

OVERVIEW OF SWOT APPLICATION ACTIVITIES: HIGHLIGHTS AND FUTURE PLANS (2021-2024)

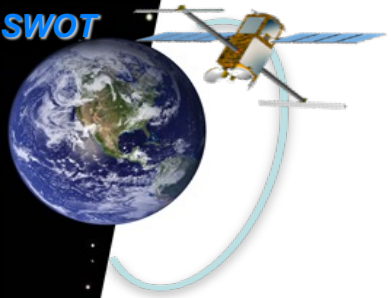
**SWOT Applications Working Group (SAWG) Leads:
Alice Andral¹, Margaret Srinivasan², and Faisal Hossain³**

¹ CNES

² Jet Propulsion Laboratory, California Institute of Technology

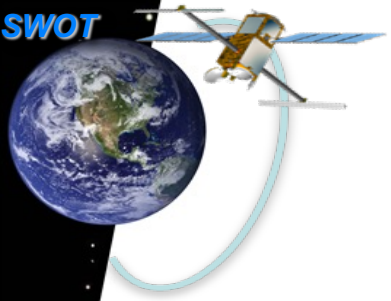
³ University of Washington

Supported by NASA Applied Science Program (Bradley Doorn), CNES-French Investment Program

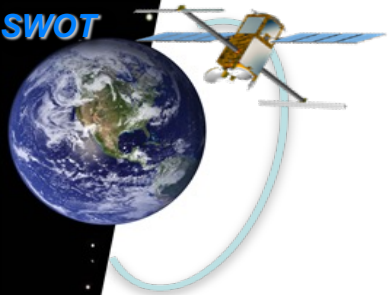


OUTLINE

- MISSION OF SWOT APPLICATION ACTIVITIES
- SUMMARY OF KEY ACTIVITIES BY SAWG :
 - ☐ MAJOR ACCOMPLISHMENTS AND HIGHLIGHTS
 - ☐ STATUS OF THE EARLY ADOPTER PROGRAM
 - ☐ SWOT EARLY ADOPTER HACKATHONS – 2021 (completed) and 2022 (planned)
- SUPPORTING SWOT APPLICATIONS

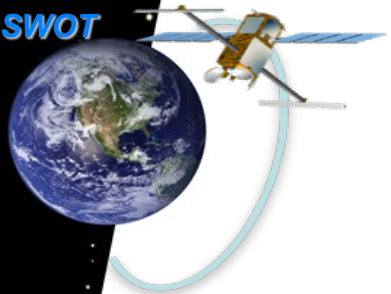


- THANK YOU FOR YOUR SERVICE - [Alice Andral](#)!
- WELCOME NEW CNES SAWG LEADS: [Nicolas Picot](#) and [Santiago Pena-Luque](#)



MISSION OF SWOT APPLICATION ACTIVITIES (SAWG)

1. To **maximize the real-world application** of SWOT data for solving critical, water-related, societal problems after SWOT's launch.
2. To **build, maintain, and grow a critical mass of early adopters** and a community of scientists, stakeholder agencies and end users interested in SWOT's unique capability for driving societal applications.
3. To **stay continuously engaged with SWOT Science Team and Project**, and to communicate application-critical information (science, engineering and data issues) to the community.
4. To be '**honest brokers**' between first mile science and last mile applications



MISSION OF SWOT APPLICATION ACTIVITIES (SAWG)

(Translation)

To build awareness and literacy of the SWOT Mission on:

- ***Why, What and How SWOT will measure***
- ***Expected SWOT data, its format/structure and availability***
- ***Expected ancillary services and functions for data handling***
- ***User-centric application potential & relevance to current missions/resources***

For a growing and global audience of potential users so that real-world and honestly-brokered societal applications based on SWOT data and SWOT science are accelerated around the world



OUR ULTIMATE GOAL

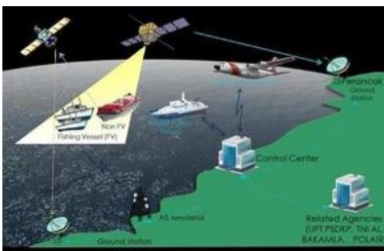
- Establish a **self-sustaining mechanism for generation of SWOT success stories** that show SWOT value for issues of societal relevance
- Create **news headlines and press releases** on successful application of SWOT data serving societal needs

Case study

Inmarsat (Indonesia) Sustainable fishing

Smart satellite technology for inclusive & sustainable fishing practices in Indonesia

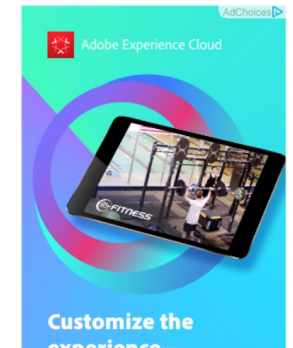
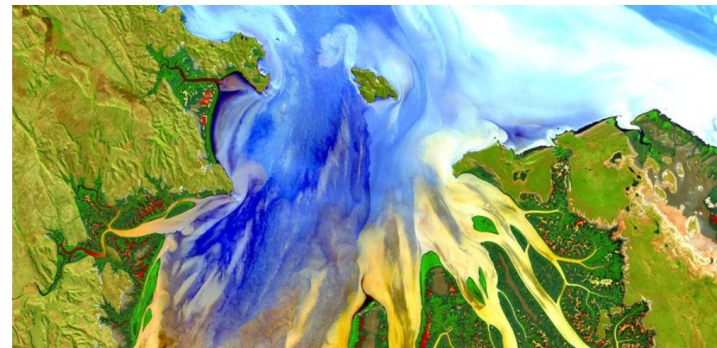
Published 26 January 2017
From: [UK Space Agency](#)



Credit: Inmarsat

Economic Policy

How satellite images are helping find the world's hidden poor





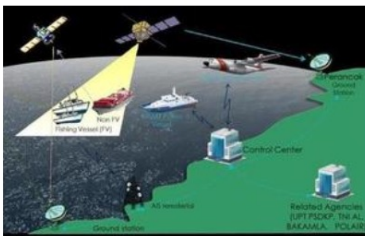
OUR ULTIMATE GOAL

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SWOT REVOLUTIONALIZES SUSTAINABLE FISHERIES

Smart satellite technology for inclusive & sustainable fishing practices in Indonesia

