

## The Study and Estimate of Floods in meandering river channels according to changes the channel bending (Case Study: Aji-Chay river in the North West of Iran)

Maryam Bayati Khatibi \*

Department of Geography, Tabriz University, Tabriz, IRAN

Received 7 June 2012

Accepted 11 September 2012

### Introduction

Active Meandering Rivers are the most dynamic and sensitive parts of the fluvial landscapes. Meandering rivers suffer a large Geomorphic changes during the annual flood events. Based on large flood evidences, reconstruction of the channel bed migration will be possible, which is use for Evaluation of future Evaluation and flood risk assessment in the flood plain areas. The morphological evolution of river meanders has been analysed by many authors and various pattern and models has been suggested (eg. Alfredo 2010, chen 2006, Hook 2008, Borisova 2006). Many researchers have examined the morphological impacts of floods and some studies of channel instability have combined time scales, examined the combined effects of flood phases and demonstrated temporal and spatial variability of stream stability.

There are many meandering rivers passing from flood plain areas in Iran which are studied by Iranian researchers (eg. Bayati Khatibi 2012, Rezaei moghadam and khoshdel 2009, Yamani 2008, Jahadi Toroghi and Hosseinzadeh 2012).

The purpose of this paper is to demonstrate of active channel changes of Aji-Chay River over the time and assessment of flood occurrence potential based on displacement of bending river course.

### Study Area

Aji-Chay river is one of the largest rivers in the northwestern of Iran to drain an area with 12790km<sup>2</sup> to orumieh lake. The study reach is selected from sarab city to Tabriz International airport at the Northern latitude of 37° 58' 07" and Eastern longitude of 47° 45' 12" most geologic formations of the flood plain include young alluvial gravel and pias sediments. The study reach is been divided to smaller parts to further analysis (figi).

### Material and Methods

Satellite Images and areal photographs were used for Geomorphological Mapping and measuring the meander characteristics. In addition the annual pick discharge records at the nahand, said abad, Khajeh and vaniyar gage station was analysed for Estimation of flood occurrence intervals. To assess the effect of the drainage basin characteristics on the flooding phenomenon on the following coefficients and indexes were calculate roughness basin (Bh), roughness number (Rn), drainage density (Dd), constant of channel maintenance (C), stream frequency (Fu), texture ratio (T) and form ratio (Rf) was calculate. also to assess of the effect river channel characteristics in event of flooding, the parameters active channel width(W), active channel depth(D), evaluation of the relation between discharge and width in meander channel and too indexes bending arc (B), flood abate ratio (Rf) and finally channel adjustment(CA) obtain. The coefficients are used by many authors to describe of relation of drainage basin properties' and flooding (e.g. Baker1988).

\* Email: M\_bayati@tabrizu.ac.ir

Corresponding Author 00989144159421

### Results and Discussion

The results calculation of the drainage density in different parts of the Aji-Chay basin indicates that proportion of the drainage density near the out let of basin is relatively high and its value is 61.1 resulted increases the probability of flood occurrence in this section than the other areas. The results obtained from the calculation of the roughness coefficient and basin roughness indicate that the elevation differences causes to decrease the concentration and may cause the inundate in lower parts. Also, the calculation other parameters show a high potential for flooding in this basin. The relationship between meander length and discharge in the river channel indicates that discharge rate affected by the meander length, is very different and in the near of Tabriz city and meddle parts of the river channel the discharge rate reach its peak. According to the calculated of the flooding potential (LFH) in almost all parts of the river potential risk of flooding is high and the amount of this risk is more than the other parts at ranging between the Sarab to Venyar. According to the calculating and comparison of annual discharges with the method of normal distribution, the occurrence probability of peak discharges more than  $80\text{m}^3/\text{s}$  is estimated in the Nahand gage Station.

### Conclusion

Evaluation of peak discharges recorded at stations of the basin river is demonstrator the occurrence of massive floods at path the Aji-Chay river channel Also historical study and high flood mark remains in the below of old bridge is evidences of this flood. According to factors related to the bending of the active channels in all of the study reach from the middle part towards the airport of Tabriz, the risk of annual flooding will increase. In addition to flooding, erodibility the banks of floodplain and increasing sediments volume is also a serious impacts. As well as the bending arc changes indicates that the risk of flood occurrence has been changed in different parts and over the future times, with the instability of river bends, under the flood impacts, installations around the river are at risk.

**Key Words:** Meander, flood, flood hazard, Active channel, Aji-Chay basin, Aji-Chay River.