2024 - grammarly-Assessment of Catchment Area Mapping at Sembrong Dam

by Puthiriraj

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29,332	4,199	212	16 min 47 sec	32 min 18 sec
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Writing Issues

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Writing Issues

97	**Correctness**	
10	Misspelled words	
33	Ungrammatical sentence	
3	Text inconsistencies	
7	Determiner use (a/an/the/this, etc.)	
3	Confused words	
12	Punctuation in compound/complex sentences	
1	Incorrect punctuation	
4	Improper formatting	
3	Misplaced words or phrases	
4	Incorrect verb forms	
2	Faulty subject-verb agreement	
4	Incorrect noun number	
3	Closing punctuation	
1	Misuse of modifiers	
4	Wrong or missing prepositions	
1	Pronoun use	
1	Incomplete sentences	
1	Conjunction use	
8	**Clarity**	
1	Wordy sentences	
1	Word choice	
5	Intricate text	
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8	**Delivery**	
6	Tone suggestions	
2	Incomplete sentences	

Unique Words

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Sentence Length

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19.8

words per sentence

2024 - grammarly-Assessment of Catchment Area Mapping at Sembrong Dam

Assessment of Catchment Area Mapping at Sembrong Dam

Abstract

The study examines the catchment area mapping at Sembrong Dam in Johor, Malaysia aiming to identify potential transit pathways contributing to dam water degradation and implement targeted mitigation measures. The analysis involves of surface runoff patterns and topographical/geographic data via digital elevation model, providing insights into terrain characteristics, slope, aspect, and flow directions to understand hydrological dynamic that significantly contributes to water resource management. The aim of this study is to produce the catchment area map with satellite imagery and to analyse transit pathway that potentially causing water degradation of Sembrong Dam. Anlysis of satellite image from sentinel-2 processing generates a detailed runoff map and digital elevation model (DEM) of the catchment area surrounding the dam using methods such as surveying techniques, topographical and geographic data collection, and analysis of surface runoff patterns. The findings of this study serve as valuable references for future research and decision-making processes related to water resource management in similar contexts. The significance of this study lies in its contribution to water resource management. In conclusion, the study "Assessing transit pathways potential causing water degradation: study case Sembrong Dam catchment" focuses on identifying transit pathways that

potentially contribute to water degradation. The analysis of these pathways enhances our understanding of potential pollution sources and enables the implementation of targeted mitigation measures.

Introduction

Sembrong reservoir, located in Malaysia, is vital in flood control and water supply for the surrounding area. Reservoirs behave more like natural lakes, with water quality affected mostly by the geology of the watershed and land use within the watershed [1]. It obtains the majority of its water intake from surface water runoff following a precipitation event. Watersheds are crucial for the hydrological cycle, producing clean freshwater resources. The growth of agricultural and forestry zones near watersheds, resulting to contaminated drinking water and increased water treatment expenses. The pollution often may be caused by agricultural fertilizers, pesticides, and farm waste which is containing ammonia, potassium, and phosphate used to boost production rate. Excessive amounts of ammonia, nitrogen, and phosphorus cause eutrophication by fostering algal blooms in water bodies which is declining quality of clean water supply. These substances are linked to pollution events, biodiversity loss, food resource contamination, and can have a direct and indirect impact on human health [2]. The nutrients reach the reservoir by stormwater runoff from land to inland, where the plantation ground is highly concentrated with nutrients from fertilizers and pesticides. In addition, nearly the whole area surrounding Sembrong Dam has a slope heading to the watershed since this reservoir is a surface water harvesting to collect and store surface water. This fact highlighted the significance of the interaction between water harvesting and surface run-off in watershed development programs [3]Land-use practices in these plantations, including using fertilizers and

pesticides, can lead to surface runoff that carries poll to manage water resources and implement targeted mitigation measures effectively to analyze the surface runoff patterns and pathways. This study will provide insights into the terrain characteristics and flow directions by collecting topographical and geographic data, such as generating a detailed runoff map and digital elevation model (DEM). This information will help identify potential runoff pathways and understand the hydrological dynamics of the catchment area surrounding the Sembrong Dam.

