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*Article*

# An Illustration Showing the Correlation between Discharge, Rainfall, and Total Suspended Solids

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**Abstract:** The eastern portion of Indonesia's Riau Province is home to the Indragiri River, which is significant to the local ecology. The Indragiri River Water Data Point Map is the foundation for this study's investigation and analysis of the intricate environmental conditions surrounding rivers. On the other hand, the analysis's findings indicate that there is not much of a relationship between rainfall and water output in the Indragiri River—roughly 0.13%. One aspect that appears to lessen the impact of rainfall on river flow is situating the data collection point near the river mouth. The rainfall diagram from January to December shows seasonal variations; the highest rainfall is recorded in January, while the highest average rainfall is found in October. In addition to maps, the complexity of the Indragiri River can also be understood by the examination of total suspended solids (TSS) and river discharge. Though the relationship between river discharge and TSS tends to be in the same direction as the relationship between rainfall and TSS, the influence is not as strong. For instance, there is just a little 2.57% association between rainfall and TSS. The Indragiri River's water quality is also impacted by other elements, such as waste from diverse sources. Understanding the relationship between rainfall, river discharge, and water quality measures like TSS is crucial for maintaining the ecosystem of the Indragiri River and its environs, even though it may not be the major focus of this investigation.

**Keywords:** Curah Hujan dan Discharge, Sungai Indragiri,Total Suspended Solid.

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## 1. Introduction

Lake Singkarak in the province of West Sumatra is the source of the Indragiri River. Additionally, the river's estuary is located in the Indragiri Hilir district, commonly known as Batang Indragi-ri or the Indragiri River. This area is also known as Batang Ombilin. Located on the east coast of Sumatra Island or in the east of Riau Province is the Indragiri Hilir Regency. Within the province of Riau, the 1,367,551 Ha Indragiri Hilir Regency is home to a total of 25 tiny islands. Its coordinates are 104°10'–102°32' East Longitude and 0°36' North Latitude – 1°07' South Latitude.

Data points such as air sampling sites, unique spots for flora and wildlife, and air quality monitoring sites are all visually represented on the Indragiri River Waters data point map. Researchers, environmental managers, and other interested parties can identify significant locations that need more thorough monitoring by using this map. Data on the distribution of ecosystems, the presence of natural resources, and potential threats to the river environment are all included in the map. With this data, more effective management and protection plans for the Indragiri River may be created.

Our knowledge of the environmental conditions in the waters of the Indragiri River can be improved by mapping data points there. These maps may include information about the spread of pollutants, air quality analysis data, and proof of ecological changes brought about by both natural and human influences. Through obtaining a thorough comprehension of the distribution and characteristics of river water areas, pertinent stakeholders can put into practice more targeted measures to protect river ecosystems, uphold environmental equilibrium, and promote sustainable management for the Indragiri River and its neighbouring communities.

## 2. Materials and Methods

Researchers, environmental scientists, and other interested parties can identify key locations that need further monitoring by using the extensive data this map presents. This image is more than just a group of dots on a map; it is a tool that illustrates the intricacy of river ecosystems, offers perception into potential environmental changes, and is crucial for the creation of long-term conservation strategies. policy for the environment's and the Indragiri River's management.

