# River System Modelling for the Lower Indus

Being able to understand and simulate the seasonal forecasting, allocation and distribution of irrigation waters of the Lower Indus River System is a key water resource planning and operational requirement in Pakistan. CSIRO has developed the Indus River System Model (IRSM) to simulate the flow of water in the main river and link canal network on the Lower Indus Plains. The model undertakes a seasonal forecast for water availability and provincial seasonal allocation according to the 1991 Water Apportionment Accord principles. The model simulates the daily distribution of water through the river and irrigation network to the canal command level. The model can be used to guide infrastructure development, assess long term climate impacts on national and provincial water security and investigate trade-offs and the efficient use of the water resource.

The IRSM has been developed, in collaboration with Pakistani Federal and Provincial agencies, to understand and evaluate canal command scale water allocation and distribution strategies in Pakistan (Figure 1).

The Source water system model simulates the key processes currently undertaken to forecast seasonal inflows and then allocates these inflows to the Provinces via the 1991 Water Apportionment Accord (WAA).

- Using these forecasted provincial water allocations, the model then creates a seasonal distribution and reservoir operation plan.
- System inflows are then used in combination with the seasonal distribution plan to simulate the flow of water through barrages, along river reaches and major canal operations.
- The model also incorporates crop modelling and associated production from the water supply.

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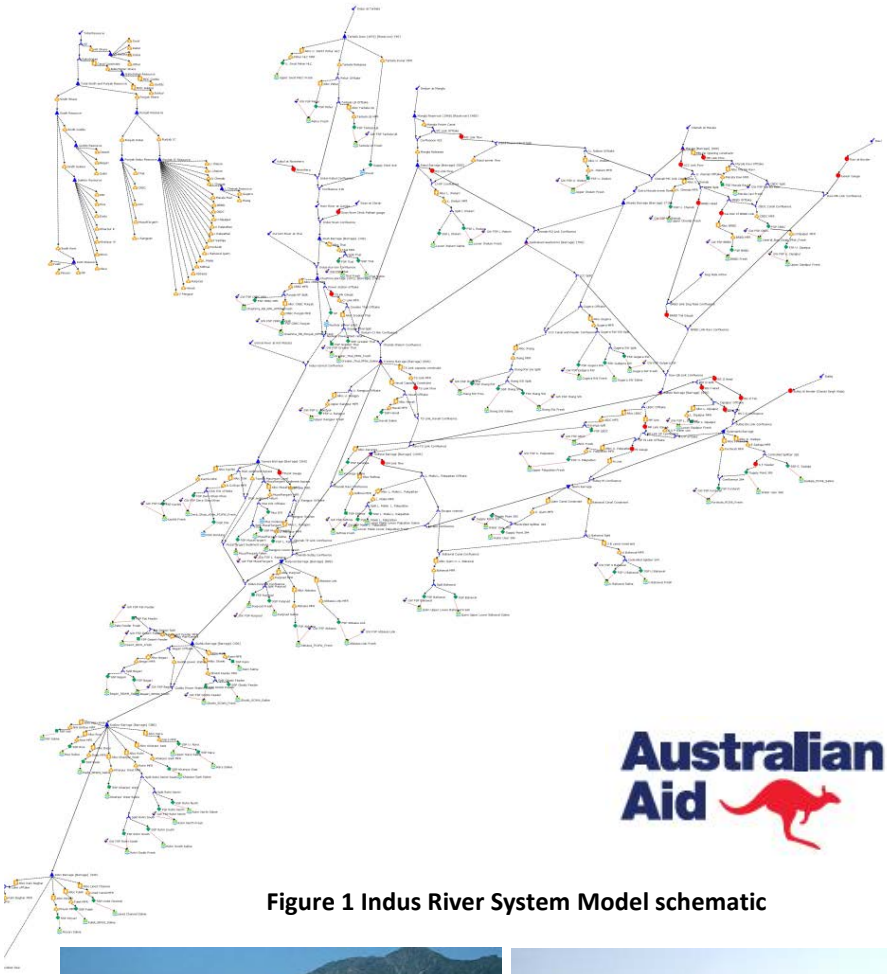
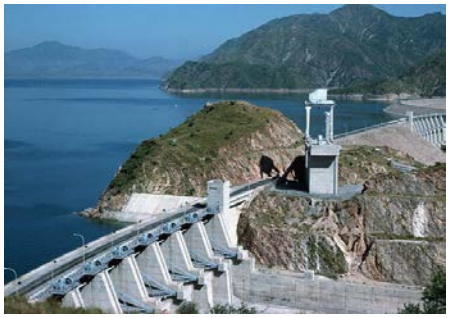


**Figure 1 Indus River System Model schematic**



## Model Performance

Figure 2 shows key model simulation results for the seasonal forecast as compared to the Indus River System Authority (IRSA) forecast, provincial water deliveries to Punjab and Sindh irrigation canals and system-wide mass balance.

