THE STUDY ON THE RIVERS BY HEC-RAS MODEL

G.Rahul Indivar
Department of Civil Engineering
National Institute of Technology (NIT)
Rourkela, Odisha.

ABSTRACT

Numerous urban areas and towns are created on downstream side of dams. Some of them are set up on the banks of stream. During the rainstorm time frame, when the dam is full at its Maximum Reservoir Level (MRL) and still the overflow floods are drawing closer into dam submergence, the most extreme release is delivered from the dam to maintain a strategic distance from the overtopping. This outcomes into floods on downstream and may cause the catastrophe in urban areas or towns chose banks of waterways. To encourage the suitable measures for compelling flood alleviation ahead of time, there is a need to show the flood plain. With the coming of present day innovation, the utilization of complex programming projects in flood displaying helps in finding out about degree of flood at its submergence. This paper presents a contextual analysis of Godavari stream flood displaying utilizing HEC-RAS programming. The flood delivered for Gangapur dam, which is built on upstream of Nashik city at 14 km distance is considered for the demonstrating. The flood release depends on the most exceedingly awful release of 1969 flood. The stream, 14 extensions across the waterway and the flood plain are demonstrated. The model encourages to find the flood plain and its degree for compelling flood moderation measures.

Keywords: - Flood modeling, Godavari River HEC-RAS Return Period

INTRODUCTION

The flood demonstrating is one of the designing devices which give exact data of the flood profile. The precipitation, spillover, catchment qualities, and return period are the boundaries which administer the flood. These boundaries are utilized as information factors alongside cross segment and L part of stream. Ibrahim, G. what's more, Ibrahim U; Brych, K, Dittrt and Elis, V; Morankar, D.V. furthermore, Awate V; have endeavored the water driven demonstrating utilizing delicate figuring instruments. Additionally Merwade, V, Cook A. also, Coonrod, J; Yi Xinog; Eric Tate, M.S.E. also, Maidment D; Manadhar, B, Balla, M.K, Awal, R, Pradhan, B; have utilized various boundaries as factors and tracked down that pressure driven displaying is a viable device for the moderation measures.

Waterway Godavari courses through Nashik city. The waterway has right around 10 km arrive at passing box city. The number of inhabitants in Nashik city is around 18 lakh and the city has verifiable importance. The Sinhanstha Kumbh-mela is held after at regular intervals in Nashik during which the drifting populace of around 20 lakh fans visit Nashik for sacred shower. The flood, either because of hefty precipitation or dam break may cause a calamity and the relief measures are conceivable ahead of time just if the designing apparatuses, for example, flood demonstrating are embraced. HEC-RAS (Hydrologic

Engineering Center-River Analysis System) is mathematical investigation programming which gives the subtleties of flood profiles. The product is effectively accessible and has exact adjustment exactness.

Flooding is one of the characteristic perils that is noticed all around the world; notwithstanding, flood occasions have various viewpoints and creating systems, and limited geomorphological cycles, for example, disintegration and dregs statement along the waterway assume a vital part in flood immersion, and thus, flood impacts. Flood immersion displaying, which ordinarily comprises of demonstrating of stream viewpoints because of the above complex cycles, requires itemized data so the models can run at the necessary scale. With the approach of proficient mathematical techniques in mix with elite registering assets lately, flood immersion models have taken a huge jump in their displaying abilities, including their capacity for creating solid and precise appraisals of different stream perspectives. Nonetheless, moderately, less examination has been sought after with regards to vulnerabilities that related with the model evaluations.

An expected audit on the prospects of flood demonstrating with various techniques, headways and wellsprings of vulnerability was examined by, while present and future bearings are given by Knowing that vulnerabilities in model assessments are unavoidable , and the expanded insight about vulnerability and gathering gauges , in mix with upgraded movement in the new decade in both the examination and operational hydrologic domain , clarifies that the vulnerability idea ought to be received in flood immersion displaying.

