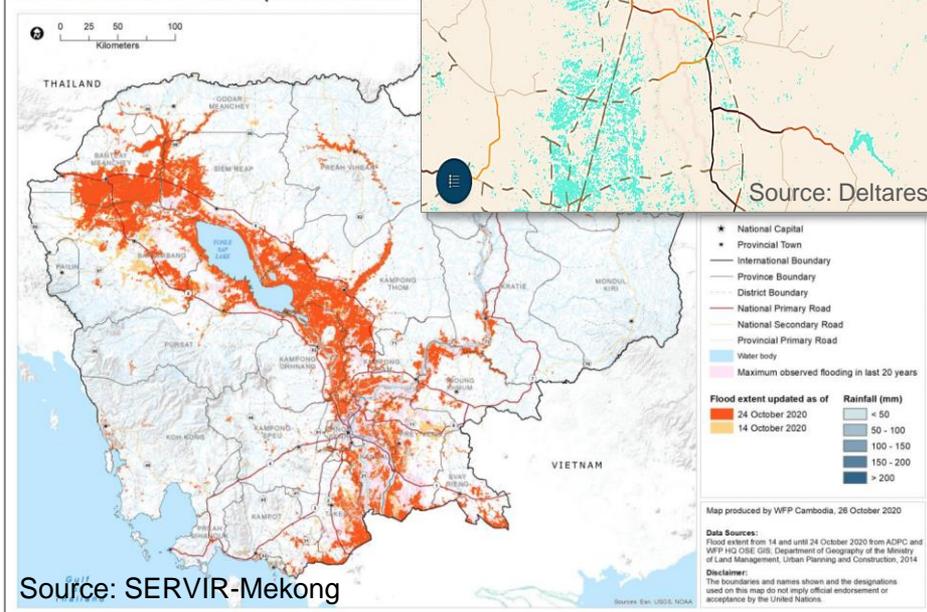
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Flood Impact Assessment

Overlaying the extent of flood – as *it happens* – with locations of energy infrastructures and roads give an early indication of the flood impact, in terms of damage to the infrastructures and accessibility.

SATELLITE-DETECTED WATER (as of 24 October 2020)



