**Tarbiat Modares University**

# Monthly Variations of Sediment Graph in Educational and Research Forest Watershed of Tarbiat Modares University in Iran

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## *Presentation Outlines:*

1. **Introduction and Necessity**
2. **Concepts**
3. **Data collection**
4. **Results and analysis**
5. **Conclusion**

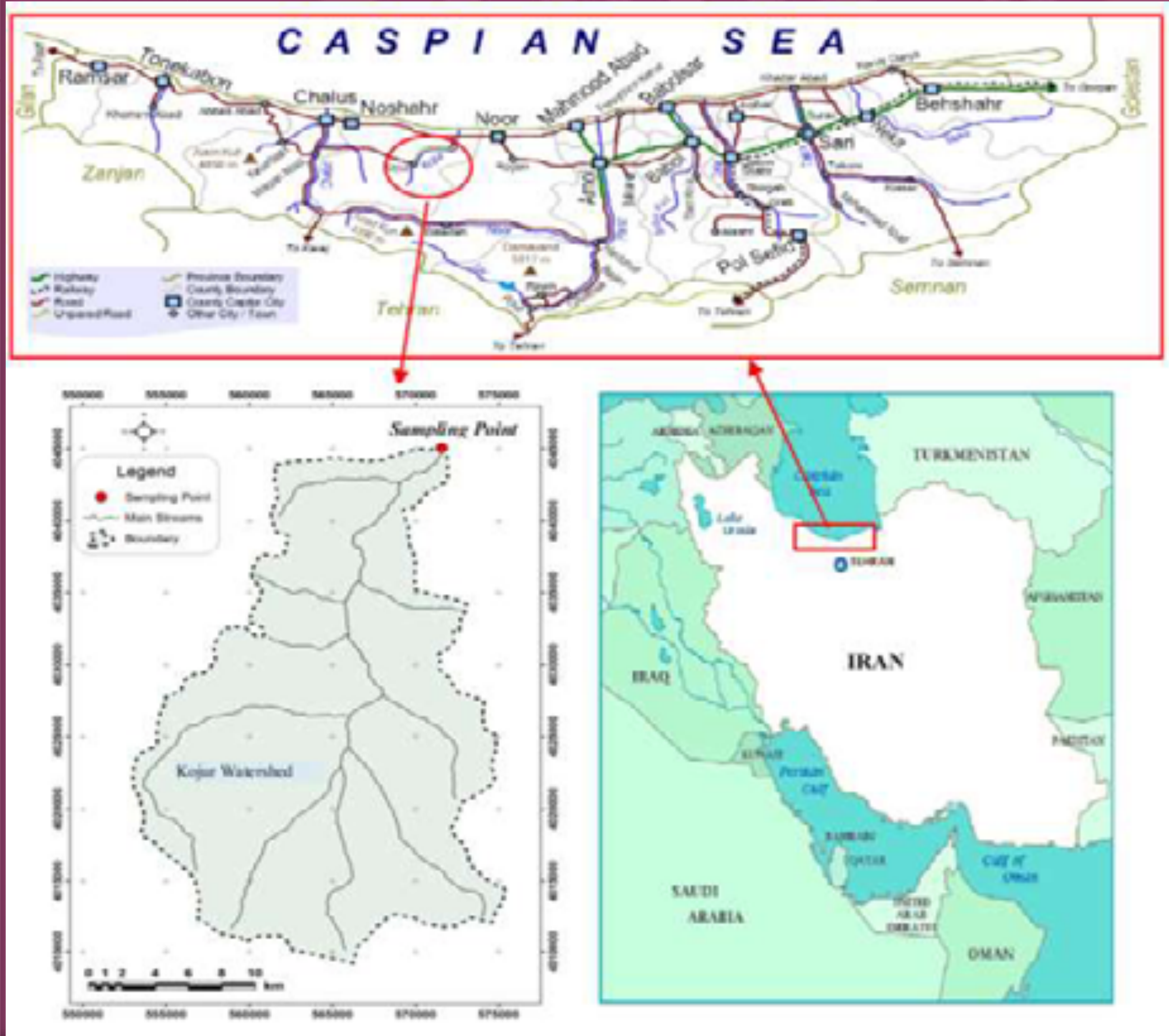
# INTRODUCTION

- Soil Erosion
- Sediment yield
- Scale/variation
- Sedigraphs

**........ Banasik (1995), Rovira and Batalla (2006), Sadeghi (2007), Lana-Renaul (2007), Sadeghi et al. (2008), Saeidi and Sadeghi (2010) and Gao and Josefson (2012)**

**They mainly emphasized on different behavior of sediment graph in storm wise basis. However, no study has been conducted on medium resolution monthly time scale in the study area. The present study therefore