Flood Analysis of Krishna River at Sangli (MS)

B. D. Pore[1] A. A. Lole[2] S. B. Patil[3] S. B. Kore[4]
[1,2,3,4]Department of Civil Engineering
[1,2,3,4]Sanjay Ghodawat Group of Institutions, Atigire-416118, Maharashtra, India

Abstract— Flood data at Irwin bridge of Sangli were analyzed for mitigation, which may be used for long term planning of flood control in the area. During 12 years period, maximum floodis occurred in year 2005. Flood data is of great importance to plan mitigation measures. If proper and comprehensive study of various flood data was analyzed, the severity and reoccurrence of flood can be predicted and various measures can be taken to cope up with the problems arising due to flood.

Key words: Flood, Irwin Bridge, Sangli

I. INTRODUCTION

When we think about flood risk management, it is possible to integrate flood damage functions, topographical, hydrological, hydraulic and economic databases in order to establish the total direct flood damage. This process can be repeated for various floods with different probabilities of occurrences. With these results it is then possible to calculate the mean annual damage (MAD). With the MAD known, it is possible to calculate the benefits of different flood mitigation measures for any area of investigation. Flood mitigation measures can be implemented to reduce the physical extent of flooding, relieve the effect of a flood on humans and the community and reduce the tendency towards flood damage in different areas. They can also be implemented to reduce the risk of flooding and in this way, income stability can be assured at farm level (Van Zyl and Groenewald, 1984a). Krutilla (1966) points out that, in spite of the disastrous effects of flooding, it is not economically viable to implement measures to such an extent that they will prevent the total risk of flood losses. This is because the cost of the flood mitigation measure will exceed the benefits thereof. Keeping the above mentioned in mind, an optimal package of flood mitigation measures, can be compiled where marginal benefits are equal to the marginal costs. Before an optimal set of flood mitigation measures can be established for an area, the different measures which can be implemented should first be identified. After that, it is necessary to indicate for each measure exactly what it entails and what its benefits and costs will be. After the benefits and costs of each measure have been established, suitable packages can be identified for the research area. An optimal flood control and flood damage control measures package can then be compiled. Against this background, the paper only focuses on the first two steps, namely identifying applicable flood mitigation measures for the research area and estimating the total benefits and cost of the different flood mitigation measures with the aid of a flood damage simulation model (FLODSIM) based on a GIS approach. Due to the fact that the procedures of calculating the different flood damage categories (Du Plessis and Viljoen, 1997; 1998) and also the procedures followed by FLODSIM (Du Plessis, 1999) are already published, no further attention will be given in this paper to the above-mentioned. The present study reveals that, the flood analysis of Krishna river basin at Sangli.

II. IMPACT OF FLOOD AROUND SANGLI

Flooding may produce some benefits, such as the deposition of nutrients on agricultural lands in the flood plain and the replenishment of groundwater. A flood plain location may have large benefits not only for agriculture but also for manufacturing and transportation activities. A flood plain may also be the most scenic location for residential developments. Nevertheless, the preponderance of potential damage makes flooding the nation's worst natural hazard. Flooding bringing greater property damage than any other hazard and loss of life in the hundreds.

The details of flood occurred around Sangli at Irwin Bridge for 12 years were studied from year 2005 to 2016. The analysis shows maximum flood in August 2005. The Krishna River were flooded due to heavy rainfall, at a time, in entire Krishna basin in western Maharashtra.

The flood data of Krishna River at Irwin Bridge Sangli from year 2005 to 2016 is collected from Water Resource Department Government of Maharashtra and is as follows.

Sr. No.	Year	R. L. (meter)	Depth of Water (Ft)	Maximum Discharge (Cusecs)
1	2005	543.28	53.20	192500
2	2006	540.47	44.00	128967
3	2007	540.09	42.75	119241
4	2008	537.88	35.50	77214
5	2009	534.38	24.00	40896
6	2010	535.60	28.00	51971
7	2011	540.47	44.00	133967
8	2012	532.78	18.75	27996
9	2013	538.65	38.00	88671
10	2014	536.05	29.50	56266
11	2015	532.70	18.50	27388
12	2016	537.58	34.50	73200