Land use change impacts on surface runoff to dams have been extensively studied. [4] found that urbanization and agricultural growth significantly affect streamflow and water quality, with agricultural expansion increasing nutrient and sediment loads and urbanization increasing impermeable surfaces and surface runoff. [5];[6] demonstrated that urbanization in the Three Gorges Reservoir Area led to increased sediment output and surface runoff due to decreased infiltration. These studies emphasize the importance of managing land use change to improve water resource sustainability in dammed watersheds. Additionally, catchment characteristics such as soil ; type, topography, and climate play a significant role in surface runoff. [7] highlighted the rise in surface runoff and sediment output resulting from land use change in a Mediterranean watershed, with extreme weather events exacerbating these effects. [8] reported that land use change, particularly the conversion of rangeland to farmland, significantly increased surface runoff and sediment output in a semi-arid Iranian watershed. These studies underline the importance of considering catchment characteristics and implementing sustainable land use strategies to minimize surface runoff and sediment production in dams. Malaysia's climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production. This pattern

of production may result in a supply inadequate as the population continues to rise over time, directly influencing rising demand. As a result, agricultural activities have increased in the recent decade, and the use of excessive fertilization has caused serious environmental issues such as eutrophication linked to the use of inorganic fertilizers. This make the agriculture soil is highly concentrated with agriculture nutrients plus unpredictable precipitation event especially heavy precipitation events causing more nutrients flow into watershed throughout the surface run-off then triggers the eutrophication. The impact of climate change on surface runoff patterns and the implication for dammed watersheds is a topic of great concern. Malaysia is one of the countries in the Southeast Asian region that has experienced climate change that has affected agriculture production [9];[10]. Unpredictable changes climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production.[11] investigated the impact of climate change on surface runoff and sediment output in the semi-arid catchment of the Loess Plateau. They found that more frequent extreme precipitation events due to climate change would increase surface runoff and sediment output. To mitigate these effects, the study emphasized the importance of adequate water resources management, including enhancing water storage capacity and supporting sustainable land use practices. These studies underscore the need to consider climate change effects when managing water resources and highlight the importance of implementing appropriate measures to mitigate the impacts of climate change on surface runoff to dams. Furthermore, Malaysia also one of the countries in the Southeast Asian region that has experienced climate change that has affected agriculture production [9] [10]. Unpredictable changes in Malaysia's climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production. This pattern of

production may result in a supply inadequate as the population continues to rise over time, directly influencing rising demand. As a result, agricultural activities have increased in the recent decade, and the use of excessive fertilization has caused serious environmental issues such as eutrophication linked to the use of inorganic fertilizers. This make the agriculture soil is highly concentrated with agriculture nutrients plus unpredictable precipitation event especially heavy precipitation events causing more nutrients flow into watershed throughout the surface run-off then triggers the eutrophication. Previous studies only focus on water quality of the reservoir and they come out with trophic status of each part of the reservoir as shown in Figure 1. This study is conduct to identify with part of land-used around this reservoir that dominantly contribute to water degradation. There are 2 major inlets of this reservoir (Sungai Sembrong at North-East region and Sungai Merpoh at North-West region). The question is, why the North-East region often facing algae growth compare to another region. The inlet region, which is The major source of water, is an economic area due to livestock farming, which has been linked to water contamination. [12] has shown that cattle economic activities around the inlet have an impact on water quality with high chlorophyll concentrations and total phosphorus. The Trophic Level Index is a measure of dam water quality, indicating its biological condition or productivity. A higher trophic index indicates poorer lake water quality.

Fig. 1 Water Quality parameters testing at different area around Sembrong dam [12]

Normalized Difference Vegetation Index (NDVI) known to monitor vegetation health and cover. In fact, healthy vegetation generally exhibits higher NDVI while unhealthy or stressed vegetation may result in lower NDVI values. Healthy vegetation presents the amount of fertilizer it receives. By using this information, area with higher value of NDVI has higher concentration agriculture nutrient (fertilizer) which is possibility for becoming one of potential contaminant that contribute to eutrophication. However, it should be evaluate based on contribution in land-used classification (how big the area for each type of activities in one particular land-used). On the other hand, NDVI known to be used for monitoring the land use. Contaminant could be transported via soil erosion to water bodies during precipitation events. From this fact, NDVI can help monitor these changes by identifying areas of reduced vegetation cover, potentially indicating soil erosion via the reflectance values of two different spectral bands, usually the near-infrared (NIR) and red bands of the electromagnetic spectrum [13]. NDVI values range from -1 to +1. High value of land cover presenting higher vegetation which is less soil erosion. In contrast, low value of land cover presenting lower vegetation which is possibility for soil erosion during precipitation event is high [14].