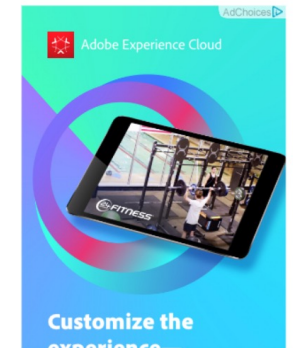
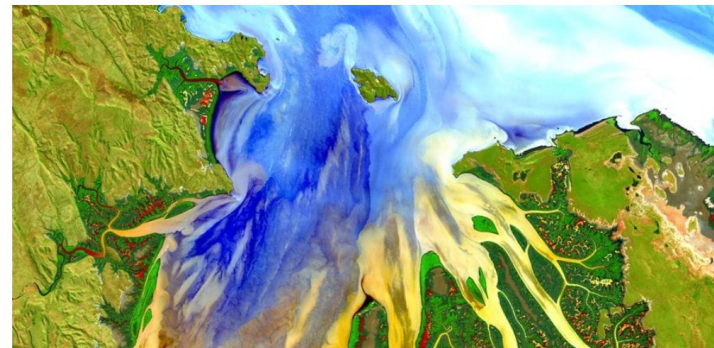
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From: [UK Space Agency](#)



Credit: Inmarsat

Economic Policy

SWOT IMPROVES LIVELIHOODS IN COASTAL FORESTS





MAJOR ACCOMPLISHMENTS (2016-2021)

- **SEVEN** Application Workshops, **TWO** Virtual Hackathon Delivered
- **SWOT EARLY ADOPTER PROGRAM** (EAP) launched in 2018
- **TWENTY-ONE** agencies signed up as SWOT Early Adopters
- **NINE** wide-audience dissemination articles on SWOT (BAMS, ASCE, EOS, AWRA, SERVIR)
- **TWELVE** peer-reviewed research published or in progress by SWOT Early Adopter lead authors since 2018
- **DEMONSTRATION** of value of SAWG for SWOT Science Team

E.g **110** Lakes gauged/to-be-monitored for potential SWOT lake cal/val via citizen science in **FOUR** countries via SWOT Early Adopter Program (**THREE** under SWOT 1-Day Orbit)



SWOT EARLY ADOPTER PROGRAM

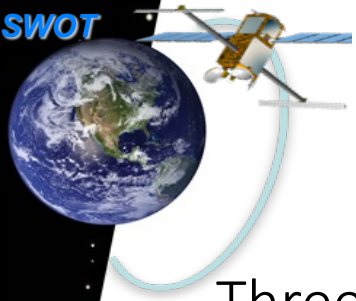
Where are SWOT Early Adopters?

Learn about this growing community working to incorporate future SWOT data into their activities. The locations of Early Adopters are shown in the map and their summaries are included below. View the [SWOT Early Adopters Guide](#).



1	Asian Disaster Preparedness Center (ADPC)/SERVIR-Mekong
2	BRL Ingénierie (BRLi), Nimes, France
3	Centre for Water Resources Development and Management (CWRDM), Kerala, India
4	Collecte Localization Satellite (CLS), Toulouse, France
5	Companie Nationale du Rhône (CNR), Lyon, France
6	Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), Cambridge, MA
7	Environment and Climate Change Canada (ECCC), Gatineau QC Canada
8	FM Global, Boston, MA
9	Indian Institute of Technology Bombay
10	Indian Institute of Technology Delhi
11	Mercator Ocean, Ramonville Saint-Agne, France
12	NASA Short-term Prediction Research and Transition (SPoRT) Center, Univ. Alabama
13	NOAA/CIRES University of Colorado Boulder
14	Ohio State University, Columbus, OH
15	Pakistan Council of Research in Water Resources (PCRWR), Lahore, Pakistan
16	Stantec Consulting Services Inc. (Stantec)
17	Texas Water Development Board (TWDB), Austin, TX
18	U.S. Air Force Weather's Land Information System (LIS), Offutt AFB, NE
19	U.S. Geological Survey, Northborough, MA
20	University of Bonn and Helmholtz-Zentrum Geesthacht
21	VORTEX.IO, Toulouse, France

