

MOTIVATION

A drought intensity-duration-frequency (IDF) curve is a mathematical function that relates the drought intensity to its duration and frequency of occurrence.

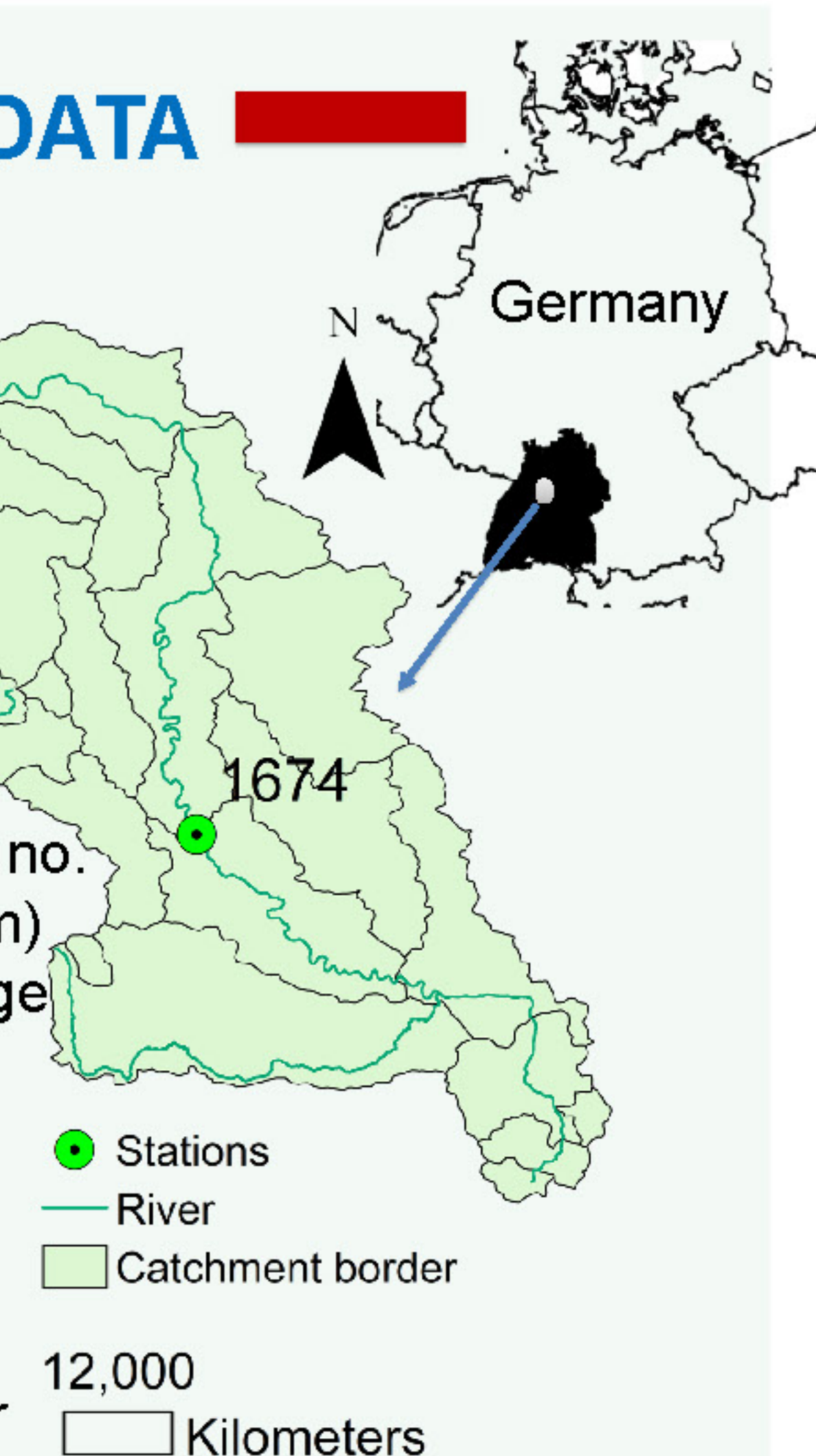
The objective of this study is to derive station-based IDF curves to quantify the recurrence intervals of droughts based on precipitation and water deficits in the Kocher catchment in Germany.

The focus is to assess the characteristics of the severe drought event of 2018-2019 on the IDF curves.

