

Tanked Water Supply in Kathmandu Valley and A case study of Jhaukhel, Bhaktapur

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Project Information

Research Project Title

Climate Policy, Conflicts and Cooperation in Peri-Urban South Asia: Towards Resilient and Water Secure Communities

Research Study Area (Country): Kathmandu Valley (Nepal), Khulna (Bangladesh), Hyderabad and Gurgaon (India)

DFID and NWO-WOTRO funded CCMCC/CoCooN grant

Partners

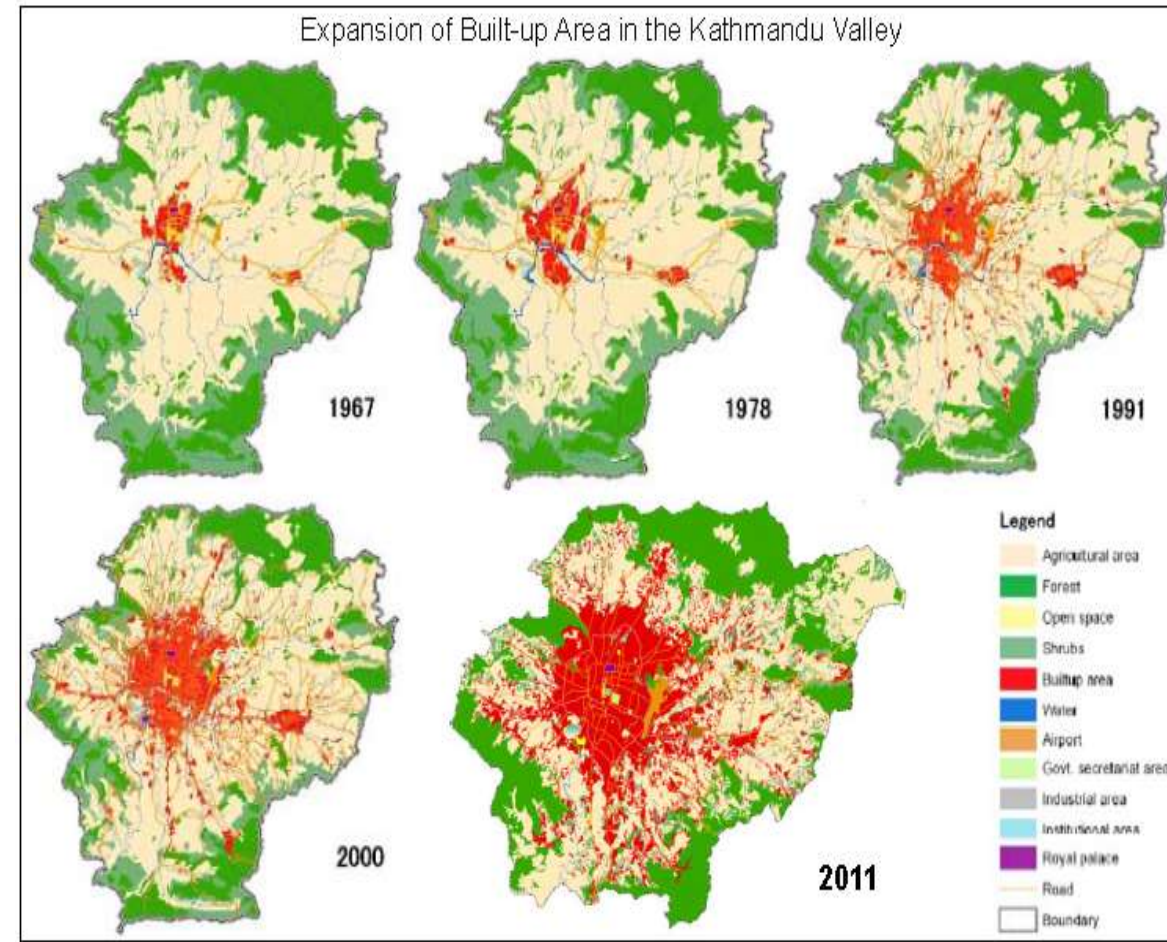
- **MetaMeta, Den Bosch, The Netherlands and Kathmandu, Nepal**
- **ICIMOD, Kathmandu, Nepal**
- SaciWATeRs, Secunderabad, India (with MDI, Gurgaon, India)
- IWFM, BUET, Dhaka, Bangladesh
- JJS, Khulna, Bangladesh
- Wageningen University, The Netherlands

Peri-Urban

- Peri-urban as a process or concept
- The peri-urban interface refers to specific context where rural and urban features co-exist, in physical, environmental, social, economic and institutional terms.
- Typical characteristics of the peri-urban interface include changing and mixed land use, growing pressure on resources (that may escalate contestation and conflict), a growing population, socio-cultural transition etc.