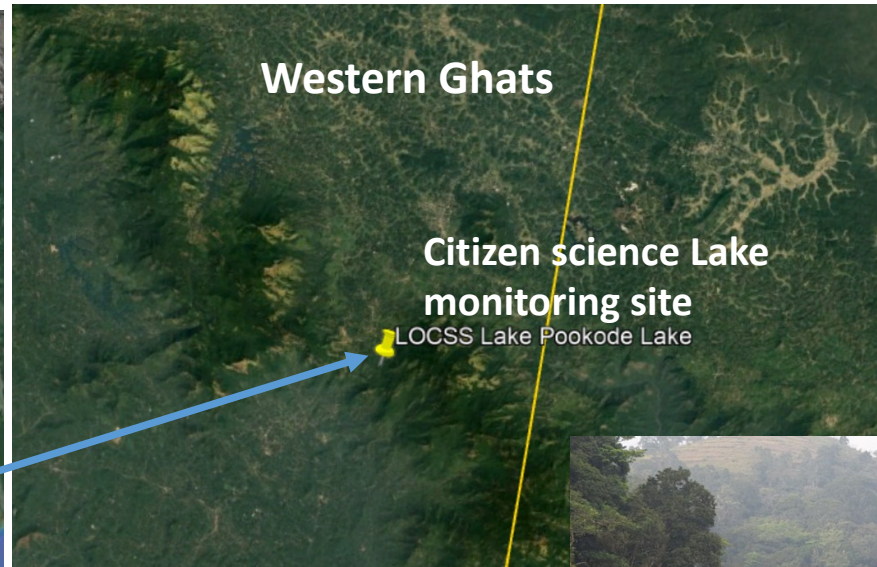
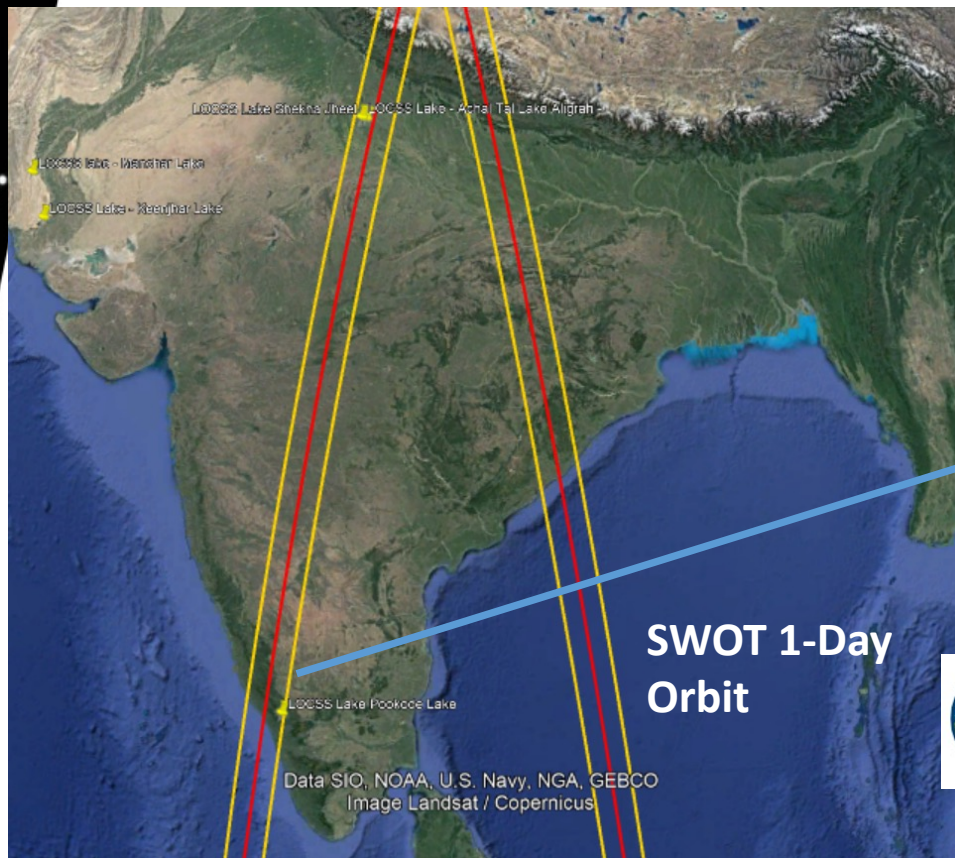
Total – TWENTY-ONE



AN EXCITING DEVELOPMENT FOR SWOT MISSION CONTRIBUTED BY SWOT EARLY ADOPTER PROGRAM

Three SWOT EAs helped set up 4 lake gauges in South Asia – CWRDM, IIT-B, PCRWR

- Early Adopters to help assess SWOT for lake storage monitoring
- SWOT Science team may be able to assess lake product cal/val (1-day orbit)
- Western Ghats is unique!