Aerial mapping approach on catchment area of the reservoir was utilized for identifying potential hotspots that responsible on the deteriorating watershed water quality. It discusses the accuracy and limitations of different Digital Elevation Model (DEM) generation methods for flood simulation and highlights the benefits of using a 3D hydrodynamic model coupled with high-resolution

topographic data obtained through digital aerial photogrammetry [15]. The paper also explores using Sentinel-2 imagery for catchment analysis, including the automatic mapping of lakes surface water using deep learning techniques [16]. Additionally, it examines the integration of NDVI and land use with runoff analysis to understand the impacts of soil and water conservation programs on vegetation regeneration and runoff patterns [17];[18]. According to [19];[20] the paper discusses the atmospheric deposition pathways for pollutant transport to water bodies, such as dams, and the importance of understanding the dynamics, sources, and ecological effects of pollutants like chlorinated pesticides, organic phosphorus, and organic pollutants as shown in Figure 2. It also highlights the significance of assessing groundwater infiltration pathways using remote sensing, GIS, and water pollution indices to identify suitable sites for groundwater recharge, manage heavy metal pollution, and ensure the quality and sustainability of water resources [21];[22].

Fig. 2 The role of agriculture nutrient (Phosphorus) in contributing to the onset of algal bloom incidents in lakes and the associated cyclic processes [23]

This study revolves around the challenges associated with surface runoff and water resource management at Sembrong Dam. There is limited knowledge

about the runoff patterns and their potential effects on dam operation. This lack of understanding hinders accurate analysis and management of runoff. Additionally, the absence of a detailed runoff map and digital elevation model (DEM) further complicates the runoff analysis and management The absence of a detailed runoff map and digital elevation model further complicates the process. To address these issues, the study aims to produce a catchment area map with a digital elevation model and analyze transit pathways that may cause water degradation. Data acquisition through surveys, measurements, and Sentinel-2 imagery is used to analyze surface water patterns and their impacts on the dam's water quality. The methodology integrates techniques such as NDVI analysis, contour mapping, DEM generation, watershed analysis, and land use mapping. The research aims to assess surface runoff patterns, understand flow dynamics, and identify risks to water quality and resource degradation.

Methodology

The methodology for this research aims to assess the degradation of water in the Sembrong Dam Lake through a multi-phase approach. The methodology is framed based on a provided flowchart outlining three key phases. In Phase 1, a preliminary survey, site investigation, fieldwork study, and data collection are conducted to gather comprehensive data on water conditions and sources of pollution. Phase 2 focuses on achieving Objective 1 by processing Sentinel-2 imagery using QGIS to generate a Digital Elevation Model (DEM), contour lines, watershed boundaries, and the Normalized Difference Vegetation Index (NDVI). Additionally, Phase 2 includes Objective 2, which involves analyzing transit pathways that potentially cause water degradation by overlapping contour lines, watershed boundaries, NDVI values, land use polygons, and observed algae locations. Through this methodology, the research aims to contribute to

the understanding of water degradation in the Sembrong Dam Lake by producing relevant findings and insightsAncillary equipment components do not need to be written. The main toolsets that should be presented in this section are equipped with image captions. Image captions are placed to be part of the figure caption instead of being part of the picture.

Fig. 3 Research flowchart

The Several studies have previously been carried out at the dam, with the majority of them focusing on Hydrology Properties and Water Quality Assessment. Due to many land use differences near the dam, which are thought to be the source of dam water quality concerns that occur often, much study has been done on Sembrong dam. The establishment of livestock farms has been linked to water contamination caused by waste such as livestock faeces and food waste. The result reveal that the region around the inlet where cattle economic activities had an impact on water quality with high concentrations of phosphorus , and ammonia nitrogen [12]. This prove that eutrophication will continue to increase in the following decades as a result of excessive nutrients entering the watershed from human activities [24]. The study is conducted at Sembrong Dam in Air Hitam, Johor, with coordinates 1°59'52"N 103°10'51"E. The Sembrong Dam covers an area of approximately 1,200 hectares. The methodology involves a comprehensive assessment of

surface run-off mapping for water quality at Sembrong Dam. In Phase 1 of the fieldwork study flow chart, the study begins with a thorough site investigation where researchers, accompanied by representatives from Jabatan Pengaliran dan Saliran (JPS), observe the dam's physical characteristics, water quality and surrounding environment shown in Figure 4.