aimed to analysis the monthly variations of sediment graph in Educational and Research Forest Watershed of Tarbiat Modares University in Iran.**

# STUDY AREA




**50 130 ha,** located in Mazandaran Province, northern Iran

**Precipitation: 1308 to 250 mm.**

**Land Use: 75% is deciduous species:**

***Fagus orientalis*, *Alnus sp*, *Acer valetinum*, *Tillia begonifolia*, *Acer cappadocicum*, *Parrotia persica* and *Diospyrus lotus***

**Cover density ≈ 75%.**

# MATERIAL AND METHODS

Data collection

Discharge measurement

Suspended sediment data collection

Sediment graph and hydrograph analyzing

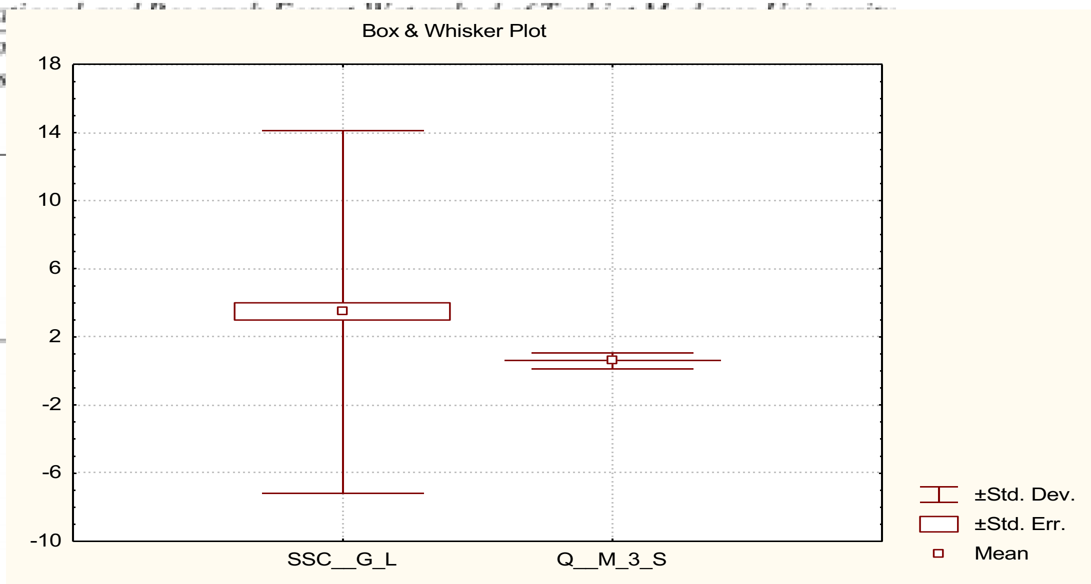
# RESULT AND DISCUSSION

**Table 1.** *Descriptive statistics of monthly hydrographs ($m^3 s^{-1}$) and sediment graphs ($g\ l^{-1}$) in Educational and Research Forest Watershed of Tarbiat Modares University*