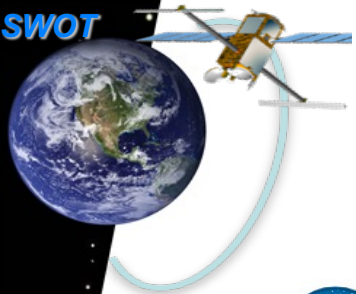


LAKE OBSERVATIONS
BY CITIZEN SCIENTISTS & SATELLITES

PI – Tamlin Pavelsky



Source: CWRDM

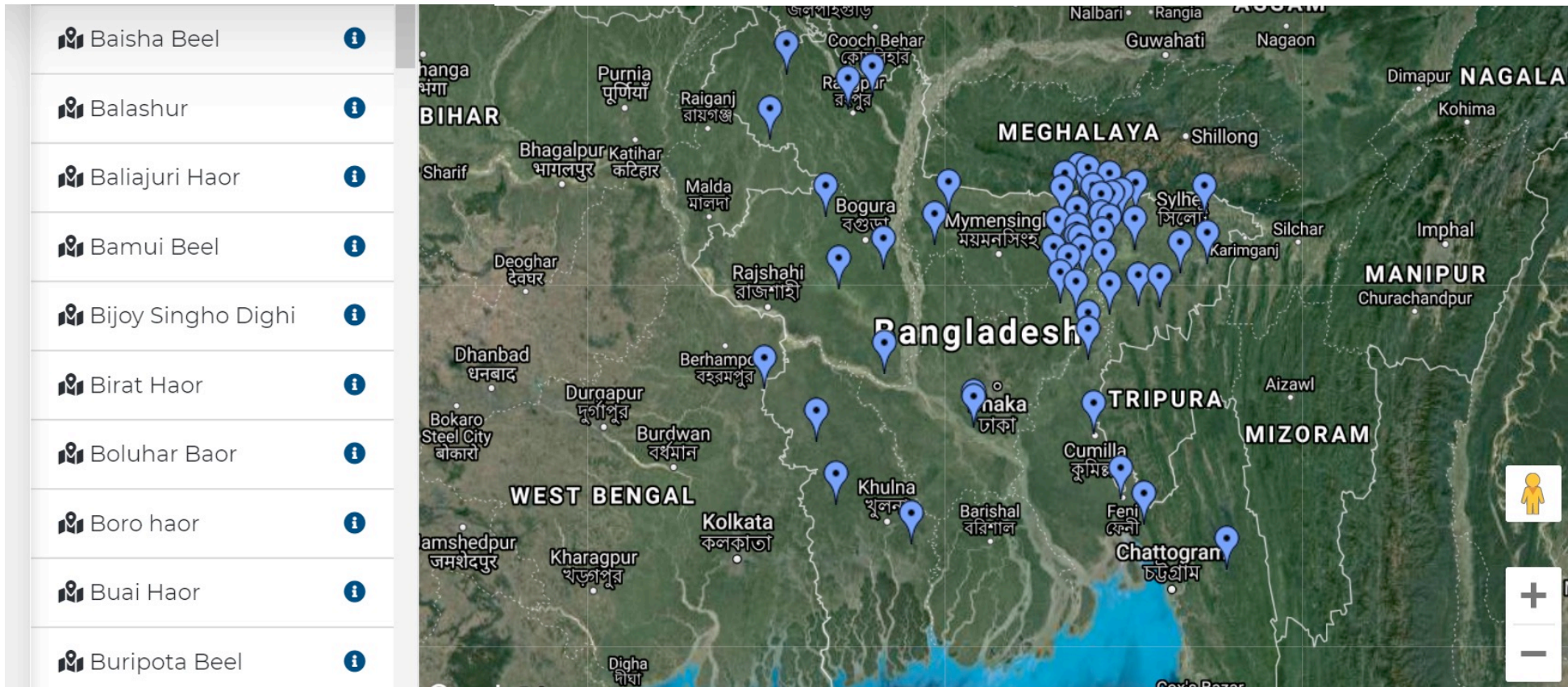


AN EXCITING DEVELOPMENT FOR SWOT MISSION CONTRIBUTED BY SWOT EARLY ADOPTER PROGRAM

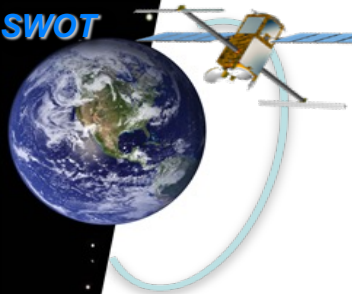


LAKE OBSERVATIONS
BY CITIZEN SCIENTISTS & SATELLITES

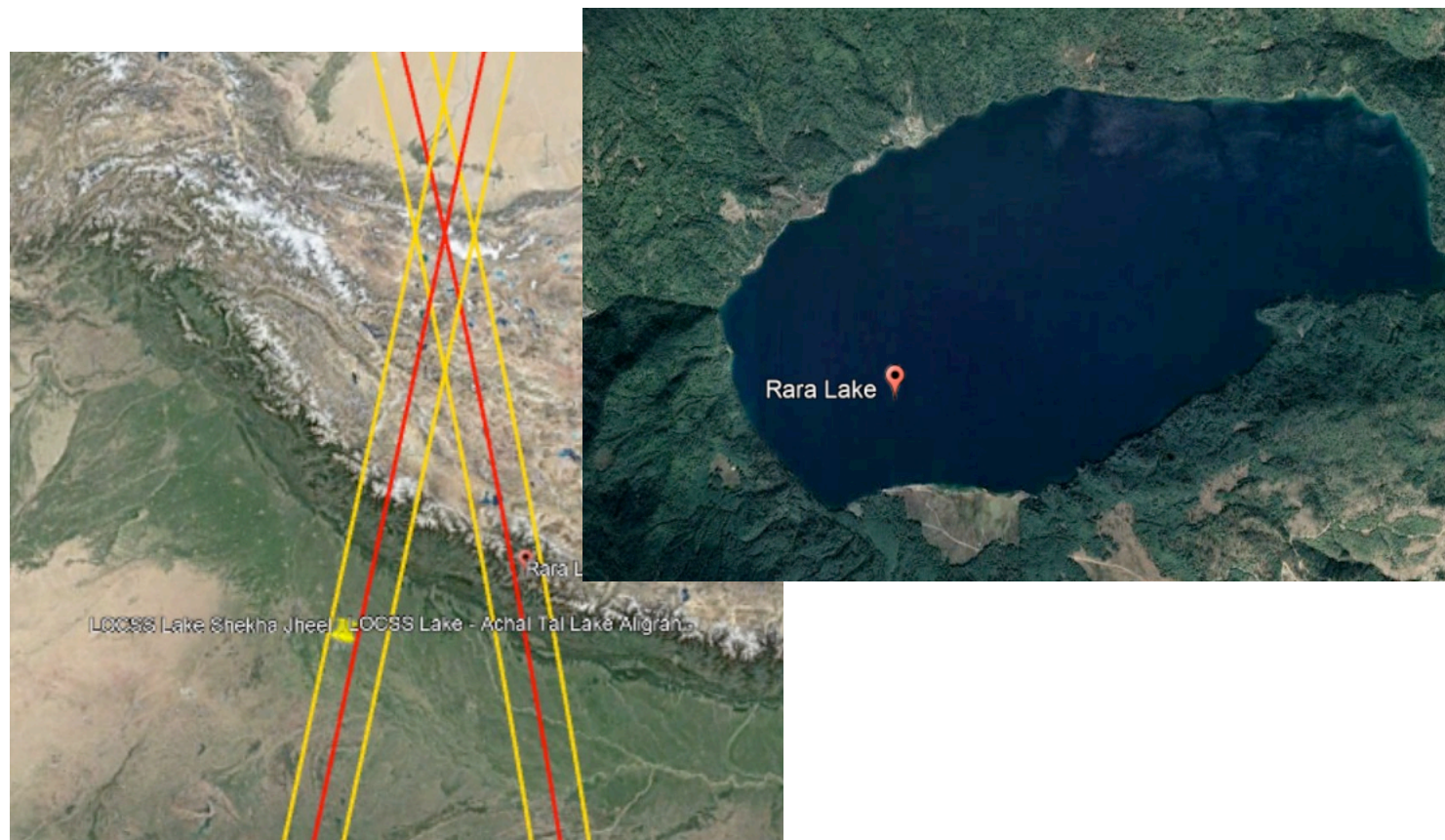
Bangladesh - 54 lake gauges in 2021; Expansion to 104 in 2022 in Stakeholder budget line for SWOT



THESE LAKE GAUGES ARE OPERATED AND MAINTAINED MOSTLY BY THE BUDGET LINE OF EARLY ADOPTER AGENCIES

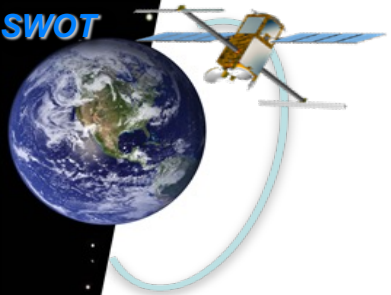


AN EXCITING DEVELOPMENT FOR SWOT MISSION CONTRIBUTED BY SWOT EARLY ADOPTER PROGRAM



Nepal - Lake Rara (under SWOT Cal orbit)

THESE LAKE GAUGES ARE OPERATED AND MAINTAINED BY THE BUDGET LINE OF EARLY ADOPTER AGENCIES



SECOND SWOT EARLY ADOPTER VIRTUAL HACKATHON

SWOT APPLICATIONS

2021 SWOT VIRTUAL EA HACKATHON
MARCH 8 - MARCH 11, 2021

Agenda

Registration

Pre-Workshop Survey

Post-Workshop Survey

Workshop Resources

<http://depts.washington.edu/saswe/swot/hackathon.html>

- Virtual Hackathon provided intense 1-1 hands-on experience for Early Adopters by a team of **volunteers** “hacker help” (UW graduate students & advanced SWOT Early Adopters).

