THE DESIGN FLOOD OF IRIGATION DRAINAGE SISTEM DUE TO THE INFLUENCE OF GLOBAL CLIMATE CHANGE

Supriya Triwiyana : Hidrologist (*)
Khaeruddin : Water Resources Engineer
Williem Minggu : Water Resources Engineer
Unit Kerja : HATHI Makassar
Address : Kompl PU Malengkeri Jl.Muhajirin II/5
Phone Number : 085255546130/04115033204

ABSTRACT

As we have already known that Montreal Protocol has declared that there exist the environtmenal deterioration i.e global climate change, ozone depletion, forest devastation and population growt. The four-issues mentioned before drectly or inderictly gave the influence to the global hydroclimatology of the earth, and finallywilln give influence to hydrology. The global climate, ozone eplition and forest defastation will directly change the hydrological system, not for the population growt.\, it is inderictly changed the hydrological system. Then hydrology fase the problem to encounter the influence of fourth issues, in the hydrological aspect, therefore accurate integrated and universal research should be carried out to fullfill such demand.

The role of general meteorology and climatology or symnoptic meteorology will be important for such research. In accordance with the Montreal protocol declaration the sugestion for us then is " To think globally and Act lokally". By this expession the author attemp to take correction on one of the hydrological aspect, for so far can be aplied on the low flow or high flow analysis in water resources development. The author just to take one of them i.e determinating the desained flood ,and expecially the design flood for irrigation drainage, due to their influence of the four-issues mentioned before. According to the author, this work is then the realization of "act locally", in contribution to the "think globally". The author just try to applied such idea for the data of Makassar rainfall gauge station. After that the result can be use for giving correction on the determination of design flood, that usually done by planner using several probabilistic distribution models. In conclussion the effect of the-four issues in the few point of statistical hydrology can be said that the sample always left away by the population from time to time..

l. General

The damage caused by the river flood event, especially in Indonesia having increase from time to time, though the effort to talking countermeasure has been doneby the flood control works in the main river, most of that are the rivers in Jawa island. Even the name of non widely known as famous river were arised in abrubt were , due to the damage caused by their flood, because the capacity of the river is not any more sufficient for discharging the discharge of the river, even for just very low propability of their occurrence.Such kind of flood problem are not found only in Jawa island, but also

for some river in Sulawesi Island. In South Sulawesi several years before some river having the arising of discharge , then caused the hazard. In accordance with the observation done by the Water Resources Development Office shows that another river also experience the arising of annual maximum discharge.
In fact it is difficult to deterime the cause of the arising of the maximum river discharge, otherwise we don't try to make integrated research in the science of General Meteorology and Climatology or also the research done in River Basin. The purpose of this paper doesn' want to look for the cause of the annual maximum discharge of the river, but only want to give the correction to the result of calculated design flood, eventhough it may be used for another parameter.