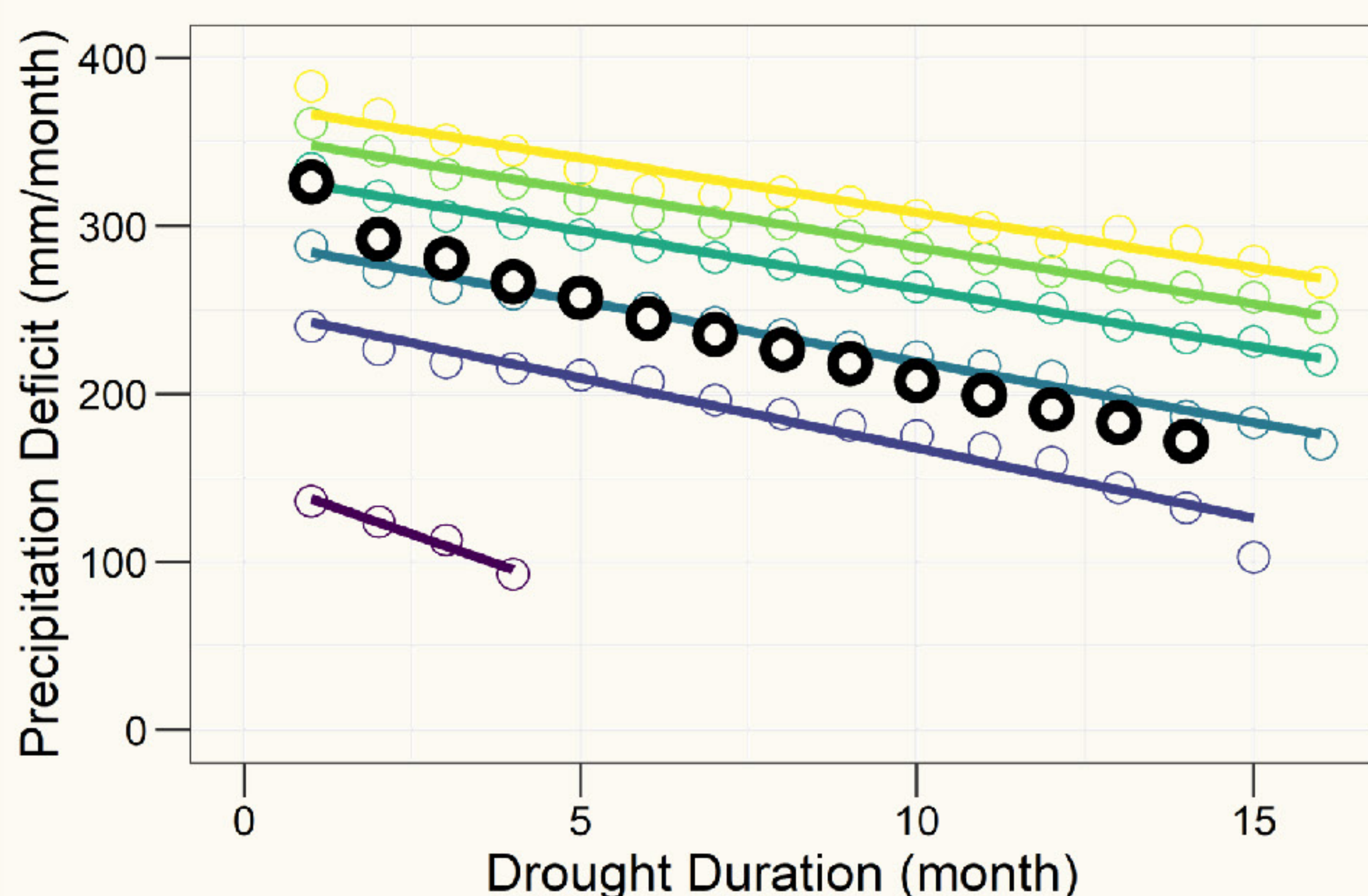
STUDY AREA AND DATA

The Kocher River is important for agricultural activity and hydropower production from run-off-the-river power plants for Germany.

