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Using seasonal forecast information to strengthen resilience and improve food security in Niger River Basin

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The rainy season occupies a central place in socio-economic activities in the Sahelian regions, as more than 80% of the population lives on agriculture and livestock. However, extreme hydroclimatic events such as droughts and floods affect these activities. Efforts made in recent years in the production of hydroclimatic information to enhance the resilience of populations have become insufficient, given the variability and climate change.

In this context, we have conducted a study on improving the quality of seasonal forecast information to strengthen the resilience and improve the food security in West Africa, especially on the Niger River Basin. We used seasonal climate forecasts and the HYPE hydrological model to predict some characteristics of the rainy season in West Africa. The ECMWF seasonal forecast ensemble (system 5) from 1993 to 2015 (hindcast) and 2018 (forecast), available in the Climate Data Store (CDS) catalogue were used. The climatic variables considered are daily precipitation, mean and extreme temperatures (minimum and maximum) at the seasonal scale. The main objective was to assess the ability of the HYPE hydrological model, developed by Swedish Meteorological and Hydrological Institute, to predict runoff over the historical period and to produce hydrological seasonal forecasts for next years.

The main season's characteristics produced are: (i) cumulative rainfall map for the rainy season (May to November), (ii) the rainfall situation of the season (above, near or below normal considering 1993-2015 as reference period), (iii) hydrological situation of the season (above, near or below normal considering 1993-2015 as reference period), (v) graph of the mean seasonal streamflow over the Niger Basin compared to the reference period (1993-2015).

The predictability of 2018 hydrological seasonal products were assessed and the results are promising. The main challenges we faced were the initialisation of the model, the bias correction (the reference data to be considered and the appropriate method). Further research on these topics should continue to improve the quality of results.