Historical trends in the flows of the Breede River

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Abstract

The Breede River is not a large river by world standards, but is the largest in South Africa's Western Province, and plays a significant part in the province's economy. Models predict that flows into it could be seriously affected by climate change. Accordingly a study was made of trends in flow over recent decades, in the hope that any trends detected would confirm, or otherwise, the prediction of the models.

Data on flows over 30 years at various sites in the Breede Valley were downloaded from the Department of Water Affairs. The data were first checked for consistency. In 2 cases there was evidence that behaviour of the flow had changed, apparently permanently, during the course of the study period (typically the variance of the flow had changed markedly at a particular point in time). The data series was accordingly truncated to make use only of the longest series of consistent records. A simple, robust technique was then employed to detect the trends. The data at each site had a log-normal distribution, and linear regression of the log-transformed data was used to detect the trend. An F-test showed that in all cases the trends were significant; in one case a t-test indicated the detected trend was of low significance, but all others were highly significant.

The results are discussed in terms of land use changes being a dominant factor in flows in the Breede River system, to an extent that should not have been ignored in attempting to use the data to predict future flows. Indeed, only one of the sites used in the study had a pristine watershed, and that showed a 14% increase in flow over the study period, contrary to the climate change predictions. There had earlier been a suggestion that climate change might be responsible for the changes in flows. It is generally recognised that climate change models cannot yet account for local climate change effects. Predictions of possible adverse local impacts from global climate change should therefore be treated with the greatest caution. Above all, they must not form the basis for any policy decisions until such time as they can reproduce known climatic effects satisfactorily.

Keywords: Breede River, runoff, trend analysis, climate change