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RIVER FLOW MODELLING FOR SUSTAINABLE OPERATION OF HYDROELECTRIC POWER PLANT IN THE TALUDAA-GORONTALO WATERSHED

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Abstract

~~Measurement of river~~ River flow discharge is generally ~~the result of~~ measured by multiplying ~~between~~ the river cross-sectional area at the measurement point with the flow speed (Q = A.v m3/s). ~~This~~ However, this approach cannot be used for planning needs ~~in~~ which involves knowing the changes in discharge values ~~must be measurable or known~~ at all ~~times. Changes~~ times which are directly affected by the variations in weather conditions and catchment area ~~systems will directly affect the value of river flow~~systems. ~~Planning~~ This is necessary because planning errors ~~will result in~~ usually lead to unsustainable and interrupted operations. ~~Using~~ It is possible to determine the ~~rainfall-runoff modeling technique,~~ changes in the river discharge values ~~could be known by~~ using the rainfall-runoff modeling technique through the hydrograph output of the model. ~~The purpose of~~ Therefore, this study ~~was to carry out~~ used hydrological modeling techniques to obtain spatial and temporal river flow discharge in ~~the~~ a watershed. ~~The~~ This involved using parameters such as watershed ~~system parameters: Watershed Area~~area, ~~Curve Number~~ curve number which represents land use and soil type, ~~Time Lag~~ time lag as the delay between maximum rainfall and the occurrence of peak discharge, and ~~Initial Abstraction~~ the initial abstraction which ~~takes into account~~ considers all the losses before the runoff ~~occurs~~occurred. ~~Rainfall~~ Moreover, rainfall data were obtained from an ARR station installed around the watershed area ~~and~~ while water level data ~~was obtained~~ were retrieved through an AWLR station installed in the river at the debit measurement point. ~~the Model analysis~~ The model was ~~carried out~~ analyzed using HEC-HMS ~~software. The~~ software while the dependable discharge for power plants was analyzed using the flow duration curve method. The results ~~show~~ showed that the rainfall-runoff hydrological modeling technique applied ~~in~~ to the Taludaa-Gorontalo sub-watershed ~~could help~~ has the ability to ensure the continuous and sustainable operation of the hydroelectric power ~~plant to operate continuously and sustainably~~plant.

Keywords: ~~Modelling~~Modeling, hydrology, discharge, watershed, electric power

1. Introduction

One of the major problems often encountered in hydropower planning is the mismatch between the value of the actual river discharge and the potential ~~discharge,~~ discharge which ~~could be realised all the~~ is needed every time to operate a plant (Tsai et al., 2016). ~~Many~~ Several electric power project planners usually rely on river flow studies by measuring the cross-sectional area of ~~a~~ the river (A) and water flow velocity (V) ~~as components~~ to determine the river discharge ~~(~~based on $Q = A \times V$ m^3/sec~~)~~. However, this method ~~could~~ can only provide the discharge value at the time of ~~measurement. Climate~~ measurement without any information on the climate change ~~that occurs over time~~ in the catchment area over time or the ~~value of~~ river discharge ~~in~~ value for one ~~year cannot be determined~~year. ~~Therefore, a built~~ This limits the ability of the hydropower plant ~~cannot~~ to operate at full capacity even though it does not rain (Amos et al, 2016). ~~By contrast~~Meanwhile, the power plant components ~~could~~ can be damaged ~~if the duration of~~ during heavy ~~rain~~rainfall, ~~which causes the river~~ thereby allowing water to exceed the capacity of the river weir or water channel for a longer period. This means there is a need to know the ~~power plant, is prolonged. The~~ dependable ~~dischargetrends must be known~~ discharge trends to determine ~~whether~~ the potential of the river ~~could~~ to be ~~utilised to turn~~ used in turning a power generator turbine constantly (Samora et al, 2016).

Therefore, a method is needed to assess ~~whether~~ the ability of a river flow ~~can~~ to guarantee the operational continuity of hydroelectric power ~~plant~~ plants throughout the year based on weather characteristics and components of the catchment area system~~. Based~~. This is expected to be established on the concept of the hydrological ~~cycle,~~ cycle which shows some of the rainwater that falls ~~to~~ on the earth's surface ~~in the catchment area~~ forms a runoff~~;~~, some ~~of which~~ seeps ~~underground, whereas~~ underground while some seeps deeper into the ground to form the base flow. ~~Without rain, the~~ The underground water rises to form an underground flow and comes out as springs in the river flow when there is no rainfall (Rasmy et al, 2019). ~~Given~~ It is important to note that the inputs into the hydrological cycle ~~is a closed system, the inputs~~ are ~~always~~ continuously the same as the ~~water output. This phenomenon~~ output because it is a closed system and this is known as water balance (Pamela J. et al, 2015). ~~A~~ Moreover, a river is formed based on the ~~combined point~~ combination of the runoff from groundwater flow and the rain that falls directly into ~~a river's~~ its water body.

Mishra (2013~~),~~) examined watershed modeling with Curve Number (CN) parameters ~~using~~ with the focus on the rain ~~duration~~ data for 10 ~~years, showing~~ years and the results ~~of~~ showed the river discharge throughout the ~~year~~ period in different weather conditions. The study is considered very important and has been used over the years by hydrologists and engineers to determine suitable locations for hydroelectric power plants~~.~~. Derdour et al. (2013) also used HEC-HMS ~~modelling~~ modeling to predict the surface runoff at the semi-arid region of Ain Sefra watershed in southwestern ~~Algeria. The~~ Algeria while the hydrologic losses and effective rainfall transformation were determined ~~by~~ using the SCS curve number and SCS unit hydrograph method respectively. ~~Findings from the research indicated that the result is acceptable for simulating~~ The results were accepted to be used in stimulating rainfall-runoff~~.~~. Moreover, Ningaraju et al. (2016) ~~demonstrated that~~ showed the possibility of effectively integrating the Soil Conservation Services Curve Number (SCS-CN) method ~~could be well integrated~~ with GIS to estimate runoff at the Kharadya mill watershed in India. The method ~~could be used~~ also has the ability to improve land use planning and watershed management.

~~Based on~~ These previous studies showed the ~~research results above, it can be concluded that~~ importance of the SCS Curve Number hydrological modeling technique with hydrograph unit

~~that describes~~ for hydrologists in the ~~occurrence~~ use of ~~river flow discharge over time is essential~~ rivers for ~~hydrologists to use in~~ power generation, ~~irrigation needs~~irrigation, drinking water supply, and other water ~~resource~~ resources needs. ~~Without~~ This is considered necessary due to the need for the data on ~~the availability of~~ river water ~~volume/~~volume or discharge over ~~time, power plants, irrigation,~~ time to ensure proper and ~~drinking water supply systems will not operate properly and sustainably~~sustainable operation.

This present study also used a hydrological ~~modelling~~ modeling technique with ~~the soil conservation service curve number (~~SCS~~ CN)~~ CN hydrological ~~model, which identifies~~ model to identify the parameters of the watershed ~~system. The~~ using the rain data ~~used as input were retrieved~~ from a ~~rain~~ station installed in the watershed ~~area~~area as the input. ~~Through~~ Moreover, HEC-HMS software ~~analysis, a~~ analysis was used to generate the hydrograph and time series output data ~~were generated. The~~ while the river discharge value used for power generation energy was ~~analysed~~ analyzed using the flow duration curve (FDC) method. ~~Based on the~~ The dependable discharge value and ~~the~~ estimated height of falling river ~~water,~~ water was used to obtain the value of possible electrical energy ~~which could~~ to be generated by the Taludaa-Gorontalo River flow ~~in~~ through the ~~Taludaa-Gorontalo-River could be obtained by using~~ use of the electrical power equation~~.~~

~~The purpose of~~ . Therefore, this study ~~is~~ was conducted to model river flow energy using hydrological modeling techniques in order to obtain the spatiotemporal river discharge ~~characteristics,~~ characteristics needed to ensure the sustainability of hydroelectric power plant operations throughout the year.

2. ~~Material~~ Materials and ~~Methods~~Method

2.~~1~~ 1 Research method and data

~~The~~ This research ~~methods used in this study were~~ was conducted using a field survey and hydrological ~~modelling~~ modeling analysis. ~~Hydrological modelling~~ The hydrological modeling analysis was used to determine the value of river discharge for energy power ~~generation, whereas~~ generation while the field survey was ~~performed~~ applied to determine the actual conditions of ~~the watershed in~~ the ~~field~~watershed. ~~Rainfall data~~Moreover, ~~which were~~ the rainfall data used as the main input to HEC-~~HMS,~~ HMS were obtained through the automatic rainfall recorder (ARR) which is the rain station data logger installed in the Taludaa–Gorontalo watershed. ~~Water~~ Meanwhile, the water level data were ~~obtained~~ retrieved from data loggers at the automatic water level recorder (AWLR) station installed at the observation point of the Taludaa River discharge. ~~The~~ The condition of the watershed ~~system~~ parameters ~~that is: watershed~~ including the area, ~~Curve Number as a component that~~ curve number which represents land use and soil type, ~~Time Lag as~~ time lag which is the delay between the maximum rainfall amount and the peak ~~discharge and Initial Abstraction~~ discharge, and the initial abstraction which is ~~a~~ the parameter that accounts for all losses before ~~runoff, was analysed~~ runoff were analyzed with ArcGIS ~~software using a topographic map as secondary data~~software. ~~The~~ A topographic map which was on a scale of 1:25,000 ~~and was~~ obtained from the Indonesian Geospatial Information Agency ~~(~~for the year ~~2019)~~2019 was used to generate secondary data for these parameters. ~~Data~~ The data from the Spot Satellite Imagery 6 and 7 from LAPAN Republik Indonesia ~~(~~for the year ~~2018)~~ 2018 were also used.

2.~~2~~ 2 Hydrological ~~modelling~~modeling

Hydrological ~~modelling~~ modeling simplifies ~~of~~ complex elements and components to ~~facilitate~~ make people understand the ~~understanding of Earth's~~ earth's hydrological phenomena. ~~Hydrological~~ The models ~~are~~ serve as a simple description of the actual hydrological system and are created to ~~study~~ investigate the function and response of water catchment areas to ~~various~~ several inputs. ~~Through these models, hydrological events could~~ They can be ~~studied and then~~ used to ~~predict~~ investigate and apply the findings in predicting future hydrological events~~. Hydrological modelling can~~ , describe the ~~process of~~ rain ~~that falls~~ falling in the catchment area of ~~the~~ a watershed and ~~is processed~~ its subsequent processing in the ~~catchment area~~ system~~. It~~ , also ~~produces~~ produce hydrograph output from river flow rates.

~~As a modelling technique,~~ SCS-CN ~~was~~ modeling technique used in this study is to ~~analyse~~ analyze the occurrence of river flow discharge as a function of effective rainfall in catchment areas, land cover, land ~~use~~ use, and soil antecedent moisture (Andrzej W. et al, 2020). In this model, the land use function, soil ~~type~~ type, and initial moisture ~~are~~ were represented by the curve number (CN) ~~parameter. The CN value is~~ parameter determined by considering the antecedent moisture condition (AMC) which is an index of basin wetness. ~~The~~ Meanwhile, it is possible to determine the AMC value ~~can be determined by an approach~~ based on the amount of rain that falls before the CN ~~calculation.~~ calculation (Silveira L. et al, 2000).

The CN value of a watershed can be estimated ~~as a function of land use, soil type and soil moisture by~~ using the SCS table and soil hydrology classification. ~~For~~ It can also be calculated as a CN composite for watersheds ~~that have~~ with different soil types and land ~~uses,~~ usage using the ~~CN value is calculated as a CN composite using~~ following Equation (1).

$$CN = \frac{\sum A_i(CN_i)}{\sum A_i} \qquad (1)$$

where CN is the total composite value of the runoff volume calculated by HEC-HMS, ~~i~~ *i* is the land usage index and soil type, ~~CN_i~~ CN_i is the CN value ~~for~~ of the distribution of the watershed, and A_i is the area of the watershed.

2.3 HEC-HMS hydrological model

The hydrological model (~~i.e.~~ HEC-HMS) was designed to simulate runoff based on the ~~basis of~~ rainfall input in a ~~watershed. Sub~~ watershed ~~parameters that were used~~ and the application of certain sub-watershed components such as ~~input in~~ the ~~HEC-HMS component consisted of Sub Basin~~sub-basin, loss, ~~transform and base flow. The SubBasin component was used to input parameters: sub watershed area, loss method~~transform, ~~transform method~~ and base flow ~~method~~as inputs. ~~In this process,~~ The method used to determine the loss ~~method used~~ in this study was the SCS ~~-~~-CN, the transform ~~method used~~ was evaluated using the SCS unit hydrograph, and ~~recession was used as~~ the base flow ~~method~~was based on the recession.

