

Google Earth Engine for Generating Sentinel-2 Time Series Over Inland Lakes in Thailand

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Session 2

- Space Technology for Water Quality

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About the Presenter

- A Space enthusiast, National Point of Contact “Women in Geospatial+”, and CEO “SPOT-GIS” is currently rendering her services to the Center for Water Informatics and Technology, Lahore University of Management and Sciences, Pakistan.
- Ms. Saleha graduated in Space Science from the University of the Punjab, Lahore, and earned her Masters in Remote Sensing and Geographical Information Science from the Institute of Space Technology, Islamabad.
- In pursue of enhancing her research capabilities, she has presented the findings at different fora on Space Science and Technology, Environment, Climate, Remote Sensing, and GIS.
- Since 2014, Ms. Saleha has been associated with World Space Week-Pakistan. With this, she has been a part of various events on Sustainable Development Goals. Her leadership, organizational, and communication skills helped her collaborate productively with teams and facilitate valuable project results.
- Her eagerness to promote and exploring diversity by engaging and inspiring peers to develop a love for the subject and research has always kept her involved in community services. Ahe believes collaborations for the mutual good to benefit communities and empower women in STEM, STEP, and STEAM.



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Outline

- Introduction/Background
- Significance of Space Technology for Water Quality Assessment
- Case Study
 - Study Area
 - Methodology
- Results and Discussion
- Conclusion and Recommendations

Introduction

• The **Sustainable Development Goals (SDGs)**- adopted by the United Nations in 2015 as a universal call to action to

- End poverty
- Protect the planet
- Ensure that by 2030 all people enjoy peace and prosperity.

• The purpose of SDG 6 is to help countries around the world improve water and sanitation.



Improving Water Management in Thailand

- The SDG landscape in Thailand is well-established. The SDGs have been integrated into the 20-Year National Strategy, which is the country's main development framework.
- According to the United Nations (U.N.) and the World Health Organization (WHO) in 2015, Thailand has been able to provide better sanitation for 93% of its population.
- The U.N. notes that issues that come from lack of water resources and sanitation could displace 700 million people by 2030.
- Strongly committed to SDG 6 of the U.N. Sustainable Development Goals.





OVERALL PERFORMANCE

COUNTRY RANKING

Thailand
43 /165

COUNTRY SCORE



REGIONAL AVERAGE: 65.7

The 2021 SDG Index Rankings and Scores

Rank	Country	Score
1	Finland	85.9
2	Sweden	85.6
3	Denmark	84.9
4	Germany	82.5
5	Belgium	82.2
43	Thailand	74.2
51	Vietnam	72.8
65	Malaysia	70.9
76	Singapore	69.9
84	Brunei Darussalam	68.3
97	Indonesia	66.3
101	Myanmar	64.9
102	Cambodia	64.5
103	Philippines	64.5
110	Lao PDR	63.0

ลำดับในกลุ่มประเทศสมาชิกอาเซียน



SDG DASHBOARDS AND TRENDS



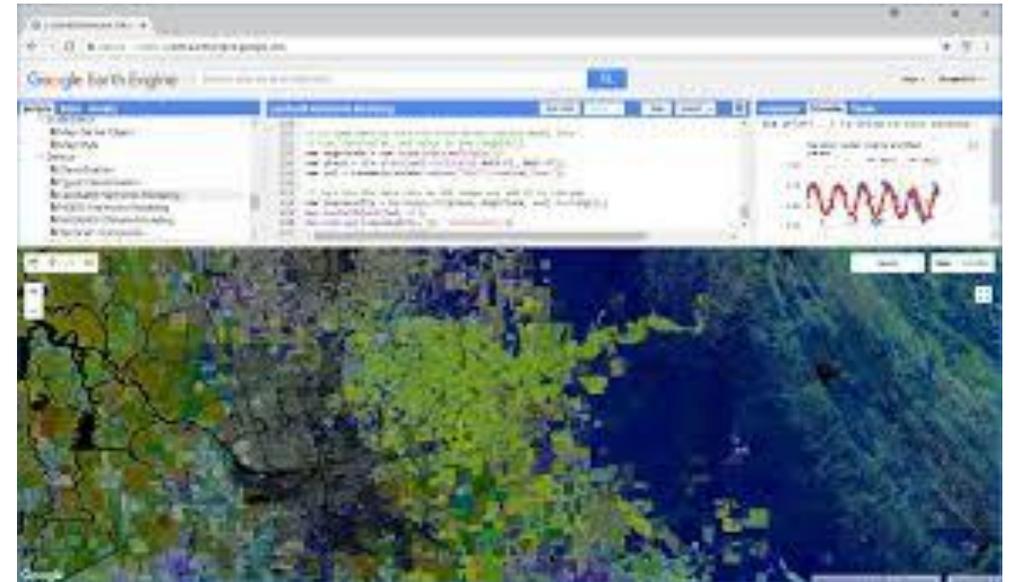
Notes: The full title of Goal 2 "Zero Hunger" is "End hunger, achieve food security and improved nutrition and promote sustainable agriculture".
The full title of each SDG is available here: <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals>