Source: SERVIR-Mekong



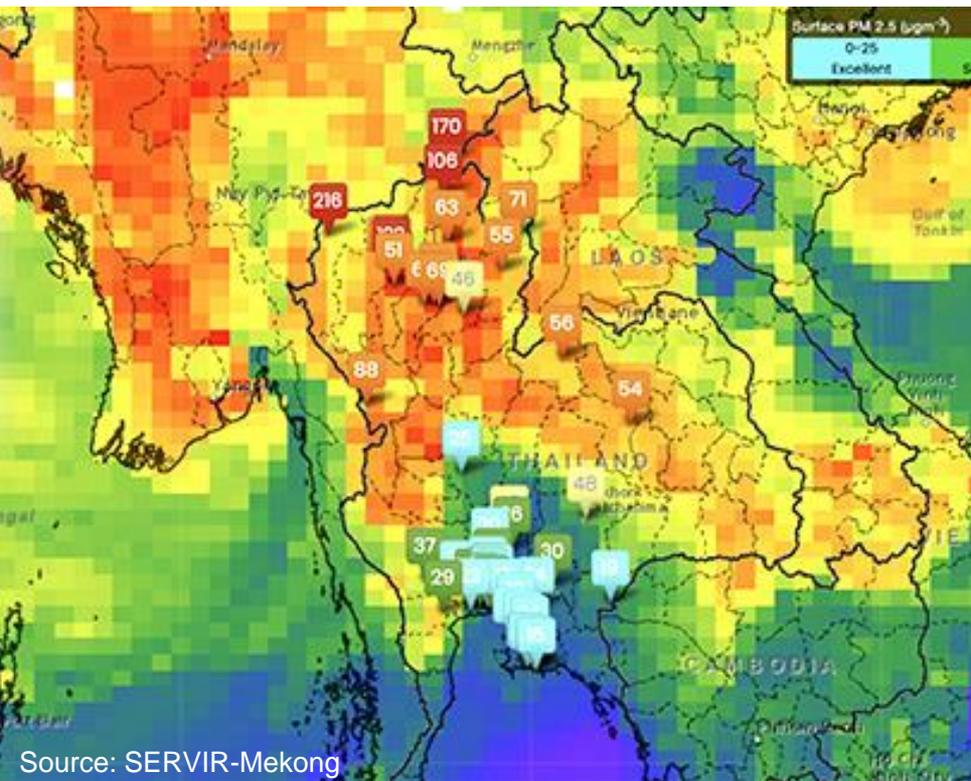


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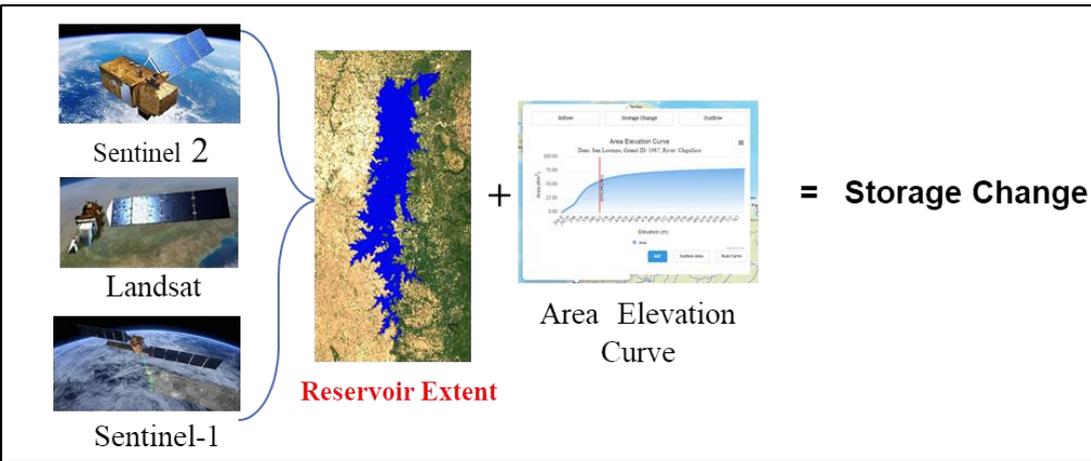
Air Quality Monitoring and Forecasting

SERVIR-Mekong's Air Quality Explorer reports on air quality improvement as one indicator of success for clean energy initiatives.

