

# Knowledge brokers in water infrastructure supply chain actors: are they an issue?

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# CONCERN.



On a planet whose surface is more than two thirds covered by water, the illusion of abundance has clouded the reality that freshwater is finite and increasingly scarce commodity (Valls, 2010)

2016 world population of 7.6 billion (World population data sheet, 2016) to reach 9 billion by 2050 and severe water shortages will affect half of world population by 2050 (Srinivasan et al., 2012)

Climate change is poised to shift precipitation patterns and speed glacial melt, altering water supplies and intensifying floods and drought (Kazmi, 2016).

Water will be the fundamental factor shaping the economic growth in the decades up to 2050 (Global Water Summit, 2016)

# CONCERN

## II



Water is another reason for war in the 21<sup>st</sup> century (Driver, 2015)

Global experts and intelligent community have warned of “Water Wars” to provoke World War III (Klare, 2013)

*“Anyone who can solve the problems of water will be worthy of two Nobel prizes - one for **peace** and one for **science**”* John F. Kennedy (Likhotal, 2013)

Water scarcity among top global challenges (FAO, 2012)



# Water scarcity

- ❑ Water scarcity is simply when demand exceeds supply in a specific location (FAO, 2012)

## Types

- ❑ Physical
- ❑ Economic

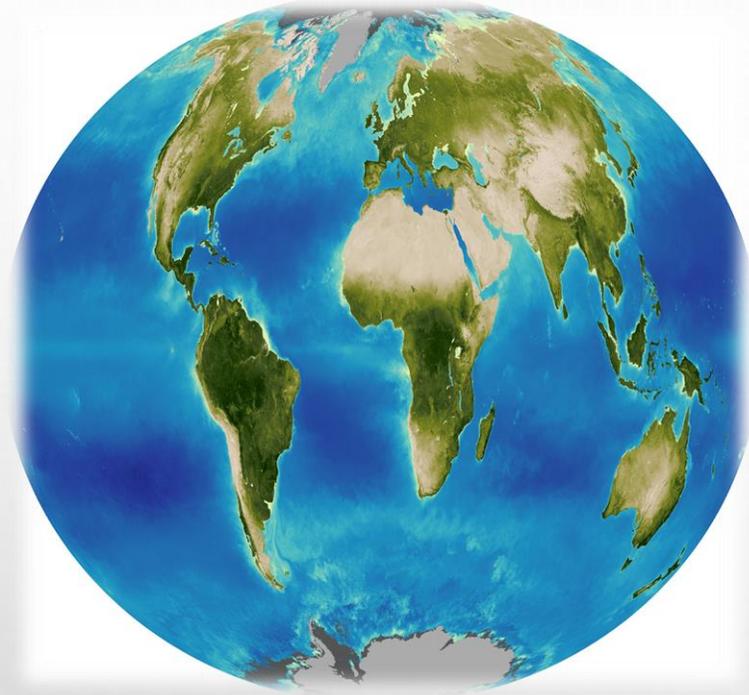
Index m <sup>3</sup> per capital	Category/Condition
> 1,700	No Stress
1,000 - 1,700	Stress
500-1,000	Scarcity
< 500	Absolute Scarcity

Malin Falkenmark indicator

(1989)

# Economic water scarcity

## CONTEXT



783 million of people in the world face both physical and economic water scarcity (Nations, 2016)



(WHO, 2013)



(Abebe et al., 2013, Lockwood & Smits, 2011, Guinness, 2010).

