CLIMATE CHANGE AND THE STREAMFLOWS IN THE UNITED KINGDOM

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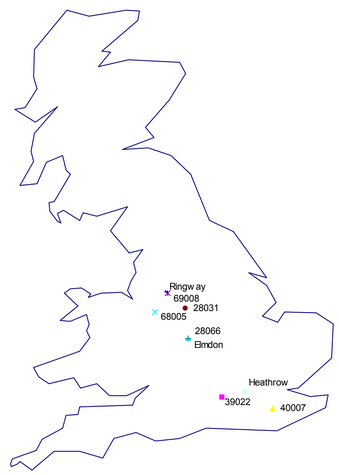
Our Future

According to “Climate Change 2007”, the Fourth Assessment Report of the IPCC, the observed change in average temperature is very likely because of the increase in anthropogenic greenhouse gas concentration. Appraising the possible hydrological impacts is important for the flood risk management, water supply and ecosystem.

The development of global climate models (GCMs), regional climate models (RCMs), weather generators (WGs) and various statistical downscaling methods allow scientific prediction of precipitation with reasonable spatial and temporal resolution under different emissions scenarios. However, possible impacts on streamflows owing to climate variability have not been widely investigated. Extreme streamflow events, including floods and droughts which have serious social and economic implications, should be further quantified.

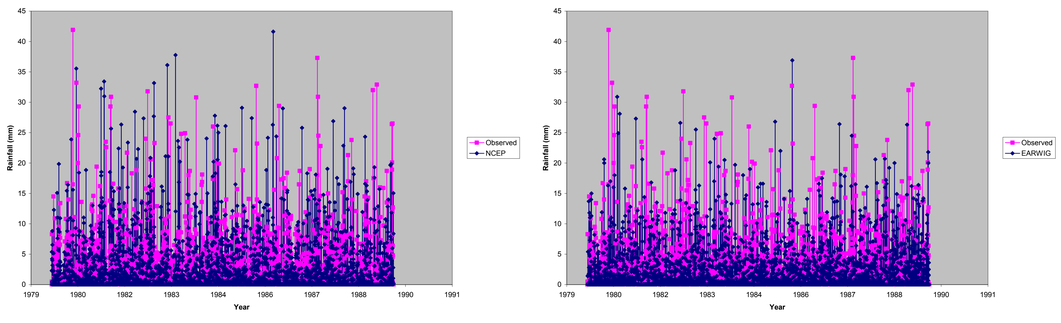
FIGURE 1



Future rainfall

The rainfall time series generated by generated by Generalised Linear Modelling for Daily Climate Time Series (GLIMCLIM) and Environmental Agency Rainfall and Weather Impacts Generator (EARWIG) for the streamflow were used for assessing possible change in six catchments in the UK (Figure 1). The GLIMCLIM and EARWIG simulated rainfall time series for the river Loddon at Sheepbridge (39022) shown in Figure 2.

FIGURE 2



Future potential evaporation

Other than rainfall, potential evaporation (PE) is a crucial climate variable for predictions of streamflows.

Figure 3 reveals that the scale of the PE is important for the explanation of the seasonal variation of streamflows for the river Manifold at Ilam (28031).

Future extreme events

The flood frequency curves in Figure 4 illustrate that the drought frequency may increase when the potential flood extremes is also likely to increase in the river Weaver at Audlem (68005).

Figure 3

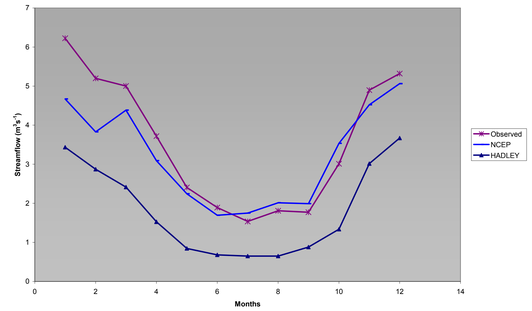
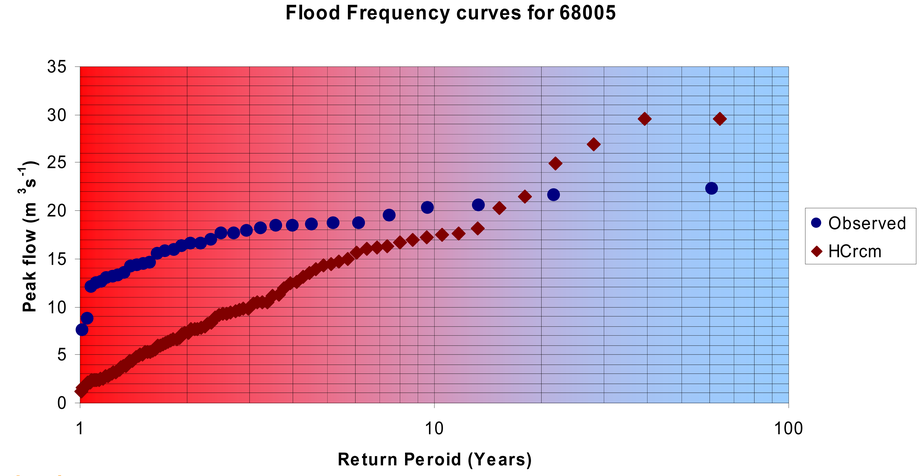


FIGURE 4



Conclusions

The results of the research provide a framework for future hydrological impact assessments. The uncertainty in the projection of rainfall and potential evaporation play significant role in the reliability of calculated streamflows.

Despite the good estimations in the studied site, the robustness of the approaches requires further testing to improve prediction capacity for different climate scenarios and catchment types. The discrepancies between models for simulating precipitation and evaporation at fine spatial and temporal scales should be further reconciled.

Acknowledgement

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