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Fig. 4 Observed the dam's physical characteristics, water quality, and surrounding environment

The subsequent phase focuses on investigating specific sites within the study area that have experienced water pollution and examining the surrounding areas. This reservoir appears to be prone to the eutrophication phenomena because of the profile and land-used surrounding dam itself. Deep lakes usually experience less eutrophication than shallow lakes. This due the fact of deep lakes has distinct water columns, dividing them into epilimnion, metalimnion, and hypolimnion, where nutrients settle and thermal stratification prevents material exchange between layers. The deepest level ever record for Sembrong Dam is approximate to 9m depth. Detailed observations and data acquisition are carried out to understand the conditions and factors associated with water pollution, including the analysis of land use and the identification of algae species as shown in Figure 5. By combining

these investigations, the research aims to comprehensively understand water pollution and its relationship with human activities in the Sembrong Dam area.

(a)

(b)

(c)

Fig. 5 Algae at Sembrong lake banks (a & b) and oil palm plantation of land use area (c)

Processing

Satellite image analysis is a crucial process for understanding water pollution and land use patterns. Data preprocessing is the first step, ensuring high-quality data from the Copernicus Sentinel-2 satellite. The focus then shifts to mapping water pollution, generating a Digital Elevation Model (DEM) to identify water concentration areas and vulnerable points. Contour mapping visualizes height differences and water flow directions. A watershed is created to identify main flow channels and tributaries. The Normalized Difference Vegetation Index (NDVI) assesses green plant concentrations and provides insights into potential water pollution related to human activities. The mapping process is illustrated in Figure 6 and Figure 7.

(a)

(b)

Fig. 6 Generated (a) DEM Contour; (b) Watershed

(c)

(d)

Fig. 7 Generated (c) Watershed; (d) NDVI map

Furthermore, a pathway transit analysis is conducted to identify potential transit pathways to the Sembrong Dam that cause water degradation. This analysis involves spatial analysis using GPS coordinates, topographic maps, and land use data. By comparing known water degradation sources with the area around the dam, overlapping patterns can be identified as shown in Figure 8, indicating potential transit routes. Land use data helps identify areas that have the potential to cause water degradation, while topographic data assists in understanding water flow directions. NDVI analysis aids in identifying areas with low or disturbed vegetation that could contribute to water pollution.

Fig. 8 Overlapping with land use area (orange, green, blue, grey), contour (soft green), watershed area (blue), location of algae (red star)

Result and Discussion

This study presents the results and analysis of investigations on Sembrong reservoir. The site investigation data has provided valuable insights into the distribution of algae species and the land use practices on the lake's ecosystem. Furthermore, analyzing satellite images and utilizing geospatial techniques such as DEM and NDVI analysis have further enhanced

understanding of the contributing factors to water degradation. By integrating and analyzing these diverse data sets, researchers have gained a deeper understanding of the complex dynamics and developed effective strategies for preserving and restoring Sembrong Lake's ecosystem for future study.

In the site investigation analysis section of the study, site investigation was conducted to investigate the visual real-time condition of water quality of the reservoir. The presence of algae in the lake may be attributed to the nearby modern agriculture project and the proximity of UK Farm, which is known for animal husbandry and agriculture. Visual observations and captured images proved that the distribution of green algae along the lake banks as shown in Figure 9. The location records for algae point 1 (1.97407256, 103.19116294) and algae point 2 (1.97512604, 103.19166619).

(a)

(b)

Fig. 9 (a) Algae location 1; (b) Algae location 2

The presence of oil palm plantations in the surrounding area, indicating a significant land use pattern. The growth of agricultural and forestry zones near watersheds, resulting to contaminated reservoir's water. The results of the site observation concluded that almost around the dam area is surrounded by palm oil plantation activities which are believed high level usage ammonia, potassium, and phosphate, the major chemicals found in agricultural fertilizers and pesticides to cause water pollution. This finding is supported by the results of data analysis from satellite images utilizing geospatial techniques such as

DEM and NDVI analysis. NDVI is calculated from the reflectance values of two different spectral bands, usually the near-infrared (NIR) and red bands of the electromagnetic spectrum [13]. NDVI values range from -1 to +1, where high positive values indicate healthy vegetation, low values indicate non-vegetated surfaces. It is particularly sensitive to changes in vegetation cover and health. NDVI values are directly related to the density and health of vegetation. Healthy and dense vegetation typically has higher NDVI values, while sparse or stressed vegetation has lower values. In areas with significant soil cover and minimal vegetation, NDVI values will be lower. Soil erosion often leads to the removal of topsoil, exposing bare soil surfaces. Bare soil surfaces generally have lower NDVI values compared to vegetated areas.

