

# OR/15/047 Conclusions

From Earthwise

[Jump to navigation](#) [Jump to search](#)

MacDonald A M, Bonsor H C, Taylor R, Shamsudduha M, Burgess W G, Ahmed K M, Mukherjee A, Zahid A, Lapworth D, Gopal K, Rao M S, Moench M, Bricker S H, Yadav S K, Satyal Y, Smith L, Dixit A, Bell R, van Steenberg F, Basharat M, Gohar M S, Tucker J, Calow R C and Maurice L. 2015. Groundwater resources in the Indo-Gangetic Basin: resilience to climate change and abstraction. *British Geological Survey Internal Report*, OR/15/047.

Groundwater abstraction and water management practices within the IGB aquifer system pose a much greater risk to the future of groundwater within the basin than direct impacts from climate change. Recent changes in groundwater storage show an evolution driven by the presence of surface water irrigation canals and groundwater abstraction. Surface water irrigation has led to rising groundwater levels, and subsequent salinization in parts of the Indus and Upper Ganges basins and reduced river flows driven by canal diversions (particularly in the Indus) has reduced freshwater recharge in drier areas. The high groundwater abstraction (estimated 205 km<sup>3</sup>) has led to significant depletion in some parts of the basin, most notably northwest India and the Punjab in Pakistan, and also induced greater recharge in wetter areas, for example in the Bengal Basin. Policies, such as the widespread lining of canals to reduce leakage, will impact the groundwater resources, which have come to rely on the large additional recharge that canal leakage provides.

The direct impacts of climate change are likely to be minor in comparison, with forecast total rainfall volumes and river flows likely to change only incrementally, and intense rainfall events which drive groundwater recharge, becoming more common. Indirect impacts of climate change may be more important, with concerns over the timing of the start of the monsoon, and increasing temperatures leading to a greater demand for groundwater.

The large volumes of groundwater within the aquifer system provides it with a significant buffer to external changes, and therefore should enable conjunctive surface water and groundwater management strategies to be developed. Of greater concern than widespread depletion of groundwater is the degradation of water quality. Increased salinization of groundwater is occurring through irrigation, water-logging and mobilisation of deeper groundwater by abstraction. The large reduction of outflow from the Indus River has led to salts generated from the weathering and erosion of the Himalayas to be retained within the aquifer. The increased use of fertilizers, pesticides and herbicides across the aquifer, coupled with the recycling of groundwater irrigation water are also leading to noticeable contamination.

The groundwater typologies developed in this study allow a new lens through which to view the groundwater resources of the IGB and their resilience to change. Each typology has its own unique set of challenges and opportunities for groundwater development, and the aquifer characteristics determine how the groundwater will respond to current and future drivers. In the first instance, the typologies could be used to help prioritise groundwater monitoring and investigation, before the eventual development of different management strategies. For example, within the Upper Ganges and Middle Indus, falling water tables and salinization associated with widespread unsustainable abstraction is the major concern, whereas in the Middle Ganges there may be plenty opportunities for increased groundwater abstraction; and in the Bengal Delta area monitoring and protection of the deeper good quality groundwater is a priority.

Retrieved from '[http://earthwise.bgs.ac.uk/index.php?title=OR/15/047\\_Conclusions&oldid=22868](http://earthwise.bgs.ac.uk/index.php?title=OR/15/047_Conclusions&oldid=22868)'  
**Category:**

- [OR/15/047 Groundwater resources in the Indo-Gangetic Basin: resilience to climate change and abstraction](#)

## Navigation menu

### Personal tools

- Not logged in
- [Talk](#)
- [Contributions](#)
- [Log in](#)
- [Request account](#)

### Namespaces

- [Page](#)
- [Discussion](#)

### Variants

### Views

- [Read](#)
- [View source](#)
- [View history](#)
- [PDF Export](#)

### More

### Search

### Navigation

- [Main page](#)
- [Recent changes](#)
- [Random page](#)
- [Help about MediaWiki](#)

## Tools

- [What links here](#)
- [Related changes](#)
- [Special pages](#)
- [Permanent link](#)
- [Page information](#)
- [Cite this page](#)
- [Browse properties](#)

• This page was last modified on 23 October 2015, at 15:01.

- [Privacy policy](#)
- [About Earthwise](#)
- [Disclaimers](#)

