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Water, Climate and Ecosystem Interactions in Monsoon Asia

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The conflict between supply and demand of water resources constitutes the biggest problem for food security of a huge world population. The distribution of water resources in monsoon Asia is strongly heterogeneous both in time and space. As an example in China, due to the shortage of water resources and its inhomogeneous distribution in space and time, large scale droughts occur frequently, with a big drought disaster every two years. Consequently, drought has become a key factor constraining China's economic development. In the 21^{st} century, the Chinese population will reach 1.6 billion, food security will be a major issue which demands a proper solution of water shortage problem. On the other hand, the increased competition between water use for ecosystem conservation, water use for agriculture and other water uses will continue to increase, in particular under the projected climatic changes. This contribution describes some research activities that contribute to advance the understandings in the water, climate and ecosystem interactions in monsoon Asia and address the needs to develop an operational system for nation wide drought monitoring and drought impact assessment for application in agriculture and hydrology. The following questions are dealt with: what are the long term variations and changes in 1) water cycle, 2) water climate interactions, 3) Water ecosystem interactions; and how would these interactions change under the projected climate change? We present some attempts to quantify the different components using independent earth observations and identify some gaps that require future international efforts in this contribution.