Water Management Challenges in Thailand

- Flood
- Drought
- Agriculture waste
- Industrial waste
- Other anthropogenic activities

Space Technology for Water Quality Assessment

- GIS and Remote Sensing plays a critical role in the management of water resources.
- The satellite technology is a useful tool during the pandemic to analyze the situation remotely.
- Many practitioners in this field are constrained by the availability of tools and computing resources to use these techniques effectively.
- GOOGLE EARTH ENGINE- a cloud computing technology provide free access to a large pool of computational resources and datasets.

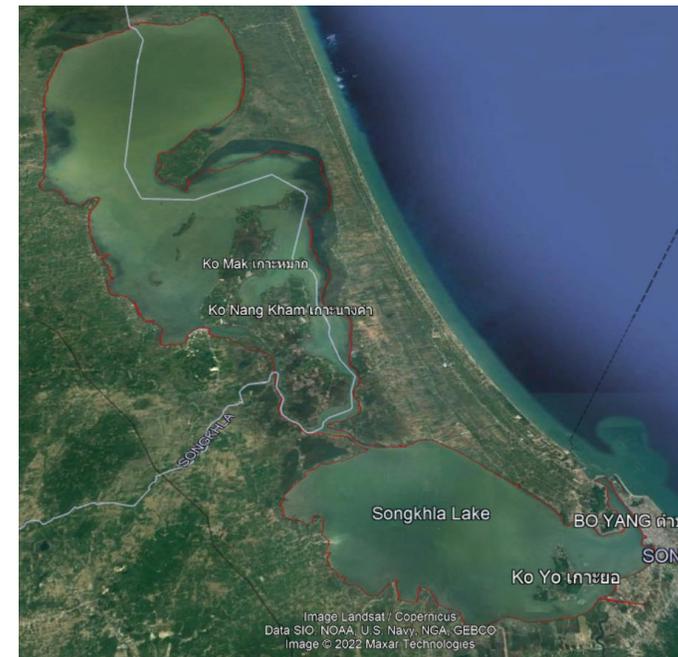
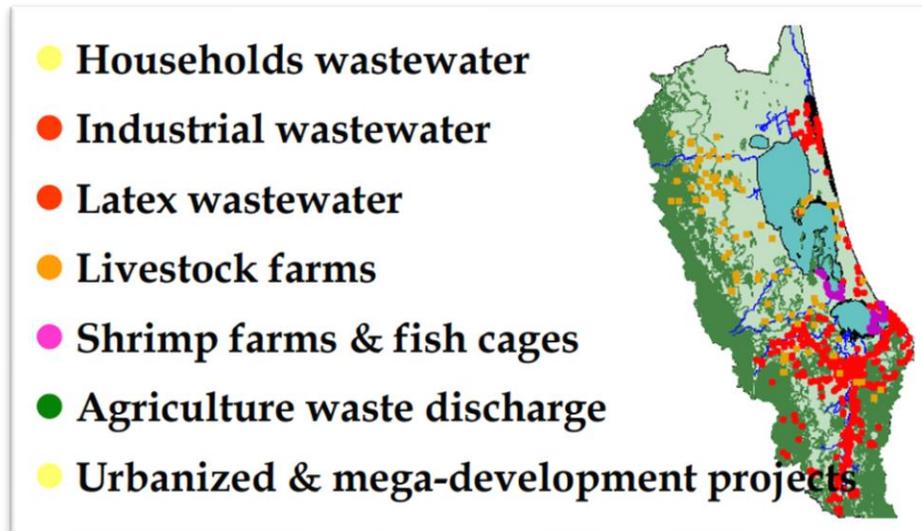


Multifaceted Impacts of COVID-19

- On 11 March 2020, the World Health Organization declared the new COVID-19 disease a pandemic.
- Most countries imposed lockdown to reduce its effects, which brought beneficial impacts on the environment in many regions.
- Many water bodies all over the world had lower pollution levels.
- Urgent preventive measures need to be taken to implement effective solutions for water protection