| Year | Descriptive Statistics / Study period | Variable | No. of Data | Min. | Max. | Mean | CV (%) |
|---|---|---|---|---|---|---|---|
| 2007 | November | Q | 25 | 0.490 | 1.060 | 0.947 | 13.09 |
| | | SSC | 28 | 0.260 | 1.980 | 0.556 | 67.09 |
| | December | Q ($m^3 s^{-1}$) | 30 | 0.200 | 1.140 | 0.485 | 43.92 |
| | | SSC ($g\ l^{-1}$) | 30 | 0.320 | 14.690 | 3.948 | 109.83 |
| 2008 | January | Q ($m^3 s^{-1}$) | 30 | 0.360 | 1.560 | 0.853 | 40.09 |
| | | SSC ($g\ l^{-1}$) | 30 | 0.260 | 16.672 | 3.015 | 167.00 |
| | February | Q ($m^3 s^{-1}$) | 23 | 0.720 | 1.620 | 1.087 | 30.36 |
| | | SSC ($g\ l^{-1}$) | 23 | 0.340 | 1.880 | 0.912 | 41.56 |
| | March | Q ($m^3 s^{-1}$) | 29 | 0.700 | 1.620 | 1.100 | 34.09 |
| | | SSC ($g\ l^{-1}$) | 29 | 0.150 | 1.620 | 1.100 | 34.09 |
| | April | Q ($m^3 s^{-1}$) | 28 | 0.060 | 0.540 | 0.175 | 69.71 |
| | | SSC ($g\ l^{-1}$) | 28 | 0.040 | 0.180 | 0.113 | 30.09 |
| | May | Q ($m^3 s^{-1}$) | 31 | 0.070 | 0.600 | 0.205 | 44.88 |
| | | SSC ($gl^{-1}$) | 31 | 0.030 | 0.120 | 0.069 | 31.88 |
| | June | Q ($m^3 s^{-1}$) | 31 | 0.130 | 0.250 | 0.181 | 16.02 |
| | | SSC ($g\ l^{-1}$) | 31 | 0.030 | 21.090 | 0.780 | 355.26 |
| | July | Q ($m^3 s^{-1}$) | 31 | 0.140 | 0.250 | 0.180 | 14.44 |
| | | SSC ($g\ l^{-1}$) | 31 | 0.030 | 0.090 | 0.056 | 28.57 |

# RESULT AND DISCUSSION

*Table 1. Descriptive statistics of monthly hydrographs ($m^3 s^{-1}$) and sediment graphs ($g\ l^{-1}$) in Educa… (text hidden by the chart)*




| Year | Descrip… Statis… | | | | |
|---|---|---|---|---|---|
| | Study period | | | | |
| 2007 | November | | | | |
| | December | | | | |
| 2008 | January | | | | |
| | February | | | | |
| | March | SSC ($g\ l^{-1}$) | | 1.100 | 34.09 |
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| | July | Q ($m^3 s^{-1}$) | | 0.180 | 14.44 |
| | | SSC ($g\ l^{-1}$) | | 0.056 | 28.57 |

$$SSC = 12.849Q - 206.355$$

$$SSC = 341.176 LnQ - 33.279$$

$$SSC = 2.225\ Q^{1.228}$$

$$SSC = 47.219 e^{(0.029Q)}$$

high variation in both the study variables with the higher rate for the SSCs. It agrees with