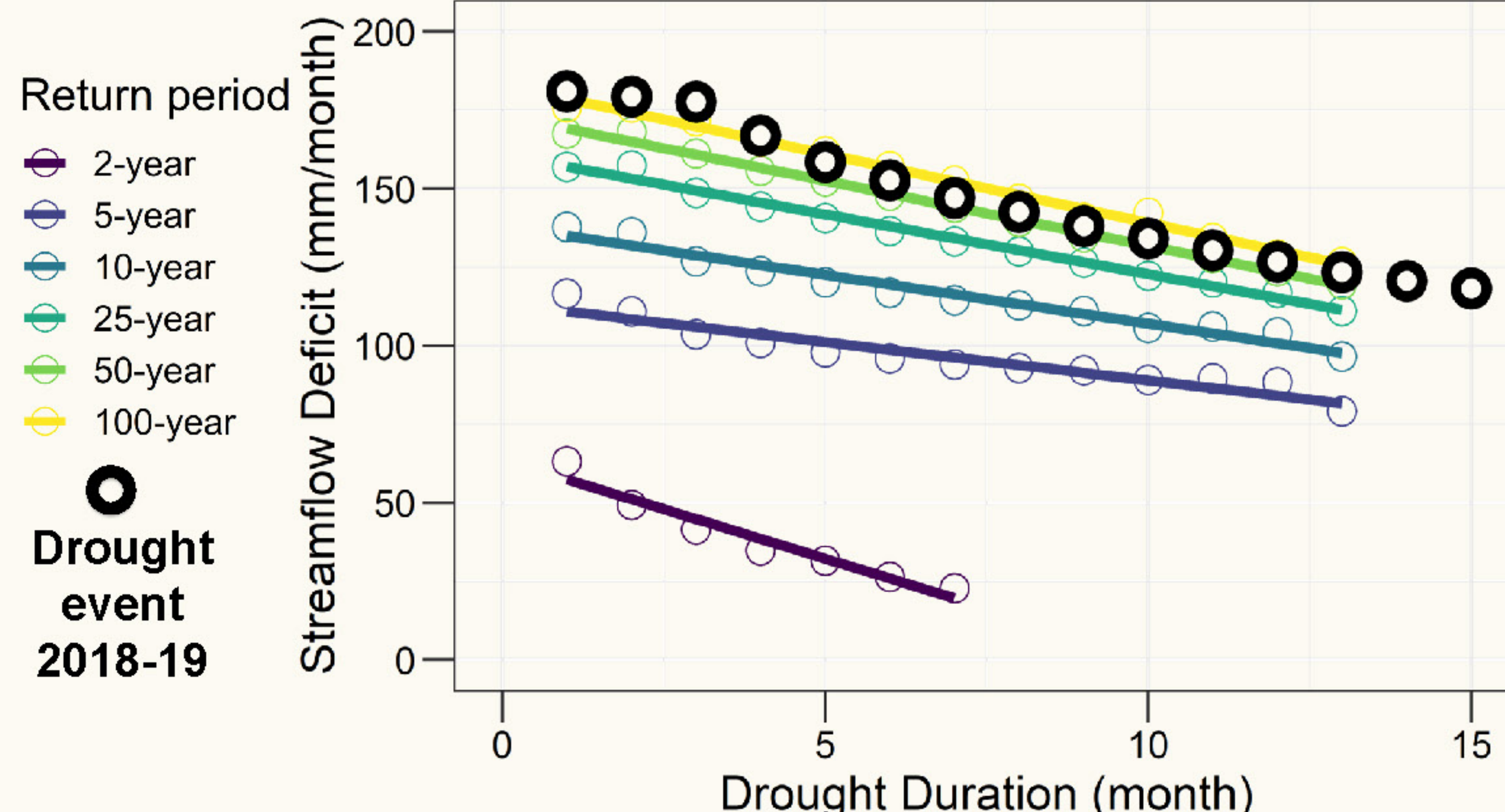
- Precipitation data at meteorological station no. 1674 from 1952 to 2020 (Elevation is 490 m)
- Drainage area of the catchment to the gauge no. 3465: 1928.73 km²
- Approximately 51% agricultural land
- Streamflow data of Kocher River at considered gauge from 1979 to 2021 (Elevation is 189 m)
- Streamflow regime with high flows in winter and low flows in summer



