River flow model assists in planning and extreme weather prediction

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Ms Badrzadeh says that more reliable forecasting can help in extreme weather conditions but it also allows for better planning for water systems. Image: Cameron Chamberlain

A novel river flow forecast model, developed by Curtin University scientists, should provide more accurate predictions using a combination of current methods.

The model developed by Curtin PhD candidate Honey Badrzadeh provides stronger river flow data estimates which will assist in cases of extreme weather and in the planning of water systems.

Accurate short and long term river flow forecasts are essential when designing hydraulic structures, in flood and drought analysis and also

provide information for irrigation scheduling and environmental planning

Currently river flow forecasting is conducted using either conceptual or data driven models, which either rely on information on a range of parameters involved in the rainfall runoff process or the historical river flow data respectively.

"We are not able to forecast the exact future events as too many parameters are involved in the process." Ms Badrzadeh says.

"What we can do is try to improve the accuracy and reliability of the forecasting."

Ms Badrzadeh says her model combined elements of already existing methods in the hopes of creating more accurate predictions.

"I combined this computational intelligence method with a signal processing tool to improve model performance," she says.

"I applied this method in a number of cases and showed that the accuracy of forecasting is considerably improved especially for longer lead time and extreme conditions."

Ms Badrzadeh says that more reliable forecasting can help in extreme weather conditions but it also allows for better planning for water systems.

"The river flow forecast is an essential part of any water planning system like irrigation scheduling, city planning and reservoir operation." she says.

"Understandably more accurate forecasting leads to more efficient

planning."

Ms Badrzadeh says she decided to research in this field based on the importance of the issue.

"Especially due to climate change, we are expecting more extreme hydrological events such as droughts and floods which can be better managed through more accurate forecasting." she says.

This model also provided accurate results with up to five days leeway which other models have failed to provide.

Ms Badrzadeh says she recently looked into even longer term forecasts of weeks or months with promising results.

She is also looking to add climatological parameters like temperature to the model to investigate the ways climate change may impact on river flow.

The journal paper discussing this research "Impact of multi-resolution analysis of artificial intelligence models inputs on multi-step ahead river flow forecasting" will appear in the December issue of the *Journal of Hydrology*.

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