Source: SERVIR-Mekong

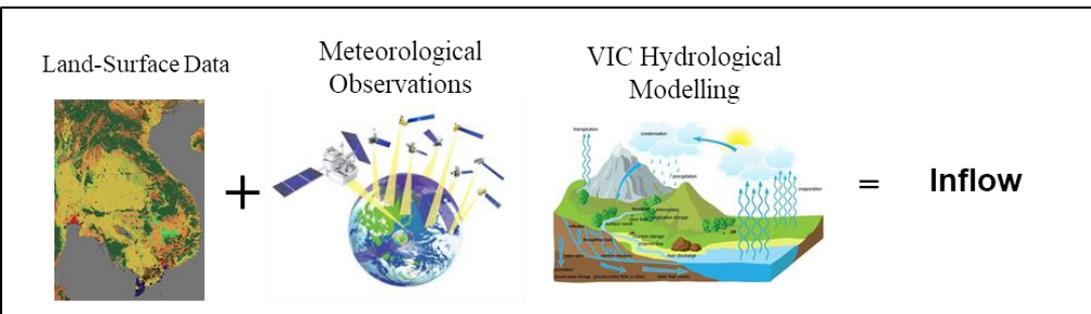
<https://aqatmekong-servir.adpc.net/>

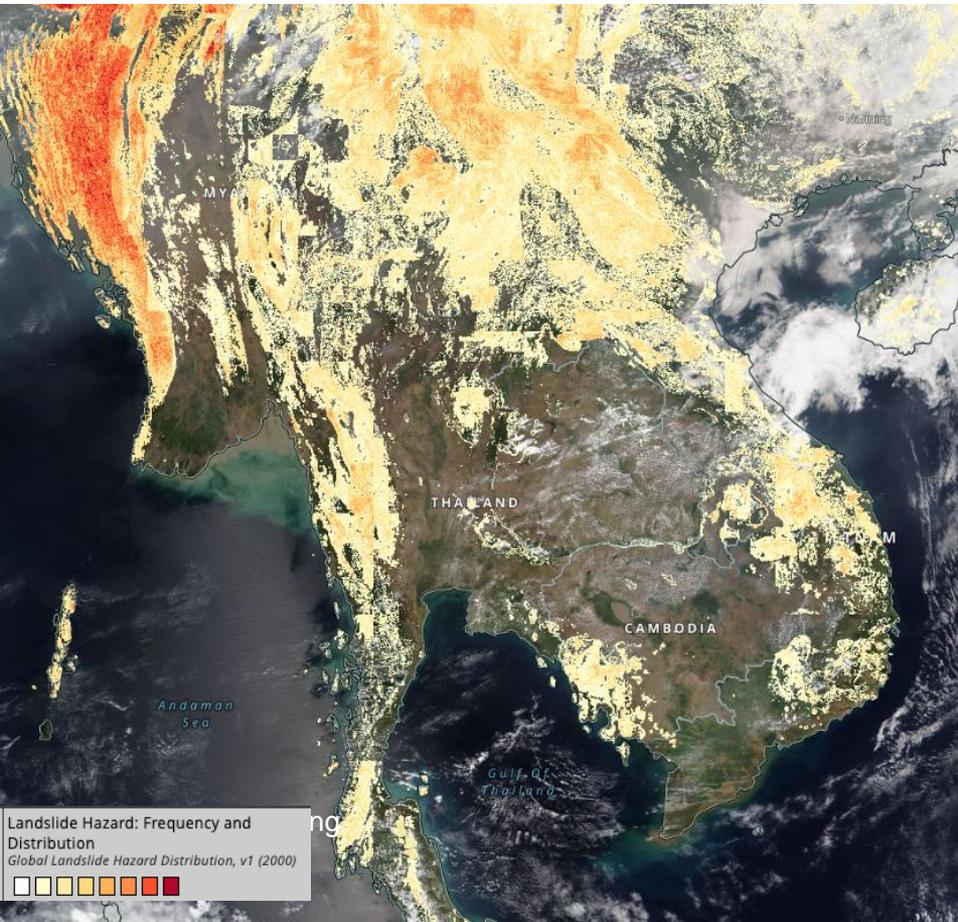




Estimating reservoirs' water storage and flows

The Mekong Reservoir Assessment Tool uses satellite data and hydrological model to estimate water levels, reservoir storages and the water inflows of dam reservoirs in the Lower Mekong.