Urbanization in Kathmandu Valley (KV)

- Fastest growing metropolitan cities in South Asia (Pant, 2012)
- Average population growth rate of 4.32% per year
 - **Population growth rate:**
Urban- 3.92%/yr
Rural (VDCs)- 4.89%/yr
(JICA 2012; Muzzini and Gabriela 2013)
- Projected Population in 2025: 5 million
 - **Built-up area:**
2.94% (1967) to
24.7% (2011)
(Thapa and Murayama 2009; JICA 2012)



Kathmandu valley accommodates nearly 24% of the Nepal's urban population (MoUD 2015)

Result

- Of 400 stone spouts, 45 disappeared, 68 dried, 43 connected to city supply as natural flow degraded (UN-Habitat 2008).
- Higher water demand. As an alternative, to meet water demand, groundwater extraction started (mostly from urban outskirts areas)
- Water sources pollution: More than 60 MLD of household wastewater generated. 80% of which is directly channelled to the river (KVDA 2015)

Drinking Water Supply Institution in KV

- Kathmandu Valley Water Supply Management Board (KVWSMB): Responsible for developing and overseeing service policies and providing license to groundwater service providers in Kathmandu Valley
- Kathmandu Upatyaka Khanepani Limited (KUKL) is a main body responsible for the management of water supply in Kathmandu valley (urban area).

Water supply and Deficit

Avg. Demand **377 MLD**;

Supply: 70 MLD (18.5%) to 116MLD (30.7%) (KUKL 2016)

Water accessed from surface and groundwater sources

Surface Water Supply of KUKL- 45 MCM (KVWSMB 2010)

Annual Groundwater Extraction (GWRDB 2014)

- Deep aquifers (Private & KUKL) - 69.44MCM
- Shallow aquifers - 30.66 MCM
- Stone spouts - 2.13 MCM

No. of deep tube wells about 1000, licensed 414, no volumetric regulations yet (KVWSMB 2016)

Such a huge deficit of water supply through government water supply triggered to develop alternative water supply mechanism i.e. tanker operation (mostly using groundwater) in KV

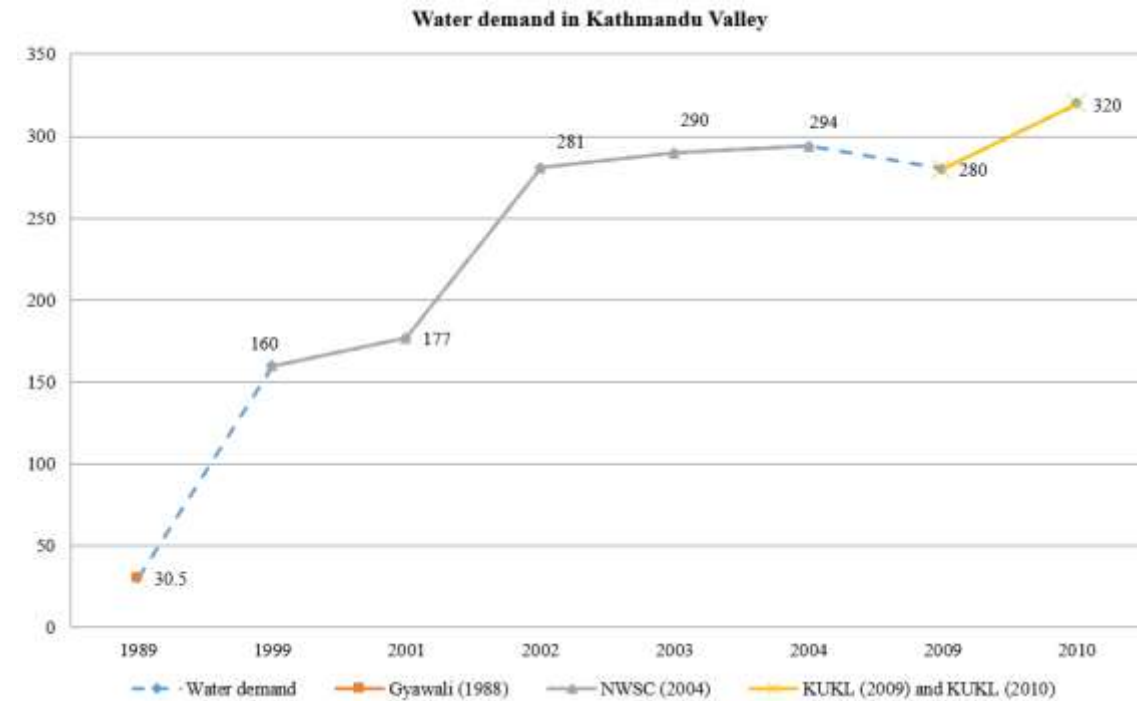
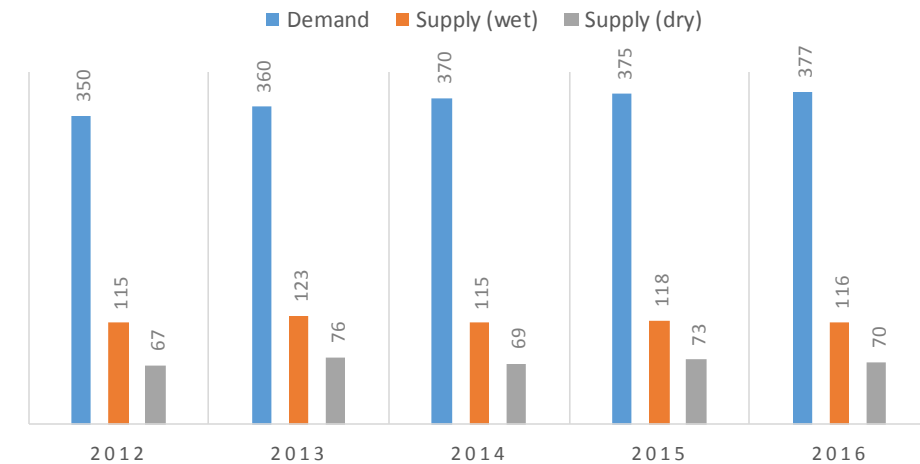