ll. Research of Aplication

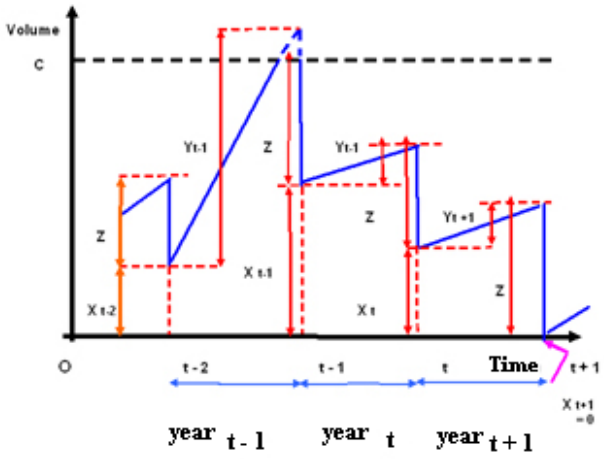
- Purpose

1. So many formuli/models that used by planner for design discharge prediction based on the annual maximum discharge These Model ini are statistic probabilistic expressed by distribution frequencies for the series of the recorded data.The distribution frequencies of the recorded data series can be valid for use if that is fit to the theoritical distribution frequencies. Therefore due to the effect of the four-issues to the hydrological system this research attemt to give a correction for that.
2. In the field of Statistic & Probability , there exist the random process. In Random process there exist ***Random walk with reflecting barrier***" " and ***Random walk with absorbing barrier*** . The Crisis in any field as politic,economy, engineering, and also water resources manajemen the assumtion that the random process as like as the movement off ball in the foot ball game/soccer is not perfect one. In that random process the walk of ball can be classified as ***Random walk with reflecting barrie.r*** The ball will move any where as the games running till the games over as it is it is **deterministically** stopped by the jury The proper view of the crisis is that the" ***Random walk with absorbing barrier*** . The example of that is the movement of colloidal particle in the water which placed on the water tube.The parikel move anywhere will stop if probabilistically touch the bed of the tube. Many manajemen practice we have done and designed based on the assumption that we are in the condition of ***Random walk with reflecting barrie,*** *not on* ***Random walk with absorbing barrier***. Therefore efektifivy, effcisiency and objectivity look like far away from the reality. Although the three factors mentioned above should be consider accurately. In the condition of ***Random walk with absorbing barrier*** we need an accurate effort for leaving from **state from where** to go to to the better **state toward with**. The practice of to say "no way" legal logging, illegal logging,which doesn't in agreed with the natute capacity , and say " lets go " to Integrated watershed manajemen including " integrates erosion/sediment control can be said as that "**Our colloidal particle doesn't probabilitically touch the the water tube bed**".

Example of Aplication :
:
Determination of the reservoir capacity by the pure probabilistic approach with

Moran model.
The water in Reservoir will be drained out fastly if the release water from reservoir is large, but the capacity is small. The water in Reservoir will be drained out slowly if the release water from reservoir is small, but the capacity is large, but it is ineconomically. The optimum condition will take place if we use the Moran model for its analysis. As the aplication of Random walk with absorbing barrier :

Moran Model For Reservoir



$X_t = \text{Max}(\text{Min}(X_{t-1} + Y_t - C)\ Z, 0)$ or

$X_t = X_{t-1} + Y_t\ Z$ if $Z = X_{t-1} + Y_t < C$

$X_t = C - Z$ if $C = X_{t-1} + Y_t < C$

$X_t = 0$ if $X_{t-1} + Y_t < C$

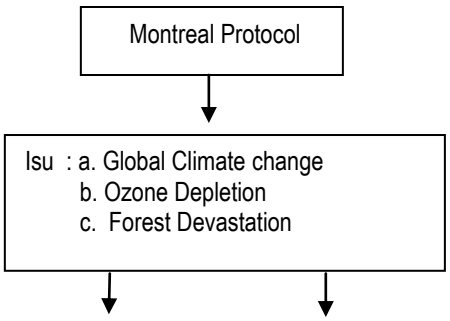
X_t = Storage of reservoir in the year of t

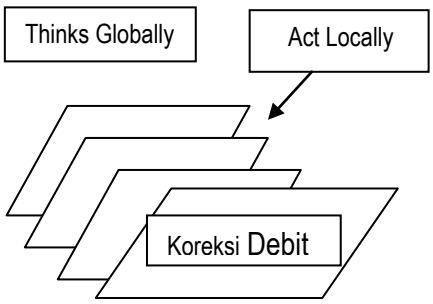
Y_t = Yearly Inflow in the reservoir of the year t

Z_t = Yearly Outflow in the reservoir of the year t

C = Reservoir Capacity

Therefore the condition of evironment will also be better, and also will give impact to the condition of Water Resources which relevan to the earth atmosphir. The change the condition of atmosphir, the change Hydrological system and the change in hydrological system, the change in irrigation drainage.





III. Metodology

South Sulawesi Province lact of recorded discharge data for the Automatic Water Level recorder station or the water level gauge. The number of year of the recorded discharge data was only 50 year, but it is not for the the rain gauge / Automatic rainfall recorder station we have about 100 years. Herefore the author is only interesting in using the rainfall data for estimating design dischargei.

There exist so different ways to estimate the design discharge by using the recorded rainfall data. One of them is rational formula :

$Q = 1/3.6 . C. A. R$

Q = DIscharget (m3/det)
C = Runoff coefficient
A = The area of Catchment (Km2)
R = Rainfall intensity mm/jam

Research Procedure :

1. Maximum Recorded Ranfall data collection (In this case the Antang rainfaff station and the others (126 years)

2 Sorting of using method by determination of wiely used factor (Log Pearson Theoritical Fequency Distribution)

3. The first 50 years recorded maximum rainfall data can be taken i.e t1 to t50. These data can then be used for the determination of design rainfall. (can be taken for 20 year return periode or 50 year return periode) by using Log Pearson Theoritical Fequency Distribution.We have the design rainfall R1

4 The procedure 3 is repeated for the 50 years recorded maximum rainfall data from t2 till t51 We have the design rainfall R2

5 Again The procedure 3 is repeated for the 50 years recorded maximum rainfall data from t3 till t51 We have the design rainfall R3

6 E.t.c then we have R1 to R76 (see figure)

7.The analysis of regression can then be done for t and Rt. Especially for the significant change.