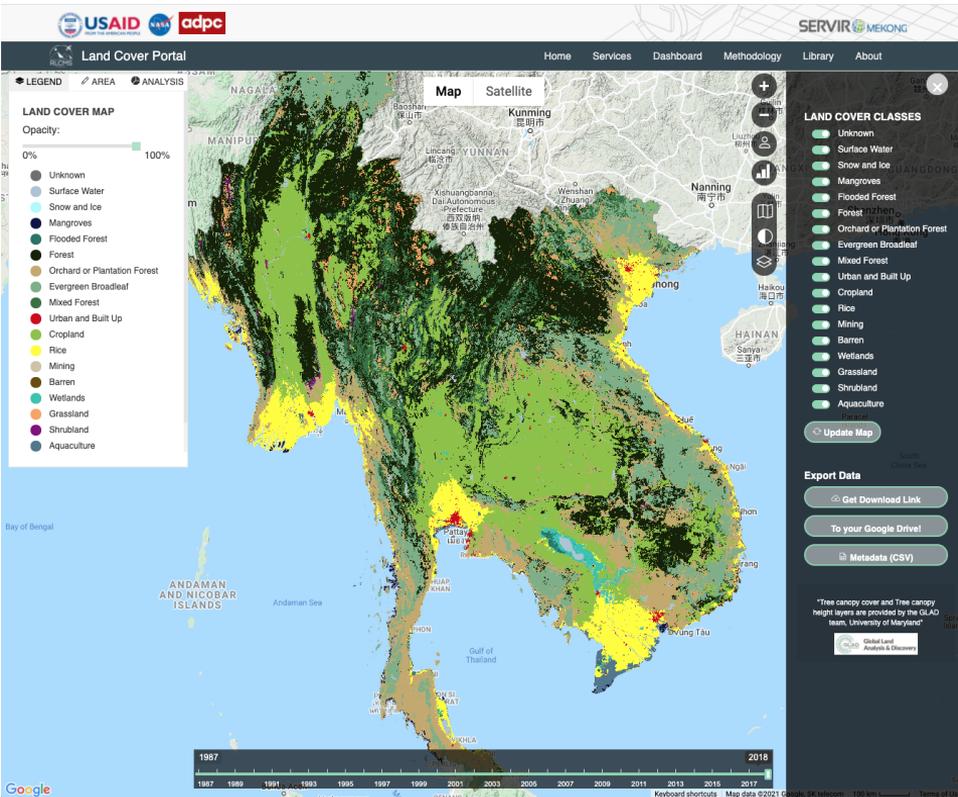


Landslide Hazard: Frequency and Distribution
Global Landslide Hazard Distribution, v1 (2000)

White	Light Yellow	Yellow	Orange	Red-Orange	Red	Dark Red
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Landslide Hazard

SEVIR-Mekong is developing a landslide hazard assessment system. Data can be used to evaluate landslide susceptibility within a utilities' service area capable of destroying electric utility infrastructure and to support hydropower planning.



Land Cover and Vegetation

The Regional Land Cover Monitoring System provides nearly 20 years of annual land cover maps enabling forest, land use, and GHG/carbon monitoring. The se data can support vegetation management in areas with power lines susceptible to vegetation encroachment.

<https://www.landcovermapping.org/>



June 16 | CPA

NASA and SERVIR

Amanda Markert
Mekong Science Coordination Lead
SERVIR Science Coordination Office
NASA Marshall Space Flight Center



ICIMOD



Countries Around the World Need Satellite Data



PROBLEM

- Complex challenges occur in data-scarce environments
- Most countries lack the capacity to use satellite data and geospatial technologies to manage resources and risk

APPROACH

- Build regional capacity at a global scale in the spirit of self-reliance
- Ensure needs-driven and collaborative solutions for impact, buy-in, and sustainability
- Leverage U.S. leadership in science and technology



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LAND COVER PORTAL METHODS SERVICE APPLICATIONS

The map data shows the landcover data for 2017

Sign in with Google (to download data to your Google d)

Land Cover Map Primitives

View Version 1 Products

Compare Landcover of different years

Show Probability Map

Download Data/Typology

Landcover Map Opacity Opacity: 1

Draw or Upload Area Administrative Region

Draw Polygon

OR

Draw Circle

OR

Draw Rectangle

OR

Upload Area (accepts kmz, kmz and geosjson)

2000 2017

Who is SERVIR?



- Poverty reduction and resilience
- Data-dependent issues in data-scarce places
- International field presence



- 30+ Earth observing satellite missions, free & open data policies
- Major research portfolio
- Societal benefit from space

Regional Hub Host Institutions:



Hub Consortium Members:



Private sector collaborators:



Research collaborators: Over 20 US universities and research centers through the Applied Sciences Team

USG collaborators: NOAA, USGS, USFS

Intergovernmental, NGO collaborators: Food and Agriculture Organization, World Food Programme, Red Cross, Mercy Corps

University collaborators: ITC, university networks in region

SERVIR Focuses on Asia, Africa, & the Americas



SERVIR Science
Coordination Office
NASA MSFC

USAID Washington
NASA Headquarters

SERVIR Amazonia
CIAT

SERVIR West Africa
AGRHYMET

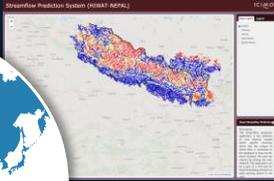
SERVIR Eastern &
Southern Africa
RCMRD

SERVIR Hindu Kush Himalaya
ICIMOD

SERVIR Mekong
ADPC

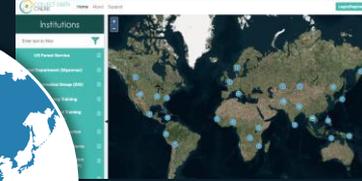
 Focus Countries
 Additional Reach

Services: Scaling, Replicating, and Exchanging across the SERVIR Global Network



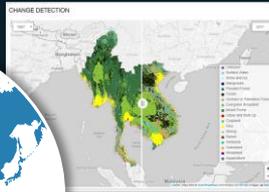
Streamflow Prediction Tool

- Hydrologic forecast system supports official flood bulletins in Nepal, scaled to Americas, Africa, and Asia through GEOGLOWS



