

Runoff analysis of the Huai He river in China

National Research Institute for Earth Science and
Disaster Prevention

Member : Tokuo Kishii

Member : Yasuhisa Kuzuha

Remote Sensing Technology Application Center,
Ministry of Water Resources, China

Jiren Li

1. Introduction

This study aims to clarify the characteristics of the runoff in the upstream of the Huai He river in China. This river is located on the area between the Yellow river and the Chang Jiang river. The river basin is strongly affected by the Asian monsoon. Tank model is used for analyzing daily runoff in this river.

2. Runoff analysis

Tank model was used for runoff model. The analyzed area is the upstream of the Huai He river basin. The target station is "Hoai pin", area of basin $16,005 \text{ km}^2$ (Fig.1). Hydrological data used here are, rainfall, runoff and evaporation from 1983 to 1991 by "Remote Sensing Technology Application Center, Department of Water Resources of China". Areal rainfall amounts are calculated by arithmetic mean of two stations, Hoai pin and Shi shen. Evapotranspiration is calculated from evaporation data of Shi shen multiplied by some coefficients.

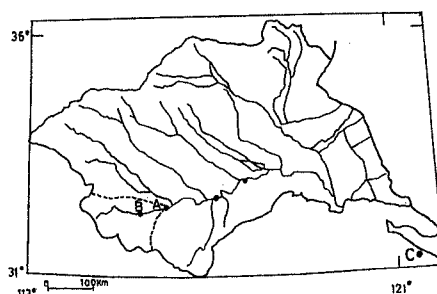


Fig.1 Location of the hydrological stations in the upstream of the Huai he river basin
(A: Hoai pin, B: Shi shen, C: Shang hai)

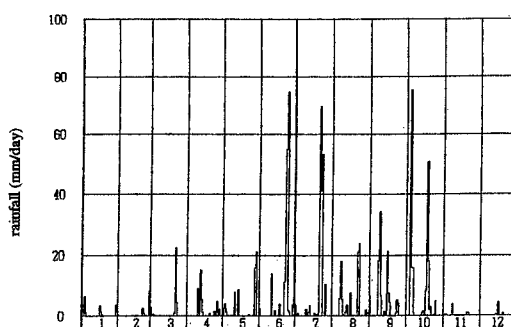


Fig.2 Daily mean rainfall(mm/day) to the upstream basin of Hoai pin

3. Results

a. Characteristics of monthly change of rainfall, runoff and evaporation. Monthly and seasonal change of hydro-meteorological as follow. Rainfall occur's mainly in June to October. Especially much rainfall in June, July and October. Runoff amounts is also large from June to October similar to rainfall.

Key words : runoff analysis, tank model, runoff ratio

3-1 Tenno-dai, Tsukuba-shi, Ibaraki 305 Japan. Tel:+81-298-51-1611, Fax:+81-298-51-1610

Evaporation is larger than 4 mm/day from April to September. A example of the change of these elements are shown as Fig. 2 and Fig.3.

b. Runoff model (Tank model) analysis (Fig. 4)

Four series Tank model is used for analyzing runoff of the Huai He river. Evapotranspiration for this analysis is used for half amounts of observed pan evaporation at

Shi shen. This is due to results by annual rainfall loss analysis.

Results are following. In summer season, of large amounts of discharge, the simulated result is coincided with observed one. But not so good in low flow period.

4. Conclusion

Runoff ratio and total discharge are following.

Annual rainfall ranges from 700 mm to 1400 mm, runoff 160 mm to 700 mm and runoff ratio from 0.22 to 0.48. Mean annual loss is about 600 mm.

From these results, runoff ratio is smaller than that of the river in Japan. That shows evapotranspiration have major role in water balance.

On the runoff model analysis, the simulated result was not coincided in low flow period. the part of the cause may be artificial drainage, irrigation for paddy field, cultivated land etc. Runoff coefficients of the first & the second tank of tank model larger than that of the down stream basin due to analyzed later. It means that rapid runoff component is larger than that of downstream basin.

5. Reference

- T. Kishii, Y. Kuzuha and C.X. Yan, 1996. Evapotranspiration in the Huai He River Basin. Proceedings of the International workshop on Macro-scale Hydrological Modeling : 54-56.
- T. Kishii, Y. Kuzuha and S. Cao, 1996. Comparoson of Yearly Water Balance between Huai He River in China and Experimental Basins in Japan. Annual Journal of Hydraulic Engineering, JSCE, VOL.40, 87-92.

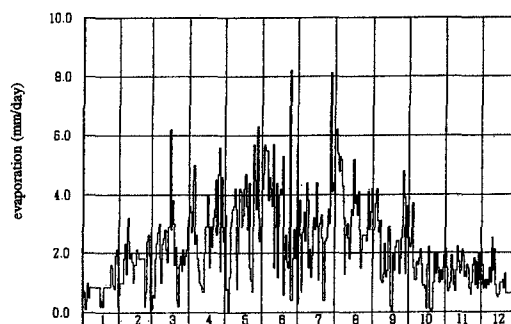


Fig.3 Daily evaporation(mm/day) at Shi shen

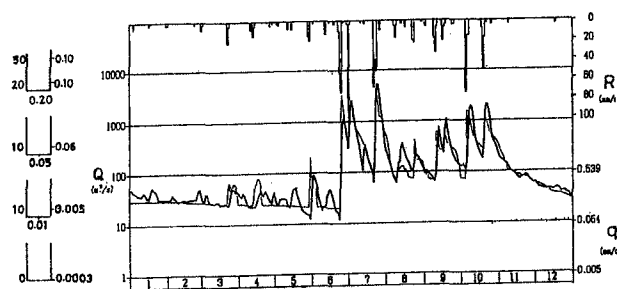


Fig.4 Tank model to the upstream basin of Hoai pin