CHART TITLE



Water supply and Deficit

Melamchi Water Supply Project (Inter-basin water transfer)

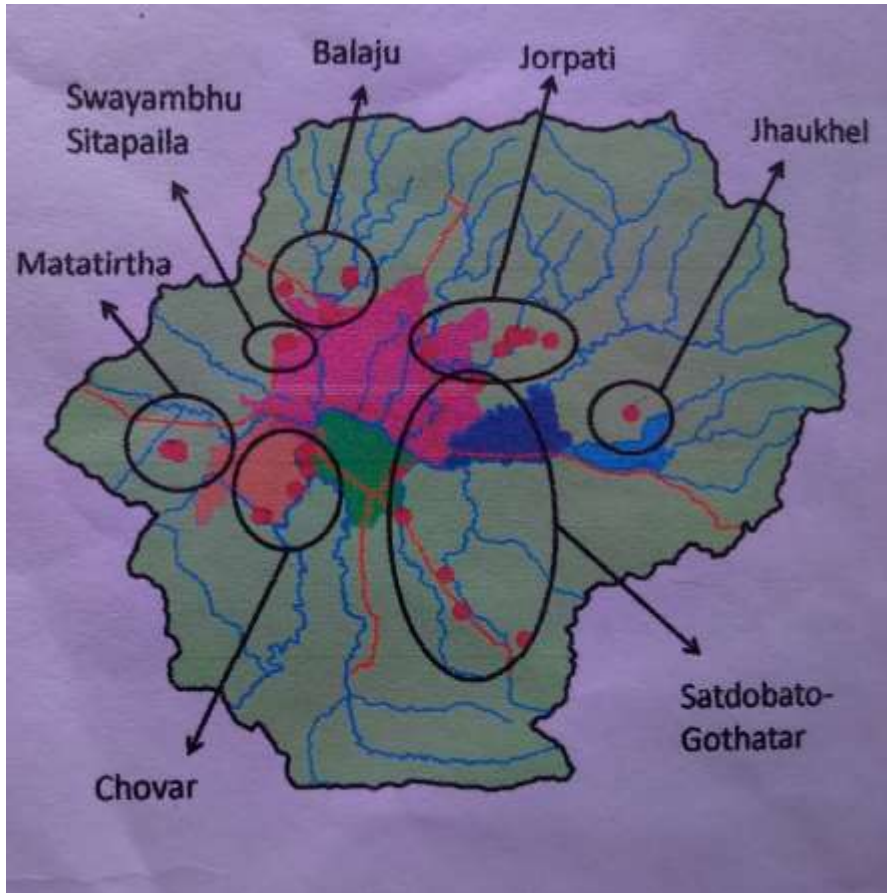
- 540 MLD in three Phase
- 1st phase of Melamchi (170 MLD) is expected not to come before 2018, and processes towards 2nd phase has been already initiated (paper work)