Collect Earth Online (CEO)

- Used in Forest Resource Assessments worldwide and to collect reference data across thematic areas



RLCMS

- Further adoption of Regional Land Cover Monitoring System (RLCMS) at regional and national levels



HydraFloods

- Country-to-country replication from Myanmar to Cambodia to prioritize food assistance in the face of floods via WFP



Capacity & Services: Gender Integration and Action



41% of people trained in 2019 identify as female



SERVIR-Mekong Vietnam Gender Inequality Index (GEII) **serves gender differentiated data**, giving insight into service design and delivery.

- Building women leaders and gender champions in SERVIR
- Empowering women and girls to explore STEM fields
- Integrating gender considerations in service planning
- Using remote sensing and GIS to address development issues that are inclusive of underrepresented groups

1 million USD awarded to build mentorship programs, expand GEII, and update the Service Planning Toolkit



Women's Global Development and Prosperity Initiative



SMAP

DSCOVR
(NOAA)

GRACE-FO

ICESat-2

CYGNSS
(EVM-1)

OCO-2

Landsat 8
(USGS)

Suomi NPP
(NOAA)

SORCE

Aqua

International Space Station
LIS on ISS
SAGE III on ISS
TSIS-1 on ISS
ECOSTRESS on ISS (EVI-2)
GEDI on ISS (EVI-2)
OCO-3 on ISS

Terra

Aura

CALIPSO

CloudSat

GPM
Core Observatory

Landsat 7
(USGS)

Why Earth Observations for the Energy Sector?

Energy challenges related to climate resilience, suitability, and costs can be informed by NASA Earth Observations

- Provide insight into energy infrastructure and management systems
- Renewable resource availability (wind, solar, water)
- Weather and climate/meteorology
- Water cycle/hydrology
- Land cover and vegetation

DSCOVR
(NOAA)

GRACE-FO

ICESat-2

CYGNSS
(EVM-1)

OCO-2

Landsat 8
(USGS)

