VIEWpoint 新观点

Increasing flash floods in a drying climate: dual challenges facing Southwest China

Rural area in Yunnan Province, Southwest China
Image: Chan Xiao (NCC, CMA)

Explainer

Accessible research from Climate Science for Service Partnership (CSSP) China, for decision-makers No.02

Focus

Increasing flash floods against a drying climate background have been observed during the past 15 years in Southwest China, which poses new challenges for climate adaptation and water resources management. Xiao et al. (2018) analysed high-resolution precipitation observations and found that this contradictory trend is expected to continue in coming decades under a warming climate.

Importance

Southwest China, located in the subtropics close to 25°N, is to the southeast of the Tibetan Plateau. The region is characterized by clearly distinctive dry winters and springs. This region is highly vulnerable to extreme rainfalls due to its unique terrain which is complex and mountainous. Such terrain facilitates the formation of strong rainfall and thus leads to landslides and flash floods.

Subtropical regions are generally expected to become drier in a warming climate worldwide. In line with this, Southwest China is increasingly prone to drought, while Southeast and Eastern China are generally getting wetter.

However, a contradictory trend of increasing extreme rainfall and more flash floods against a drying climate has been observed during the past 15 years in the region. The drought-affected crop area has more than doubled since 1971 in Yunnan Province while area of crops affected by flash floods has increased by 96%, according to historical records from the Chinese Ministry of Agriculture.

Approach

Rainfall changes were examined using hourly and daily gauge observations between 1971 and 2013 collected from a measurement network of 142 stations in Southwest China.

Yunnan Province. Image: Charlottees, Pixabay

A decrease in both the annual and wet season precipitation over Southwest China was seen 1971–2013. A significant decreasing trend of total summer rainfall in the past 15 years was found at almost all stations in the region. However, precipitation extremes (the intensity of rainfall during the wettest 5% of hours) have steadily increased, consistent with recent annual statistical records of droughts and flooding as reported by the Chinese Ministry of Agriculture.

Next steps

This contradictory trend in Southwest China is expected to continue in coming decades under a warming climate as suggested by future projections (Wang et al. 2014; Wu et al. 2015). Given this trend and sensitivity to climate changes of this region, policymakers and the public should prepare for not only drought-induced water shortages but also increasing flash floods. In particular, considering this poor region is highly dependent on agriculture, preparation well ahead of the imminent expected changes in climate warrants urgent attention.

References

Wang et al., 2014 DOI:10.1007/s00376-014-3223-3
Wu et al., 2015 DOI:10.1002/cjg2.20187
Xiao et al., 2018 DOI:10.1007/s00376-018-7275-7

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Produced by VIEWpoint, a CSSP China project from the Institute for Environmental Analytics, highlighting research and improving the uptake of climate services developed in the partnership, through accessible resources.