8.We have the regression line (see figure)

9.The regression line can then be used for estimating the correction

10. Thet Corection can be given to the estimated original design rainfall

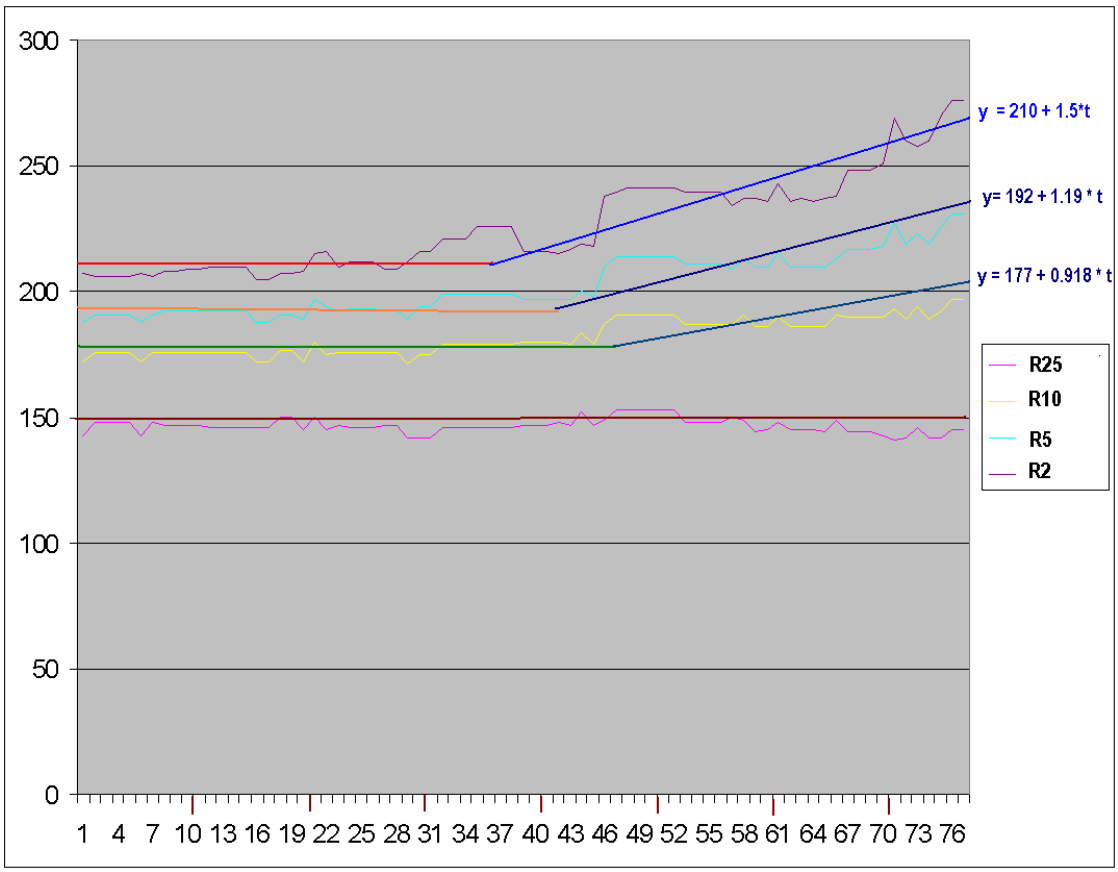
11. Finally The correctied design rainfall can be used for determining design discharge

IV. Result of Calculation

The result of calculation expressed in the following regression formula :

RT = a + b. t

R50 a = 210 b = 1.5
R25 a = 192 b = 1.19
R10 a = 177 b = 0.918
R2 a = 150 b = 0



Gambar 2

V. Conclussion and Sugestion

Conclussion

The expression formula obtained by this procedure can then be used for the corection of any year of prediction we do.
Similarly we can aply this procedure for low flow analysis purpose.