SORCE

Aqua

Aura

CALIPSO

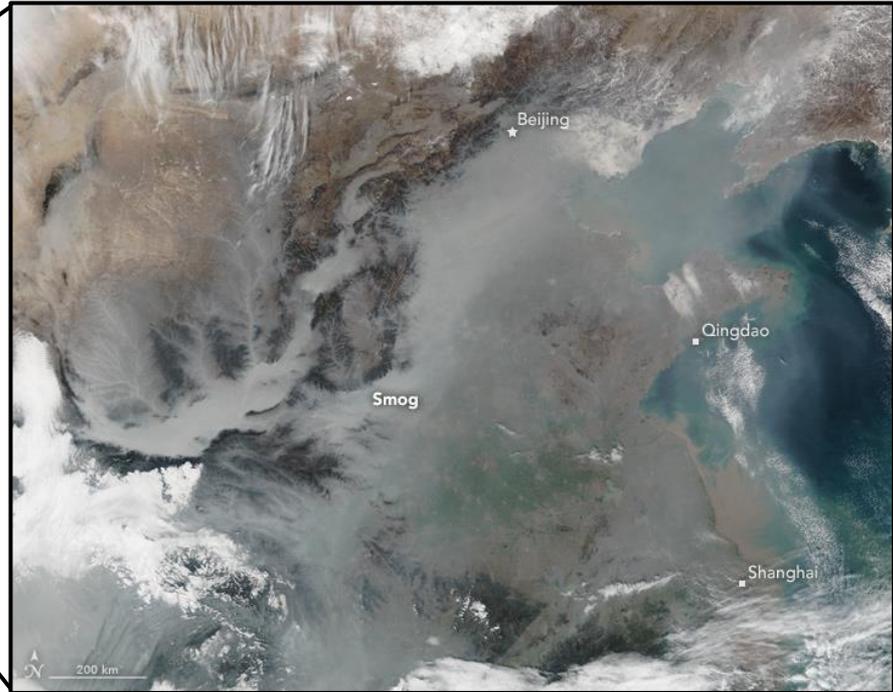
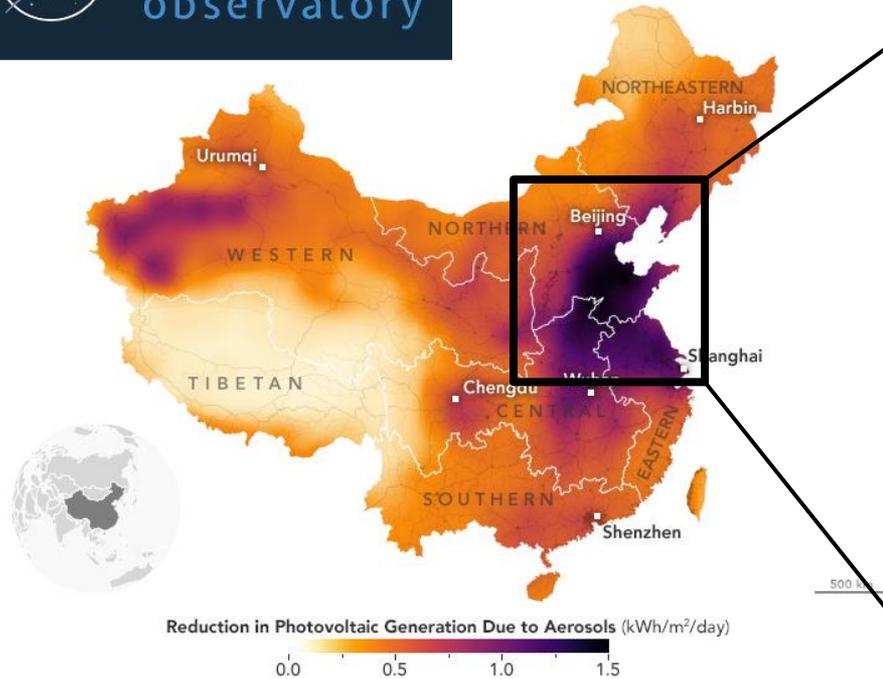
CloudSat

Landsat 7
(USGS)

How Can EO be used for Energy?



Used to Monitor Physical, Climate, and Hydro-Meteorological Parameters



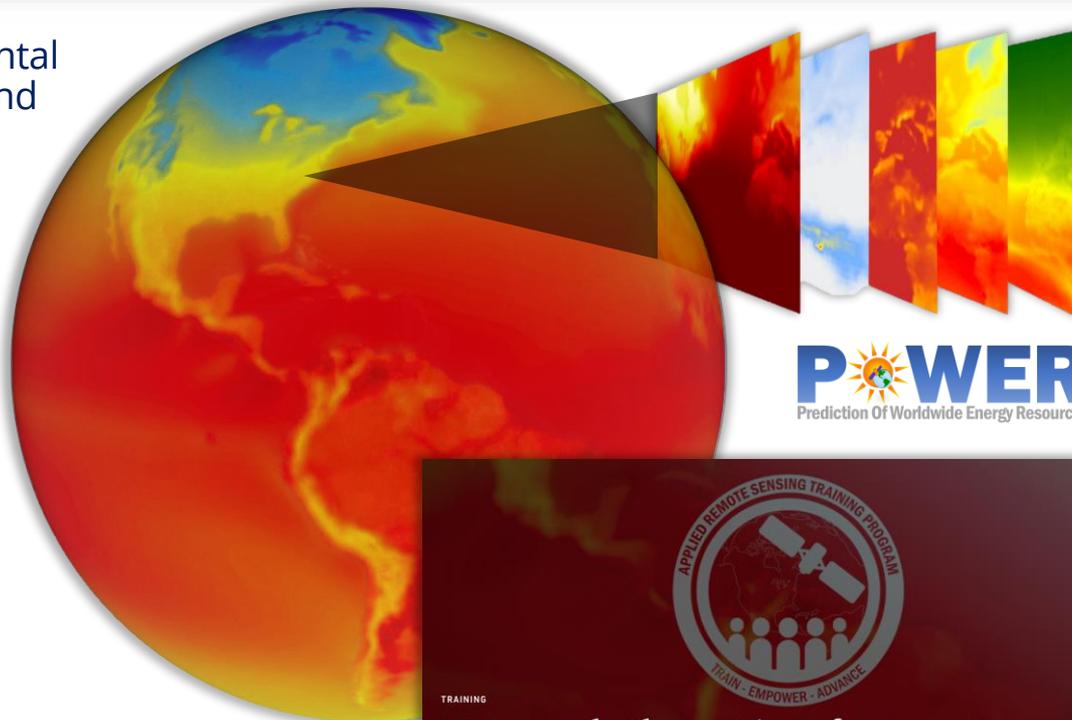
Source: Smog Smothers Solar Energy in China: <https://earthobservatory.nasa.gov/images/92054/smog-smothers-solar-energy-in-china>

