

A rare confluence of events led to flooding in Kerala, says study

Notebook: office

Created: 05-Oct-18 4:26 PM

Updated: 05-Oct-18 4:48 PM

URL: <https://www.thehindu.com/news/national/kerala/a-rare-confluence-of-events-led-to-flooding-in-kerala-says-stu...>

A rare confluence of events led to flooding in Kerala, says study

R. Prasad



A flood-hit road in Kozhikode city. | Photo Credit: [S. Ramesh Kurup](#)

Four factors — above normal rainfall, extreme rainfall events, over 90% reservoir storage before the rains, and unprecedented extreme rainfall in catchment areas — contributed to the flooding witnessed in Kerala.

A combination of four factors led to extreme flooding across [Kerala](#) in 2018, a study says. The four factors are: above normal seasonal (May-August) rainfall, extreme rainfall events occurring almost across the State during the season, over 90% reservoir storage even before the onset of extreme rainfall events, and finally, the unprecedented extreme rainfall in the catchment area of major reservoirs in the State.

The results of the study were posted on September 14 in *Hydrology and Earth System Sciences Discussions*, and the manuscript is being peer-reviewed.

The summer monsoon rainfall in Kerala from May to August this year was 2,290 mm, which was 53% above normal. The average rainfall during the summer monsoon period (June-September) is about 1,619 mm. This makes 2018 Kerala's third wettest year in the last 118 years (1901-2018); 1924 and 1961 were the wettest years with about 3,600 mm of annual rainfall.

Also Read

Second, till August 21, Kerala witnessed a few extreme rainfall events covering almost the entire State. These extreme rainfall events have very low probability of recurrence in any given year.

Third, Kerala received 1634.5 mm rainfall during the period May 1 to August 7, which is more than the average rainfall (1619.37 mm) during the summer monsoon period (June-September). As a result, six of the seven major reservoirs in the State had over 90% storage before August 8, well before Kerala received the unprecedented extreme rainfall events.

Finally, the catchment areas of major reservoirs in the State received extreme rainfall never before witnessed in the State. The role of other factors such changes in how infrastructure has grown at the expense of vegetation and drainage remains to be studied.

“The State-wide flooding in Kerala shows that reservoirs can play a major role in improving or worsening the **flood** situation.

So there is a compelling need to improve reservoir operations using skilful forecast of extreme rainfall events with longer lead time of four-seven days,” says Prof. Vimal Mishra from the Civil Engineering Department at IIT Gandhinagar. Currently, forecast of cyclone and depression is available a few days in advance thus providing sufficient time for evacuation of people from low lying areas. Since extreme rainfall events have been a recent phenomenon, forecasts with such long lead time are currently not available.

Also Read

Extreme rainfall

The extreme rainfall events on August 15-17 were unprecedented and therefore had very low probability of recurring in any given year. For instance, on August 15, the State received 120.2 mm of rain, making it an extreme rainfall event lasting for a single day. Based on data since 1901, Prof. Mishra says there is very low probability (1.3%) of the State witnessing a similar extreme event in any given year.

Extreme rainfall of 235.5 mm on two continuous days (August 15-16) too has extremely low probability (0.5%) of recurring in any given year. Extreme rainfall of 294.2 mm lasting for three continuous days (August 15-17) is also unparalleled. The probability of such an event occurring again in any given year is just 1%. Maximum rainfall during the ten-day period (August 8-17) was about 592 mm, which is 40-50% more than the normal amount.

Reservoir storage

With over 90% storage, six of the seven major reservoirs had more than the normal storage before the extreme events could occur. “In August 2018, the catchments upstream of the major reservoirs experienced unprecedented extreme rainfall since 1901,” the authors write. During the period May 1-August 21, the catchments upstream of the Idukki, Kakki, and Periyar reservoirs received unprecedented rainfall of 279%, 700%, and 420% respectively from their long-term means.

The probability of Idukki catchment area receiving extreme rainfall in one day during any other year is 0.3%. The probability of extreme rainfall for 2-15 days

duration in the Idukki catchment area is 0.2%. Similarly, the probability of Kakki, and Periyar catchment areas receiving extreme rainfall in any given year is 0.2%.

What caused the floods in Kerala?

Notebook: office

Created: 05-Oct-18 4:27 PM

URL: <https://www.thehindu.com/todays-paper/tp-national/what-caused-the-floods-in-kerala/article25023787.ece>

What caused the floods in Kerala?

R. Prasad



A file photo of a rescue effort in Alappuzha, Kerala.

Study by IIT professor identifies four major factors for the disaster

A combination of four factors led to extreme flooding across Kerala this year, a study says. Above normal seasonal (May-August) rainfall, extreme rainfall events occurring almost across the State during the season, over 90% reservoir storage even before the onset of extreme rainfall events, and finally, the unprecedented extreme rainfall in the catchment areas of major reservoirs in the State led to the disaster.