Study Area

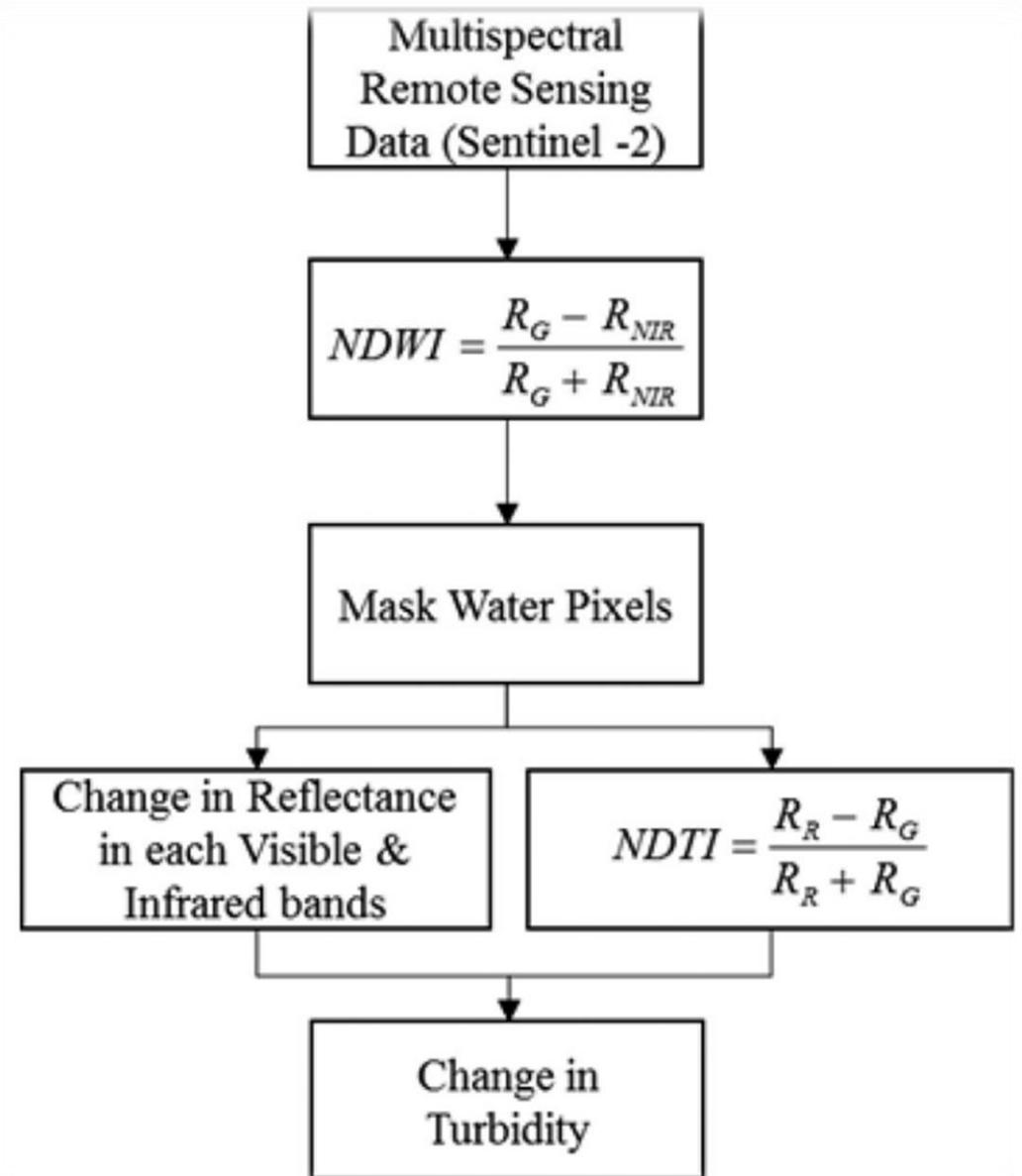
- Upper Lake, 491 sq. km turbid windswept, fresh to brackish water
- Middle Lake, 336 sq. km brackish, Buffer zone; fresh & saline
- **Lower Lake, 190 sq. km marine ecosystem, Fishing Gears, shrimp farms, business development zone**