Sichingabula (1998) in British of Columbia, Canada

Kao et al. (2005) in mountainous rivers of Taiwan

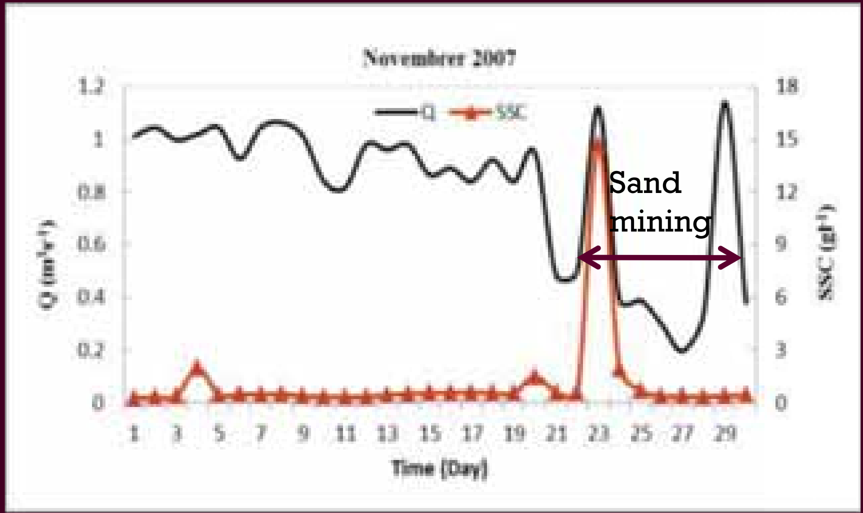
Sadeghi et al. (2008) in a Japanese reforested watershed

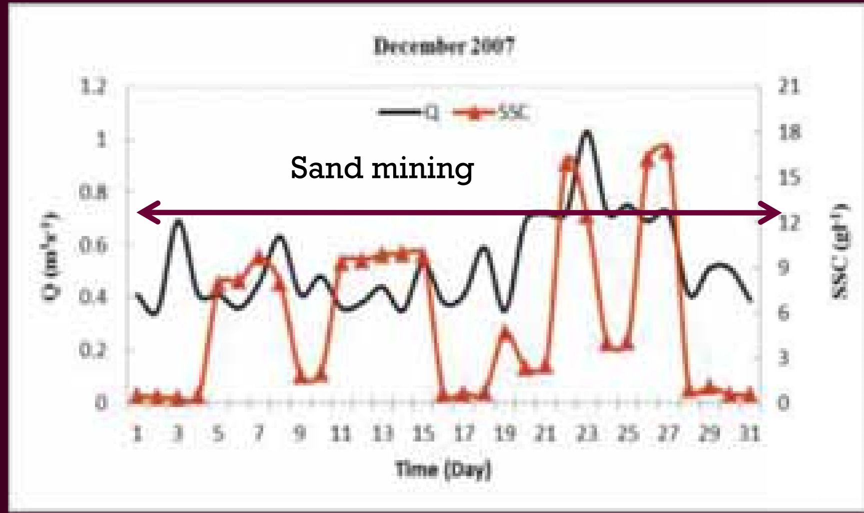
Nadal-Romero et al. (2008) in a humid Mediterranean badland area

Sadeghi et al. (2009) in the same study watershed with a study period

- CVs of SSCs data in comparison with discharge in each month, demonstrates the significant and complex effects of affecting factors such as discharge on SSC as reported by Lana-Renault et al. (2007).

- Monthly CVs of SSCs in all study months is higher than discharge except for April and May 2008 that is because of more concentration of storm events.