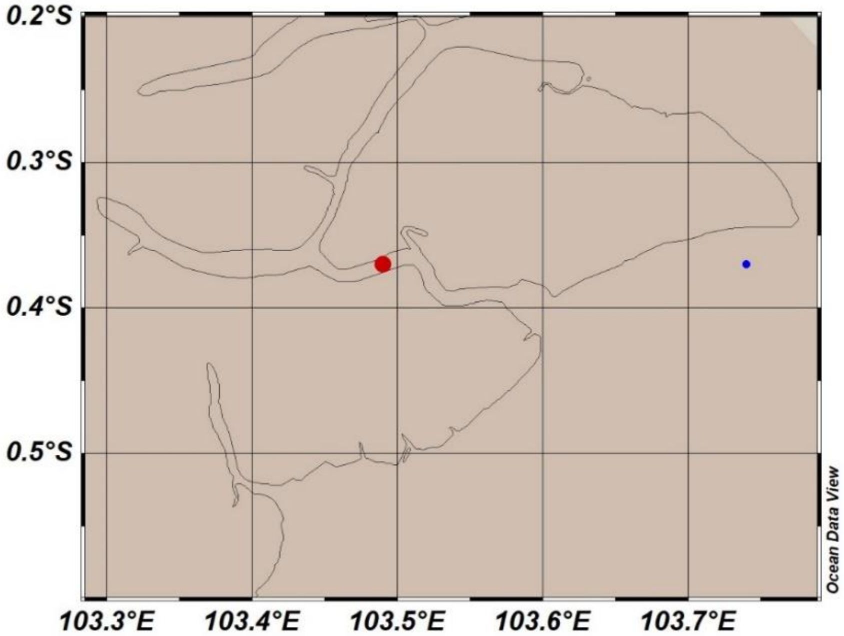


**Figure 1.** Map of data points in the waters of the Indragiri River
(Source: http://marine.copernicus.eu)

A map of the data points in the Indragiri River's waters, shown in Figure 1, offers a visual depiction of key sites within the ecosystem of the river. These maps include crucial information including locations of significant wildlife and plant life, water quality monitoring stations, and sample sites for water.

## 3. Results

The total suspended solid (TSS) in the Indragiri River is depicted in Figure 2, which is a crucial metric for comprehending the river's and its environs' air quality. TSS measures the amount of solid particles in the air that are suspended in it. These particles might originate from a variety of sources, including industry, soil erosion, agricultural waste, and other human activities. The significance of TSS data lies in its potential as a key indicator of river conditions, particularly with reference to pollution and environmental shifts. Knowing the TSS level in the Indragiri River greatly increases the likelihood of successful river management and environmental conservation initiatives. By closely observing changes in TSS, we can spot trends in the quality of the air as a result of human activity and create plans to lessen the pollution burden on the Indragiri River. In order to preserve the sustainability of river ecosystems, conservation measures and mitigation activities must be carefully planned using the knowledge gleaned from TSS data.

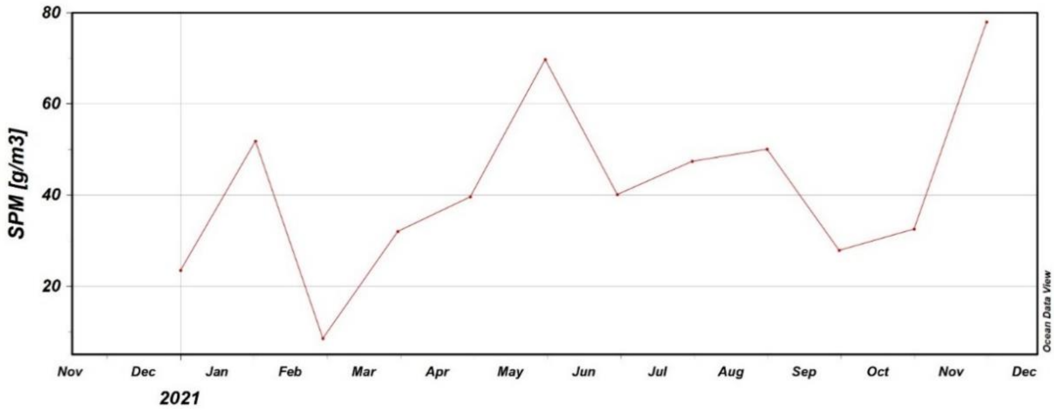


**Figure 2.** Total Suspended Solid (TSS) in the Indragiri River

In Figure 2, the value of Total Suspended Solids in the waters of the Indragiri River from January to December ranges from 8.5 mg/I to 77.97 mg/I, the highest in December and the lowest in February. TSS is a physical parameter measurement which aims to measure the level of pollution where for fisheries purposes requires a TSS value between 25 – 80 mg/l (Effendi, 2003).