Over the full model simulation period the seasonal forecast inflows are in very close agreement with the IRSA forecasts for the same period. The subsequent water allocation and canal deliveries to the two largest provinces of Punjab and Sindh are also in reasonably close agreement noting that some day to day operational decisions such as canal closures during the 2010 Kharif floods are not yet simulated in the model. The overall mass balance is also in agreement indicating that the unaccounted difference calculated by the model reflects the average system behaviour. These results indicate that the Indus Source Water System Model has captured the key planning and water allocation aspects of the river network and that the model may now be suitable for assessment of infrastructure development, long term climate impacts.

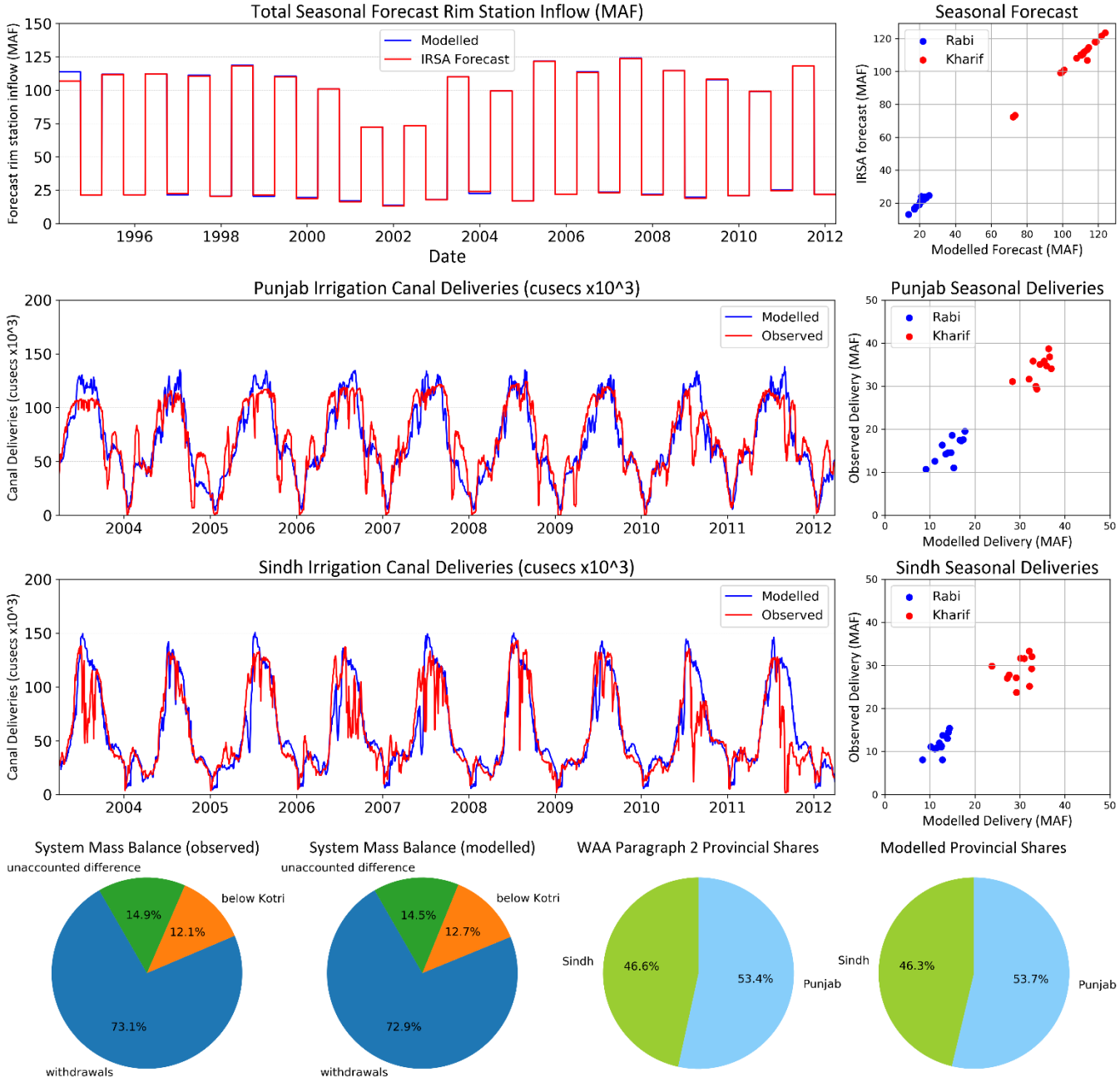



**Figure 2 Indus River System Model results**

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FOR FURTHER INFORMATION

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