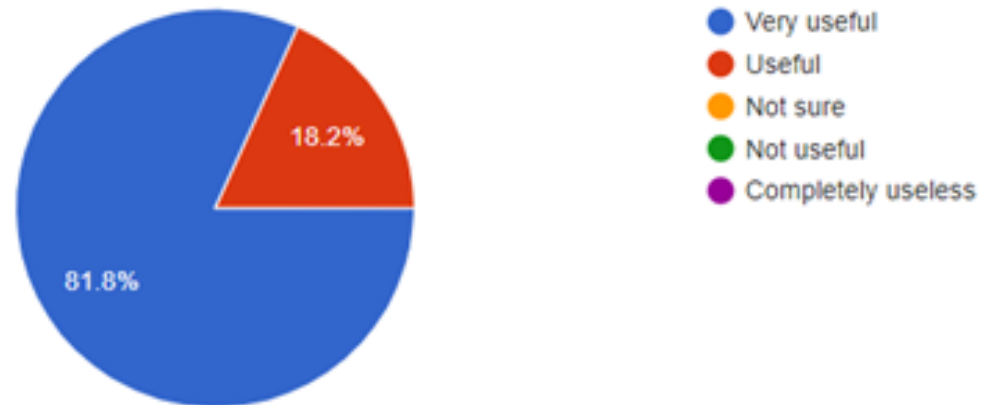


SECOND SWOT EARLY ADOPTER VIRTUAL HACKATHON (March 2021)

OUR VIRTUAL HACKATHONS FOR EARLY ADOPTERS SEEM TO BE WORKING

7. We designed the 1-1 sessions for each early adopter to receive detailed and very customized service to address project hurdles. Was that 1-1 framework using zoom breakout rooms useful?

11 responses



<http://depts.washington.edu/saswe/swot/hackathon.html>



SPRING 2022 – THIRD SWOT HACKATHON

SWOT APPLICATIONS

APPLICATION WORKSHOPS

2022 EA Hackathon

2021 Virtual EA Hackathon

2020 Virtual EA Hackathon

2019 Application Workshop

2018 Application Workshop

2017 Application Workshop

 Zoom Guidelines

<http://depts.washington.edu/saswe/swot/workshops.html>



PLANS FOR 2022 – THIRD SWOT HACKATHON

SWOT APPLICATIONS

APPLICATION WORKSHOPS

2022 EA Hackathon

2021 Virtual EA Hackathon

2020 Virtual EA Hackathon

2019 Application Workshop

2018 Application Workshop

2017 Application Workshop

 Zoom Guidelines

SWOT APPLICATIONS

2022 SWOT EA HACKATHON DATES: TBD, 2022

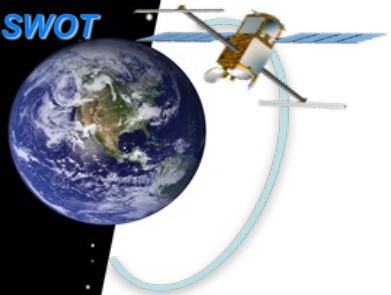
Agenda

Registration

Pre-Workshop Survey

Post-Workshop Survey

2022 Workshop Resources



PLANS FOR 2022 – THIRD SWOT HACKATHON

- **Last Hackathon** before SWOT Launch
- Focus on **EA-specificity** rather than ‘catch-all’ topics
- Priority given the advanced **EAs who are likely to cross the LAST MILE by 2023** and generate success stories
- Focus on **automation, building scripts/tools for backend and front-end interfaces** that can readily ingest SWOT data and show ‘success’



WHY SHOULD WE SUPPORT SWOT APPLICATION ACTIVITIES?

1. Since 2016 SWOT Applications program has expanded awareness of SWOT's societal value & generated anticipation for SWOT data among potential users (e.g 4 Early Adopters already confirmed operational uptake of SWOT L2 data after 2023 = **4 potential success stories expected for NASA after 2024**)
2. SWOT Applications program pioneered infrastructure for 24/7 community-driven online education/training for building technical literacy on SWOT. (*Science Team can use the resources too!*)
3. Many SWOT Early Adopters are doing application-critical science; providing cal/val infrastructure for lake data product at no additional cost (*current total > 100 Asian sites with 3 under SWOT 1-day orbit*)
4. SWOT Early Adopter Program growing since 2018 (*current total 21 spanning Americas, Europe, Asia & Africa, private/public and research sectors*)

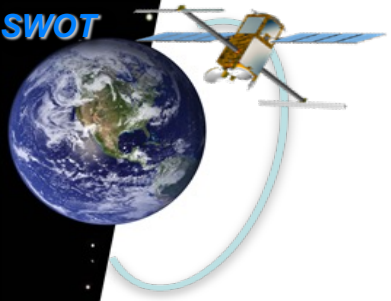


HOW CAN WE SUPPORT SWOT APPLICATION ACTIVITIES?

1. **Encourage your ST team members**, who are interested in volunteering to help Early Adopters, to contact SAWG leads (email: fhossain@uw.edu and Margaret.srinivasan@jpl.nasa.gov; cc the ST Project PI)
2. **Let SAWG leads know** if there is a specific EA project, topic or skillset that interests your team member to volunteer for SWOT applications.

For more information check:

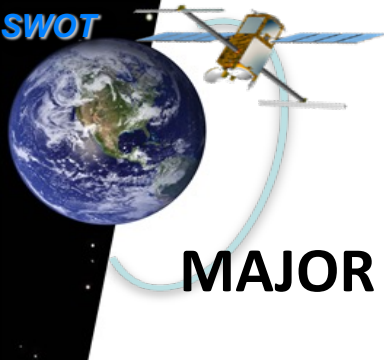
- a) SWOT Application Page – <http://swot.jpl.nasa.gov/applications>
- b) UW SWOT Application Landing Page:
<http://depts.Washington.edu/saswe/swot>



THANK YOU!!