Tankers Information (KUKL and Private Tanker Associations)

KUKL

- No. of tankers with KUKL: 27
- No. of Trip made by KUKL tanker in a year 2016 = 24017
- Tanker size available with KUKL (5000 L, 6000 L, 8000 L, 9000 L, and 10000 L)
- Average size of Tanker: 8000 L
- Amount of drinking water supplied by KUKL operated tankers: 192 million liters in 2016

Private Tanker (Association)



Source: Tankers' Association, 2016



Source: Tankers' Association, 2016

- No. of private tankers operating in Kathmandu valley: 610
- Available tanker Size: 5000 L, 7000 L, 10000 L, and 12000 L
- Association divided water extraction places in 7 sub-regions

Detail of water extraction in the sub-region

| SN | Sub-Region | No. of source used | No. of tankers | Extracted volume (MLD)* |
|----|---------------------|--------------------|----------------|-------------------------|
| 1 | Swayambhu Sitapaila | 6 | 45 | 3 |
| 2 | Matatirtha | 13 | 45 | 2.25 |
| 3 | Jorpati | 12 | 160 | 11 |
| 4 | Satdobato-Gothatar | 8 | 85 | 6.75 |
| 5 | Chovar | 9 | 90 | 5 |
| 6 | Jhaukhel | 8 | 35 | 2 |
| 7 | Balaju | 9 | 150 | 8 |

Source: Tankers' Association, 2016

*In a peak season

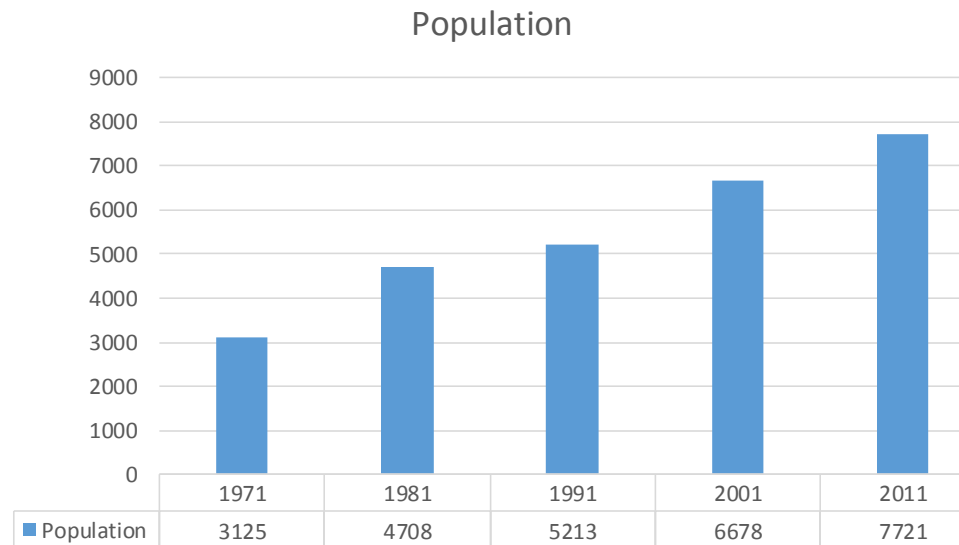
Results

- Private tankers supply 38 MLD in a peak season (dry period), which become 10% of the total water demand and more than 50 % of the water supply by KUKL in dry period (Tanker Association, 2016). While secretary of MoUD claim that Private Tankers supply at least 20 MLD water in the KV.
- Groundwater depletion: 1-4 m in average in deep tube wells (Shrestha SD, 2012) and approx. 2.5 m in shallow wells (Shrestha 2007)
- Water balance deficit of 29.52 MCM (GWRDB 2014).
- Deteriorating groundwater quantity and quality (Pandey et al. 2010)