Using satellite image processing techniques, the DEM analysis generated precise DEM and contour mapping. The contour map visually represents elevation variations across the landscape, with different colours representing different elevation ranges. Water pollution could be identified based on on elevation and topographical features by analyzing the DEM and contour mapping results. Low-lying regions depicted in blue on the contour map indicate areas susceptible to receiving runoff and potential water degradation. Steep slopes, represented by darker shades, can also contribute to water degradation by accelerating water runoff speed and erosive force as shown in Figure 10. This analysis helps in understanding potential transit pathways and areas prone to contamination.

Fig. 10 Water flow (light blue line) from higher elevations to lower elevations from generated Digital Elevation Model (DEM)

The Watershed Analysis mapping conducted as part of the study aimed to delineate and identify watershed boundaries using satellite imagery, DEM, and contour data. The resulting map displayed 20 drainage basins within the watershed, covering an area of approximately 43.658 km²as shown in Figure 11. The classification of rivers using the Strahler stream order system provided insights into the river systems' hierarchical flow patterns and connectivity. These drainage basins are susceptible to water degradation from land use areas, making it crucial to understand the potential sources of water degradation and implement effective management strategies. By analysing characteristics such as land cover types, topography, slope, and aspect, areas with high vulnerability to water degradation can be identified, allowing for prioritization of conservation efforts. The Watershed Analysis mapping provides valuable insights for future research in water resource management and conservation, enabling the development of sustainable land use practices and water resource management strategies in the Sembrong Lake area.

Fig. 11 Watershed map and highlighted drainage basins in the watershed area

The Normalized Difference Vegetation Index (NDVI) analysis conducted as part of the satellite image processing analysis provides a comprehensive assessment of vegetation health and its relationship to water degradation in Sembrong Lake. By deriving NDVI values from satellite imagery, a detailed NDVI map with distinct legend categories was generated as shown in Figure 12. The dark green areas indicate robust and healthy vegetation cover, while the medium dark green areas represent dense vegetation cover, contributing to a more sustainable water environment. Light green areas exhibit moderate vegetation cover but may be more susceptible to water pollution. Grey areas signify sparse or stressed vegetation, which could be attributed to various factors, including water pollution or environmental stressors as shown in Figure 13 The absence of blue and dark blue colors suggests no areas lacking vegetation cover or severe water degradation. Analyzing the distribution of NDVI categories allows for identifying areas of concern and prioritizing further investigations. This analysis provides valuable insights into the spatial patterns of vegetation health and its potential relationship to water pollution, serving as a foundation for developing effective management strategies to mitigate water degradation and preserve the ecological integrity of Sembrong Lake.

Fig. 12 Normalized Difference Vegetation Index (NDVI) map

Fig. 13 Cloud cover (blue circle), Moderate Vegetation Cover (black rectangular) and potential implications for water quality (yellow arrow)

The comprehensive research on the transit pathway potentially causing water degradation in Sembrong Lake involved an analysis of various factors, including the spatial distribution of algae obtained from site investigations and satellite image processing. By integrating data from multiple sources, researchers gained a holistic understanding of the spatial distribution of algae in the lake. The identification of hotspots or areas with high algae concentration was achieved through the analysis of overlapping maps, incorporating the Normalized Difference Vegetation Index (NDVI), contour lines, watershed areas, and the location of algae-based on-site investigations. This analysis identified areas where algae growth was particularly dense or evident, providing valuable insights into potential transit pathways causing water degradation.
To further explore the potential causes of these hotspots, the investigations can be done by looking at relationship with land use and watershed characteristics. The types of land use activities surrounding the identified hotspots, such as agricultural fields, industrial sites, or urban areas, were analyzed to establish potential correlations between specific land use practices and the occurrence of high algae concentration. Additionally, the

characteristics of the watershed surrounding Sembrong Lake, including factors like soil erosion, nutrient runoff, and sedimentation patterns, were researched. The aim was to identify potential pathways through which pollutants or excess nutrients could enter the lake, contributing to water degradation and algae growth as shown in Figure 14. This study provided crucial insights into the impact of human activities and watershed features on water degradation in Sembrong Lake.