~~To calculate the~~ The volume of water infiltrated into the soil ~~which is estimated from CN is~~ was calculated using the following Equation (2~~) was used:~~).

$$S = 25.4\left(\frac{1000}{CN-10}\right) S = 25.4\left(\frac{1000}{CN-10}\right) \qquad (2)$$

where *S* is the water infiltrated into the soil (mm). ~~Given the~~ The relationship between S and ~~a~~ the linear initial abstraction (I_a~~), I_a can be approximated by~~) was further explained using Equation (3).

$$I_a = 0.2SI_a = 0.2S \qquad (3)$$

Time lag (TL) ~~refers to~~ is the time difference between the peak of rain and the peak of the ~~hydrograph; it~~ hydrograph which is ~~analysed on the basis of~~ normally analyzed using TL = 0.6 ~~Tc.~~ T_c where T_c is the ~~concentration~~ concentration-time required by water to move from the farthest place

(upstream ~~sub~~ of the sub-watershed) to the observation point of water flow (outlet). ~~Tc~~ It is normally calculated using the Kirpich ~~equation~~equation as follows.

$$T_c = 0.01947(L^{0.77}s^{0.385})T_c = 0.01947(L^{0.77}s^{0.385}) \quad (4)$$

where L is the length of the main river basin, s is the slope of the watershed $(\Delta H/L)\Delta H/L)$, and $\Delta H\Delta H$ is the difference ~~in~~ between the upstream and outlet heights. ~~The~~ Therefore, the main components needed as ~~input~~ inputs for the sub-basic parameters in HEC-HMS are ~~shown~~ presented in Table 1.

Table 1. Components of sub-DAS parameters used as input for the HEC-HMS

	Component	Parameter
1.	Sub Basin	Area (km^2)
		Initial abstraction (mm)
2.	Loss	Curve Number
		Impervious (%)
3.	Transform	Time Lag (min)
		Initial discharge (m^3/s)
4.	Base Flow	Recession constant
		Flow (m^3/s)

~~Hourly~~ The hourly rainfall data obtained from rain stations (ARR) installed in the watershed area at a certain time (forming 1 hydrograph ~~curve of rain data~~curve) were used as the input in the time series data ~~manager component~~manager. ~~Data were obtained from rain stations (ARR) installed in the watershed area. Through~~ Moreover, the HEC-HMS simulation process conducted with the watershed parameter components and rain data ~~input,~~ were used to obtain the hydrograph output and river discharge values ~~were obtained~~ at a certain time (only forming 1 discharge hydrograph curve)~~.~~

~~The modeling technique was carried out by inputting data from the watershed parameters analysis result and rainfall data for the watershed area in the HEC-HMS software~~. ~~The modeling results would show river discharge data as~~ However, a ~~result of the hydrological~~ model calibration process ~~in~~ was required because the ~~watershed system~~ results produced in ~~hydrograph and time series graphs of river flow over time. Considering that~~ the simulation ~~produced results that~~ did not match the real-~~world~~ life measurements~~, a model calibration process was needed~~.

2.4 Model calibration process

The model calibration process is needed to test the ~~model simulation~~ results ~~(~~produced from the simulation which is the hydrograph ~~output)~~ output to ensure it is in accordance with the actual river discharge ~~(discharge~~ from the observation point~~)~~. ~~Model calibration~~ This was conducted in the HEC-HMS ~~is conducted~~ through the ~~optimisation~~ optimization trial manager ~~process. Data for~~ process which involved obtaining field river discharge ~~comparisons were obtained~~ through direct ~~observation/~~observation or measurement ~~at~~ with the ~~discharge observation point. River discharge data were measured for several values from~~ focus on the minimum ~~to the~~ and maximum water ~~level~~ levels at a particular time. ~~Every measurement was~~ It is also important to note that all the values recorded were adjusted to the water level value on the staff gauge.

~~Observed~~ The discharge data observed were recorded ~~on the basis of~~ in relation to the time and date of ~~measurement~~ measurement, and later paired with the river stage data recorded ~~by~~ using the AWLR logger installed in the river flow at the ~~discharge~~ observation site. ~~By using~~ The application of the discharge rating curve ~~method, data were paired~~ method for the pairing led to ~~obtain~~ a curved line equation (Y = XZ~~). By entering all the water level values in variable X,~~) which was further used to

determine the Y value or ~~the~~ debit series value ~~can be obtained as much as~~ by entering all the water level ~~data. The curve equation is shown~~ values in variable X as indicated in Figure 1.

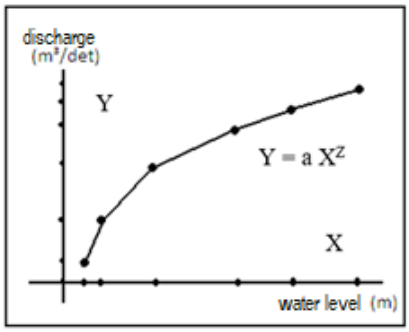


Figure 1. ~~Curve~~ The curve of water level versus discharge

~~By using the~~ This rating ~~curve,~~ curve can be used to determine the river discharge time series data ~~can be obtained~~ for a certain period. In ~~the HEC-HMS calibration process, the discharge data from~~ a situation where the ~~observations compere with the discharge model results occurring at the same time (one~~ hydrograph ~~curve). If the hydrograph of the discharge modelling results differed from the hydrograph discharge obtained~~ produced is different from the ~~measurement results (~~value measured up to 85%~~)~~, ~~then optimisation~~ there is a need to conduct an optimization calibration ~~procces, was performed~~ process by changing the value of the ~~subwatershed parameter~~ sub-watershed components ~~(~~including the CN, ~~TL~~ TL, and ~~Ia)~~ Ia from the minimum ~~up~~ to the maximum value. ~~After several optimisations, a~~ A model hydrograph that resembles the ~~hydrograph of~~ one from the observations ~~was obtained, indicating that~~ is expected to be obtained after several optimizations and this means the model ~~for obtaining~~ is acceptable to be used in determining the river flow ~~rates is acceptable~~rates. ~~The component values of~~ Moreover, it is also possible to use the ~~sub watershed~~ changed parameters ~~resulting from changes can be used~~ to simulate the discharge using the time-series rain data ~~input. The process of~~ as the input in the HEC-HMS ~~optimisation with time series rain data input produces~~ to produce the time-series river discharge ~~data, which are the value of~~ data required to be used as river discharge value over time (temporal ratio).

2.5 Dependable discharge analysis

The ~~use of~~ river discharge to be used for power generation ~~must~~ needs to meet reliability ~~requirements where the river discharge value must always be~~ standards by continuously being within the determined threshold. ~~The~~ For example, the dependable discharge needed for electric power generation is 85%–90~~%, which~~ % and this means ~~that from~~ the discharge rate for the overall time series river flow ~~events, a discharge rate of 85%–90%, which would~~ events needs to be within this range to be ~~available~~ eligible for ~~generating electricity, must be met.~~
use in electricity generation. The dependable discharge which is based on the frequency of events was ~~analysed~~ analyzed in this study using the flow duration curve (FDC) ~~method. The dependable, which is~~ method based on the ~~frequency of events, was formulated through~~ formula in Equation (5) (Lei Ye et al., 2015).

$$A = \frac{(n-q)}{n} 100\% A = \frac{(n-q)}{n} 100\% \qquad (5)$$

where n is the number of ~~observations;~~ observations and q is the number of ~~failures, specifically that of~~ failures with a specific focus on the situation when the recorded discharges are smaller than the

dependable discharge. The FDC curve ~~was created by~~ involves sorting the discharge data from the largest ~~data~~ to the smallest ~~data~~ on the ~~Y~~ Y-axis and creating a probability ranking of the number of events from 1%–100% on the X-axis. ~~The~~ This led to the calculation of the probability of discharge for each percentage ~~was calculated~~ using Equation (6)~~:~~.

$$P = 100[M/(n+1)]P = 100[M/(n+1)] \quad (6)$$

where P is the probability of water discharge, M is the ranking position of debit data, and n is the total data.

The minimum dependable discharge ~~that was used~~ to turn the electric generator turbine was 90% of the total available flow rate (time series~~). The 90% minimum dependable discharge was~~) as determined based on the ~~basis of the~~ height of the ~~hydrograph, as shown~~ hydrograph presented in Figure 2.

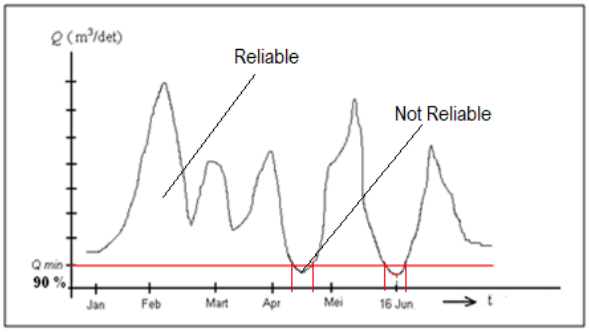
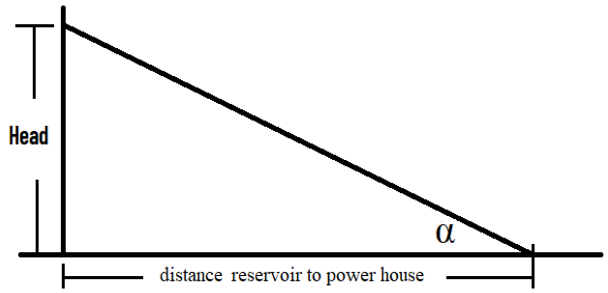


Figure 2. Determination of 90% main discharge

2.6 Head Analysis

The ~~designed~~ waterfall height design determines the energy available to move the turbine in ~~the~~ a proposed power ~~plant to be built~~plant. ~~The location of~~ This is the reason the power plant ~~construction was determined by analysing~~ is normally constructed based on the analysis of the slope in the watershed ~~area. To~~ area such that a high slope is required to obtain the sufficient water flow ~~for turning~~ needed to turn the turbine. Moreover, ~~a high enough slope must be found. The~~ the location ~~selected~~ for the power plant ~~must~~ should not be too far from the water discharge measurement ~~point. To obtain~~ point while an ~~adequate waterfall, an~~ appropriate water channel ~~must~~ needs to be ~~built~~ constructed to produce the optimal volume of river flow needed to turn the power generator turbine. ~~The value of~~ It is important to note that the water drop height ~~(head) was~~ or head value is usually determined by subtracting the height of the observation point ~~and~~ from the height of the hydropower building point. ~~The height of~~ It can also be calculated by adding the location ~~added~~ height with ~~the height of~~ the river height after ~~being dammed is~~ it has been dammed. Therefore, the ~~height~~ determination of the ~~waterfall (head) of the river. Head determination~~ head based on the assumed ideal field distance is ~~shown~~ presented in Figure 3.



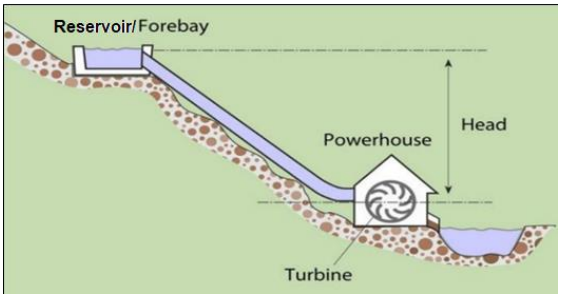


Figure 3. . Determination of the head based on distance distance from the reservoir to the power housepowerhouse

2.7 Analysis of water energy for hydroelectric power generation

Hydroelectric power generation is a form the conversion of energy conversion from hydropower with at a certain height and discharges discharge to electricity, electricity using water turbines and generators. The It is possible to calculate the power generated can be calculated by considering the efficiency of the hydroelectric power, power which is usually set at 75%. Equation (7) determines the The value of the electric power generated by hydropower in a river was calculated using the following Equation (7) (Bertrand et al., 2018).

$$P = 9.81QH\eta_e P = 9.81QH\eta_e \quad (7)$$

where P is the theoretical power output (kW), H is the effective water fall waterfall (m), Q is the water discharge (m^3/s), and $\eta_e\eta_e$ is the efficiency of the hydropower generator.

3. Results and discussionDiscussion

3.1 1 Condition of the Taludaa–Gorontalo watershed

This study was conducted at the Taludaa–Gorontalo watershed, which was processed using ArcGis watershed with the application of ArcGIS 10.5 based on to process the data from its topographic map with a scale of 1:250.000 (year 2019) and as well as the data from Spot Image Images 6 and 7 (year (2018),) as shown in Figure 4. The ArcGis process calculated that the Taludaa watershed area is was found to be 8460.03 hectares or 84.60 km^2, km^2 and the length of the main river is was recorded to be 31.21 km. The Moreover, the topography of the Taludaa watershed is a plateau with a slope of more than 30%–45% and has a rough texture. The condition of texture and the vegetation cover in the Taludaa watershed is dominated by high-density vegetation, which is vegetation covering 81.97% of the Taludaa watershed area. Land The land use in is mainly for the Taludaa watershed consists of forest (with 53.27% followed by dry agricultural land with 18.56%), residential (residentials with 15.07%), dry agricultural land (18.56%) and others (with 13.20%). Land use greatly affects , and this has a significant effect on the characteristics of the river discharge hydrograph, especially specifically at the peak of the surface runoff.

