

# WATER@MICHIGAN 2017

## Presentation Summary

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### **The Relative Influence of Groundwater and Canal Irrigation on Winter Crop Production and its Sensitivity to Rainfall Variability in India**

India is a hotspot for food security issues over the upcoming decades, due to increasing population, groundwater depletion, and climate change. Investing in additional irrigation infrastructure may bolster food security, however, the relative influence of different types of irrigation (e.g. groundwater versus canal) on agricultural production remains unclear. We assess the relative impact of groundwater (i.e. dug, shallow, and deep wells) and canal irrigation (i.e. surface lift and flow canals) on winter cropped area and its sensitivity to rainfall across India at the village-scale from 2000 to 2006 using high-resolution cropped area maps produced using a novel algorithm applied to MODIS satellite data. We find that deep well irrigation is both associated with the greatest amount of winter cropped area, and is also the least sensitive to monsoon and winter rainfall variability. However, the effectiveness of deep well irrigation varies across India, with the greatest benefits seen in the regions that are most at risk for losing groundwater as a possible source of irrigation over the upcoming decades (e.g. Northwest India). This work highlights the need to develop ways to use remaining groundwater more efficiently (e.g. drip irrigation, less water-intensive crops) given that canal irrigation is not an adequate substitute.

### **Additional Resources**

- Meha Jain research website: <http://mehajain.weebly.com/>
- Jain, Meha, et al. "Irrigation as an Adaptation Strategy to Climate Change: The relative influence of groundwater and canal irrigation on winter crop production and its sensitivity to weather variability in India." American Geophysical Union, 2014. Abstract: <http://adsabs.harvard.edu/abs/2014AGUFMGC13G0749J>
- Fishman, Ram, et al. "When Water Runs Out: Scarcity, Adaptation and Migration in Gujarat." 2016.  
<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxyYW1maXNobWFufGd4OmRkYzRkY2Q4OGEwMjdmMw>