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Editorial

Using Environmental Toxicology to Address East Asian Public Health Issues Using Google Earth Engine Cloud Computing, Suspended Particulate Matter Analysis of Pre and during Covid Lockdown: A Case Study of Ukai Reservoir

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Abstract

There are many factors that can contribute to the presence of suspended particle matter (SPM) in a waterbody or river, including additional pollutants released from sewage that has not been properly treated, siltation, sedimentation, flooding, and even bacteria. The impacts of pandemic-induced lockdown on the SPM levels in the lower Tapi reservoir or Ukai reservoir were investigated in this study using remote sensing techniques. With a radiometric resolution of 12 bits and a spatial resolution of 30 m, Landsat-8 OLI (Operational Land Imager) was used to perform the estimation. The study's products were produced using the Google Earth Engine (GEE) cloud computing platform. The GEE is a robust semi-automated workflow system created for the processing and visualisation of geospatial datasets for scientific purposes. A computer algorithm was used, and for the subject area, a time-series analysis (2013–2020) was performed. The average mean value of SPM in the Tapi River for 2020 was determined to be lower than it was for the previous seven years at the same period (Arshad MA et al., 1997).

Keywords: Suspended Particle Matter (SPM), Google Earth Engine (GEE)

INTRODUCTION

(Bengough AG et al., 1990) Despite the fact that water covers 70% of the earth's surface, rivers are the primary source of fresh water. Due to the discharge of home sewage, industrial effluents, and other pollutants, the river waters are highly polluted. Additionally, the freshwater issue has worsened due to manmade factors including climate change, population growth, and others. The urgent requirement for water resources management is to maximise the current natural water flows. For a variety of uses, including irrigation, power generating, and flood control, artificial reservoirs are built. Pollutants and silt are carried by rivers, where they are eventually dumped in reservoirs (Colombi T et al., 2018). An important element endangering reservoir sustainability and lifetime is sedimentation. It lessens the reservoir's ability to store water. In addition, water quality is a crucial factor that must periodically be assessed to ensure the sustainability of aquatic life and people (Gee GW et al., 1986). The water quality is determined by a number of factors, including DO, BOD, COD, pH, turbidity, ammonia, etc. Dissolved oxygen, or DO, is a crucial indicator of water quality because it affects the health of the phytoplankton and the sustainability of algal development. BOD, also known as biochemical oxygen demand, is a measurement of the volume of biodegradable organic material in water.

Chemical oxygen demand, or COD, is a highly helpful technique for monitoring contamination since it measures the quantity of oxygen needed to oxidise all the chemicals (even those that have been biologically degraded) in water Water's pH is a well-known measurement (Tekeste MZ et al., 2019).

quality. Any water sample with a pH value below or over 7 is a sign of pollution (Beza E et al., 2017). An significant niche in the sciences of toxicology, environmental health, and public policy is occupied by the multidisciplinary field of environmental toxicology. Environmental toxicology focuses on people while researching the harmful health consequences of chemical, biological, and physical agents on living things in ecosystems; as a result, it is crucial in resolving issues of public health. Environmental toxicology research has over the years given policy-makers and the general public tools and scientific proof to help avert significantly greater environmental degradation, including harmful consequences for human health (Dhillon J et al., 2020).

The total amount of suspended organic and inorganic elements in water is measured by turbidity (Duvick DN et al., 2005). It is an optical characteristic that is connected to the reflectance of water bodies. Several studies (Fischer RA et al., 2015) have noted a correlation between an increase in turbidity and an increase in reflectance in the visible region .Along with anthropogenic factors, a number of natural factors, including as erosion and floods, also affect the quantity of suspended sediments in the water column. Sunlight penetration is decreased by the suspended sediments, which affects primary productivity. The association of toxic metals and organic materials with suspended sediments can result in eutrophication and water contamination (Lobell DB et al., 2009) .

Turbidity can therefore be used to determine the quality of water. One of the most important water quality metrics for determining how polluted a waterbody is is suspended particle matter (SPM). SPM harms the ecosystem in several ways, including by concealing benthic organisms, irritating fish gills, and obstructing light needed for photosynthesis, among other issues. SPM can be present in a water body or river for a number of causes, including additional pollutants from the discharge of sewage that has not been properly maintained, siltation, sedimentation, flood, and even bacteria. Environmental toxicology is anticipated to play an increasingly significant role due to the compelling demand for quick health remedies in East Asia due to the growing number of environmental issues. To address the challenges to public health posed by environmental issues and to broaden the body of scientific knowledge in this area, more basic and applied research must be conducted. Although environmental toxicology has grown significantly and is receiving more attention, there are still just a small number of articles about it in international journals. The role of environmental toxicology in enlightened public health and the issue of sustainable development are both factors influencing how society is changing as a result of the introduction of new technologies and the East Asian region in particular. Even greater emphasis will be placed on public policy. Red band reflection change detection The variation in the spectral reflectance in the visible part of the spectrum has been explained in the writing and shown to be crucial due to the adjustment of suspended sediments of the water (Brezonik et al., 2005; Liedeke et al., 1995; Ritchie et al., 1976). Writing suggests that even a single band can provide a reliable estimate of suspended sediments when chosen properly (Gholizadeh et al., 2016; Nechad et al., 2010; Pavelsky and Smith, 2009). It was suggested that one red band may be used to determine the amount of suspended sediments in water (Shi and Wang, 2009; Hellweger et al., 2007; Miller and McKee, 2004). The idea of a single band was employed. where the concentration of suspended silt increases with an increase in reflectance. Red band is used in the current study to examine how the variation in suspended sediment content throughout the reservoir affects the change in spectral response. Each water pixel on each annual median image (2013–2020) was rated according to its reflectance, from high to low. It was observed that the reflectance in the red band increases when silt concentration increases and vice versa. Accordingly, high reflectance pixels in the red band are interpreted as having a high concentration of suspended sediment, whereas low reflectance pixels have a low quantity of suspended sediment.

DISCUSSION

Any system that is contaminated by chemicals runs the risk of having its structure and functioning changed . There is a chance that neonicotinoid pesticides will leak, drain, run off, or melt snow . These insecticides have been discovered in a range of water sources, including tanks, lakes, streams, and groundwater Aquatic creatures exposed to neonicotinoids showed a variety of impacts on immunity, growth, and development, as well as affects on eating and locomotion

CONCLUSION

This study examined how the Covid-19 lockdown affected the Ukai reservoir of the Tapi River using data collected via remote sensing and the cloud-based Google Earth Engine technology. This study is efficient in that it did not need downloading any of the 77 Landsat 8 pictures and that no software for image processing, editing, or manipulation was needed. A flow of semi-automated data processing that produced the desired results was constructed using a few lines of code.

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CONFLICT OF INTEREST

The author has no known conflicts of interested associated with this paper.

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