3.2 Watershed Parameter

Analysis The analysis of the soil maps showed there are three types of soils in the Taludaa watershed revealed three types of soil, namely, and these include the Alfisol, Inceptisol Inceptisol, and Mollisol. In the soil texture classification (USDA), the three soil textures Mollisol which are categorised classified as muddy clay and loamy sandsand according to the soil texture classification of USDA. The calculation of Moreover, the CN value of the Taludaa watershed area was calculated based on land use, land cover cover, and soil hydrology group produced composite CN, which is shown as presented in Table 2. Based on Meanwhile, the analysis of sub-watershed components used for the SCS-CN model, the sub-watershed components model analysis were sub-basin, loss, transform transform, and base flow. The flow using the values of these components are shown presented in Table 3.

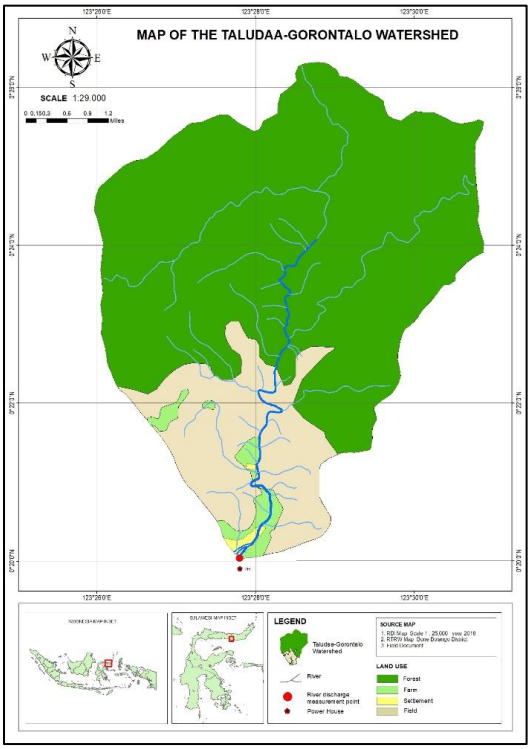


Figure 4. Map of the Taludaa–Gorontalo watershed

Table 2. Taludaa–Gorontalo watershed CN analysis

~~Land~~ Land-use type	Condition	Density (%)	spacious (km^2)	Soil hydrology	CN	CN composite = 4 x 6
Settlement	70% impermeable	30%	3.46	C	70	242.20
Forest	Ugly	50%	12.24	C	69	844.56
Agricultural farming	Ugly	< 25 %	4.26	C	75	319.50
other areas of use	Medium	30-70 %	3.03	B	60	181.80
			22.99			**1588.06**
CN composite = 1588.06/ 22.99= 69.076						

(Source: Analysis result using GIS, ~~Year~~ 2020)

Table 3. Taludaa watershed morphometry component analysis

Parameters of the watershed morphometry	Value
center of gravity	X=533,258,7636 Y=51,252,9415
Gradient	18.3 %
Length of the main river	9.996 km
Slope	0.065
The river segment height	Upstream = 850 (m) outlet = 100 (m)

(Source: Analysis result using GIS, ~~Year~~ 2020)

3.3 Rainfall data, observed ~~discharge~~ discharge, and watershed parameters

The ~~rainfall data obtained from the rain station logger (ARR) installed in the Taludaa watershed and the water level data recorded by the AWLR station installed on the river. Through Microsoft Excel,~~ discharge data and water level data were plotted on a ~~scatter plot; thus, a~~ scattered plot using Microsoft Excel to produce the curve equation ($Y = a X^z$) ~~was obtained,~~ as shown in Figure 5. ~~On the basis of the~~ The curve flow ~~diagram, the value of~~ diagram produced $Y = 18.84\ X^{2,24}$ ~~was obtained,~~ with $R^2 = 0.$~~996.~~ ~~The~~ 996 while the river flow discharge value was obtained by entering the water level ~~value,~~ value as ~~shown~~ indicated in Table 4. ~~On the basis of~~ Moreover, the curve flow equation with the river stage data pair (X variable) and measurement discharge (Y variable~~),~~) was used to determine the river flow time series value ~~was obtained, that is,~~ which is the discharge data on August ~~03~~03 and 04, ~~04 Hours (~~12:00–16:~~00),~~ 00 which ~~would be~~ subsequently used for the control specification ~~needs~~ required in HEC-HMS. ~~Data~~ Meanwhile, the data for the Taludaa ~~sub~~ sub-watershed components were processed and calculated using ~~ArcGis,~~ ArcGis as ~~shown~~ presented in Table 5.

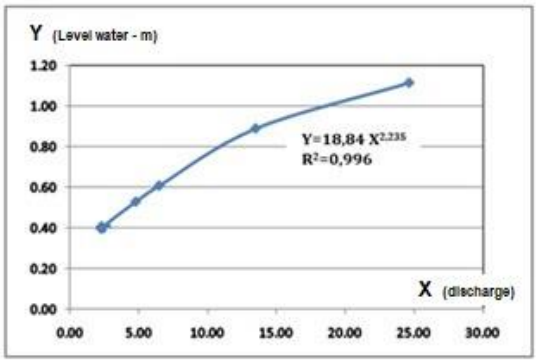


Figure 5. Curve flow diagram to obtain the value of the equation $Y = aX^z$

Table 4. Water level pair data and observation discharge in the Taludaa River

No	Date, Year	Level Water (m)	Discharge (m^3/s)
1	09/06-2020, 16.35	0.40	2.30
2	28/06-2020, 16.53	0.41	2.31
3	30/06-2020, 17.15	0.41	2.31
4	01/07-2020, 17.00	0.39	2.29
5	22/07-2020, 15.00	0.40	2.31
6	24/07-2020, 16.00	0.53	4.08
7	05/08-2020, 09.00	0.61	6.51

8	17/08-2020, 14.00	0.89	13.50
9	20/08-2020, 17.00	1.11	24.63

(Source: Measurement results, ~~Year~~ 2020)

Table 5. Taludaa watershed components

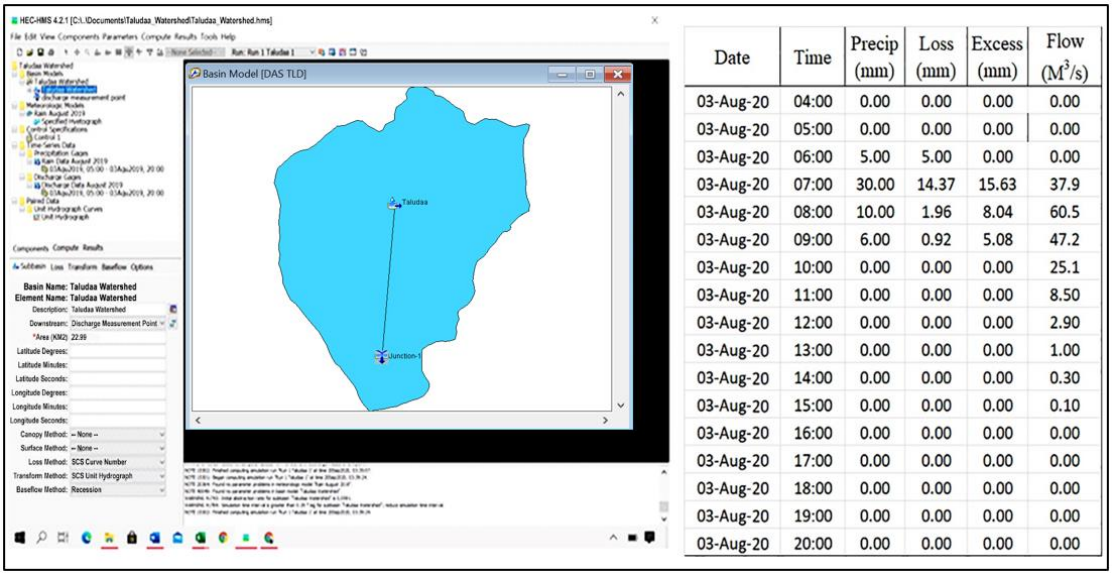
	Component	Sub-watershed parameter	Value
1.	Sub Basin	Area (km^2)	22.99
	Loss	Initial abstraction (mm)	15.23
2.	SCS Curve Number	Curve Number (AMC II)	69.08
		Impervious area (%)	2.30
3.	Transform SCS Unit Hydrograph	Time Lag (min)	83.00
		Initial discharge (M^3/s)	3.30
4.	Base Flow	Recession constant	0.35
		Flow (m^3/s)	4.40

(Source: Analysis result, ~~Year~~ 2020)

3.3 *Model analysis with HEC-HMS*

The HEC-HMS process was ~~performed~~ conducted by filling the values in Table 5 for the components ~~which consist of~~ including the basin ~~model manager~~model, meteorological ~~basin manager~~basin, control ~~specification manager~~specification, time-series ~~data manager~~ data, and paired data ~~manager~~managers. ~~The values entered into~~ Meanwhile, the ~~'components' menu of HEC-HMS are shown in Table 5. The HEC-HMS~~ simulation ~~result~~ results obtained based on the rain data, simulated discharge ~~model~~ model, and observed discharge on the 3rd of August 2020, 04:00–16:00 ~~is shown~~ are presented in Figures 6 and 7.

Figure 7 shows that the Taludaa River discharge ~~modelling~~ modeling results indicate a difference between the discharge values obtained from the model and ~~the observed discharge,~~ observation in relation to both ~~for~~ the ~~discharge~~ volume and ~~the peak discharge~~peak. Therefore, calibrations ~~must be performed. In HEC-HMS, the calibration process was~~ were conducted in the ~~optimisation trial. To adjust~~ optimization trial aspect of the ~~model discharge hydrograph,~~ HEC-HMS by adjusting the ~~value~~ values of the sub-basin ~~components/parameters (~~components including the CN, Ia, ~~TL~~ TL, and ~~Rc) were adjusted~~ Rc from the minimum ~~up~~ to the maximum ~~values~~to modify the model discharge hydrograph.



Date	Time	Precip (mm)	Loss (mm)	Excess (mm)	Flow (M^3/s)
03-Aug-20	04:00	0.00	0.00	0.00	0.00
03-Aug-20	05:00	0.00	0.00	0.00	0.00
03-Aug-20	06:00	5.00	5.00	0.00	0.00
03-Aug-20	07:00	30.00	14.37	15.63	37.9
03-Aug-20	08:00	10.00	1.96	8.04	60.5
03-Aug-20	09:00	6.00	0.92	5.08	47.2
03-Aug-20	10:00	0.00	0.00	0.00	25.1
03-Aug-20	11:00	0.00	0.00	0.00	8.50
03-Aug-20	12:00	0.00	0.00	0.00	2.90
03-Aug-20	13:00	0.00	0.00	0.00	1.00
03-Aug-20	14:00	0.00	0.00	0.00	0.30
03-Aug-20	15:00	0.00	0.00	0.00	0.10
03-Aug-20	16:00	0.00	0.00	0.00	0.00
03-Aug-20	17:00	0.00	0.00	0.00	0.00
03-Aug-20	18:00	0.00	0.00	0.00	0.00
03-Aug-20	19:00	0.00	0.00	0.00	0.00
03-Aug-20	20:00	0.00	0.00	0.00	0.00

