Study of Suitable Methods for Runoff and Flood Estimating in Arid Watersheds of Iran

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ABSTRACT
Today, successful management of water resources requires achieving a delicate balance of multiple uses that it needs to know existed water resources. These uses the support of fish populations, municipal and industrial water supply, navigation, recreation, hydropower, agriculture and flood control. As a result of increase in population and development in many regions, this balance is becoming more difficult to sustain and the potential adverse impacts of water supply shortage are becoming more significant especially in arid and semi-arid regions. When shortages do occur, the potential for conflict among multiple interest groups is high. Many regions, in an effort to mitigate social, ecological and economic damage during future water shortages are in the process of reevaluating existing for resource allocation during drought and examining new management options for the future. To be successful, these planning efforts must explicitly recognize the concerns of the different interest groups whose welfare is impacted by this resource and build consensus among them regarding an appropriate water management strategy. Iran is lake of water resources, especially in its arid regions. So the management of water resources in these areas is very important. Regarding the climate conditions and average precipitation of 240 mm, Iran plateau is considered as an arid and semi – arid region of the world, which is mostly encountered, with lake of water consequently leading to water, explore operations. The study area (Eileh basin) is located in the Eastern North of Iran (34° 38′ to 34° 48′ N, 60° 22′ to 60° 24′ E,), which belongs to the continental arid climate in the temperate zone. Mean annual precipitation is 265 mm, mean annual potential evaporation is 1275 mm, and the mean annual temperature is 13.3°C. This paper investigated Suitable Methods for Runoff and Flood Estimating in Arid Watersheds of Iran. The studies show that Justin and Envelop Curve methods were suitable methods respectively for estimating of runoff and flood.

***Keywords*:** Arid regions, Water resources, Watershed, Runoff, Flood, Iran.

INTRODUCTION

Today, successful management of water resources requires achieving a delicate balance of multiple uses. These uses the support of fish populations, municipal and industrial water supply, navigation, recreation, hydropower, agriculture and flood control. As a result of increase in population and development in many regions, this balance is becoming more difficult to sustain and the potential adverse impacts of water supply shortage are becoming more significant especially in arid and semi-arid regions. When shortages do occur, the potential for conflict among multiple interest groups is high. This conflict is aggravated by a variety of factors including a lack of communication among groups with different interests, inadequate understanding of complex interactions in a

water supply system, lack of common data agreement on assumptions, and inexperience with extreme or unusual events. Many regions, in an effort to mitigate social, ecological and economic damage during future water shortages are in the process of reevaluating existing for resource allocation during drought and examining new management options for the future. To be successful, these planning efforts must explicitly recognize the concerns of the different interest groups whose welfare is impacted by this resource and build consensus among them regarding an appropriate water management strategy (Bingham 1989).

STUDY AREA

The study area (Eileh) is located in the Taibad Plain (34° 38′ 18” to 34° 48′ 32” N, 60° 22′ 17”to 60° 24′ 37”E,) in the Eastern-North of Iran, which belongs to the continental arid climate in the temperate zone. Mean annual precipitation is 265 mm, mean annual potential evaporation is 1275 mm, and the mean annual temperature is 13.3°C.

