Analysis of daily rainfall of the Sahelian weather-station Linguère (Senegal) – Trends and its impacts on the local population

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In the 20th century, the West African Sahel has been a hot-spot of climatic changes. After severe drought-events in the 1970s and 1980s which were followed by a significant drop in annual precipitation, rainfall seems to increase again during the past years. Most studies are based on monthly or yearly datasets. However, many processes and events which are important for the local population depending on rainfall are not related to monthly or annual precipitation but are related to intra-annual, often daily scales.

During this study, interviews with farmers and herders were conducted in the Senegalese Sahel. The results show, that wet months with unsuitably distributed precipitation can cause more harm than bringing benefits - depending on the phenological stage of the plants. Agricultural crops for example need rainfall breaks. On the other hand, natural herbaceous vegetation tolerates longer wet periods. So, a wet season can still hide dry spells that alter crops and vegetation development.

Based on the results of these interviews, this study developed two indexes, one for local farmers and one for herders separately, showing if the year was favorable for them or not. The indexes integrate the length of rainy seasons, intensity and frequency of rainfall events, breaks between events and also the previous year. This way, each year is assigned to one of 5 classes. Using daily rainfall data of the Linguère weather-station (from the Senegal Meteorological Service, ANACIM), trends of the indexes from 1945 to 2002 are detected and compared to results of the interviews.

Statistically relating the indexes to yearly and monthly data demonstrates, how much information can be gathered by those datasets. Furthermore, changes in intensity and frequency are related with yearly and monthly sums showing relations between daily data and annual sums. For example, a high correlation (r=0.73) between the amount of rain days (> 1 mm) and the annual rainfall is observed in Linguère.