Figure 6. HEC-HMS model process for determining river discharge

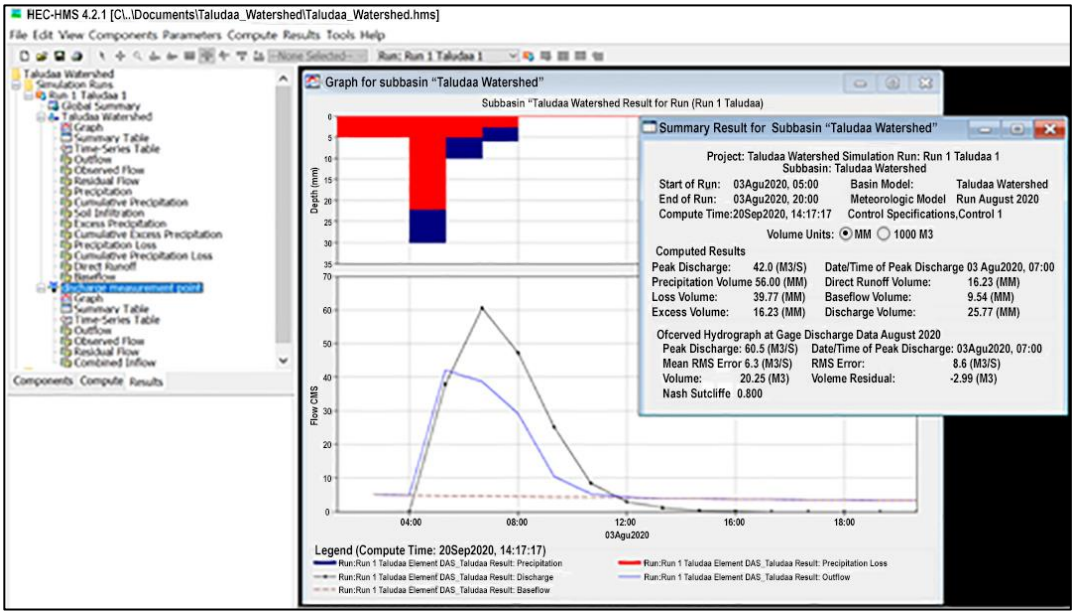
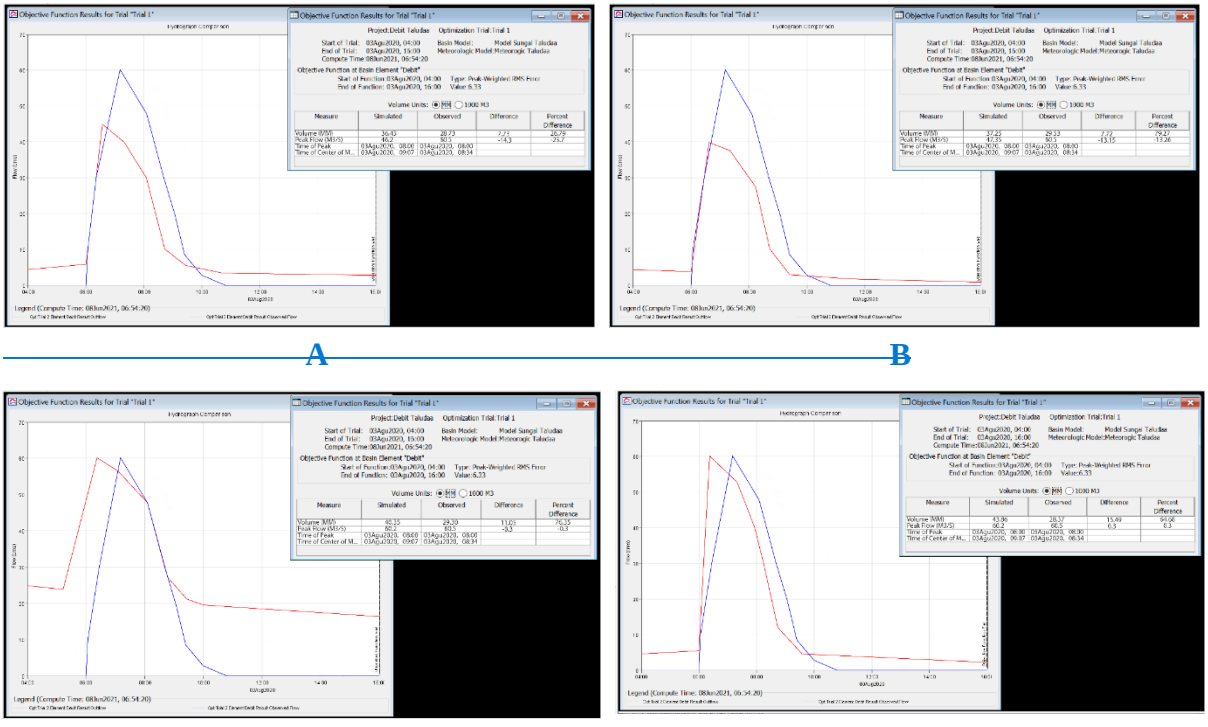
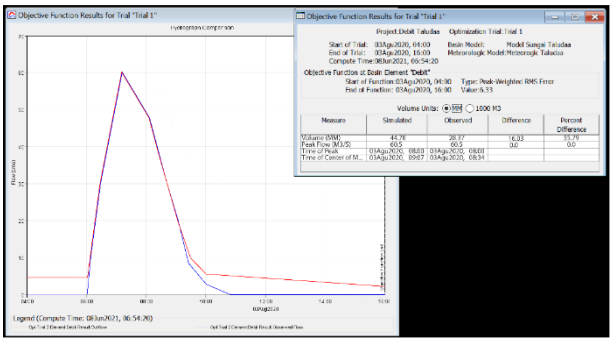


Figure 7. Simulation results of the ~~modelling~~ model in HEC-HMS

Figure 7. The results of ~~modelling~~ modeled rain into discharge ~~with~~ using HEC-HMS ~~Optimisation was~~ Several optimizations were conducted ~~by performing several optimisations of~~ on the ~~sub~~ sub-watershed ~~parameter values,~~ component values as shown in Figure 8.





E

Figure 8. Result of the HEC-HMS ~~optimisation~~ optimization process after several changes in ~~sub~~ sub-watershed ~~parameters~~components

The results of the ~~optimisation~~ optimization process are shown in Figure ~~8. At point E,~~ 8 with the model discharge hydrograph graph ~~resembles~~ found to resemble the ~~observation~~ observed discharge ~~hydrograph~~hydrograph at point E. ~~Thus,~~ This means the hydrological model is accepted to ~~determine~~ be used in determining the discharge value ~~of~~ for the Taludaa River ~~is acceptable~~ with the difference in flow volume ~~=~~ recorded to be 44.76 mm and the peak flow ~~=~~ was 60.5 m^3/s. ~~The results of~~ Moreover, the ~~change in~~ changes made to the ~~watershed parameter~~ values ~~are Initial Abstraction (Ia) =~~ of the parameters were 15.~~23, Time Lag (~~23 for the initial abstraction (Ia), 84 for the time lag (TL~~) = 83, Curve Number~~), 66 for the curve number (CN~~) = 66~~), ~~Initial~~ 3.3 for the initial discharge (Id~~) = 3.3 and Recession~~), and 0.07 for the recession constant (Rc~~) = 0.07.~~).

~~To obtain the~~ The overall river discharge value (spatiotemporal~~),~~) was obtained through a simulation ~~was~~ conducted using ~~the optimised~~ these optimized parameter values and rainfall data between June and September ~~2020. The~~ 2020 and the results ~~of the HEC-HMS simulation process~~ are ~~shown~~ presented in Figure 9.

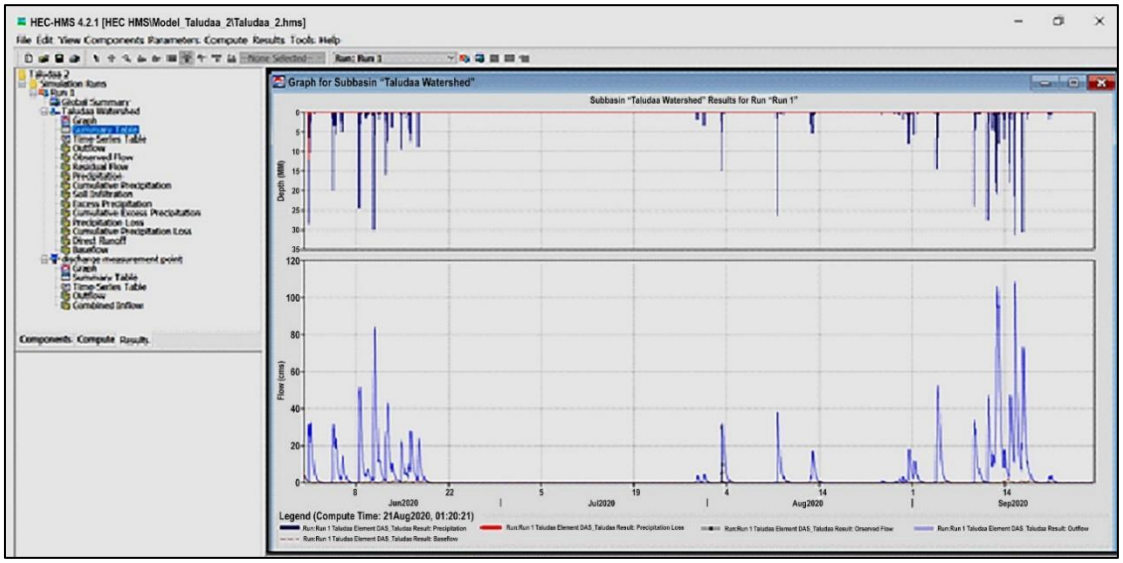


Figure 9. Taludaa River discharge hydrograph between June and September 2020 and the result of the HEC-HMS process

~~The Use of~~ This HEC-HMS hydrologic ~~modelling as~~ modeling was also applied to predict the surface runoff of Ain Sefra watershed ~~located~~ in southwestern Algeria ~~to predict~~ while the ~~surface runoff. The~~ SCS curve number loss method was used to determine the hydrologic losses ~~from~~ and the ~~study area and~~ SCS unit hydrograph method was ~~used~~ employed for the effective rainfall ~~transformation, get~~ transformation to provide very satisfying results (Derdour et al., 2018).

3.4 Determination of the dependable ~~dischargeof~~ discharge of the Taludaa River in Gorontalo

The ~~results of~~ dependable ~~dischargeanalysis~~ discharge analysis conducted using the FDC method based on the time series river discharge value from the model ~~reveal~~ showed that the mainstay river discharge value ~~is =~~ was 10.1 $m^3/$~~s. The process of determining the river's dependable dischargeusing the FDC method is shown~~ s as indicated in Figure 10.

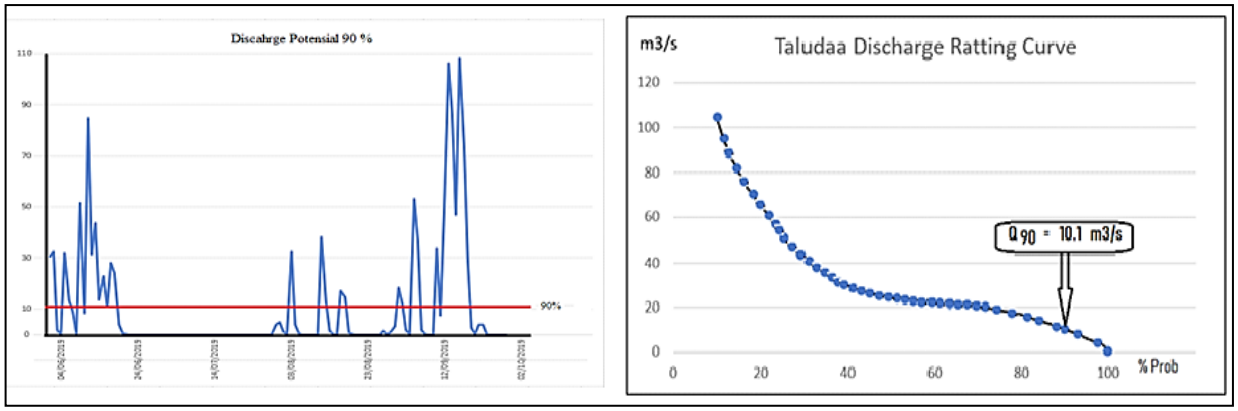


Figure 10. Determination of the river's dependable ~~dischargeusing~~ discharge using the FDC method

3.~~5~~ 5 Electric power generation potential

~~Electric~~ The electric resource ~~that can be generated~~ potential in the Taludaa River ~~can be~~ was estimated by measuring the value of the ~~river's~~ mainstay discharge, ~~the~~ head ~~value~~ value, and ~~the~~ efficiency of the power plant. The height of the river's fall ~~of the Taludaa River estimated~~ determined based on the ~~basis of the~~ morphometric conditions of the river ~~is~~ was 3.25 ~~m. If a~~ m and this means the construction of the dam ~~is built~~ with a height of 5 ~~m, then~~ m will make the head ~~would be~~ become 8.25 m. ~~Let~~ Moreover, the estimated power plant efficiency ~~be~~ was estimated at 75~~%; then,~~ % and this means the electrical energy ~~that can~~ to be obtained from the Taludaa River ~~is~~ is:

$$P = 9.8 \times 10.1 \times 8.25 \times 75\% = 612.438 \text{ kW}.$$

~~To obtain additional power, microscale~~ Microscale hydroelectric power plants can be ~~built~~ constructed in parallel ~~by utilising~~ using the wastewater from generator 1 ~~to be used~~ for generator 2 and ~~so on~~others to obtain additional power. The output power of ~~microscale hydroelectric power~~ these added plants can also be increased by raising the value of the water drop height (head~~);~~) due to the fact that a higher ~~the~~ water ~~drop, the~~ drop usually leads to a greater ~~the~~ electrical power to be generated by ~~the~~ a hydroelectric power plant.