Pressure driven models with various abilities, for instance, 1D and 2D methodologies, diverse mathematical strategies and a stun catching plan addressing progressed hydrodynamics and equal calculation calculations are run in significant waterway frameworks at better and coarser goals across the globe. The model exhibition is investigated regarding the information, boundaries and design. A model's contributions for flood immersion planning comprise of floodplain math, land use, Manning's unpleasantness coefficient, stream and water level at numerous areas. Note that vulnerabilities in estimated just as assessed estimations of the above change at both spatial and transient scales. Among all, the model's math, especially the height data, is treated as the essential wellspring of vulnerability for the model flood immersion gauges. Moreover, the part of contact and movement in hydrodynamic displaying and model design related vulnerability has been investigated.

Hydrodynamic displaying in one and two measurements (1D and 2D) is accessible for realtime flood estimating . Be that as it may, the wide utilization of 1D models is trailed by coupled 1D/2D or 2D models. Lately, 2D models have acquired a lot of consideration with the advancement of better goal rise models and land use informational collections. A correlation somewhere in the range of 1D and 2D displaying featured the job of the model construction in flood immersion demonstrating.

A couple of studies tended to vulnerabilities in the flood immersion appraisals, and a large number of them took care of one wellspring of vulnerability, i.e., vulnerabilities in stream immersion gauges are tended to regarding the monitoring's harshness, model construction and beginning and limit conditions. Moreover, vulnerability as a result of the constraints of overseeing conditions to process the frictional and bed incline has additionally been investigated . Not many investigations effectively actualized the Generalized Likelihood Uncertainty Estimation (GLUE) framework into the pressure driven models to decide the boundary affectability and related vulnerability. The vulnerability can emerge from different parts of sources of info, including satellite-based evaluations and precipitation spillover model recreations. The underlying and limit conditions comprise of hydrological data, which can be assessed representing vulnerability by means of different progressed strategies, for instance, copula-based bivariate or multivariate recurrence investigation. Furthermore, the vulnerability that comes from model construction mimicking stream measures has not been concentrated in detail. This features the requirement for considers that figure vulnerabilities from various sources in an examination area so that impact of various sorts of vulnerabilities can be perceived. In this specific situation, this investigation computes the model yield at an area with shifting wellsprings of vulnerabilities, and afterward gives bits of knowledge on the job of the wellsprings of the vulnerabilities.

The Godavari River is the second longest stream in India, and its waste territory, ~312,812 km2, records the Godavari River Basin (GRB) as the third biggest waterway bowl in India. The Godavari River gets a lot of precipitation during the rainstorm, which in relationship with environmental change, for instance, changes in precipitation sums, term and recurrence , improves the flood probability along its significant course. While no definite examinations have been completed for flood immersion, flood immersion maps, for various flood occasions, every occasion from a year, has been determined from satellite guides for Sabari River Basin, a sub-bowl of the Godavari River Basin.

Objective of the study

1. To examination on excess floods are drawing closer into dam submergence, the greatest release is delivered from the dam to dodge the overtopping.
2. To examination on the flood plain and its degree for successful flood moderation measures.

Flood modeling

The flood displaying utilizing HEC-RAS was acted in after advances. The examination of each progression is introduced in type of yield on paper screen mode.

Storage Area

A territory which resembles lake in which water can stream into and out of and is associated with the waterway reach by parallel design associations is known as capacity zone. In this investigation, the capacity territory for example Gangapur dam is at the upstream side of Godavari stream reach. The association comprises of gated spillway and a weir. The gross stockpiling zone of dam is 7600Mcft. The most extreme stature of Gangapur dam is 36.58m over the waterway bed. For calculation in the product, volume is considered as zero for first rise to get height and volume bend relationship.

Inline Structure

Gangapur dam is having all out length 3811m out of which 101.82m is length of gated spillway in left side seat. Nine outspread entryways having greatest opening stature 6.1m are furnished on flood segment with 81,000 Cusecs release limit. The vital information for ascertaining the weir stream between two stockpiling regions is weir width, weir coefficient and peak shape and it is utilized for schematic outline, stream estimations and submergence rules. The gated spillway is added to the design utilizing the door information proofreader. Additionally, actual depiction and required coefficient of door is entered in HEC-RAS.