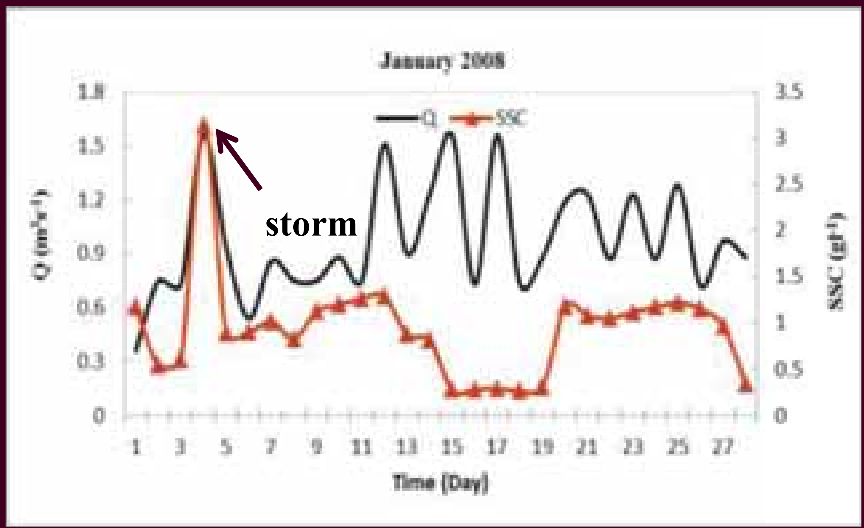


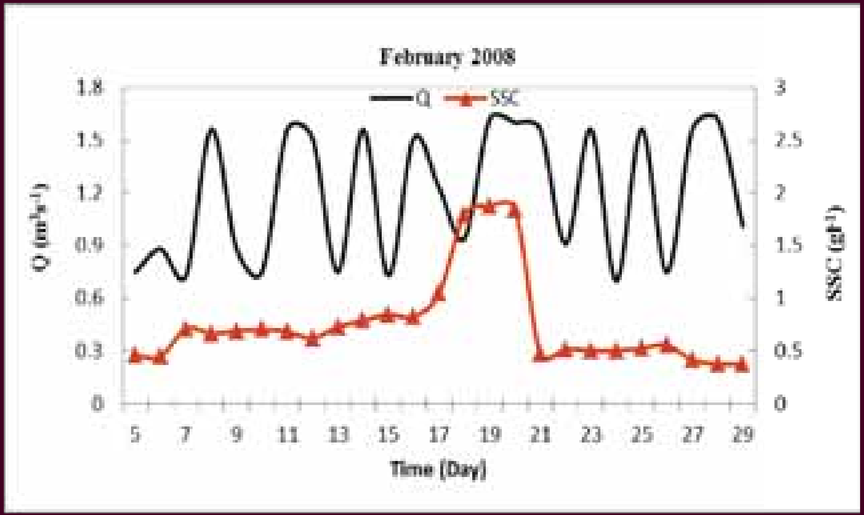




- Oscillating variations in SSCs data from late November to late December 2007 are due to sand mining activities and it's exploitation rates (70% of total SSL) and verifying inter/intra variation of SSC.

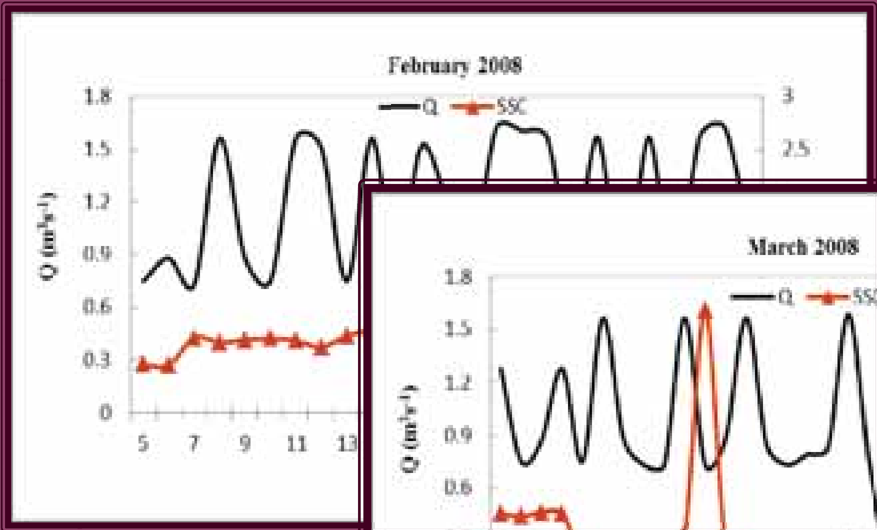
- Occurrence of intense storm event in 5 January, 2008 and after sand mining activities caused to sediment export from the study area thoroughly and it also resulted in reduction of the SSCs during later months.