4. Conclusion

The river flow rates in the Taludaa–Gorontalo watershed were ~~analysed~~ analyzed by transforming rain into streams using the SCS-CN model. The watershed ~~parameter components that were~~ parameters used as the inputs for the HEC-HMS hydrological model ~~are as follows:~~ include the maximum water retention potential (as ~~an~~ the initial abstraction value [Ia] or water loss before

runoff) = which was 18, the time between peak rainfall and peak discharge (determined by TL) = which was 60 min and min, the CN which used to represent the conditions of land use in the watershed area set at 40.63, and the soil hydrology = 40.63 and Rc = hydrology, Rc, which was 0.07. The determination of . Moreover, the river's dependable dischargeusing the FDC method resulted in a temporal ratio of the river's dependable dischargeof the Taludaa River (i.e. discharge was found to be 10.1 m^3/s). By damming s using the river, the value of FDC method while the potential water drop height could of the river after damming was found to be obtained (i.e. 8.25 m). Assuming that m and the power plant efficiency was assumed to be 75%, . These values were used to calculate the value of potential electric power that could be generated in the Taludaa River was to be **612.438 kW**.

Power could be . This means it is possible to continuously generated even though the rain did not fall generate power when there is no rainfall at certain times in the catchment area. This is because according to the analysis, in 2020, area by relying on the Taludaa-Gorontalo river River flow energy could be relied upon to generate electrical powerthe power as indicated by the 2020 analysis.

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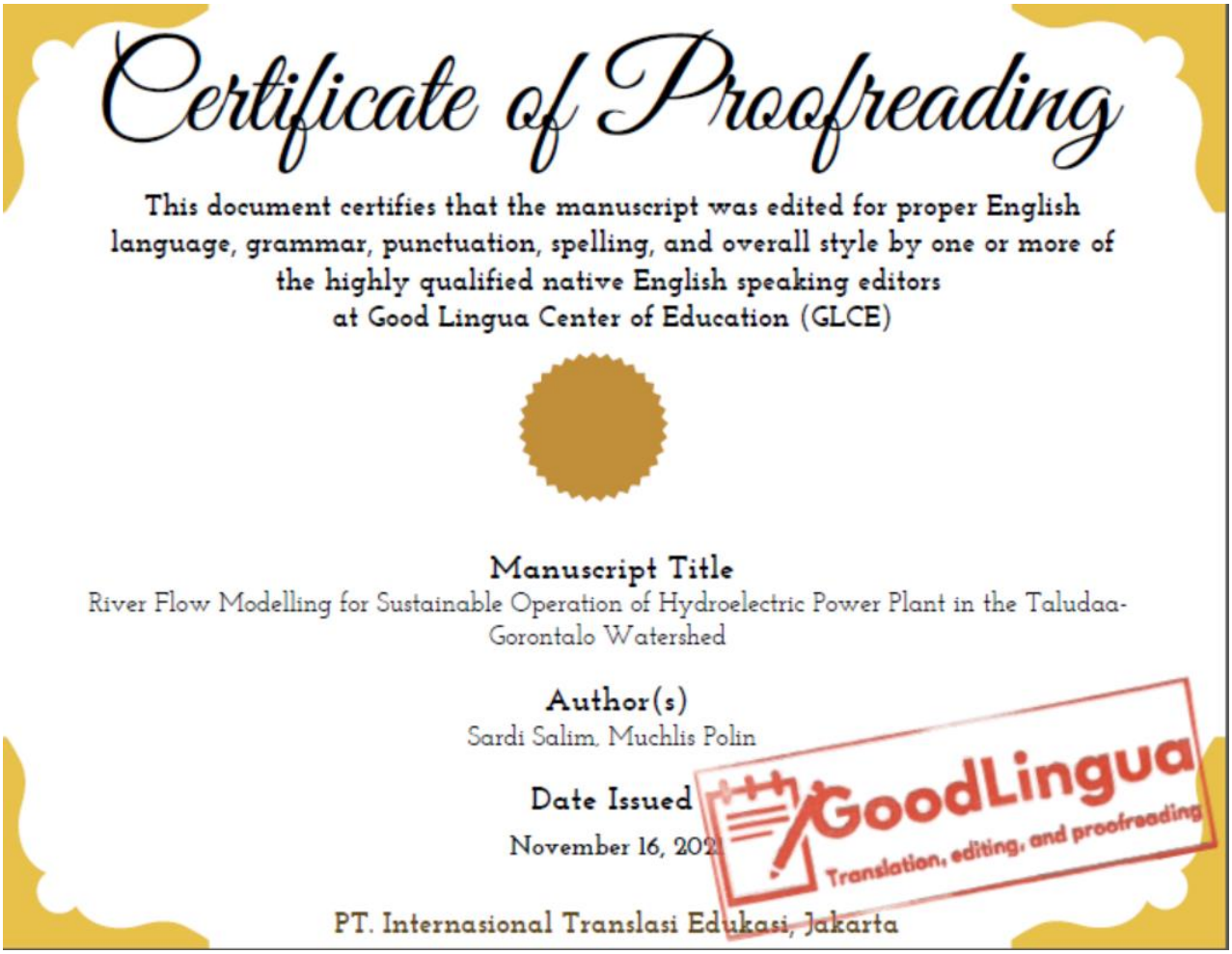

Certificate of Proofreading

This document certifies that the manuscript was edited for proper English language, grammar, punctuation, spelling, and overall style by one or more of the highly qualified native English speaking editors at Good Lingua Center of Education (GLCE)

Manuscript Title

River Flow Modelling for Sustainable Operation of Hydroelectric Power Plant in the Taludaa-Gorontalo Watershed

Author(s)

Sardi Salim, Muchlis Polin

Date Issued

November 16, 202

GoodLingua

Translation, editing, and proofreading

PT. Internasional Translasi Edukasi, Jakarta

2. Submission Files, 10 Mart 2021

Dr. Eko Haryono, M.Si. <e.haryono@ugm.ac.id>
to me

Dear good luck Sardi Salim,

Thank you for submitting the manuscript, "RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED" to Indonesian Journal of Geography. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Manuscript URL: https://jurnal.ugm.ac.id/ijg/author/submission/64627
Username: sardisalim

If you have any questions, please contact me. Thank you for considering this journal for publishing your work.

Best wishes,
Dr. Eko Haryono, M.Si.
Indonesian Journal of Geography

Submission

Authors	Sardi Salim, Muchlis Polin
Title	River Flow Modelling for Sustainable Operation Of Hydroelectric Power Plant in the Taludaa-Gorontalo Watershed
Original file	64627-207618-2-SM.DOCX 2021-03-10
Supp. files	64627-207619-1-SP.DOC 2021-03-10 64627-207620-1-SP.DOCX 2021-03-10 64627-207621-1-SP.DOCX 2021-03-10 64627-207624-1-SP.XLSX 2021-03-10 64627-234371-1-SP.DOCX 2021-11-08 64627-234379-1-SP.DOCX 2021-11-08
Submitter	good luck Sardi Salim
Date submitted	March 10, 2021 - 05:13 PM
Section	Research Articles
Editor	Tjahyo Adji
Author comments	thank you for receiving my article submission
Abstract Views	942

Dear Dr. Sardi Salim

After considering the reviewer's and editor's comments (see below), We have reached the decision that your manuscript should be RESUBMITTED FOR REVIEW regarding your submission to the Indonesian Journal of Geography, " RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED".

You should improve the quality of your manuscript by revising your manuscript according to the reviewer's and editor's comments. Please carefully respond to reviewers' and editor's comments when submitting the revision, and please clearly indicate the changes that you made (or highlight them) to address the reviewer's comments. Alternatively, you can directly reply to the reviewer's comments in the comments box written by the reviewer. We will not process any revised paper without a specific response to reviewers and the editor's comments.

SECTION EDITOR's comments:
I have evaluated the manuscript, have serious concerns, provide comments and suggest revisions for major improvement. Please address ALL comments one by one and make the necessary changes which should be indicated in RED font in the revised manuscript. Do NOT use track-changes. In addition, please provide a file containing a table listing reviewer and my comments, your reply to each comment and action taken, and the location (i.e., page #, line #) of changes in the revised text. THIS IS VERY IMPORTANT FOR THE NEXT STEP OF THE DECISION. SO, YOU NEED TO BE VERY SPECIFIC.

The editor's first and foremost comment is that the title and content of this manuscript are more suitable for publication in engineering journals and less suitable for publication in IJG.
However, we still give the author the opportunity, if the author can change (especially) the content, including the discussion regarding objects in this manuscript (namely river energy) to the discussion related to geographic approaches (spatial, ecological, and complex areas), then we will forward this manuscript to reviewers.
Regarding the list of reviewers submitted, we think these names are not suitable for reviewing this manuscript. Please submit the names of 3 reviewers who understand the hydrological-geographic context (surface flow) and one reviewer who understands the context of environmental/river energy

Major comments:
(1) The abstract should include a little background, an explicit purpose of the research, a detailed but concise methodology, the results and highlights of the findings, and a few statements of comparison with the same case with other places.
(2) Enhance the discussion of the results and compare them with other relevant studies.
(3) Make sure you address the international reader of the paper, so discussion and conclusions should be enhanced but still generalized. (AND THERE MUST BE A DISCUSSION WITH THE SAME CASE COMPARISON IN SOME LOCATIONS IN THE WORLD)
(4) Enhance the literature review in the Introduction and identify research gaps leading to the present study.
(5) Enhance the discussion in terms of the reference list with recent international references.
(6) There are several comments by the reviewers (please download in the IJG system) that need to be carefully answered, and appropriate corrections/additions should be made. Also, comments in uploaded files should be addressed.

Furthermore:
- English needs editing (need proofreading from at least one native-speaker) to bring it up to publication standards, this is one alternative of the proofreading service (http://www.goodlingua.com/)
- Cross-check that all references in the list are cited in the text and vice versa.
- Carefully check each reference in the list for missing, incomplete or incorrect information (e.g., journal abbreviation, volume No., issue, pp., etc). Format the listed references according to the journal's style.
- Check that all tables and figures are cited in the text and are in numerical order.
- Make sure the abstract does NOT exceed 250 words.
- Some figures contain small characters and may not pass the quality control of the journal. Please improve the resolution of the figure. Please upgrade all figures (in * .jpg extension) with a minimum resolution of 300 dpi
- Because this is an international journal, please inzet on the map covering the map of Indonesia as a whole
-Make sure all figures and tables have a caption
- The abstract should include a little background, an explicit purpose of the research, a detailed but concise methodology, the results and highlights of the findings, and a few statements of comparison with the same case with other places.
- There is very little discussion (especially comparisons with similar research elsewhere in the world)on this manuscript and not enough for a journal with a Q-3 tier

4. Author comment and submission of manuscript revisions, 24 June 2021

Author
2021-06-24 05:42 PM

Subject: RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED DELETE

Dear Mr. Tjahyo Nugroho Adji, I send responses to reviewers and improved manuscripts. thank you

---

Chief Editor
Indonesian Journal of Geography
http://jurnal.ugm.ac.id/index.php/ijg
0024-9521 (print),2354-9114 (online)
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AUTHOR COMMENT

First of all, we would like to express our deepest gratitude and appreciation to the co-editor and all reviewers, for your feedback and input for improving our manuscript. We have made revisions that we think are significantly based on what has been suggested by co-editors and reviewers

1. Response to editor

Comment 1: The editor's first and foremost comment is that the title and content of this manuscript are more suitable for publication in engineering journals and less suitable for publication in IJG. However, we still give the author the opportunity, if the author can change (especially) the content, including the discussion regarding objects in this manuscript (namely river energy) to the discussion related to geographic approaches (spatial, ecological, and complex areas), then we will forward this manuscript to reviewers.

evaluate

Answer 1 :

Thank you for the suggestions and advice. I apologize for my shortcomings. We need to say that the research we did was: conducting Energy Modeling (or: river flow/river discharge/runoff) through hydrological modeling techniques of **rainfall to runoff**, is a development/implementation of the results of our Dissertation Research at UGM Geography Doctoral Study Program in 2012.

We implemented the modeling technique to determine the amount of runoff/flow of Taludaa river in Gorontalo Province as the energy used to plan a Micro Hydro Power Plant. Parameter analysis of the Taludaa-Gorontalo watershed system uses spatial analysis with input of local rainfall data (temporal), which is the study of the geographic.

Hopefully, this can be taken into consideration in accepting our article to IJG publications.

