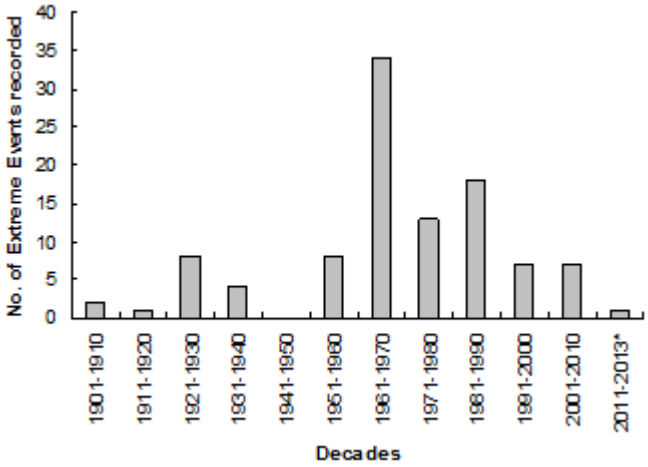

Figure 4: Decadal frequency of 1-day extreme rainfall events

Note: 2011-2013 is not a full decade, but no. of extreme events in these three years has been shown just by way of comparison.

The extreme rainfall events recorded by individual stations also support the fact that there is decrease in extreme rainfall events during seasonal as well as annual basis. More than 40% of the stations have shown decreasing trend and very few (about 10-12) stations have shown increasing trend in extreme rainfall events inside the Uttarakhand state.

Analysis of June 2013 rainfall showed that stations nearby the Kedarnath experienced heavy rainfall of 100 to 200 mm. Although nearby Stations viz. Dehra Dun, Mukteshwar recorded > 200 mm of rainfall during the heavy spell, these stations have recorded more than 450 mm of rainfall in the past. Just to the south of Landsdown, Nagina (Dist. Bijnor, Uttar Pradesh) recorded 823 mm of rainfall in one-day during 17-18 Sept. 1880 rainstorm with the spread over more than 100000 sq.km area (Dhar et al, 1975).

4. Conclusions

While studying the impact of climate change on global scale, lots of studies has come forth showing that there is an increasing trend of extreme precipitation events. The torrential rainfall episode during 15-18 June 2013 occurred over Uttarakhand and neighbouring states invited research on extreme rainfall events over this region.

In the present study, analysis of extreme rainfall events during 1901 to 2013 of about 100 stations in and around the Uttarakhand state showed that more than 40% of the stations showed decreasing trend in extreme rainfall events. Most of the extreme events have occurred in the months of July, August and September.

Although heavy rainfall of 2013 occurred for the first time in June, was mostly because of cloud burst. The heavy rainfall became severe due to rapidly melting of glacier in the upper reaches of Chorabari Lake releasing large amount of accumulated water from the lake as there was no outlet in the lake. In addition to this, man made interventions and poor planned development in this region is also responsible for such evidences (Dobhal et al, 2013).

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