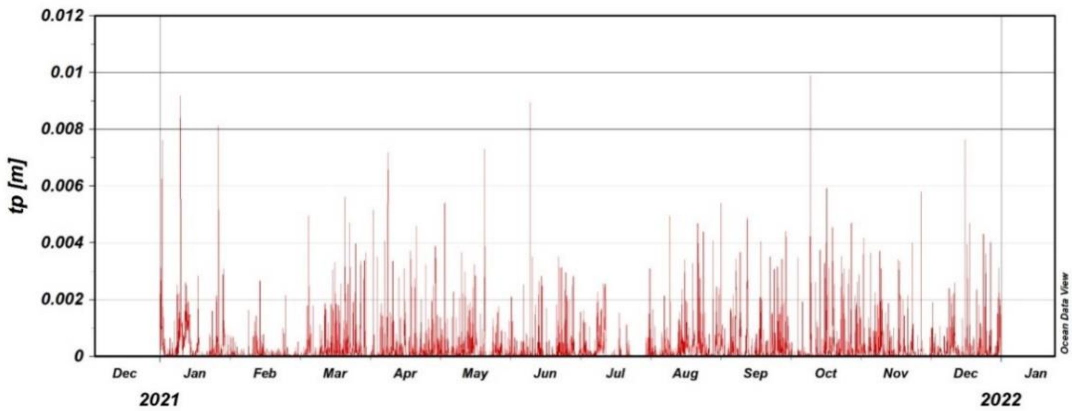


**Figure 3.** Height of Rainfall in the Waters of the Indragiri River

The diagram depicts a spectrum of rainfall levels ranging from 0.08 mm to 0.47 mm, providing an indication of the intensity of rainfall experienced throughout the year around the Indragiri River. January recorded the highest rainfall, while February recorded the lowest rainfall. However, the rainfall pattern in general has a contrasting trend, where October shows the highest average rainfall value and February shows the lowest rainfall value. These fluctuations indicate changes in weather dynamics throughout the year, providing important insights into seasonal trends that may affect the Indragiri River and the surrounding ecosystem. Understanding these periodic fluctuations is critical for natural resource management, agriculture, and for estimating potential hazards associated with flooding or drought in the Indragiri River region.

These differences paint a significant picture of the wet and dry seasons in the Indragiri River basin by illuminating the year-round variances in weather. Understanding the regional climatic patterns is essential as they can greatly affect river ecosystems and human activities that depend on the surrounding environment. The inversely proportionate link between rainfall and TSS in the Indragiri River's waters is seen in Figure 4 below. Rainfall affects 2.57% of TSS, as explained by this regression. Total Suspended Solids (TSS) are low when rainfall is heavy.

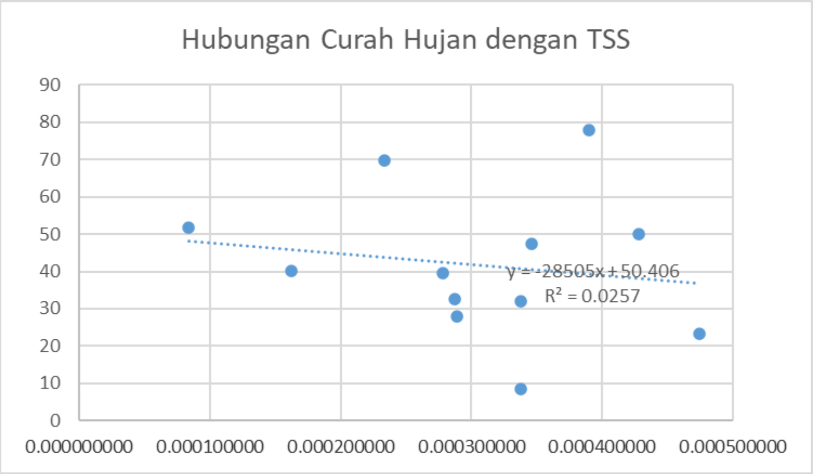


**Figure 4.** Relationship between Rainfall and TSS

The Indragiri river discharge varies from 1473.98 m2/s to 5438.04 m2/s, with February and March seeing the highest and lowest levels, according to Figure 5 above. Based on the significant rainfall in October, it was determined from the data that the largest average river discharge happened between September and October, specifically between 4926.80 m2/s and 5239.56 m2/.