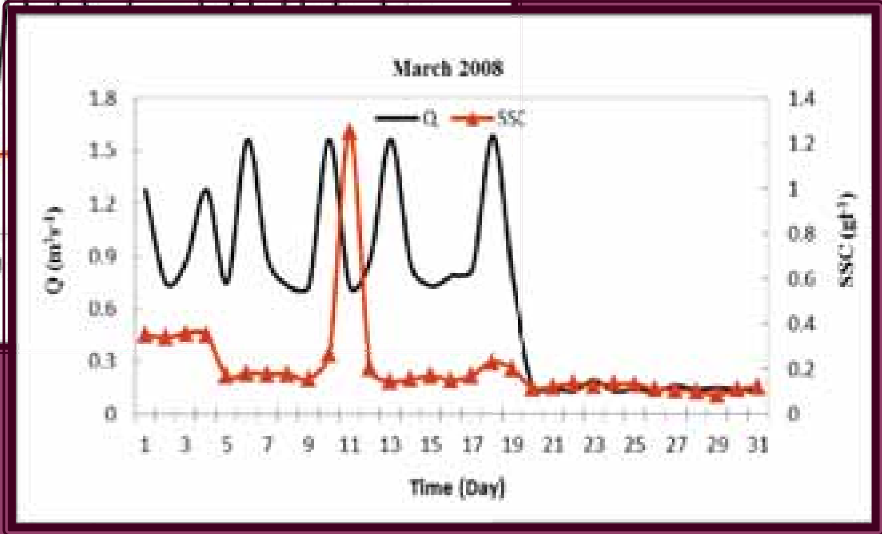
- Batalla and Rovira (2006) have also reported that the suspended sediment value reduced after continues storms in Spain.