PLEASE JOIN SWOT APPLICATIONS PROGRAM

SUCCESS OF ANY MISSION DEPENDS ON HOW WELL WE DEMONSTRATE
ITS VALUE TO HUMANITY AND THE WORLD



SUMMARY OF KEY ACTIVITIES BY SAWG

MAJOR ACCOMPLISHMENTS AND HIGHLIGHTS (CUMULATIVE SUMMARY SINCE 2016)

Putting Satellite Maps of Surface Water to Practical Use

2nd SWOT Application User Workshop: Engaging the User Community for Advancing Societal Applications of the Surface Water Ocean Topography (SWOT) Mission, Reston, Virginia, 5–6 April 2017



The Early Adopter Program for the Surface Water Ocean Topography Satellite Mission

Lessons Learned in Building User Engagement during the Prelaunch Era

Faisal Hossain, Matt Bonnema, Margaret Srinivasan, Ed Beighley, Alice Andral, Bradley Doorn, Indu Jayaluxmi, Susantha Jayasinghe, Yasir Kaheil, Bareerah Fatima, Nicholas Elmer, Luciana Fenoglio, Jerad Bales, Fabien Lefevre, Sébastien Legrand, Damien Brunel, and Pierre-Yves Le Traon

BAMS Meeting Summary

BAMS Meeting Summary

Accelerating Applications for Planned NASA Satellite Missions

A New Paradigm of Virtual Hackathons during a Pandemic and in the Post-Pandemic Era

Faisal Hossain, Nicholas Elmer, Margaret Srinivasan, and Alice Andral

2019 SWOT Early Adopters Train

What: A workshop was organized mission that is planned for wide range of stakeholders SWOT's application potential.

GUEST ARTICLE

Building Pathways to Societal Applications of the Surface Water Ocean Topography (SWOT) Satellite Mission

Faisal Hossain, Margaret Srinivasan, Alice Andral and Ed Beighley

SWOT IS A RESEARCH SATELLITE MISSION (Fig. 1), planned for launch in 2021, and developed jointly by the National Aeronautics and Space Administration (NASA) and Centre for National D'Etudes Spatiales (CNES) of France, with participation from the Canadian and UK space agencies. The SWOT mission will serve both the hydrology and oceanography communities by providing the first global survey of Earth's surface waters including rivers, reservoirs, lakes, and wetlands, as well as unprecedented detail in the topography of the ocean surface.

Following a US workshop in May 2018 (see Beighley et al., *Water Resources IMPACT*, 21(2):30–31, March 2019) in May 2021, 2019 a workshop was organized at CNES headquarters (HQ) in Paris for SWOT Early Adopters (EA). These EAs had earlier proposed a tangible plan to proactively assess the utility

understand the progress they have made, document the hurdles and needs they face and identify clear pathways to accelerate successful use of SWOT data after launch. The workshop was organized by the SWOT Application Working

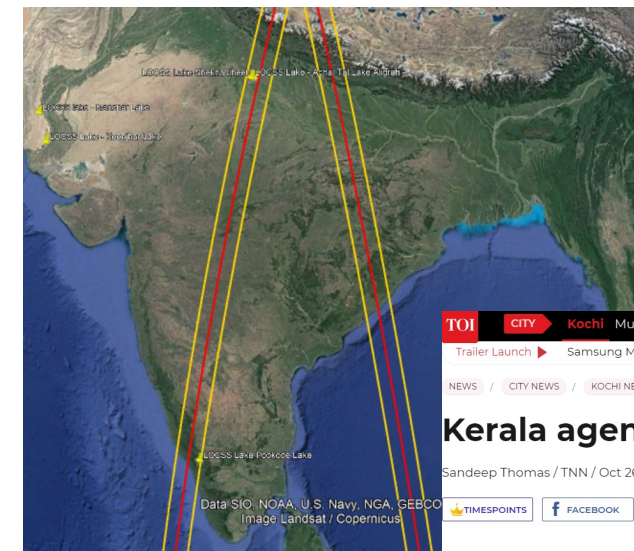


Figure 2. Participants of the 2019 SWOT Early Adopter Workshop

Group (SAWG) leads with support provided by the NASA Applied Sciences Program, the SWOT Project, and CNES. This is the second such EA workshop designed to explore ways to maximize the user readiness of SWOT data after launch. Summaries from previous SWOT applications workshops are available here: <https://go.nasa.gov/2Lm1Btc>.

More than forty participants attended the workshop in person or remotely. Representatives from eleven EA agencies, spanning three continents, participated as potential users of SWOT data and presented updates on their project over the two days (Fig. 2). These participants represented various stakeholder agencies from the public and private sectors that deal with water issues including: Asian Disaster Preparedness Center (ADPC), Indian Institute of Technology (IIT), Pakistan Council for Research in Water Resources (PCRWR), Collecte Localisation Satellites (CLS), BRIL Ingénierie (BRIL), Consortium of Universities to Advance Hydrologic Science Institute (CUAHSI), NASA's Hydrologic Modeling and Analysis (HMA), CNRS, Mercator, University of Bonn, Mercator Océan and FM Global. SWOT Project representatives shared plans and expected timelines for provisioning simulated SWOT data for use by the Project, the Science Team, and by EAs. A hands-on

engage with the EAs to provide further hands-on training.



TOI CITY Kochi Mumbai Delhi Bengaluru Hyderabad Kolkata Chennai Agra Agartala Ahmedabad Ajmer Allahabad

Trailer Launch ▶ Samsung Microwave - Perfect Biryani masala by Neena

NEWS / CITY NEWS / KOCHI NEWS / KERALA AGENCIES JOIN NASA, IIT-BOMBAY TO TACKLE DISASTERS

Kerala agencies join Nasa, IIT-Bombay to tackle disasters

Sandeep Thomas / TNN / Oct 26, 2020, 08:52 IST

engage with the EAs to provide further hands-on training.