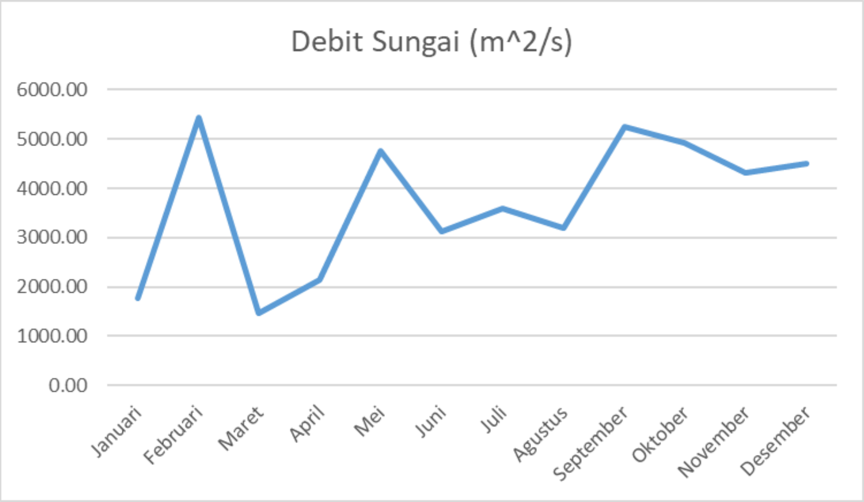


**Figure 5.** Indragiri River Discharge Graph

Figure 5 is a graph illustrating the volumetric rate of air passing through the Indragiri River at a specific time interval. Accurate river flow data is essential for comprehending the natural dynamics of water systems, particularly about water availability, flood patterns, and overall water resource management. This graph presents a concise depiction of the temporal variations in the volume of water flow in the Indragiri river.

Knowledge about the flow protocols of the Indragiri River is crucial for the river's ecosystem and the livelihoods of individuals reliant on the river. River discharge data is essential for flood modelling, air management, and air resource planning, all of which play a key role in development and environmental conservation efforts. Hence, a comprehensive comprehension of the Indragiri River flow chart is crucial to bolster continuous monitoring and management endeavours for this river.

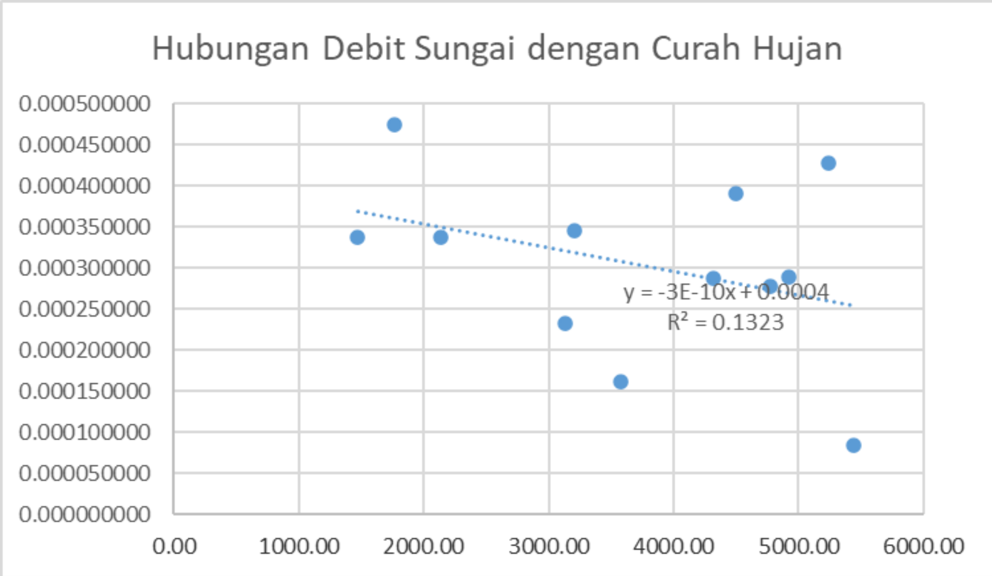


**Figure 6.** Relationship between river discharge and rainfall

Figure 6 shows that, although not statistically significant, there is a trend for an inverse relationship between rainfall and river discharge in the waters of the Indragiri River. The figure's regression analysis reveals that rainfall has an impact on just 0.13% of the Indragiri River's water discharge. This aspect might have to do with the fact that the data collection site is close to the river's mouth and has a wide cross-section, making it difficult to see how rainfall affects the Indragiri River's flow rate.