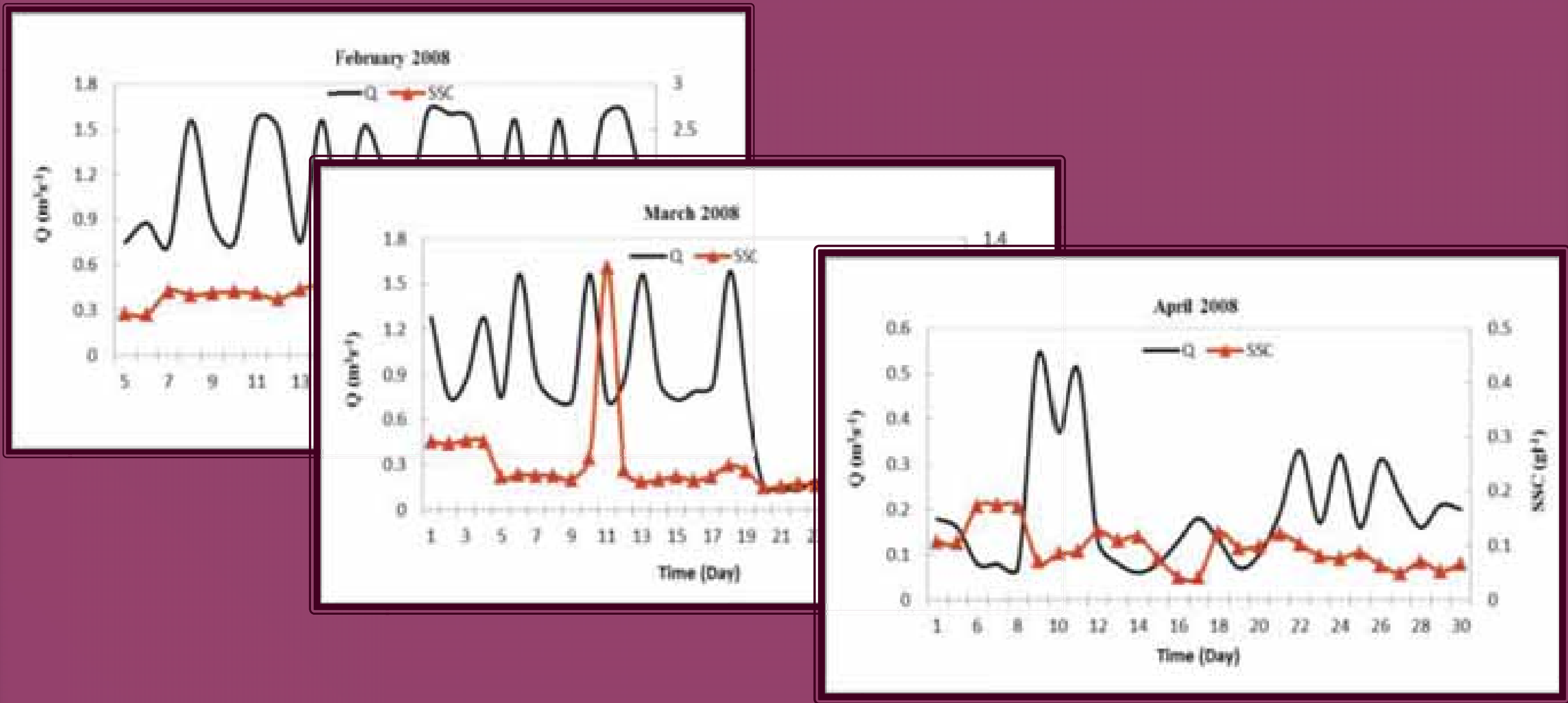



February 2008
Q
SSC
Q (m³s⁻¹)
SSC (gl⁻¹)
Time (Day)

**International conference sediment transport modeling in hydrological watersheds and rivers Istanbul, Turkey- 14-16, Nov, 2012**






❖A steady trend in suspended sediment variations from January to April 2008 in result of stopping mining activity and governing snowy condition in the upper part of watershed.

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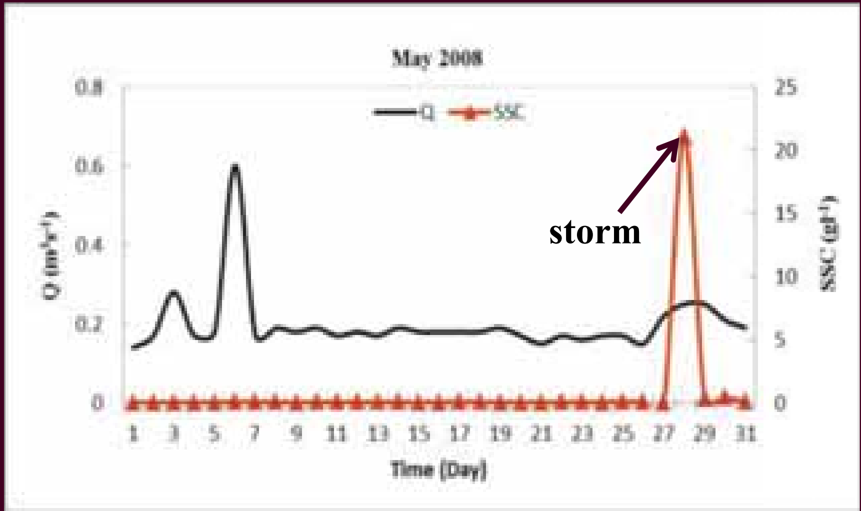