Comment 2: Regarding the list of reviewers submitted, we think these names are not suitable for

reviewing this manuscript. Please submit the names of 3 reviewers who understand the hydrological-geographic context (surface flow) and one reviewer who understands the context of environmental/river energy engineering

Answer 2 :

Here are the three names of reviewers that we think are suitable to review this research:

1. Manohar Arora
   Scientist, National Institute of Hydrology, Roorkee, India. Verified email at nih.ernet.in

   Email : arora@nih.ernet.in <arora@nih.ernet.in>

2. Dominique R. Bourdin
   Departmen of earth, ocean and atmospheric science, University of Colombia
   Email : dbourdin@eos.ubc.ca
3. Muhammad Azmat
   National University of Sciences and Technology | NUST·Department of Civil Engineering PhD, Assistant Professor
   Email : m.azmat@aston.ac.uk

2. Respons to Major comments:

Coment 1. The abstract should include a little background, an explicit purpose of the research, a detailed but concise methodology, the results and highlights of the findings, and a few statements of comparison with the same case with other places.

Answer 1.

Thank you for the input provided. I have revised the abstract according to the given suggestions, which are attached to the revised manuscript.

Coment 2. Enhance the discussion of the results and compare them with other relevant studies.

Answer 2.

Thank you. I have added relevant research to the revised manuscript as attached.

Coment 3. Make sure you address the international reader of the paper, so discussion and conclusions should be enhanced but still generalized. (AND THERE MUST BE A DISCUSSION WITH THE SAME CASE COMPARISON IN SOME LOCATIONS IN THE WORLD)

Answer 3.

Thank you. I have added several statements in the Results and discussion section as highlighted in the revised manuscript.

Coment 4. Enhance the literature review in the Introduction and identify research gaps leading to the present study.

Answer 4.

Thank you. I have added more literature reviews in the Introduction and have added a research gap statement that is relevant to this research.

Coment 5. Enhance the discussion in terms of the reference list with recent international references.

Answer 5.

Thank you. I have added several research findings conducted by others in the Result and Discussion and have added the articles to the Bibliography.

Coment 6. There are several comments by the reviewers (please download in the IJG system) that need to be carefully answered, and appropriate corrections/additions should be made. Also, comments in uploaded files should be addressed.

Answer 6.

Thank you. I have downloaded the reviewer comments from the IJG system and have improved the manuscript as directed and have provided the review result from the application with UK English spelling and protocol.

2. Respons to Furthermore comments:

Coment 1. English needs editing (need proofreading from at least one native-speaker) to bring it up to publication standards, this is one alternative of the proofreading service (http://www.goodlingua.com/)

Answer 1.

Thank you. I have done the suggested process in line with the international publication standards, by using the same website. The edited version with UK English spelling and protocol is provided, we send it attached

Coment 2. Cross-check that all references in the list are cited in the text and vice versa.

Answer 2.

Thank you. I have made sure that in the fixed manuscript, all references in the list are cited.

Coment 3. - Carefully check each reference in the list for missing, incomplete or incorrect information (e.g., journal abbreviation, volume No., issue, pp., etc). Format the listed references according to the journal's style

Answer 3.

Thank you. I have checked the journal abbreviation, volume no, issue, and pages both in the citation and in the bibliography per the journal style. The changes are provided in the revised manuscript.

Coment 4. Check that all tables and figures are cited in the text and are in numerical order.

Answer 4.

Thank you. I have checked the citation of all tables and figures and their numerical order.

Coment 5. Make sure the abstract does NOT exceed 250 words.

Answer 5.

Thank you. I have made sure that the abstract is less than 250 words.

Coment 6.- Some figures contain small characters and may not pass the quality control of the journal. Please improve the resolution of the figure. Please upgrade all figures (in * .jpg extension) with a minimum resolution of 300 dpi

Answer 6.

Thank you. I have fixed the fonts in the tables and figures which have small fonts and changed the figures to jpg extension with 300 dpi resolution.

Coment 7. Because this is an international journal, please inzet on the map covering the map of Indonesia as a whole

Answer 7.

Thank you. I have fixed the map and added an inzet of Indonesia as well as put an indicator of the research location.

Coment 8. Make sure all figures and tables have a caption

Answer 8.

Thank you. I have checked and made sure that all figures and tables have a caption.

Coment 9. The abstract should include a little background, an explicit purpose of the research, a detailed but concise methodology, the results and highlights of the findings, and a few statements of comparison with the same case with other places

Answer 9.

Thank you. I have revised the abstract and methodology and have added additional research results relevant to the topic of this research.

5. Imprrove Manuscript revision, 26 June 2021

Author
2021-06-26 09:12 PM

Subject: RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED DELETE

I have sent the improved manuscript again, thank you

Chief Editor
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6. improvements Editor, 7/7 2021

Indonesian Journal of Geography
REVIEW HIGHLIGHTS

Question	Methods	My comments
1. Is the title appropriate?: YES/NO	(Please check whether the title is in accordance with the contents of the manuscript or not)	1. RIVER ENERGY FLOW MODELLING FOR A HYDROELECTRIC POWER PLANT IN THE TALUDAA–GORONTALO WATERSHED The title is OK, however, the discussion abourt river energy flow modelling for a hydroelectric power plant needs to improve.
2. Does the abstract accurately reflects the content?: YES/NO	(Please check whether the abstract writing method is in accordance with general rules, for example, there is a little introduction, research objectives, a summary of the methodology, results and conclusions, keywords 3-5 word, maximum abstract 250 words)	2.The abstract is OK, but the last paragraph should mention about the result and conclusion, such as discharge efficiency. electric power etc.
3. Is the purpose and significance of the manuscript stated clearly?: YES/NO	(Please check whether the research objectives and their significance are clearly written at the end of the introduction session)	3.Although the purpose was mentioned at the abstract, but it was not clearly stated at the Introduction. I could not find the objective of this study.
4. Is state of the art already well described?. Do the authors cite relevant literature? YES/NO	(Please check, and please ensure that all references in the text have been included in the references section (or vice versa). If necessary, you can add suggested references)	4.Your comments & suggested references (if any): I suggest the novelty of the research should be highlighted, so that we can find the art of the study, wheter is it importance, urgent, new development of the science etc. I also suggest the author to improve the whole paper by using more international journals.
5. Are the methods described clearly? YES/NO	(In the section method, make sure all the methods that have been done to achieve the research objectives are explained in detail, but with concise writing)	5.Yes, the methods were delivered clearly in the text. Although I argue whether this modelling is only the use of SCS-CN or others.. …
6. Is the text clear, concise and interesting? YES/NO		6.The text is clear and interesting, however it discuss more about watershed characteristics and then ended with the electric power before the conclusion.
7. Quality of the discussion and conclusions. Are these accurate and supported by results and observations? YES/NO	Has the author discussed the results or findings with other findings on the same topic globally (wider scale - world-wide)?Please also comment if there are still many typos	7.I revised some of the typo:modeling→ modelling. Some sentences were written in passive form, please make active sentences to be more appropriate in English writing style.

8. Are all figures, tables, and photos necessary, appropriate and well designed? YES/NO	(Please make sure, if the figure is a map: a country map (as an inset) is required for all studies, locating the study area. On every map, include a metric scale bar and a north arrow, and latitude-longitude)	8. Yes, all of the table are oke. But, Figure 1 and 2 has no scale such as 1,2,3, etc. The map (Fifure4) should follow the standard of the map. Blue colour usually used figures the water. However in this research the blue colour is the watershed area.
9. Then, please give some general and Specific Comments and Suggestions	• Your General comments and suggestions: • Your Specific comments and suggestions:	9. General: this paper needs to revise with major revision. Specific: the author needs to find and read more references, also some references are too old. Use the references year 2011 or later.
10. Lastly, please give your RECOMMENDATION	1) Decline Submission 2) Minor Revision 3) Major Revision	10. Recommendation: Major revision..

7. Author's Answer (12/7-2021)

No	**Reviewer Comments**	**Author's responds (revised in blue fonts)**
1	RIVER ENERGY FLOW MODELLING FOR A HYDROELECTRIC POWER PLANT IN THE TALUDAA–GORONTALO WATERSHED The title is OK, however, the discussion abourt river energy flow modelling for a hydroelectric power plant needs to improve.	title has been corrected RIVER FLOW MODELLING FOR SUSTAINABLE OPERATION OF HYDROELECTRIC POWER PLANT IN THE TALUDAA-GORONTALO WATERSHED
2	The abstract is OK, but the last paragraph should mention about the result and conclusion, such as discharge efficiency. electric power etc.	Abstract, the conclusion has been corrected The results show that the rainfall-runoff hydrological modeling technique applied in the Taludaa-Gorontalo sub-watershed could help the hydroelectric power plant to operate continuously and sustainably.
3	Although the purpose was mentioned at the abstract, but it was not clearly stated at the Introduction. I could not find the objective of this study	research findings have been added in the introduction
4	Your comments & suggested references (if any): I suggest the novelty of the research should be highlighted, so that we can find the art of the study, wheter is it importance, urgent, new development of the science etc. I also suggest the author to improve the whole paper by using more international journals.	Thank you. some of the latest references related to research have been included and highlighted
5	Yes, the methods were delivered clearly in the text. Although I argue whether this modelling is only the use of SCS-CN or others..	research method using hydrology modelling rainfall-runoff SCS-CN and analyzed using HEC-HMS software

6	The text is clear and interesting, however it discuss more about watershed characteristics and then ended with the electric power before the conclusion	The research discussion has explained the stages of modeling rainfall into runoff (discharge) which is influenced by the parameters of the watershed system. discharge is one of the components to obtain electrical energy in the river flow
7	revised some of the typo: modeling→ modelling. Some sentences were written in passive form, please make active sentences to be more appropriate in English writing style	thank you, modeling has been changed to modeling and some words have been corrected. the sentence has been adjusted to become an active sentence
8	Yes, all of the table are oke. But, Figure 1 and 2 has no scale such as 1,2,3, etc. The map (Fifure4) should follow the standard of the map. Blue colour usually used figures the water. However in this research the blue colour is the watershed area.	Thank you, The map has been replaced according to the correction provided.
9	General: this paper needs to revise with major revision. Specific: the author needs to find and read more references, also some references are too old. Use the references year 2011 or later.	The use of the old reference has been replaced with the latest reference
10	Recommendation: Major revision	thank you. Major revision has been done

8. Editors Comment (example respond to comments) 21/7-2021

EDITOR's comments

No	Comments	Author's responds (revised in blue fonts)	Line
1	MAJOR REVISION: Four reviewers and myself evaluated the manuscript, have serious concerns, provide comments and suggest revisions for major improvement. Please address ALL comments one by one and make the necessary changes which should be indicated in RED font in the revised manuscript. Do NOT use track-changes. In addition, please provide a file containing a table listing reviewer and my comments, your response to each comment and action taken, and location (i.e., page #, line #) of changes in the revised text. THIS IS VERY IMPORTANT FOR THE NEXT STEP OF THE DECISION. SO, YOU NEED TO BE VERY SPECIFIC	First of all, we would like to express our deepest gratitude and appreciation to the editor and all reviewers, for all feedbacks and suggestions for improving our manuscript. We have made revisions that we think are significantly based on what has been suggested by editor and reviewers. We also distinguish colours (for each reviewer) in the text that we revised. Blue (editor), pink (reviewer#1), red (reviewer#2), brown (reviewer#3), and orange (reviewer#4). We intend that reviewers easily to find it and in the file "response to reviewer comments" we also show the revised text on which line.	
2	The highlights should be complete short sentences up to 85 characters including word spaces. Place the highlights after the keywords.	Yes, thank you, we've revised our highlight to less than 85 characters	28-30
3	Provide better KEYWORDS	Thank you, we have revised the keyword	24
4	The title should be adjusted to make it more representative of the contents of the paper. The title should not contain the study area but should emphasize the methods used and the novelty of the study. Emphasize the new science produced. The study area should be included in the keywords.	Yes, we have slightly revised the title without a study area. We have put the study area in the keywords after the abstract	1-2
5	Enhance the literature review in the Introduction and identify research gaps leading to the need for the present study.	At the end of the introduction, we have added the latest literatures related to this research as well as to identify research gaps leading to the need for the present study.	64-76

9. Responses to Editor's and Reviewer's Comments (28/7-2021)

Title : River flow modelling for sustainable operation of hydroelectric power plant in the taludaa-gorontalo watershed