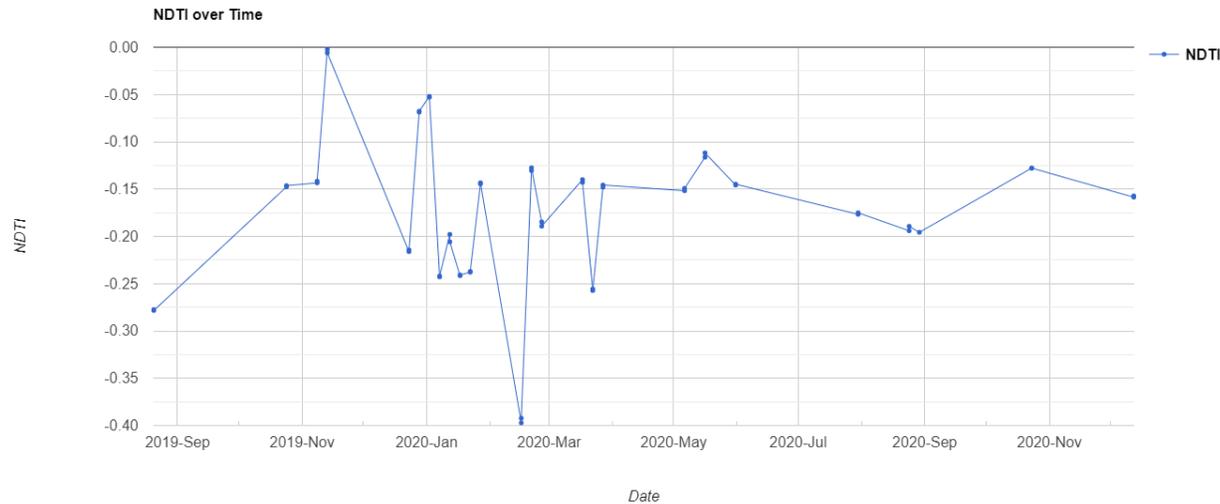
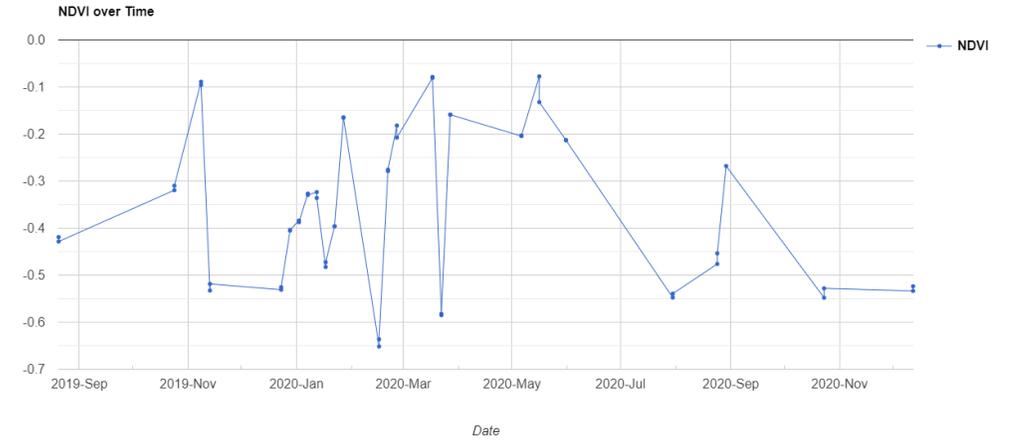
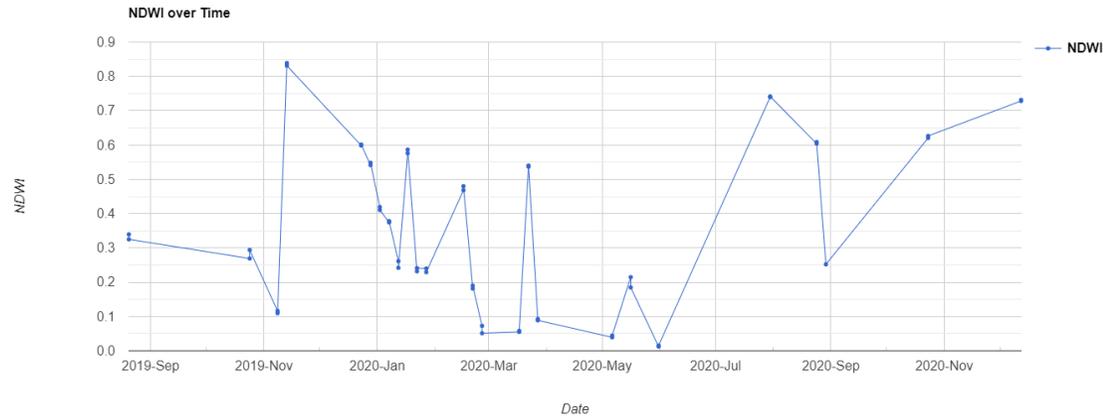
Objectives

- Mapping water quality using Normalized Difference Turbidity Index (NDTI) using Cloud Computing Google Earth Engine platform
- Comparing the COVID19 pre-lockdown, lockdown, and post-lockdown imagery to understand the effects of human induced activities on water quality