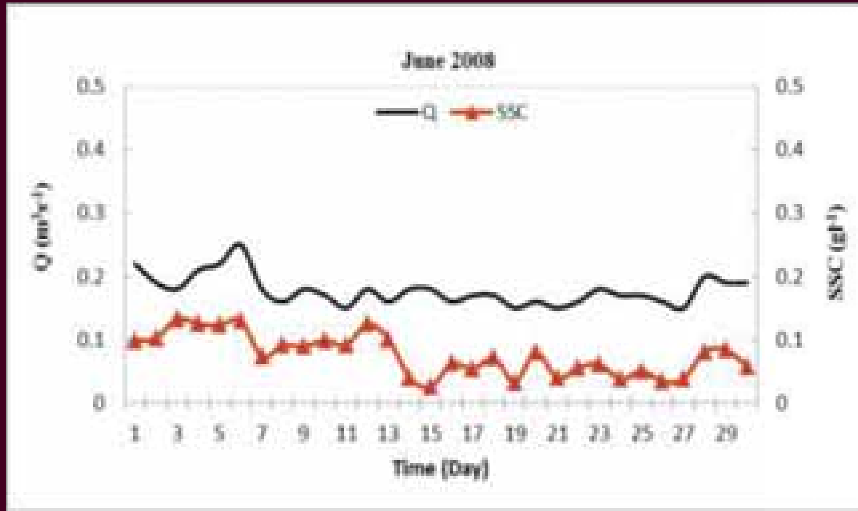


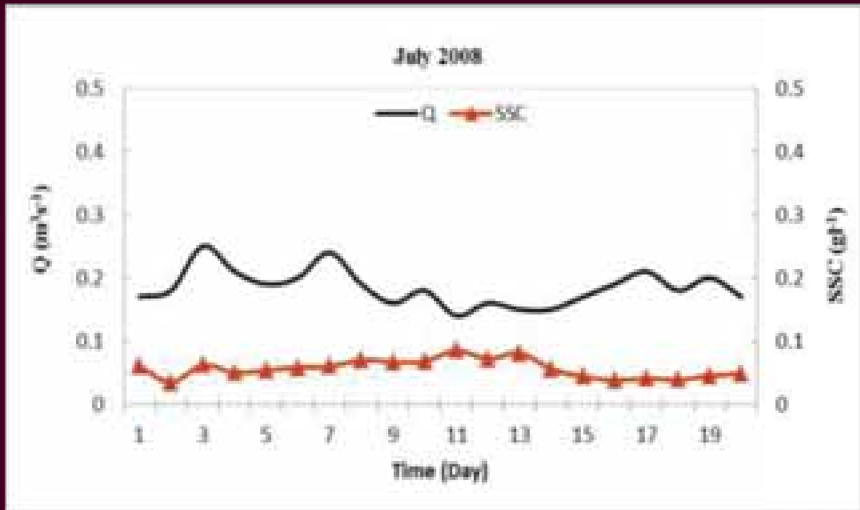

- Recorded data for suspended sediment of 21.09 g $L^{-1}$ clearly showed the response of watershed to a storm event after a long time of dryness and preparing sediment in these months and high sediment availability.

- The same results reported by Walling et al. (2001) in England; Sadeghi et al. (2008) in Japan and Sadeghi and Saeidi (2010) in Iran

- Result of the present study showed that hydrological responses of study area follow the general patterns the same as other watersheds but it has some temporal and spatial variations affected by some effective factors that is agree with Banasik and Walling (1996); Miura et al. (2002); Gomi et al. (2005); Lana-Renault (2007); Nadal-Romero (2008); Sadeghi et al. (2008); Sadeghi and Saeidi (2010) in different watersheds

# CONCLUSION

- The results of analysis of sediment graphs and associated hydrographs collected in a 9-month study period showed that the sediment graphs had different behaviors according to covering conditions change continually.
- A proper assessment of sediment yield in forest ecosystems, despite the general low rate of soil erosion and comparatively sustainable governing conditions, needs collection of high-resolution data in such a way to be sure that all different circumstances are precisely considered and governing conditions are well formulated.
- Further extensive studies with longer and comprehensive hydrological and climatological data sets for the same study area and other forest watersheds are accordingly advised, before drawing a final conclusion on the study watershed as a representative of hyrcanian forest in Iran.


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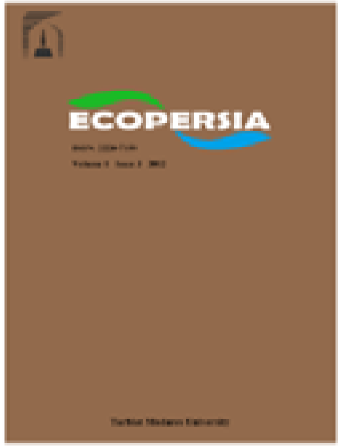

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**Hereafter, the entire processes will be taken under ECOPERSIA with similar abbreviation too.**

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