Geometric

In present examination, the mathematical information for example cross segment information at the Ramkund segment is entered which incorporates the cross segment of stream at Ramkund and the bordering forms at that segment. This information will give the flat spread of the water at the specific release in the bordering territory. At Ramkund area, the most minimal level of the waterway is 557.1m which is at the focal point of cross segment. The estimation of the cross area portrays the part information alluding to other segment inside the span. The information to be entered is from upstream to downstream heading of the stream in mathematical information manager of HEC-RAS.

Entering Flow Data and the Boundary Condition

In the wake of giving every one of the information boundaries to the product for the calculation, the yield regarding the table and the diagrams is gotten which incorporates: In the cross area yield the estimation of ground height, speed head, water surface rise, absolute speed, max channel profundity, misfortunes, normal speed, wetted border and so on

Study area

The Dhudhana stream bowl, a piece of the upper Godavari bowl under hydro-meteorological subzones 3e, lies between 19.6022 N' to 19.4766 N scopes and 76.3118 E to 76.5101 E longitudes and is situated in the Marathawada area of Maharashtra. DEM of Study territory is arranged and appeared in figure 1, utilizing Q-GIS programming.
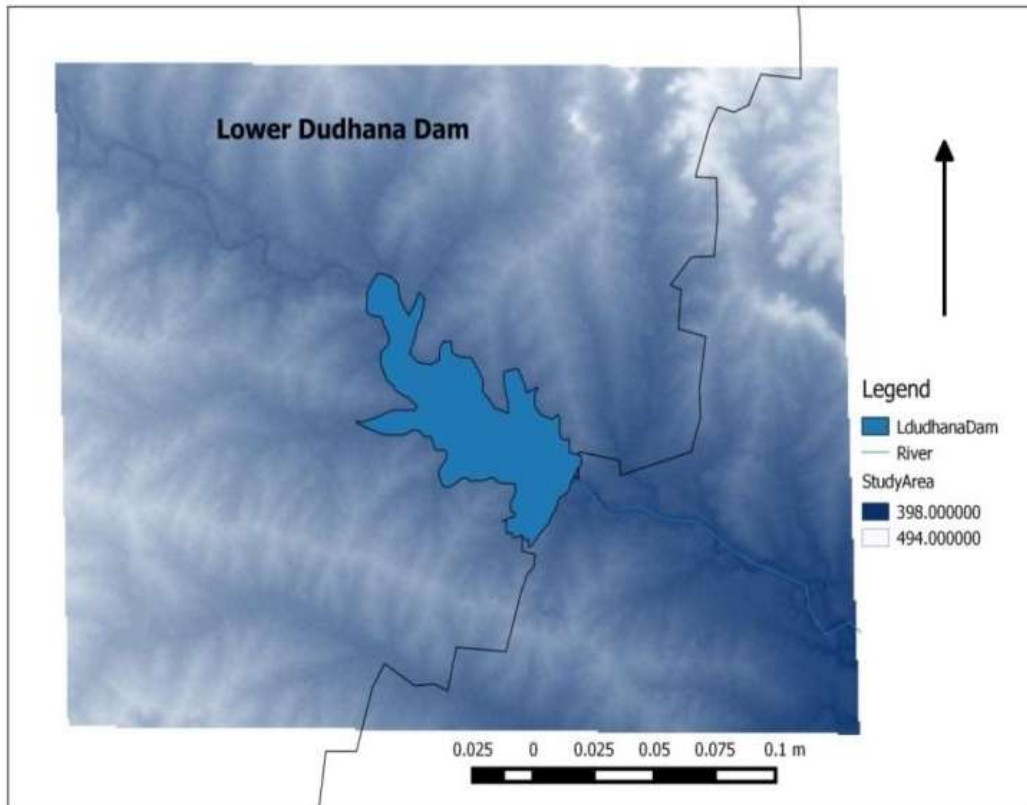
Model Description