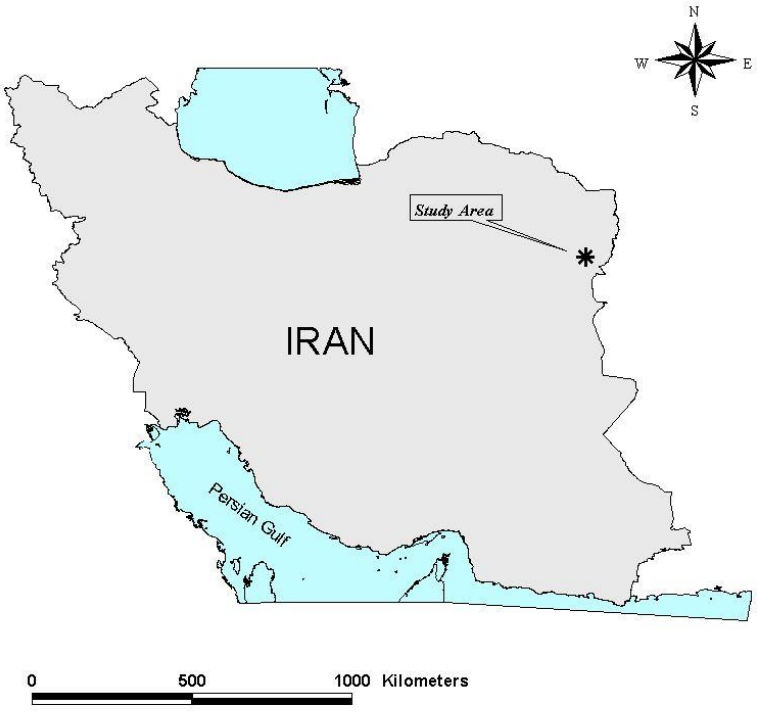

Fig.1. Study Area

Materials & Methods

Runoff

Eileh River is a seasonal river and located in Eastern-North of Iran that flows in wet months (February to April). Studies show surface water in Eileh river is very slight. Runoff studies did using C.C.Vermuel, khoslu's, Justin and ICAR methods. We tried to select the best method by field control and analysis of total calculation.

Flood

Flood studies were done by Regional Analysis, Envelope curve, Mathematic and SCS Methods. One of the approaches that we used for flood estimating was Envelope curve method that *K* coefficient modified by Jalali et al. (1996) for arid and semi-arid regions of Iran.

RESULTS

High of runoff in year determined by C.C.Vermuel, khoslu's, Justin and ICAR methods and respectively were 15.6, 22.8, 5.11 and 4.41 cm.

Table1- Precipitation data of Eileh (mm)

Months	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Ag.
Precipitation	0	1.56	10.2	25.7	33.9	50.9	59.1	48.6	18.4	2	0.34	0.13

Table2- Runoff Estimated by Justin and ICAR Methods

Basin	Area(Km^2)	Justin(cm)	ICAR(cm)	C1	V1(m.c.m.)	C2	V2(m.c.m.)
Eileh	18.85	5.11	4.41	0.19	0.96	0.17	0.83

Table3- Runoff Estimated by C.C.Vermuel and khoslu's Methods

Basin	Annual Precipitation Average (mm)	Annual Temperature Average ^0C	Runoff High Average (cm) C.C.Vermuel	Runoff High Average (cm) khoslu's
Eileh	265	13.3	15.6	22.8

Flood studies were done by Regional Analysis, Envelope curve, Mathematic and SCS Methods that shows in follow tables.

Table4- Flood Estimated by Regional Analysis Method in Eileh (m^3/s)

Basin	Area (Km^2)	Return Period (Year)						
		2	2	10	20	25	50	100
Eileh	18.85	14.8	28.8	60	83.6	91.7	118.8	148.5

Table5- Flood Estimated by Envelope Curve Method in Eileh (m^3/s)

Basin	Area (Km^2)	Return Period (Year)						
		2	2	10	20	25	50	100
Eileh	18.85	7.3	13.1	19.8	29.3	33.1	47.5	66

Table6- Flood Estimated by Mathematic Method in Eileh (m^3/s)

Basin	Area (Km^2)	Return Period (Year)						
		2	2	10	20	25	50	100
Eileh	18.85	4.6	12.5	23.8	33.7	38.7	58.7	86.9

Table7- Flood Estimated by SCS Method in Eileh (m^3/s)

Basin	Area (Km^2)	Return Period (Year)						
		2	2	10	20	25	50	100
Eileh	18.85	15.6	26.5	33.2	39.4	41.3	52	57.3

CONCLUSION

Regarding to climate, topography, vegetation and general conditions of watershed and studies and field control, we concluded that Justin is the best method for estimating runoff in this region. Because this method use effective factors on runoff such as slope percentage to estimating runoff. For flood estimating results showed that Envelop Curve method because apply modified *K* coefficient for arid and semi-arid regions of Iran was suitable method for flood estimation.

REFRENCES

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