*Slides adapted from NASA's Applied Remote Sensing Program Training: NASA Earth Observations for Energy Management

How Can EO be used for Energy?



- Monitor and forecast environmental threats such as climate change and extreme weather
- Assessing impacts, investment in resilience
- Green House Gas Emissions
- Meteorological Conditions
- Air Pollution



POWER
Prediction Of Worldwide Energy Resources

NASA Power Project

NASA ARSET Training:

Tuesdays, June 1, 8, 15, & 22,
2021, 10:00-11:30 or 16:00-17:30
EDT (UTC-4)

Training Recorded

TRAINING

NASA Earth Observations for Energy
Management

<https://appliedsciences.nasa.gov/join-mission/training/english/nasa-earth-observations-energy-management>

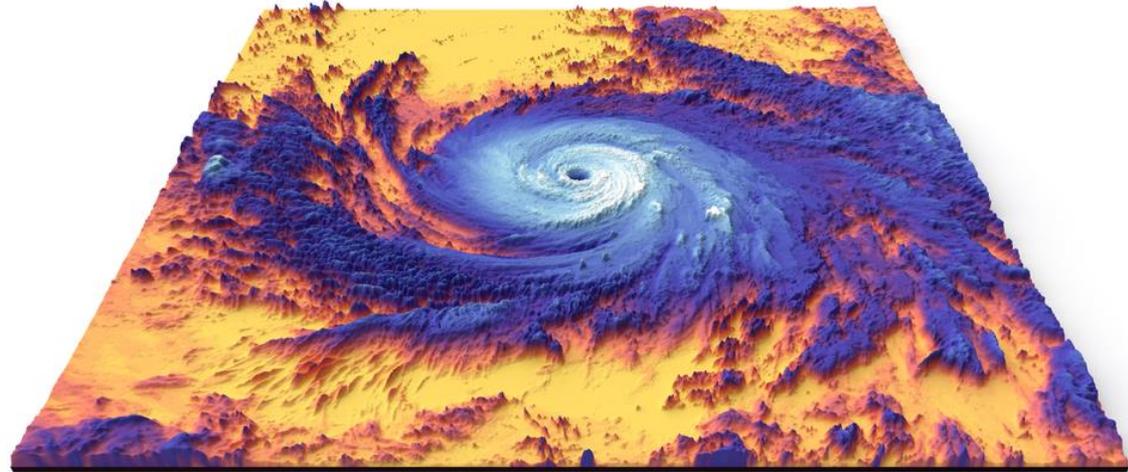
NASA Earth System Observatory



NASA will design a new set of Earth-focused missions to provide key information to guide efforts related to climate change, natural hazard mitigation, fighting forest fires, and improving real-time agricultural processes.

Focus:

- Aerosols
- Clouds, Convection Precipitation
- Mass Change (Drought, water resources, agriculture, hazards)
- Biology and Geology (ecosystems, carbon)
- Surface Deformations (earthquakes, disaster impact, volcanoes, landslides, glaciers etc.)



Hurricane Maria, shown in a 2017 thermal image captured by NASA's Terra satellite.

Capacity: Power & Depth of the SERVIR Network



2020 SERVIR Annual Global Exchange, Siem Reap, Cambodia