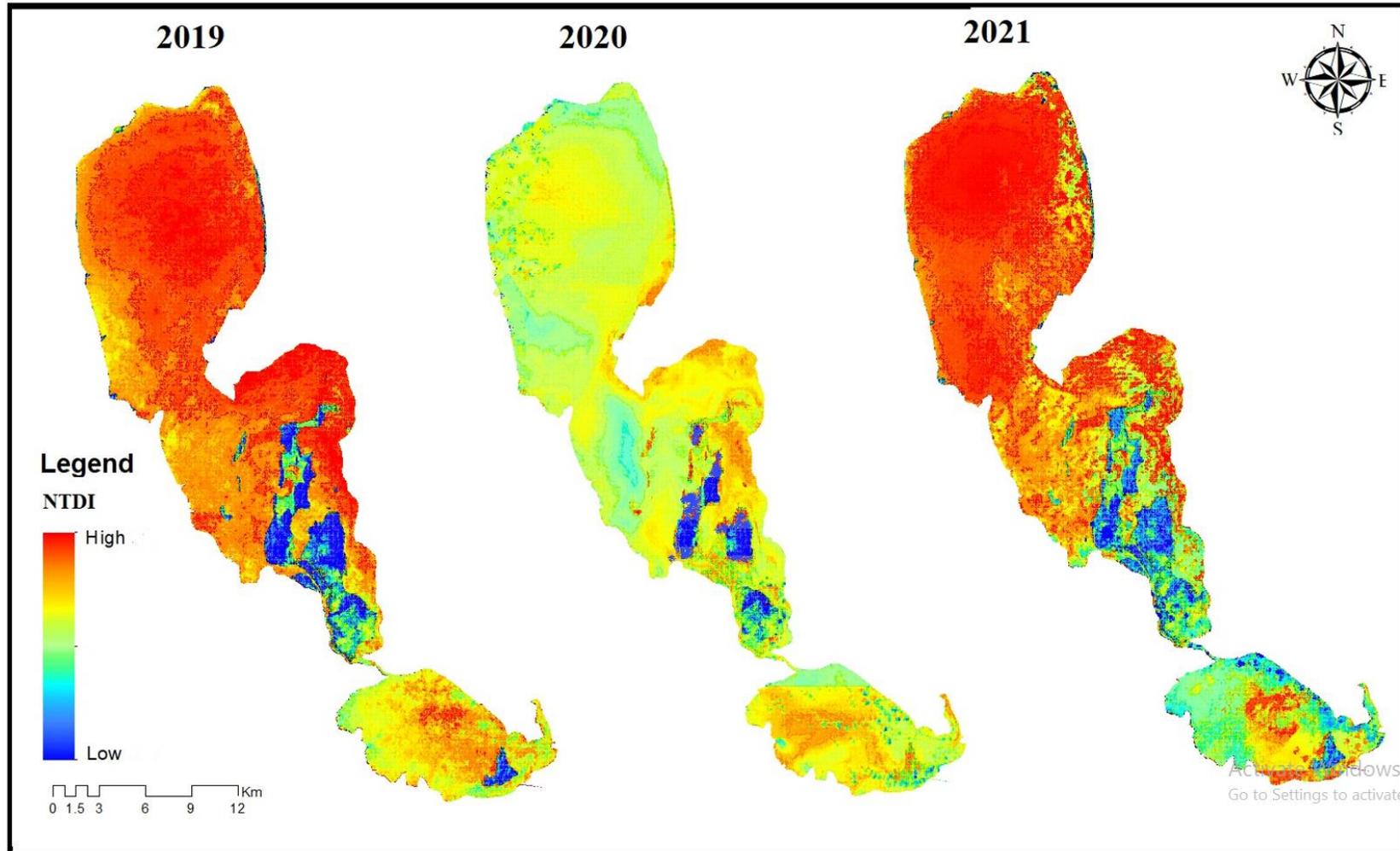
Working Methodology



Results and Discussion



Pre During Post Lockdown NDTI



Conclusion and Recommendations

- Using Google Earth Engine eliminates some constraints of traditional analysis, which is labor-intensive and time-consuming in monitoring the entire river.
- The NDTI does a great job in highlighting the sediment areas and thus saves the laborious process of image classification.
- The water quality is better in the lockdown phase and reflect the impact of human induced activities on freshwater resources.
- It is important to note that ground truth is very significant to measure the amount of sediments present, which is suggested for further research and implementations to achieve UN SDGs.
- Efficiently managing water and committing to achieving all of the SDG 6 indicators will ensure sustainable progression and development

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