Fig. 14 Potential algae location growth and potential transit pathway causing water degradation

The implications of this study are significant for preserving water quality in Sembrong Lake. By understanding the transit pathway that potentially causes water degradation, it can provide a foundation for future studies and further investigation. The findings and insights gained from this analysis can guide future researchers in their efforts to understand and address water degradation in the lake. The strategies resulting from this research might include implementing best management practices in land use activities, promoting sustainable agricultural practices, or introducing measures to reduce nutrient runoff and sedimentation within the watershed. Ultimately, implementing targeted management strategies based on this research will

contribute to mitigating water degradation, preserving water quality, and promoting the overall health of Sembrong Lake's ecosystem.

Conclusion

In conclusion, the study on the assessment of catchment area mapping at Sembrong[109] Dam successfully produced a comprehensive catchment area map with a digital elevation model. It[3] analyzed[7] the transit pathway that potentially causes water degradation. Integrating[3] various datasets and mapping techniques provided valuable insights into the dynamics of surface water in the catchment area and its implications for water quality at the dam. First[3,110] research's aim was accomplished by accurately delineating catchment area boundaries and understanding land cover and land use patterns. This[3] information is crucial for future planning and decision making[111] in water resource management and environmental conservation efforts. Second[3,112] goal was focused on identifying potential movement routes that could contribute to water pollution at the dam. By[3] analyzing[7] water capture area maps, the study successfully identified areas of concern and emphasized[7] the need for an integrated management strategy. Implementing[3] measures such as best management practices in agriculture, improved wastewater treatment systems, and effective urban rainwater management plans is crucial to reduce[113] pollution and preserve[113] water quality at Sembrong reservoir[113].

1.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
2.	*The study examines the catchment area mapping at Sembrong Dam in Johor, Malaysia aiming to identify potential transit pathways contributing to dam water degradation and implement targeted mitigation measures.*	Ungrammatical sentence	Correctness
3.	*. The; . Anlysis; . In; . Reservoirs; . It; . Watersheds; . Excessive; . These; . This; . [; . Additionally; . [; . Malaysia's; . As; . Malaysia; . Unpredictable; . They; . To; . Furthermore; . There; . A; . Healthy; . By; . However; . On; . Contaminant; . From; . NDVI; . High; . The; . According...*	Text inconsistencies	Correctness
4.	*The analysis involves of surface runoff patterns and topographical/geographic data via digital elevation model, providing insights into terrain characteristics, slope, aspect, and flow directions to understand hydrological dynamic that significantly contributes to water resource management.*	Ungrammatical sentence	Correctness
5.	*runoff; run-off*	Text inconsistencies	Correctness
6.	This study aims	Wordy sentences	Clarity
7.	*analyse; fertilizers; analyze; urbanization; emphasize; minimize; fertilizer; fertilization; emphasized; Normalized; utilized; analyzing; visualizes; utilizing; analysing; prioritization; Analyzing; prioritizing; analyzed*	Text inconsistencies	Correctness
8.	the transit	Determiner use (a/an/the/this, etc.)	Correctness

9.	*Anlysis of satellite image from sentinel-2 processing generates a detailed runoff map and digital elevation model (DEM) of the catchment area surrounding the dam using methods such as surveying techniques, topographical and geographic data collection, and analysis of surface runoff patterns.*	Ungrammatical sentence	Correctness
10.	~~reservoir~~ → Reservoir	Confused words	Correctness
11.	*The growth of agricultural and forestry zones near watersheds, resulting to contaminated drinking water and increased water treatment expenses.*	Ungrammatical sentence	Correctness
12.	*The pollution often may be caused by agricultural fertilizers, pesticides, and farm waste which is containing ammonia, potassium, and phosphate used to boost production rate.*	Ungrammatical sentence	Correctness
13.	*Excessive amounts of ammonia, nitrogen, and phosphorus cause eutrophication by fostering algal blooms in water bodies which is declining quality of clean water supply.*	Ungrammatical sentence	Correctness
14.	*These substances are linked to pollution events, biodiversity loss, food resource contamination, and can have a direct and indirect impact on human health [2].*	Ungrammatical sentence	Correctness
15.	, Land-use	Punctuation in compound/complex sentences	Correctness
16.	~~impermeable~~ → Impervious	Word choice	Clarity
17.	soil;	Incorrect punctuation	Correctness
18.	soil ;	Improper formatting	Correctness