Table 1: Maximum Discharge during Rainy Season at Irwin Bridge, Sangl

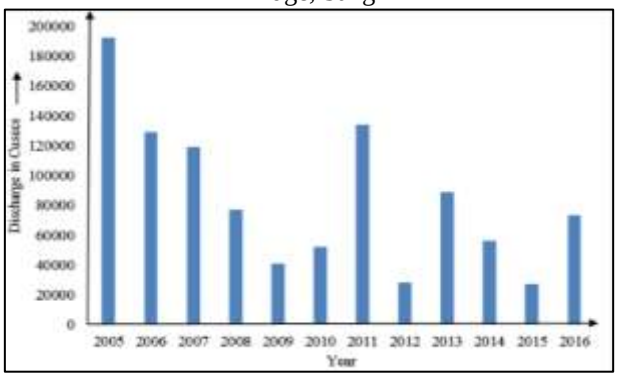

Fig. 1: Graphical Representation of Discharge

Simultaneously the average rainfall data at Sangli collected from Water Resource Department Govt. of Maharashtra is as follows

Sr. No.	Year	Average rainfall in mm
1	2005	973
2	2006	688
3	2007	654
4	2008	503
5	2009	557
6	2010	552
7	2011	364
8	2012	372
9	2013	620
10	2014	631
11	2015	355
12	2016	721

Table No. 2: Rainfall Variation at Sangli

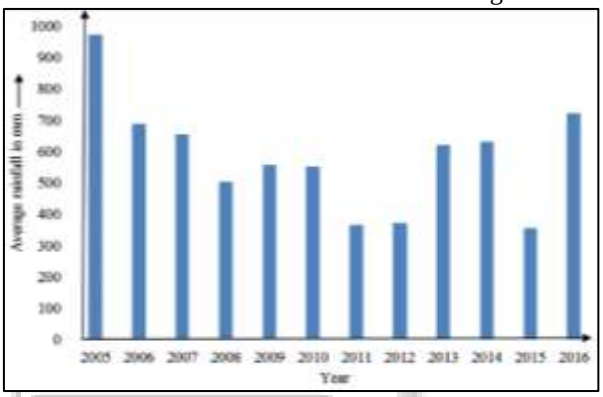

Fig. 2: Graphical representation of rainfall

III. CONCLUSION

After evaluation of 12 years rainfall and Flood data of Krishna basin, the maximum average rainfall in the year 2005 was 973mm as well as flood discharge was 1,92,500 Cusecs. The minimum average rainfall in the year 2015 was 355mm and flood discharge was 27,388 Cusecs. Based upon amount of rainfall and discharge we conclude that, the maximum flood occurred at Irwin Bridge Sangli in the year 2005.

REFERENCES

[1] DU PLESSIS LA (1999) New flood damage simulation model for irrigation areas of South Africa: A GIS approach. Agric. Eng. in S. Afr. 30 (1).
[2] DU PLESSIS LA and VILJOEN MF (1998) Estimation of total flood damage in the lower Orange River area with the aid of a flood simulation model: A GIS apporach. Water SA 24 (3) 201-204.
[3] DU PLESSIS LA en VILJOEN MF (1997) Die ontwikkeling van vloedskadefunksies vir die landbousektor in die Benede-Oranjerivier. Water SA 23 (3) 209-216.
[4] KRUTILLA JV (1966) An economic approach to coping with flood damage. Water Resour. Res. 2 (2) 183-190.
[5] VAN ZYL J en GROENEWALD JA (1984a) Ekonomiese aspekte vavloedskadegeneigdheid in die landbou: 'n Studie in die Laer Dfolozivlakte Agrekon 23 (1) 32-42.
[6] VAN ZYL J en GROENEWALD JA (1984b) Plaasgrootte en vloedskadegeneigdheid: Gesamentlike effekte op kontantvloei. Agrekon 23 (1) 28-33.
[7] VAN ZYL J en GROENEWALD JA (1988) Vloedskadeversekering: 'n Studie op die Benede-Umfolozivlakte. Agrekon 27 (3) 16-20.
[8] SMITH DI and GREENAWAY MA (1993) An Introduction to Urba Flood Damage Assessment. Johannesburg. Paper presented to the Department of Water Affairs.
[9] SWIEGERS C (1993) Personal communication. Deputy Director: Strategic Management, Dept. of Water Affairs and Forestry, Pretoria.
[10] THAMPAPILLAI DJ and MUSGRAVE WF (1985) Flood damage mitigation: A review of structural and nonstructural measures and alternative decision frameworks. Water Resour. Res. 21 (4) 411-424.