Water Resources Research

Research Article

Generating Proxy SWOT Water Surface Elevations Using WRF-Hydro and the CNES SWOT Hydrology Simulator

Nicholas J. Elmer ✉, Christopher Hain, Faisal Hossain, Damien Desroches, Claire Pottier

First published: 16 July 2020 | <https://doi.org/10.1029/2020WR027464>

Read the full text >

PDF TOOLS SHARE

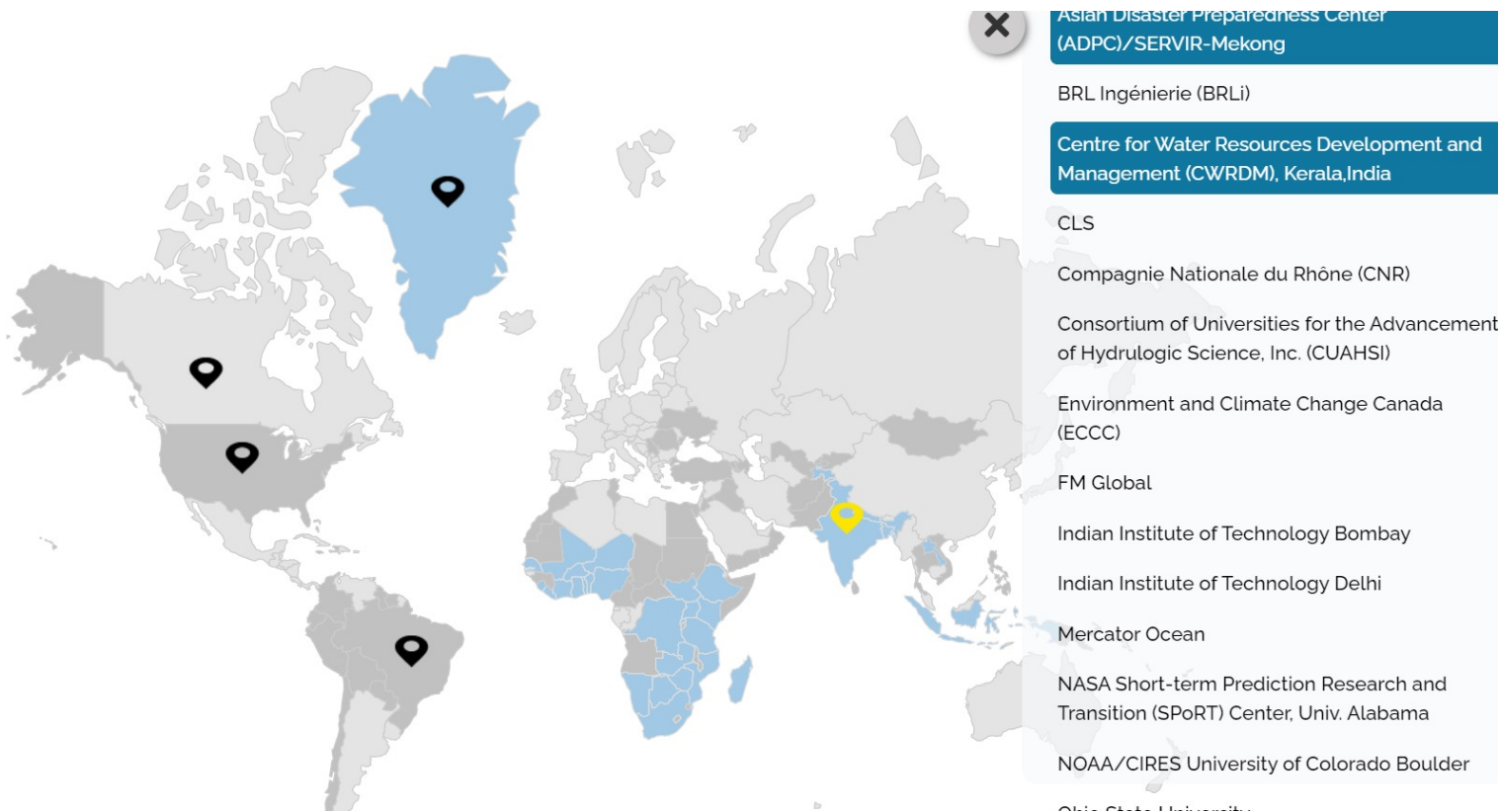
Abstract

The Surface Water Ocean Topography (SWOT) mission will launch in early 2022 to provide the first global inventory of terrestrial surface water. Although SWOT is primarily a research mission with key science objectives in both the oceanography and hydrology



PLANS FOR 2022

IMMERSIVE & VISUAL SWOT EA STORIES PAGE



- Story-telling is very critical for global engagement of SWOT mission
- Webpage under construction at <http://depts.Washington.edu/saswe/swot>
- Designed to make navigation easier and to understand better how exactly SWOT is adding value to the EA's bottom line



PLANS FOR 2022

IMMERSIVE & VISUAL SWOT EA STORIES PAGE

Asian Disaster Preparedness Center
(ADPC)/SERVIR-Mekong

BRL Ingénierie (BRLi)

Centre for Water Resources Development
and Management (CWRDM), Kerala, India

CLS

Compagnie Nationale du Rhône (CNR)

Consortium of Universities for the
Advancement of Hydrologic Science, Inc.
(CUAHSI)

Environment and Climate Change Canada
(ECCC)

FM Global

Indian Institute of Technology Bombay

Indian Institute of Technology Bombay

Title: Examining the potential of SWOT mission in Hydrometeorology over India

Organization: Indian Institute of Technology Bombay

Leads: J. Indu; Subimal Ghosh; Subhankar Karmakar

Summary

In order to derive weekly/monthly estimates of river discharge, this project will use data assimilation to generate continuous fields of SWOT-relevant observables by merging them with model predictions. This will provide hydrologic information in areas where SWOT data gaps will prevent direct observation. The research objectives of this project are: Evaluate various data assimilation (DA) techniques on synthetic SWOT measurements to generate improved SWOT observables Uncertainty quantification of SWOT orbital data products Using SWOT measurements for the creation of a data inventory towards flood forecasting for different hydro-climatic scenarios

[Current Progress and Future Steps](#)



PLANS FOR 2022

IMMERSIVE & VISUAL SWOT EA STORIES PAGE

Asian Disaster Preparedness Center
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BRL Ingénierie (BRLi)