19.	t type	Improper formatting	Correctness
20.	*Malaysia's climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production.*	Ungrammatical sentence	Correctness
21.		Tone suggestions	Delivery
22.	*This pattern of production may result in a supply inadequate as the population continues to rise over time, directly influencing rising demand.*	Ungrammatical sentence	Correctness
23.	, such	Punctuation in compound/complex sentences	Correctness
24.	*This*	Intricate text	Clarity
25.	*This make the agriculture soil is highly concentrated with agriculture nutrients plus unpredictable precipitation event especially heavy precipitation events causing more nutrients flow into watershed throughout the surface run-off then triggers the eutrophication.*	Ungrammatical sentence	Correctness
26.	*Unpredictable changes climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production.*	Ungrammatical sentence	Correctness
27.		Tone suggestions	Delivery
28.	*To mitigate these effects*	Misplaced words or phrases	Correctness
29.	is also	Incorrect verb forms	Correctness
30.	*Unpredictable changes in Malaysia's climatic conditions have surge in the use of any kind of fertilizer to overcome the problem of sluggish production.*	Ungrammatical sentence	Correctness

31.		Tone suggestions	Delivery
32.	*This pattern of production may result in a supply inadequate as the population continues to rise over time, directly influencing rising demand.*	Ungrammatical sentence	Correctness
33.	, such	Punctuation in compound/complex sentences	Correctness
34.	*This*	Intricate text	Clarity
35.	*This make the agriculture soil is highly concentrated with agriculture nutrients plus unpredictable precipitation event especially heavy precipitation events causing more nutrients flow into watershed throughout the surface run-off then triggers the eutrophication.*	Ungrammatical sentence	Correctness
36.	*Previous studies only focus on water quality of the reservoir and they come out with trophic status of each part of the reservoir as shown in Figure 1.*	Ungrammatical sentence	Correctness
37.	~~is conduct~~ → is conducted	Incorrect verb forms	Correctness
38.	~~land-used~~ → land used	Confused words	Correctness
39.	~~contribute~~ → contributes	Faulty subject-verb agreement	Correctness
40.	~~2~~ → two	Improper formatting	Correctness
41.	*There are 2 major inlets of this reservoir (Sungai Sembrong at North-East region and Sungai Merpoh at North-West region).*	Ungrammatical sentence	Correctness
42.	*The question is, why the North-East region often facing algae growth compare to another region.*	Ungrammatical sentence	Correctness

43.	the different	Determiner use (a/an/the/this, etc.)	Correctness
44.	~~area~~ → areas	Incorrect noun number	Correctness
45.	~~dam~~ → Dam	Confused words	Correctness
46.	is known	Incorrect verb forms	Correctness
47.	*Normalized Difference Vegetation Index (NDVI) known to monitor vegetation health and cover.*	Incomplete sentences	Delivery
48.	, while	Punctuation in compound/complex sentences	Correctness
49.	*By using this information, area with higher value of NDVI has higher concentration agriculture nutrient (fertilizer) which is possibility for becoming one of potential contaminant that contribute to eutrophication.*	Ungrammatical sentence	Correctness
50.	*However, it should be evaluate based on contribution in land-used classification (how big the area for each type of activities in one particular land-used).*	Ungrammatical sentence	Correctness
51.	~~On the other~~ → ¶ On the other	Intricate text	Clarity
52.	*On the other hand, NDVI known to be used for monitoring the land use.*	Ungrammatical sentence	Correctness
53.	~~Contaminant~~ → Contaminants	Incorrect noun number	Correctness
54.	*High value of land cover presenting higher vegetation which is less soil erosion.*	Ungrammatical sentence	Correctness

55.	*In contrast, low value of land cover presenting lower vegetation which is possibility for soil erosion during precipitation event is high [14].*	Ungrammatical sentence	Correctness
56.	*Aerial mapping approach on catchment area of the reservoir was utilized for identifying potential hotspots that responsible on the deteriorating watershed water quality.*	Ungrammatical sentence	Correctness
57.	~~and highlights~~ → It highlights	Hard-to-read text	Clarity
58.	~~lakes~~ → lakes', lake's	Incorrect noun number	Correctness
59.	, the	Punctuation in compound/complex sentences	Correctness
60.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
61.	. The	Punctuation in compound/complex sentences	Correctness
62.	*To address these issues*	Misplaced words or phrases	Correctness
63.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
64.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
65.		Tone suggestions	Delivery
66.	~~The~~ Several	Determiner use (a/an/the/this, etc.)	Correctness
67.	*The result reveal that the region around the inlet where cattle economic activities had an impact on water quality with high concentrations of phosphorus, and ammonia nitrogen [12].*	Ungrammatical sentence	Correctness