HEC-RAS 4.1.0 is open source delicate instrument accessible on US Army Crop site. Programming is equipped for playing out the consistent slowly differed stream on waterway and channel math. In the current investigation, consistent slowly stream incitement model has been utilized to perform one dimensional water driven figuring for full organization of common waterway bed. Figure 2 shows the philosophy of model execution. Figure 3 address the default transport development of area in HEC-RAS. The Left bank and Right bank height are needed for consistent stream investigation utilizing unpleasantness coefficient.
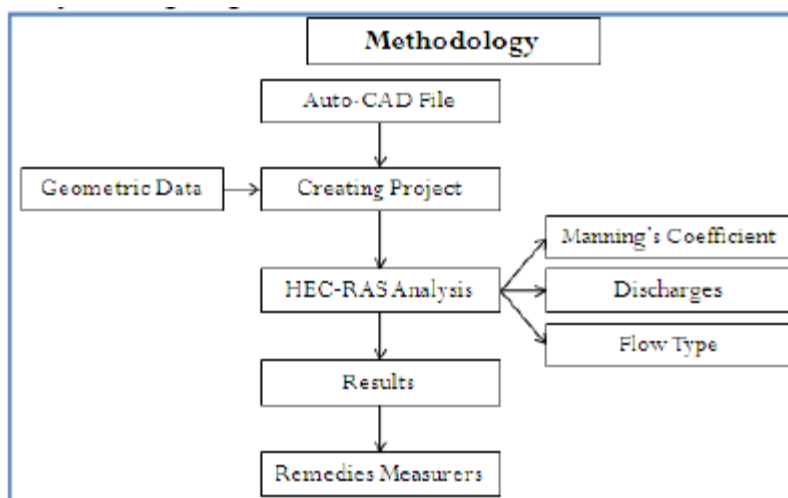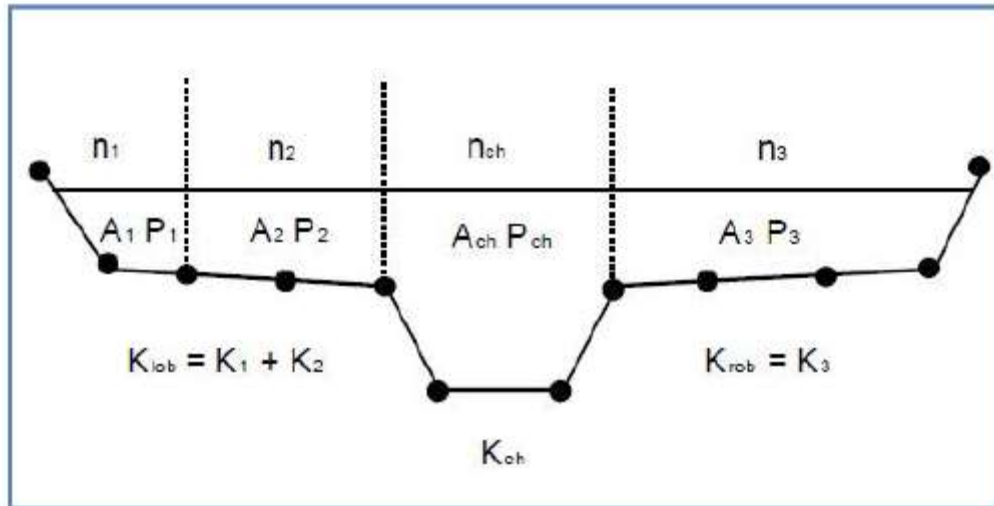

Fig 2 Flow chart of steady flow HEC-RAS Modeling

HEC-RAS Default conveyance subdivision method

Geometric and Hydrologic Data

The stream calculation, limit conditions and bowl opposition are needed for leading stream recreation through HEC-RAS 4.1.0. Water Resources Department has given the mathematical information of the compass for present investigation as shape map in Auto CAD (.dwg document) design. The cross-area information at 50 meter spans surpassing over a length of 1100m has been given. Information incorporates the station and rise facilitates, arrive finally, channel width at the segments, monitoring's coefficient and compression/extension coefficient. The flood hydrograph has been utilized for approval of the model.

