

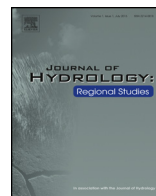


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A case of groundwater depletion in Balochistan, Pakistan: Enter into the void[☆]

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ABSTRACT

Study region: Kuchlugh, Balochistan Province, Pakistan.

Study focus: The depletion of groundwater is a specter presented for many parts of the world that rely on the unmanaged use of groundwater. This article describes how the alluvial aquifer in Kuchlugh was exhausted after three decades of intensive use from more than three hundred agricultural wells and how the water users gradually adapted to it. Intense and unsustainable resource use is often expected to lead to conflict or cooperation. However, in Kuchlugh overuse did not lead to conflict nor did it trigger a process of cooperation or the use of efficient irrigation methods or the adaptation of local groundwater recharge measures. The situation is best described as a 'socio-institutional void' in which at no point in time action is taken, whereas at the same time the resource is gradually destroyed.

New hydrological insights for the region: In Kuchlugh the loss of opportunities in high value horticulture were cushioned by emerging urban employment, by developing agriculture in other parts of the Province or by simply 'chasing the water table deeper', i.e. investment in pumping from the hard rock layers underneath the alluvial aquifer. This suggests that if groundwater depletion occurs in a single isolated place it may not necessarily lead to human disaster or trigger a turn-around as the loss of resources may be compensated by other intervening opportunities.

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1. Introduction

Groundwater irrigation has been a major force behind the spectacular increase in food production in South Asia. The reliability and timeliness of groundwater use and the additional water it brought has made it an integral part of the region's green revolution since the 1970s. However, groundwater is also the world's 'most mined resource' (UNESCO, 2003; Mukherjee et al., 2015). Over recent decades, groundwater use has grown exponentially in scale and intensity in many places, leading to aquifer depletion and groundwater pollution (Giordano, 2009; Wada et al., 2010; Kulkarni et al., 2015). The National Academy of Sciences (2012) for instance in its report on glacier melt in the Himalayan asserted that groundwater over use was a bigger problem in the Indo Gangetic Basin than the melt associated with climate change and air pollution. In Pakistan, the decrease in water tables outside the canal areas is a threat to the sustainability of irrigated agriculture.

This article describes the steady decline in groundwater levels over a period of thirty years in Kuchlugh sub-basin in Pishin Lora Basin in Pakistan's arid western Province of Balochistan. It is based on a longitudinal study with research visits to the area in 1993, 1998, 2005 and 2011. Initially in 1970s the groundwater use was very nominal through karezes and open dug wells. Groundwater use however increased steeply around 1980 with economic expansion and in particular the development of transport to large markets like Lahore and Karachi and the influx of Afghan refugees, bringing skilled labor. By the late nineties and early part of 2000s a point was reached whereby the main alluvial aquifer in Kuchlugh was exhausted.

Kuchlugh presents a specter predicted for more semi-arid areas of the world that depend on unmanaged groundwater, particularly where there is little recharge to compensate for the intensive use of groundwater. This article traces how groundwater users responded to the falling and later disappearing water tables and how livelihoods were adjusted over time as the groundwater reserves vanished.

Several theories link more intense resource use and competition over resources to either one of the two opposite outcomes: either there will be more conflict or there will be more cooperation. The main exponent of this first 'pessimist' cluster of theories is the Neo-Malthusian school. Resource scarcity is caused by an increase in demand whereas at the same time resources are in limited supply, and this may even exacerbated by unequal access. The resulting tension weakens institutions. This encourages resource capture and encroachment, which further undermines the resource bases. Instability increases. Another main cluster of resource scarcity theories is 'optimist' in outlook and predicts that resource competition will lead to cooperation. If resource scarcity does occur, technological innovation, efficiency, conservation or other forms of human ingenuity and cooperation are triggered. Boserup is the main inspiration for this school of thought. There is the assumption that humans can respond to scarcity by a variety of mechanisms: regulation, market mechanisms and pricing, technological innovation or more intense development investment.

A third theoretical perspective emerged more recently, particularly in the work in transboundary water management by Zeitoun and Mirumachi (2010). In their so-called TWINS perspective Zeitoun and Mirumachi demonstrate that conflict and cooperation can very well co-exist. Conflict is not necessarily problematic: it helps to raise the issue and come to a redefined and better system of resource management. Also cooperation is not necessarily good, as it can for instance consolidate relations that are asymmetrical and unbalanced. The drivers of cooperation and conflict are not exclusively related to scarcity and competition, but also include power hegemonies, governance arrangements and the dominant political discourses.

This article discusses an example from arid high land South Asia where groundwater depletion ran its full course and scarcity rapidly turned into exhaustion. The first part of this article (Section 2) describes the so-called 'race to the bottom' in Kuchlugh: the accelerated use of groundwater till the point was reached whereby first water tables started to severely drop. The next section (Section 3) discusses the tipping point that was reached in 1998–2004, when the alluvial aquifer was by and large exhausted. Section 4 describes the coping mechanisms of different groups of water users after 2004, the institutional responses in terms of conflict and cooperation and economic options. Section 5 is a summary of findings and Section 6 discusses what the Kuchlugh case suggests for theories on conflict and cooperation over over-used resources.

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