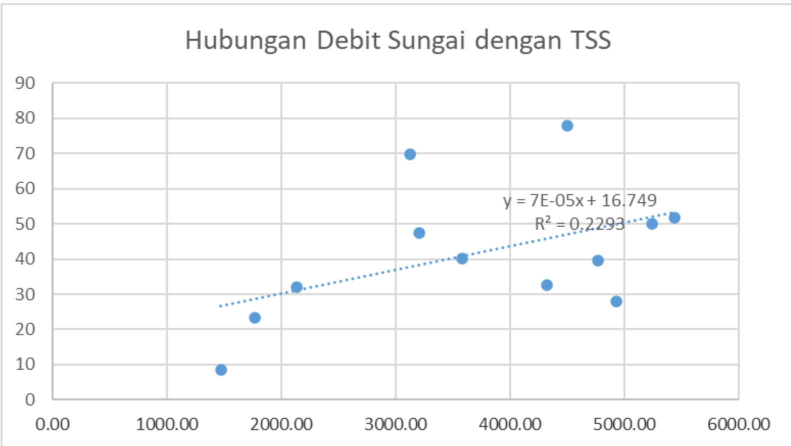


**Figure 7.** River Discharge Relationship With TSS

## 4. Discussion

Nonetheless, knowledge of the relationship between river discharge and rainfall is crucial to comprehending the dynamics of the Indragiri River. Understanding these linkages helps researchers and river managers estimate possible changes in river responses to weather conditions, even though the effects might not be significant at the chosen measurement points. This is especially useful when it comes to disaster risk management and more efficient planning for river management.

With a regression value of 22.93%, Figure 7 below illustrates the connection between river discharge and TSS. The discharge of rivers affects TTS. Because high water discharge might alter the mixing of suspended materials, the TSS value generally decreases with increasing water discharge. Nonetheless, evidence from the Indragiri River indicates a direct correlation between TSS and river discharge. The significant amount of sediments that is transported to the estuary from upstream areas may be the source of this. Furthermore, it is estimated that the TSS content is influenced by a number of additional factors in addition to rainfall, discharge, and sediment, including domestic waste from homes, businesses, and farms, as well as waste from livestock and agriculture in the area surrounding river basins (Sutamihardja et al., 2018; Yudo and Said, 2018).

## 5. Conclusions

Data points from the Indragiri River are crucial for understanding the intricate nature of the river environment. This map facilitates the identification of crucial areas that necessitate thorough monitoring by providing comprehensive details on water sample locations, specific areas of flora and animals, and water quality monitoring stations. Analysis, however, reveals a negligible correlation—roughly 0.13%—between rainfall and water discharge in the Indragiri River. The main element that seems to lessen the impact of rainfall on river discharge is how close the data collection station is to the river mouth.

In addition to the Point Data Map, additional graphs showing river discharge and Total Suspended Solid (TSS) give a complete view of the intricate circumstances of the Indragiri River. Although there is an inversely proportionate association between rainfall and TSS and a usually positive relationship between river discharge and TSS, the influence is not very strong. Nonetheless, this correlation offers information for better planning for river management and disaster risk reduction. The Indragiri River's water quality is also influenced by other elements, such as the dumping of trash from other sources. In conclusion, this analysis may not focus primarily on the relationship between rainfall, river discharge, and water quality metrics like TSS. To preserve the ecosystem of the Indragi-ri River and the surrounding area, stakeholders must still be aware of this relationship in order to take the necessary action.

## References

Andriansyah, Maulana. Di-atom flora in subterranean ecosystems: a review. JOANE Vol. 01 No. 01 January 2023, p24-27. https://doi.org/10.56855/joane.v1i01.133

Effendi, H., 2003. Telaah kualitas air, bagi pengelolaan sumber daya dan lingkungan perairan. Kanisius.

Habibillah,Dikri.(2023).Hydrilla Photosynthesis Process As Biochemical Reducing Agent. JOANE Vol. 01 No. 02 May 2023, p-33-36. https://doi.org/10.56855/joane.v1i2.339

Sutamihardja RTM, Azizah M, Hardini Y. 2018. Studi dinamika senyawa fosfat dalam kualitas air Sungai Ciliwung hulu Kota Bogor. *Jurnal Sains Natural Universitas Nusa Bangsa.* 8(1): 43-49.

Varabih, Cucu A., Nofir-man. (2023). The Importance Of Seaweed as a Bioremediation Natural Agent. JOANE Vol. 01 No. 02 May 2023, p-48-53. https://doi.org/10.56855/joane.v1i2.343R

Yudo S, Said NS. 2018. Status Kualitas Air Sungai Ciliwung di Wilayah DKI Jakarta Studi Kasus: Pemasangan stasiun online monitoring kualitas air di segmen kelapa dua – Masjid Istiqlal. *Jurnal Teknologi Lingkungan*. 9(1): 13-22.