68.	~~of phosphorus~~ → of phosphorus	Improper formatting	Correctness
69.	*This*	Intricate text	Clarity
70.	~~prove~~ → proves	Faulty subject-verb agreement	Correctness
71.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
72.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
73.	environment.	Closing punctuation	Correctness
74.	*This reservoir appears to be prone to the eutrophication phenomena because of the profile and land-used surrounding dam itself.*	Ungrammatical sentence	Correctness
75.		Tone suggestions	Delivery
76.	*This due the fact of deep lakes has distinct water columns, dividing them into epilimnion, metalimnion, and hypolimnion, where nutrients settle and thermal stratification prevents material exchange between layers.*	Ungrammatical sentence	Correctness
77.	*This*	Intricate text	Clarity
78.	~~record~~ → recorded	Incorrect verb forms	Correctness
79.	~~approximate~~ → approximately	Misuse of modifiers	Correctness
80.	~~to~~	Wrong or missing prepositions	Correctness
81.	species,	Punctuation in compound/complex sentences	Correctness
82.	~~Sembrong~~ → Sebring	Misspelled words	Correctness

83.	Watershed.	Closing punctuation	Correctness
84.	map.	Closing punctuation	Correctness
85.	, as	Punctuation in compound/complex sentences	Correctness
86.	the Sembrong	Determiner use (a/an/the/this, etc.)	Correctness
87.	our understanding	Pronoun use	Correctness
88.	*In the site investigation analysis section of the study, site investigation was conducted to investigate the visual real-time condition of water quality of the reservoir.*	Ungrammatical sentence	Correctness
89.	*Visual observations and captured images proved that the distribution of green algae along the lake banks as shown in Figure 9.*	Ungrammatical sentence	Correctness
90.	*The presence of oil palm plantations in the surrounding area, indicating a significant land use pattern.*	Ungrammatical sentence	Correctness
91.	*The growth of agricultural and forestry zones near watersheds, resulting to contaminated reservoir's water.*	Ungrammatical sentence	Correctness
92.	~~around~~	Wrong or missing prepositions	Correctness
93.	, which	Punctuation in compound/complex sentences	Correctness
94.	to be high	Incomplete sentences	Correctness
95.	~~level~~ → levels	Incorrect noun number	Correctness

96.	of usage	Wrong or missing prepositions	Correctness
97.	of ammonia	Wrong or missing prepositions	Correctness
98.	and low	Conjunction use	Correctness
99.	*Using satellite image processing techniques*	Misplaced words or phrases	Correctness
100.	on~~en~~	Misspelled words	Correctness
101.	, as	Punctuation in compound/complex sentences	Correctness
102.	*The Watershed Analysis mapping conducted as part of the study aimed to delineate and identify watershed boundaries using satellite imagery, DEM, and contour data.*	Incomplete sentences	Delivery
103.	, as	Punctuation in compound/complex sentences	Correctness
104.	*Grey areas signify sparse or stressed vegetation, which could be attributed to various factors, including water pollution or environmental stressors as shown in Figure 13 The absence of blue and dark blue colors suggests no areas lacking vegetation cover or severe water degradation.*	Ungrammatical sentence	Correctness
105.	the relationship, or a relationship	Determiner use (a/an/the/this, etc.)	Correctness
106.	growth	Punctuation in compound/complex sentences	Correctness

107.	*By understanding the transit pathway that potentially causes water degradation, it can provide a foundation for future studies and further investigation.*	Ungrammatical sentence	Correctness
108.		Tone suggestions	Delivery
109.	~~Sembrong~~ → Sebring	Misspelled words	Correctness
110.	The first	Determiner use (a/an/the/this, etc.)	Correctness
111.	~~decision making~~ → decision-making	Misspelled words	Correctness
112.	The second	Determiner use (a/an/the/this, etc.)	Correctness
113.	*Implementing measures such as best management practices in agriculture, improved wastewater treatment systems, and effective urban rainwater management plans is crucial to reduce pollution and preserve water quality at Sembrong reservoir.*	Ungrammatical sentence	Correctness