The summer monsoon rainfall in Kerala from May to August this year was 2,290 mm, which was 53% above normal. The average rainfall during the summer

monsoon period (June-September) is about 1,619 mm. This makes 2018 Kerala's third wettest year in the last 118 years (1901-2018); 1924 and 1961 were the wettest years with about 3,600 mm of annual rainfall.

Second, till August 21, the State witnessed few extreme rainfall events covering almost the entire State. These extreme rainfall events have very low probability of recurrence in any given year.

Third, Kerala received 1634.5 mm rainfall during the period May 1 to August 7, which is more than the average rainfall (1619.37 mm) during the summer monsoon period (June-September).

As a result, six of the seven major reservoirs in the State had over 90% storage before August 8, well before Kerala received the unprecedented extreme rainfall events.

Finally, the catchment areas of major reservoirs in the State received extreme rainfall never before witnessed in the State. The role of other factors such as changes in how infrastructure has grown at the expense of vegetation and drainage remains to be studied.

"The State-wide flooding shows that reservoirs can play a major role in improving or worsening the flood situation," says Prof. Vimal Mishra from the Civil Engineering Department at IIT Gandhinagar.

The results of the study were posted on September 14 in Hydrology and Earth System Sciences Discussions, and the manuscript is being peer-reviewed.

Kerala floods: IIT professor identifies four major factors

Notebook: office

Created: 05-Oct-18 4:27 PM

URL: <https://www.thehindu.com/news/national/kerala/kerala-floods-iit-professor-four-major-factors-for-disaster/articl...>

Kerala floods: IIT professor identifies four major factors

R. Prasad



“The State-wide flooding shows that reservoirs can play a major role in improving or worsening the flood situation,” says Prof. Vimal Mishra from the Civil Engineering Department at IIT Gandhinagar.

A combination of four factors led to extreme flooding across Kerala this year, a study says. Above normal seasonal (May-August) rainfall, extreme rainfall events occurring almost across the State during the season, over 90% reservoir storage even before the onset of extreme rainfall events, and finally, the unprecedented

extreme rainfall in the catchment areas of major reservoirs in the State led to the disaster.

The summer monsoon rainfall in Kerala from May to August this year was 2,290 mm, which was 53% above normal. The average rainfall during the summer monsoon period (June-September) is about 1,619 mm. This makes 2018 Kerala's third wettest year in the last 118 years (1901-2018); 1924 and 1961 were the wettest years with about 3,600 mm of annual rainfall.

Second, till August 21, the State witnessed few extreme rainfall events covering almost the entire State. These extreme rainfall events have very low probability of recurrence in any given year.

Also Read

Third, Kerala received 1634.5 mm rainfall during the period May 1 to August 7, which is more than the average rainfall (1619.37 mm) during the summer monsoon period (June-September).

As a result, six of the seven major reservoirs in the State had over 90% storage before August 8, well before Kerala received the unprecedented extreme rainfall events.

Finally, the catchment areas of major reservoirs in the State received extreme rainfall never before witnessed in the State. The role of other factors such as changes in how infrastructure has grown at the expense of vegetation and drainage remains to be studied.

"The State-wide flooding shows that reservoirs can play a major role in improving or worsening the flood situation," says Prof. Vimal Mishra from the Civil Engineering Department at IIT Gandhinagar.

Also Read

Currently, forecast of cyclone and depression is available a few days in advance thus providing sufficient time for evacuation of people from low-lying areas. Since extreme rainfall events have been a recent phenomenon, forecast with such long lead time is currently not available.

The results of the study were posted on September 14 in Hydrology and Earth System Sciences Discussions, and the manuscript is being peer-reviewed.

The extreme rainfall events on August 15-17 are unprecedented and therefore have very low probability of recurring in any given year. For instance, on August 15, the State received 120.2 mm of rain, making it an extreme rainfall event lasting for a single day.

Based on data since 1901, Prof. Mishra says there is very low probability (1.3%) of the State witnessing a similar extreme event in any given year.

Extreme rainfall of 235.5 mm on two continuous days (August 15-16) too has extremely low probability (0.5%) of recurring in any given year. Extreme rainfall of 294.2 mm lasting for three continuous days (August 15-17) is also unparalleled. The probability of such an event occurring again in any given year is just 1%. Maximum rainfall during the 10-day period (August 8-17) was about 592 mm, which is 40-50% more than the normal amount.

Also Read

With over 90% storage, six of the seven major reservoirs had more than the normal storage before the extreme events could occur.

“In August 2018, the catchments upstream of the major reservoirs experienced unprecedented extreme rainfall since 1901,” the authors write.

During the period May 1-August 21, the catchments upstream of the Idukki, Kakki, and Periyar reservoirs received unprecedented rainfall of 279%, 700%, and 420% respectively from their long-term means.

The probability of Idukki catchment area receiving extreme rainfall in one day during any other year is 0.3%. The probability of extreme rainfall for 2-15 days' duration in the Idukki catchment area is 0.2%. Similarly, the probability of Kakki, and Periyar catchment areas receiving extreme rainfall in any given year is 0.2%.