RESULTS

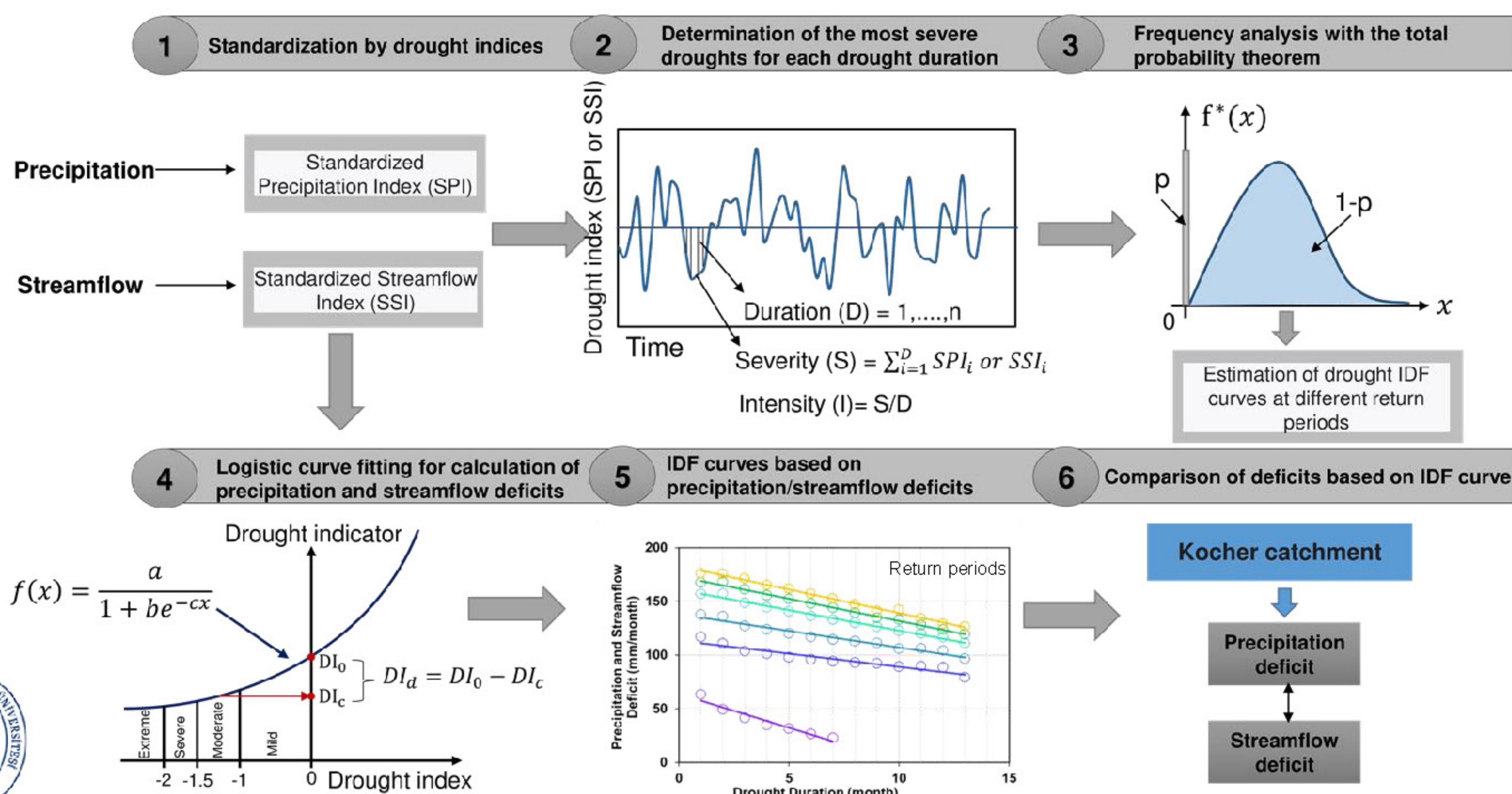


- Precipitation deficit IDF curves show that deficit decreases linearly as the drought duration increases.
- Every two years, a 4-month drought can be expected with precipitation deficit less than 100 mm per each month.
- The drought of 2018-2019 was a 25-year event at short durations and a 10-year event at longer durations.



- Streamflow deficit IDF curves' relations of intensity, duration and frequency are generally similar to precipitation deficit curves'.
- Every two years, we may expect a 7-month drought with streamflow deficit of about 70 mm per month.
- The drought event of 2018-2019 in Kocher streamflow had a return period higher than 100-year for short durations (<4 months) and higher than 50-year for longer durations.

METHOD DETAILS



Take home messages

- Streamflow deficit in the severe drought event of 2018-2019 had a higher return period than precipitation deficit.
- Streamflow drought had a return period >50-year, but it was most severe at short durations.