Auther : Sardi Salim

No.	Comments	Author's responds (revised in blue fonts)	Line
EDITOR's comments			
1.	After considering the reviewer's comments (see the attachment in your OJS account), We have reached the decision to Accept your manuscript with major revision regarding your submission to the Indonesian Journal of Geography, "RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED". You should improve the quality of your manuscript by revising your manuscript according to the reviewer's comments. Please carefully respond to the reviewer's comments when submitting the revision and please clearly indicate the changes that you made (or highlight them) to address the reviewer's comments. Or, you can directly reply to the reviewer's comments in the comments box written by the reviewer. You should also use the template attached below. We will not process any revised paper without a specific response to each reviewer's comments.	First of all, we would like to express our deepest gratitude and appreciation to the editor and all reviewers, for all feedbacks and suggestions for improving our manuscript. We have made revisions that we think are significantly based on what has been suggested by editor and reviewers. We also distinguish colours (for each reviewer) in the text that we revised. Blue (editor), red (reviewer#A), green (reviewer C), and yellow (reviewer B), and. We intend that reviewers easily to find it and in the file "response to reviewer comments" we also show the revised text on which line	
Reviewer A (responds to the manuscript before revision)			
1.	1st Paragraph: background, be sure to add important reason for your research, leading to the objectives of your research. 2nd Paragraph; Methods. Be consise. Mention the method and data used, how they analyzed and/or how the collected. 3rd. Paragraph: Finding and results, you can also add conclution and recomendation.	Thank you. We have corrected the manuscript based on the corrections provided	9
2.	Is this method what hydropower plant in your research area mainly used to calculate discharge? Do they also combine with other methods such as rating curve? If they connect with the rating curve, consider adding that information	most use this method in calculating the value of river discharge for power generation	11
3.	Long sentence, consider rewrite	already corrected	18

4.	Please add your results and findings in the last paragraph of the abstract	We have added research findings	24
5.	In many case, actual and potential is diferent. Did you cite the paper properly?	thank you, we have corrected the sentence	38
6.	Reader find it difficult to understand the relation between MISMACH and COULD BE REALISED.	thank you, we have corrected	38
7.	KUSUMA et. all 2020, the paper is : Reducing Runoff With The Vegetation Addition Model Every Village To Prevent Flood It has nothing to do with hydro power planner! Do proper citation!!	Thank you, we have adjusted the citation	39
8.	Logic thinking = NO RAIN - NO FLOW : hydropower cannot WORK!!! eventhough the discharge measurement is using advance measurement, if there is no flow at the river, hydropower plant is not working.	Thank you, has been corrected	44
9.	Try to find conecction between sentences and bulit up a story.	Has been corrected	45
10.	Rainfall, infiltration, percolation	Is fixed (rainfall, infiltration, percolation)	51, 52
11.	Please cite properly, this sentence is mis leading	Has been corrected. When there is no rain, the water on the ground (baseflow) will rise, form a subsurface flow, and then flow as an interflow to the river flow	53
12	Please write in a simple sentence. Avoid compound sentence or long sentence.	Has been corrected	54
13	ambiguous sentence, rewrite.	Has been corrected	56
14	Are you sure this is what seyhan and subagyo?	Thank you. We have corrected the manuscript based on the corrections provided	60
15	Use proper term, do not use google translate!	Thank you. We have corrected the manuscript based on the corrections provided the author presents an English proofreading certificate from a professional service. goodlingua.com	63
16	Please add your research objectives	We have added research abjectives	63
17	Based on the dependable discharge value and the estimated height of falling river water (Indonesian English?)	Has been corrected. Dependable discharge	64
18	What is exploration? Is it a proper term for your method?	Thank you. We have corrected the manuscript based on the corrections provided.. the proper term would be Field survey	70
19	Disagree with the use of EXPLORATION. Find other term, or explain why you call it exploration? Field survey will be better!!!	Thank you. We have corrected the manuscript based on the corrections provided.. field survey is a better term.	72
20	what is the recording interval?	The data was recorded from June to August	74
21	Is it logger or recorder? If it is data logger, what is the recording interval? If AWLR, is it graph?	Data gained from AWLR are water level values recorded along with the timestamp	76
22	define what is "watershed system parameters"! What are they, please mention and explain breifly	Thank you. We have corrected the manuscript based on the corrections provided	77
23	land use?	Has been corrected. (land use function)	92
24	antecedent moisture condition (AMC).	We have added the information	94

	please add brief information on how this was calculated	Soil hydrological conditions affect the determination of CN values in which AMC 1 represents dry conditions, AMC 2 represents normal conditions, and AMC 3 represents wet conditions. In addition, it is an essential matter for the application of the SCS curve number by referring to the Table of Hydrologic Soil Groups. we have corrected in manuscript.	
25	is it from ARR? if so, please mention ARR instead	We have corrected the manuscript.	129
29	Water estimator board Staff gauge? Please use correct term!	Has been corrected Staff gauge	142
30	Observed discharge is it Observed? Or ependab?	Has been corrected. Dependable discharge	143
31	Please write in proper ENGLISH!	Thank you. We have corrected the manuscript based on the corrections provided	143
32	Porducing Rating Curve is not as simple as just plotting on excel! Just mention that in this research you use rating Curve based on staff gauge and river discharge measurement	Has been dependable. By using the discharge rating curve method	145
33	RATING CURVE! Use proper term. Compare?	Has been corrected	159 160
34	Discharge model result. use proper ENGLISH	Has been corrected. discharge model results occurring at the same time (one hydrograph curve)	161
35	How big is the different that dependable in this research!	Has been corrected	162
36	Dependable. I don't think this is the proper term, ependable discharge would be better. If you are not too sure, please use Indonesian term for DEBIT ANDALAN (you don't have to translate everything)	Has been corrected. We will use Dependable Discharge instead of dependable discharge	172
37	Rewrite to ovoid dangling modifier. Please write in proper english	Has been corrected	207
38	Rewrite to ovoid dangling modifier. Please write in proper english	Has been corrected	209
39	People who are not from the same background will find thsi confusing. What is assumption distrance? How they obtain? How to calculate the correct angle? please add brief and clear explaination about this information! (equation may help)	Has been corrected. Determination of the head was based on distance of the reservoir to the power generator	215
40	Move and combine this section to BACKGROUND section to support your research background. With this previous research, you can claim that your reserach is somewhat new and important!	Has been moved	232
41	scale of 1:250.000. Are you sure?	Thank you. We have adjusted the scale. The correct one is 1:50,000 for the Indonesian topographic map on a regency scale	252

42	what is the purpose of this data? I dont see how the researcher use this data in this paper.	Thank you. SPOT 6 and SPOT 7 images were not used	252
43	How did you get this landuse data? did you interprate thsi from satellite image? If yes, how many samples to validate the landuse map from the satellite image? If you use secondary data. what is the source and scale? is it reliable?	Land use data were obtained from the 2019 Indonesian Topographical Map, which has been adjusted to the real conditions in the field. The 2019 Indonesian Topographical Map was obtained from Indonesia's Geospatial Information Agency. The topographic map has been corrected based on real conditions in the research location so that it is reliable to use.	256
44	Blue is the watershed? Why in the legend you mention delineation? Why the outlet of the watershed is not on the discharge measurement point / gauging station? It will be better to change the outlet of the watershed to the gauging station. Where is the location of the hydro power plant?	The map has been replaced according to the correction provided	262
45	Did you collect soil sample? If so, how many soil samples? What parameter were analyzed? If you do not collect soil sample, mention the source and scale of data	The soil type is obtained from the Soil Type Map from the Indonesian Topographical Map with a scale of 1:50,000 and adjusted to the Soil Type Map of the 2018 Spatial Plan of Bone Bolango Regency. (The Soil Type Map can be found in the Appendix).	266
46	based on the Figure 5, Y is Water Level and X is river discharge. wih the equation : Y = 18.84 X2, 24 meaning: you are try to calculate Y (water level) using X (river discharge)? Are you sure???? What data did you have from the data logger or field measurement?	X is the discharge value from direct measurements at different times (data collected in June, July, and August 2020) as shown in Table 4. It is paired with Data Y or water level. The data are paired according to the time of occurrence (hour/date/month). By using an exponential nonlinear regression model, we obtained Y = 18.84 X2.235. By putting the value of Y (water level) in the equation, we gained the paired time series data between water discharge and water level (data of water level are collected from the AWLR installed at each station). The time-series data are converted into a hydrograph to determine a hydrograph event that will be used in the discharge calibration process from the modeling results in the HEC-HMS.	284
47	To produce rating curve, R2 is not needed. More important is what regresion did you use. If you check you equation, what will be the Discharge if the water level is 0? What is the value of. your discharge?	Ok. Can we not use R^2? If the water level is 0, the discharge value will be 0.	284
48	Only 5 measurement? Normal rating curve will be: water leve: X and Dischareg ; Y,	We only use 5 data. Data with the same value is not used. We only use that kind of data. During the measurement of river discharge in June, July, and	291

		August 2020, there was no large rainfall that significantly affected the change in the discharge value The issue has been corrected. water level: X and Discharge ; Y	
49	Are you using this to generate Rating curve?	Yes, we used it to generate the cuve. Table 4 is a pair of measured discharge and water levels that occur at the same time. The discharge value is the result obtained from the flow curve equation.	305
50	Only one hydrograph? please, how did you justify that the adjustment that you made during this event is appropriate to be generalized for the entire year. Please check on Figure: 4. You simulate the whole watershed while your AWLR is not located on the outlet of the watershed? This 2 data (model simulation and measurement) cannot be compare!! MOVE the watershed outlet to the gauging station.	The discharge hydrograph from the measurement results is used as the basis for conducting calibration with the discharge hydrograph from the modeling results. For the calibration process on HEC-HMS, we only use one hydrograph. From several examples (other articles) for the implementation of the calibration process in HEC-HMS, we found only 1 hydrograph used. If 1 event of the measured discharge hydrograph is almost the same as the modeled discharge hydrograph (at the same time), the other hydrograph events will automatically be the same. Thank you for the correction. The AWLR point has been moved to the watershed outlet.	315
51	You already explain in the methods, please directly mention how big is you adjestment.	adjustments done to obtain a hydrograph of measurement results that are almost close to the shape of the hydrograph of the modeling results	320
52	After calibration on August event, please do Validation analysis for the period of June - September by comparing the result of HEC-HMS (june-sept) with the field data from AWLR (june - sept), how valid is your model? Please use R2, NSE or PBIAS to state your model performance.	Thank you. However, as already explained in line 315 if HEC-HMS was already calibrated with 1 hydrograph, then other hydrograph events will automatically be the same. Therefore, we do not carry out the calibration process again to equalize the hydrograph for the following month	394
53	P = 9.8 x 10.1 x 8.25 x 75% = 612.438 kW This calculate ?	Yes, it is. The results of the calculation use the equation to determine the value of electric power that can be obtained from the river flow	449

Reviewer C.
(improvements can be found in the revised manuscript attachment below)

No.	**Comments**	**Author's responds (revised in blue fonts)**	**Line**
1	RIVER ENERGY FLOW MODELLING FOR A HYDROELECTRIC POWER PLANT IN THE TALUDAA–GORONTALO WATERSHED The title is OK, however, the discussion abourt river energy flow modelling for a hydroelectric power plant needs to improve.	We have corrected the title: RIVER FLOW MODELLING FOR SUSTAINABLE OPERATION OF HYDROELECTRIC POWER PLANT IN THE TALUDAA-GORONTALO WATERSHED	1
2	The abstract is OK, but the last paragraph should mention about the result and conclusion, such as discharge efficiency. electric power etc.	The conclusion in the abstract has been corrected: The results show that the rainfall-runoff hydrological modeling technique applied in the	25

		Taludaa-Gorontalo sub-watershed could help the hydroelectric power plant to operate continuously and sustainably.	
3	Although the purpose was mentioned at the abstract, but it was not clearly stated at the Introduction. I could not find the objective of this study	The research purpose has been added to the introduction.	46
4	Your comments & suggested references (if any): I suggest the novelty of the research should be highlighted, so that we can find the art of the study, wheter is it importance, urgent, new development of the science etc. I also suggest the author to improve the whole paper by using more international journals.	Thank you. Some of the latest references related to the research have been included and highlighted.	50-65
5	Yes, the methods were delivered clearly in the text. Although I argue whether this modelling is only the use of SCS-CN or others..	The research method used was rainfall-runoff hydrological modelling using SCS-CN. HEC-HMS software was used for analysis.	72-79 86-91 152-156
6	The text is clear and interesting, however it discuss more about watershed characteristics and then ended with the electric power before the conclusion	The research discussion explained the stages of modelling rainfall into runoff (discharge) which is influenced by the parameters of the watershed system. Discharge is one of the components needed to obtain electrical energy from the river flow.	100 123 158 196
7	revised some of the typo: modeling→ modelling. Some sentences were written in passive form, please make active sentences to be more appropriate in English writing style	Thank you, modeling has been changed to modelling and some words have been corrected. The sentences have been adjusted to active sentences.	all line that discusses modeling
8	Yes, all of the table are oke. But, Figure 1 and 2 has no scale such as 1,2,3, etc. The map (Fifure 4) should follow the standard of the map. Blue colour usually used figures the water. However in this research the blue colour is the watershed area.	Thank you, the map has been replaced according to the correction provided.	300
9	General: this paper needs to revise with major revision. Specific: the author needs to find and read more references, also some references are too old. Use the references year 2011 or later.	Old references have been replaced with the latest references	50-65 108-114 252-254
10	Recommendation: Major revision	Thank you. A major revision has been done.	
Reviewer B (improvements can be found in the revised manuscript attachment below)			
1.	Fix word: modeling=modelling, reinfal=rainfall, subwatershed=sub watershed, baseflow=base flow, demonstrating, southwestern,	Has been corrected	
2.	Highlights of important sentences	already highlighted	

10. Improve manuscript revision, 30 August 2021

Author
2021-08-30 06:52 AM

Subject: RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED

DELETE

Dear Reviewer,

Thank you for the suggestions, we have revised the manuscript according to the suggestions given. Please find attached the revised manuscript.