Sugestion

- The procedure done in this paper is still a simple one. We only concern to the available existing data The error due to the error during the recording work. The better procedure may be aplied if we also consider the change of meteorological & climatological factors in our earth Therefore global research should be doe to fullfill the best and more accurate result. akurat.
-
- Similarly we can aply this procedure for low flow analysis purpose

VII Literature

1. Malkov, General meteorology and Climatology,
2. Gaston Demaree, Climatology
3. Dinas PSDA Sul-Sel, Rekaman stasiun curah hujan Antang/ Makassar
4. Montreal Protocol
5. Van D e Wiele, G.I ,System Aprroach To Water Managemen
6. B.C Yen, Deterministic Surface Water Hidrology

.

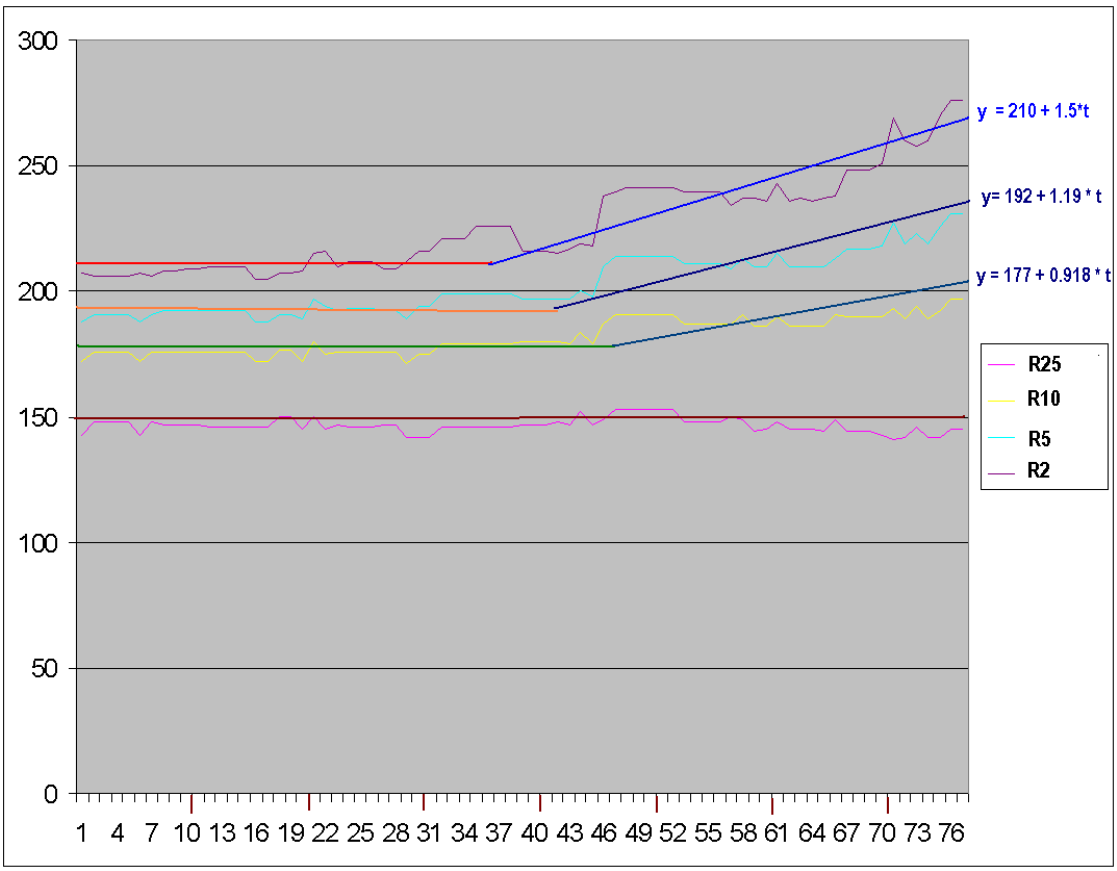
The author :

1. **SUPIYA TRIWIYANA**
2. **Khaeruddin**
3. **WILLIEM MINGGU**
4. **Mohammad Noor**

HATHI SULAWESI_SELATAN OFFICE

RT = a + b. t

R50 a = 210 b = 1.5
R25 a = 192 b = 1.19
R10 a = 177 b = 0.918
R2 a = 150 b = 0



Gambar 2