Study Area: Jhaukhel

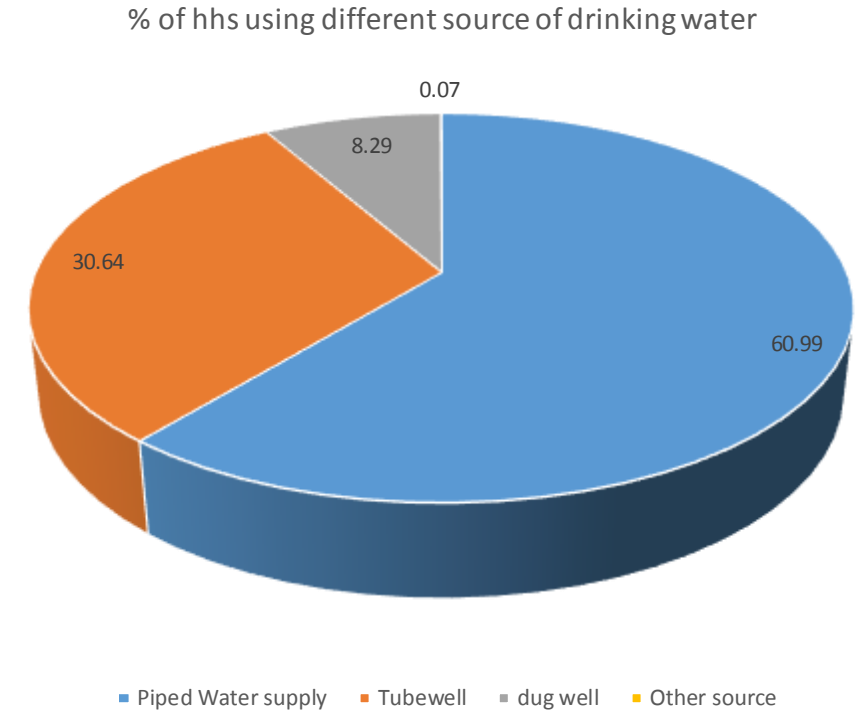
Population growth rate (2001 to 2011): 1.56%

- At the northern flange of Bhaktapur Municipality
- Area- 5.41 sq. km
- Lies in the northern groundwater recharge zone (JICA, 1990).



Case of Jhaukhel

Majority of household depends on pipe water supply. But it is inadequate to meet domestic water supply. As a alternative, they uses community groundwater or private dug wells.



Source: VDC profile, 2013

Commercial GW Extraction

- Started in 2002 in the form of bottling industries
- Tanker and tractor water supply from 2008
- 12 formally registered commercial water extractors and over two dozens unregistered tanker water suppliers.
- Depth of commercial wells range from 70 ft. to 140 ft.



Commercial GW Extraction

- More than 90 Million litres of groundwater (Jar, tanker, bottle) is extracted through wells in a fiscal year 2010/11. (Sada et al., 2013)

Result

- Drying of traditional water supply systems like Hitis (Stone spouts), wells, Kuwa
- Lowering of the groundwater table. Average annual drawdown of groundwater 3.38 ft (1.03 m) (Sada et al., 2013). Lowering of submersible pump in commercial wells is done to grab new groundwater level
- Deepening wells and bore wells or construction of new wells and bore wells
- Degrading Water quality

Overall, it has increased water insecurities in Jhaukhel as water security in Jhaukhel is closely associated with its groundwater resource.

Note: The main victims are poor who can not afford deepening of wells

Threat/fear of land subsidence (according to local residents)

Conflict and Cooperation

- Conflict:

Step 1: Delegation

Several delegation for regulation of commercial groundwater extraction by local communities. Local village government declared illegal status of water tankers. But it stayed for short time due to poor implementation of the decision

Step 2: Demonstration against water vendor by blocking road

The village and district government were informed about the demonstration and blockage for few days demanding better management of commercial water extraction as difficulty in access to water for local people increased. No action was taken by government bodies rather more vendors came in.

Local people perception: There is hidden nexus between water vendors and government at district and village level.

Conflict and Cooperation

Cooperation

- Emergence of communal wells for water supply (support from local or district government) in hamlet (limited to those hamlet who are proactive and have political linkages) and private wells.
- Provision of water by water vendors to the local people: Either paid or in some occasion free supply of water to local people. Such provision plays important roles in preventing open conflicts between water vendors and local users.

Groundwater Regulations

About 90% of the water markets are based on groundwater (Shrestha, 2011)

Groundwater Management Policy 2012 (KVWSMB)

- i. Recognized groundwater market and try to regulate commercial groundwater market
- ii. Regulation of groundwater for different purpose i.e. Shallow and Deep water layer for different purposes

Provision of Sticker System in the Tanker Operation

BLUE STICKER: Appropriate for drinking (physically, chemically and biologically)

GREEN STICKER: Appropriate for domestic purpose (not drinking). Can be drink after boiling

YELLOW STICKER: Never be use for drinking.

Information in the sticker

Supplier Name and Contact Number:

Capacity of Tanker:

Registration Number:

Source of Water:



Acknowledgement

- NWO
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