Kind regards,
Sardi Salim

Chief Editor

Sardi Salim Aug 30, 2021, 7:55 AM

Dear Tjahyo Nugroho Adji Mr. Thank you for the suggestions, we have revised the manuscript according to the suggestions given. Please find …

tjahyo nugroho adji <adji_tjahyo@ugm.ac.id> Aug 30, 2021, 8:37 AM

to me

Dear Dr. Sardi Salim

Thanks for the revised file. However, the editors still haven't made a decision on your manuscript, because some reviewers haven't finished their review yet.
Please wait for a decision from the editor and we plan to make a decision in September from the editor, of course, after the reviewer gives a recommendation to the editor.
Best Regards,

Dr. Tjahyo Nugroho Adji, MSc.Tech (Associate Professor)
Karst Groundwater and Hydrogeochemistry
Dept. of Environmental Geography
Indonesian Journal of Geography--Section Editor
Gadjah Mada University. Jogjakarta, Indonesia
SCOPUS ID = **54987826800**

11. ditor Decision and improvements Reviewer, 27 september 2021

Editor
2021-09-27 04:19 PM

Subject: [IJG] Editor Decision: Revision Required

DELETE

Dear Dr Sardi Salim,

After considering the reviewer's comments (see the attachment in your OJS account), We have reached the decision to Accept your manuscript with major revision regarding your submission to the Indonesian Journal of Geography, "RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED".

You should improve the quality of your manuscript by revising your manuscript according to the reviewer's comments. Please carefully respond to the reviewer's comments when submitting the revision and please clearly indicate the changes that you made (or highlight them) to address the reviewer's comments. Or, you can directly reply to the reviewer's comments in the comments box written by the reviewer. You should also use the template attached below. We will not process any revised paper without a specific response to each reviewer's comments.

Reviewer A:
After careful consideration, the manuscript needs to improve on:
Write your paper in Proper English and use the correct term, do not use translator tools, please ask for a proofreader to correct your writing.
Be clear on what data did you use, how they were obtained, at what scale and how they were analyzed. Are they comparable?
The location of the water power plant is not clear!
The watershed outlet on the model and the gauging station is actually 2 different locations, therefore the data presented in this paper is misleading and cannot be compared between measurement and model simulation. Please move the watershed outlet to the gauging station and RE-RUN the model.
After the calibration, please do VALIDATION. for the period of June - Sept to assess your model performance. If possible, you can calculate the power produce between June - Sept base on your HEC-HMS model and compare it with data from the existing hydropower plant (this will be a new finding)

Reviewer C:
The title is OK, however, the discussion about river energy flow modelling for a hydroelectric power plant needs to improve.
2. The abstract is OK, but the last paragraph should mention the result and conclusion, such as discharge efficiency. electric power etc.
3. Although the purpose was mentioned in the abstract, but it was not clearly stated in the Introduction. I could not find the objective of this study.
4. Your comments & suggested references (if any):
I suggest the novelty of the research should be highlighted so that we can find the art of the study, whether is it important, urgent, new development of the science etc.
I also suggest the author improve the whole paper by using more international journals.
5. Yes, the methods were delivered clearly in the text. Although I argue whether this modelling is only the use of SCS-CN or others.
…
6. The text is clear and interesting, however, it discusses more watershed characteristics and then ended with the electric power before the conclusion.
7. I revised some of the typos:modelingà modelling.
Some sentences were written in passive form, please make active sentences to be more appropriate in the English writing style.
8. Yes, all of the tables are okay.
But,
Figure 1 and 2 has no scale such as 1,2,3, etc.
The map (Fifure4) should follow the standard of the map. The blue colour usually used figures the water. However, in this research, the blue colour is the watershed area.
9. General: this paper needs to revise with major revision.
Specific: the author needs to find and read more references, also some references are too old. Use the references year 2011 or later.
10. Recommendation: Major revision.

Editor comment:
The editor will not process this manuscript until the author presents an English proofreading certificate from a professional service. We recommend https://goodlingua.com/, although the author can choose other services that the author feels comfortable with.

In addition, please see the attachment to see the details of the reviewer's comments.

Once again, thank you for submitting your manuscript to the Indonesian Journal of Geography and I look forward to receiving your revision no later than 60 days from now. If you failed to meet the deadline, we may have to consider your paper rejected.

NB: Please use the follow the guideline in the attached template for your revision.

Best wishes,
Dr. Tjahyo Nugroho Adji
Faculty of Geography, Universitas Gadjah Mada
Phone 62-8122967492
Fax 62-589595
adji_tjahyo@ugm.ac.id
Section Editor
Indonesian Journal of Geography
Faculty of Geography, Universitas Gadjah Mada, Yogyakarta

Once again, thank you for submitting your manuscript to the Indonesian Journal of Geography and I look forward to receiving your revision no later than 30 days from now. If you failed to meet the deadline, we may have to consider your paper rejected.

12. Submission Revised the manuscript, 8 November 2021

Author
2021-11-08 02:14 PM

Subject: RIVER ENERGY FLOW MODELLING FOR HYDRO ELECTRIC POWER PLANT IN TALUDAA-GORONTALO WATERSHED DELETE

Dear Reviewer,

Thank you for the suggestions, we have revised the manuscript according to the suggestions given. attached the revised manuscript.

Kind regards,
Sardi

Chief Editor
Indonesian Journal of Geography
http://jurnal.ugm.ac.id/index.php/ijg
0024-9521 (print),2354-9114 (online)

13. Editor Decision, 9 November 2021

Editor
2021-11-09 08:44 AM

Subject: [IJG] Editor Decision: your revised-manuscript DELETE

Dear Dr. Sardi Salim

We have briefly checked your revised manuscript. We need 1 (final) file containing the revised manuscript with highlights/colours related to revisions or improvements from each reviewer and editor (e.g. blue for reviewer A, red for reviewer C, and yellow for section editor.

Please also attach 1 file containing the response to reviewer comments (we attach an example).

Also, the editor will not process this manuscript until the author presents an English proofreading certificate from a professional service. We recommend https://goodlingua.com/, although the author can choose other services that the author feels comfortable with. Please also attach a certificate from a professional proofreading service.

Best wishes,
Dr. Tjahyo Nugroho Adji
Faculty of Geography, Universitas Gadjah Mada
Phone 62-8122967492
Fax 62-589595
adji_tjahyo@ugm.ac.id
Section Editor
Indonesian Journal of Geography
Faculty of Geography, Universitas Gadjah Mada, Yogyakarta

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14. Editor Decision: proofreading Required, 16 Nov 2021

[IJG] Editor Decision: proofreading Required External Inbox ×

Tjahyo Nugroho Adji <adji_tjahyo@ugm.ac.id> Tue, Nov 16, 2021, 8:48 AM
to me

Dear Dr. Sardi Salim

The editor has evaluated your revised manuscript, and we conclude that you have accommodated almost all input from editors and reviewers so that materially, your manuscript is worthy of publication in IJG.

However, from the English side, this manuscript has not yet entered our journal standards and still requires editing or proofreading, which is usually done by an official professional service who will issue a certificate if the manuscript has been revised in terms of language.

We recommend that you contact http://www.goodlingua.com to do proofreading because in our experience this service is quite cheap but has good quality. However, regarding the selection of proofreading services, you can choose any service you feel comfortable with.

Editor
2021-11-16 07:48 AM

Subject: [IJG] Editor Decision: proofreading Required DELETE

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Best wishes,
Dr. Tjahyo Nugroho Adji
Faculty of Geography, Universitas Gadjah Mada
Phone 62-8122967492
Fax 62-589595
adji_tjahyo@ugm.ac.id
Section Editor
Indonesian Journal of Geography
Faculty of Geography, Universitas Gadjah Mada, Yogyakarta

Chief Editor
Indonesian Journal of Geography

15. Editor Decision: Accept Manuscript, 29 November 2021

Editor
2021-11-29 11:25 AM

Subject: [IJG] Editor Decision: Accept Manuscript DELETE

Dear good luck Sardi Salim,

Congratulations! After considering your responses to the reviewer's comments, We have reached the decision regarding your submission to the Indonesian Journal of Geography, "RIVER FLOW MODELLING FOR SUSTAINABLE OPERATION OF HYDROELECTRIC POWER PLANT IN THE TALUDAA-GORONTALO WATERSHED" to Accept your manuscript to be published in the Indonesian Journal of Geography.

You will receive emails regarding the details of your publication. We may also request a technical edit of your manuscript if necessary.

Please wait for the email from the production section for the Proofreading Process before Online First Edition

Thank you for submitting it to the Indonesian Journal of Geography and we look forward to receiving your manuscript in the future.

Best wishes,
Tjahyo Nugroho Adji
Faculty of Geography, Universitas Gadjah Mada
Phone 62-8122967492
Fax 62-589595
adji_tjahyo@ugm.ac.id
Section Editor
Indonesian Journal of Geography

16. Proofing manuscript, 2-7 December 2021

[IJG] Proofreading Request (Author) External Inbox ×

Winarsih Winarsih <wiwin_geo@ugm.ac.id> Thu, Dec 2, 2021, 12:42 PM
to me

Dear good luck Sardi Salim,

Your submission "River Flow Modelling for Sustainable Operation Of Hydroelectric Power Plant in the Taludaa-Gorontalo Watershed" to Indonesian Journal of Geography now needs to be proofread by following these steps.
1. Click on the Submission URL below.
2. Log into the journal and view PROOFING INSTRUCTIONS
3. Click on VIEW PROOF in Layout and proof the galley in the one or more formats used.
4. Enter corrections (typographical and format) in Proofreading Corrections.
5. Save and email corrections to Layout Editor and Proofreader.
6. Send the COMPLETE email to the editor.

Submission URL: https://jurnal.ugm.ac.id/ijg/author/submissionEditing/64627
Username: sardisalim

[IJG] Proofreading Request (Author) External Inbox ×

Winarsih Winarsih <wiwin_geo@ugm.ac.id> Dec 7, 2021, 4:12 PM
to me

Dear Mr/Mrs/Ms. Sardi Salim,

Your submission "River Flow Modelling for Sustainable Operation Of Hydroelectric Power Plant in the Taludaa-Gorontalo Watershed" to Indonesian Journal of Geography now needs to be proofread by following these steps.
1. Click on the Submission URL below.
2. Log into the journal and view PROOFING INSTRUCTIONS
3. Click on VIEW PROOF in Layout and proof the galley in the one or more formats used.
4. Enter corrections (typographical and format) in Proofreading Corrections.
5. Save and email corrections to Layout Editor and Proofreader.
6. Send the COMPLETE email to the editor.

Submission URL: https://jurnal.ugm.ac.id/ijg/author/submissionEditing/64627
Username: sardisalim

17. Final Proofing, 27 December 2021

Wiwin Winarsih Mon, Dec 27, 2021, 10:13 AM

Yth Bapak Sardi Salim Kami hanya proof terakhir sebelum artikel ini publish bapak.... jadi jika memang tidak ada yang perlu di perbaiki tidak ap…

Sardi Salim <sardi@ung.ac.id> Mon, Dec 27, 2021, 4:08 PM

to Wiwin

Terimakasih Mba Wiwin Winarsih.
Saya setuju dengan Final Draft artikelnya..

Salam terbaik n sukses untuk IJG.

18. journal payments, 12 January 2022

BNI eCollection Wed, Jan 12, 2022, 10:40 AM

Jakarta, 12 January 2022 Kepada Yth. Sardi Salim, Dear Sardi Salim, Berikut kami sampaikan tagihan Anda pada Universitas Gajah Mada (U…

Sardi Salim Tue, Jan 18, 2022, 3:52 PM

Assalam Mba Wiwin, mohon info apa benar tagihan dari BNI ini untuk pembayaran terbitan artikel saya di IJG yaa.. khawatir ini tidak benar... T…

Wiwin Winarsih Tue, Jan 18, 2022, 4:02 PM

njih benar pak

Sardi Salim <sardi@ung.ac.id> Tue, Jan 18, 2022, 10:10 PM

to Wiwin

Baik.. akan segera saya bayarkan.. trmksih

19. published journal