Submitted Abstract

ID IMC22-FSAbstr- 493

First Author First Name Last Name	 Arthur (1) Lutz
Submitting Author First Name Last Name	 Arthur Lutz
Correspondence	a.f.lutz@uu.nl
Co-Authors **>> E-Mails will be not listed**	Immerzeel, Walter (1); Siderius, Christian (2); Wijngaard, René (3); Nepal, Santosh (4); Shrestha, Arun (4); Wester, Philippus (4); Biemans, Hester (5)
Organisations	1: Utrecht University, The Netherlands 2: Uncharted Waters Research, Australia 3: Yonsei University, Korea 4: International Centre for Integrated Mountain Development, Nepal 5: Wageningen University & Research, The Netherlands
Country	Netherlands, The
Region	Western Europe
Title	Future Dependence Of South Asian Irrigated Agriculture On Mountain Water.
Keywords	Climate Change, Socioeconomic Change, Mountain Hydrology, Agriculture, South Asia
Type	List Of Focus Session
Focus Session ID	72

Abstract

Irrigated agriculture on the Indo-Gangetic plain in South Asia depends on meltwater, monsoon rains, and groundwater availability. Climate change alters the hydrological cycle and causes shifts in the timing, composition and magnitude of these sources of water supply. In particular in the mountainous headwaters in the Hindu Kush, Karakoram, and Himalaya, hydrological shifts are projected. Simultaneously, socioeconomic growth causes a strong increase in water demand downstream. Here we use a high-resolution cryosphere-hydrology-crop model forced with an ensemble of climate and socioeconomic projections to assess how the sources of irrigation water supply in the Indus, Ganges, and Brahmaputra river basins may shift during the 21st century, under changing supply and demand.

We find clear increases in the importance of meltwater as well as groundwater for irrigated agriculture. An earlier melt peak increases meltwater withdrawal at the onset of the cropping season in May and June in the Indus, whereas increasing peak irrigation water demand during July and August aggravates non-renewable groundwater pumping in the Indus as well as Ganges basins, despite overal increases in runoff. In addition, increasing inter-annual variability in rainfall-runoff increases the need for meltwater as well as groundwater to complement rainfall-runoff during future dry years. These findings provide important information to guide climate change adaptation for the regional agricultural sector.