Reenactment of stream for various benefit of Manning's "n" In the current examination, exertion has been made to align Manning's harshness coefficient for single benefit of utilizing aforementioned information and thusly, various qualities have been utilized to legitimize their ampleness for reproduction of flood in the investigation reach. Keen perspective on inserted cross-segment and field cross-area are as demonstrated in Figure 4. For given examination monitoring's harshness coefficient is taken as 0.030 for each segment.
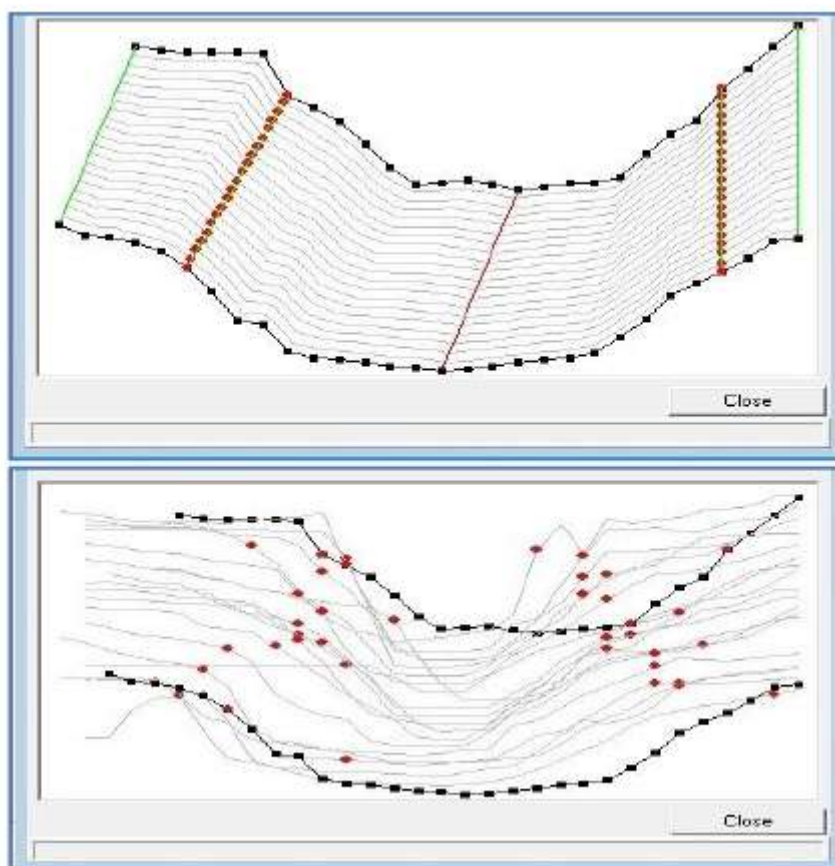
Fig 4 XYZ Perceptive View of Interpolated C/S and Field C/S

Results

In the wake of giving every one of the info boundaries to the product for the calculation, the yield as far as the table and the diagrams is gotten which incorporates: In the cross segment yield the estimation of ground height, speed head, water surface rise, complete speed, max channel profundity, misfortunes, normal speed, wetted border and so on For the given release, the submergence at the given area is likewise, shown which shows the degree of flood The rating bend is additionally inferred for example chart between water surface height and release at the given flood at a given cross area. This gives the thought regarding the water level at various release esteems

CONCLUSION

The HEC-RAS gives the flood profile to the most noticeably terrible flood power. This profile will encourage to embrace proper flood catastrophe moderation measures. The flood profiles for various flood forces with various return periods can be plotted at some random cross part of stream. Likewise, such flood profile can be plotted for whole length of waterway reach. Flood demonstrating utilizing HEC-RAS is powerful instrument for pressure driven investigation, treatment of calamity the executives measures. Based on waterway cross segments, hydrologic information of stream, one-dimensional numerical model (HEC-RAS) was done to gauge the flood level in the waterway for given release. 3D perspective on keen plot for three unique releases for given investigation zone are appeared in figure. In light of the examinations, the degree of dike of segment 3, area 15 and segment 21, ought to be expanded. The exhibition of aligned model has been

confirmed for past releases from dam in a year ago records. Besides, model can be geo-referred to with Google earth and flooding can be featured on Google map.

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