Centre for Water Resources Development
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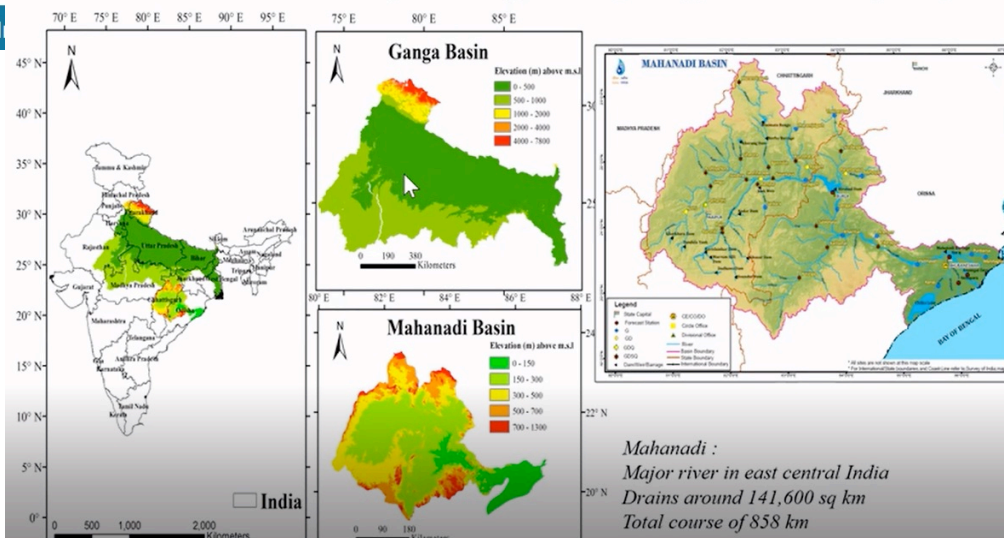
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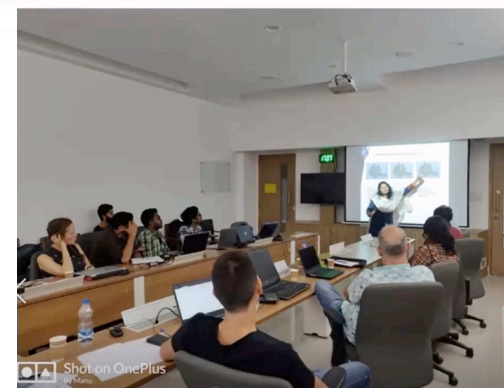
Current Progress and Future Steps



Indian I

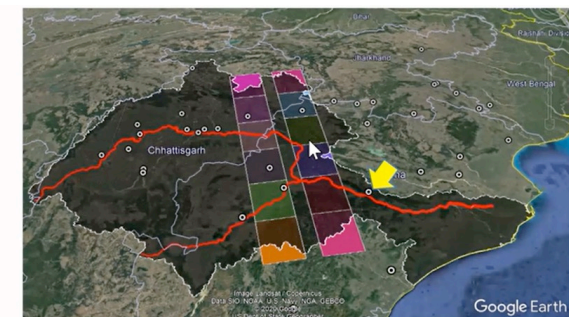


Mahanadi :
Major river in east central India
Drains around 141,600 sq km
Total course of 858 km



During brainstorming session at IIT Bombay on
Application of SWOT over Mahanadi basin

Day2 SWOT_Hackathon_2021_J.INDU_IITBOMBAY



Mahanadi River ● CWC Gauging stations





SAWGW STRATEGIC PLAN [By end of 2024]

2021-2022 (PRE LAUNCH)

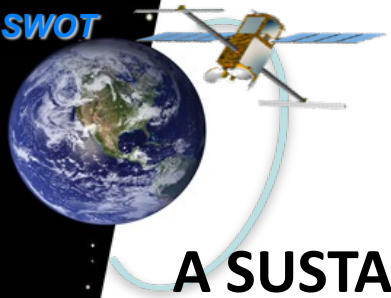
- Create the **online infrastructure and self-help community** where applications of SWOT data and success stories are **easier** to create, accelerate and scale globally by any entity addressing water issues

2023-2024 (POST LAUNCH)

- Generate **high profile success stories and NASA Hyperwall** on how the SWOT mission adds value to stewardship of water resources and ocean applications.
- Train a new generation of **diverse (BIPOC) leadership** ready to lead SWOT application activities.

2024- (SUSTAINABILITY)

- Formalize a **self-sustaining mechanism for generation of training materials**, multi-media tutorials, education activities with AWRA, CUAHSI, NASA ARSET
- Establish **operational synergy between SWOT and national/global discharge assimilation activities** (NOAA/ECMWF) and other missions (NISAR, Sentinel series)



SUMMARY OF KEY ACTIVITIES BY SAWG (2019- 2020)

A SUSTAINABLE & SELF-HELP ARCHITECTURE FOR SWOT APPLICATION TRAINING RESOURCES

*Towards a More User-friendly, Do-It-Yourself Visible Platform for Online Content on SWOT Applications where users can build literacy on SWOT mission from anywhere, anytime and independently (as **24/7 self-help**)*




SUMMARY OF KEY ACTIVITIES BY SAWG (2019- 2020)


← → ↻ ⚠ Not secure | depts.washington.edu/saswe/swot/ 🔍 ★ ⚙ ⚙ 👤 ⋮

Developed by **Shahryar K Ahmad** | SASWE Research Group


SWOT APPLICATIONS




**EARLY ADOPTER
PROGRAM**



**APPLICATION
WORKSHOPS**

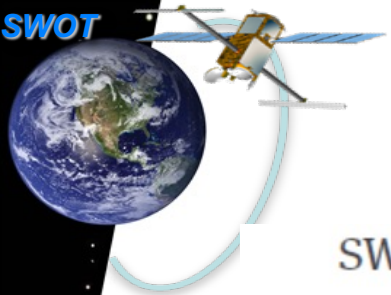


**EDUCATION AND
TRAINING**



**NEWS AND
PUBLICATIONS**

RE-ORGANIZED ACCESSIBILITY TO RESOURCES VIA A FRONT-END PORTAL
<http://depts.washington.edu/saswe/swot>



SOME EARLY ADOPTER “EXPECTED” HEADLINES

SWOT helps supporting early flood preparedness in Myanmar (ADPC),

SWOT data enables popular and blameless management of waterlogging in Sindh Province of Pakistan (PCRWR),

SWOT data helps in rationalizing irrigation supplies while preventing loss of land to waterlogging (PCRWR),

SWOT data improves reservoir outflow forecasting to reduce downstream flood risk in Kerala (IIT-Bombay),

The NOAA National Water Model forecast accuracy is improved (NASA SPoRT),

Demand for CUAHSI workshops on use of SWOT streamflow products is high (CUAHSI),

SWOT data improves navigability prediction and integrated resources water management on the Sangha River (CNR),

SWOT mission improves mapping of potential sites for hydropower projects in the Congo basin (CNR),