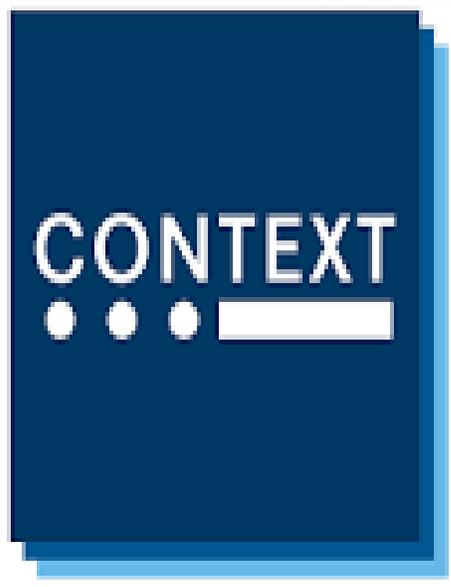


Economic water scarcity is caused by a lack of investment in water infrastructure or insufficient human capacity

# Collectively in terms of financial investments.....

- ❑ Governments of developing nations and external co-operations have invested billions of dollars in the provision of rural water supply systems in the developing countries over the past three decades (**Lockwood & Smits, 2011**)
- ❑ It has been estimated that approximately 35,000 bore-hole water projects per year need to be drilled in sub-Saharan Africa to meet the millennium development goals (MDGs) (**Carter, Adekile & MacDonald, 2008**)
- ❑ The world bank group (WBG)-the largest multi-lateral source of financing for water supply and sanitation (WSS) in developing countries currently supervises WSS lending portfolio of approximately US\$13.5 billion (**The World Bank, 2014**)





- ❑ Global monitoring results inform that progress is being made but in terms of access to service that users actually experience, communities unable to cope with management of water schemes, poor maintenance, unreliable & disrupted supply of water (Lockwood & Smits, 2011).
- ❑ Effective water infrastructure development must be underpinned by knowledge and understanding of availability of resources in the local communities itself and translating it into policy (UN-Water 2012)
- ❑ The know-do gap was recognized by the Mexico ministerial summit and the 58th world health assembly as a major obstacle to the attainment of the MDGs (Pablos-mendez & shademani, 2006)
- ❑ The mission of the knowledge management (KM) strategy of WHO is to help bridge the “know-do” gap in global health by fostering an environment that encourages the creation, sharing, and effective application of knowledge to improve health (Pablos-mendez & shademani, 2006)
- ❑ Move the discussion on water infrastructure to closing the ‘know-do’ gap in water infrastructure development seems to be effective in giving deeper insights into socio-political-engineering world of water supply projects.

## Aim



- The aim of this paper is to systematically review the empirical, peer reviewed research on brokerage broadly and specifically knowledge brokerage from the perspectives of networks.

# Collections & Compilations



28



YEAR 1989 TO 2016

# Criteria



Inclusion criteria	Exclusion criteria
Empirical research on brokerage in networks	Social networks of non-experts e.g criminals, terrorist, children, students or generic groups
Empirical research on potentials of knowledge brokerage towards sustainability	Networks of non-humans such as animal societies
Locating critical connectors in a network	
Analysis of stakeholders using networks	
Developing knowledge brokering program/system in collaborative settings	

## Criteria



- Main criterion – empirical evaluation of role of knowledge brokerage/brokers
- Collaborative oriented/networks
- Articles that considered actors with high centrality in networks as ‘brokers’ included if ‘brokers’ was the focal point
- Investigation was outside water supply sectors

Phrases	Characteristics	Motivation	References
<b>Knowledge broker</b>	Knowledge brokers are people or organisations that move knowledge to potential users and create connections between them	To narrow the gap by analysing and theorising the practice of knowledge brokers	( <a href="#">Abbate &amp; Coppolino, 2011</a> ; <a href="#">Meyer, 2010</a> ), ( <a href="#">Dagenais, Some, Boileau-Falardeau, McSween-Cadieux, &amp; Ridde, 2015</a> ), ( <a href="#">Drew, Ritchie, &amp; King, 2014</a> ), ( <a href="#">Ziam, Landry, &amp; Amara, 2009</a> ),
<b>Knowledge transfer</b>	Process through which one network member is affected by the experience of another	To construct a more precise and understanding of how different types of social interactions influence knowledge transfer	( <a href="#">Crona &amp; Parker, 2011</a> )
<b>Knowledge broker system</b>	Link between knowledge seekers and knowledge experts	To construct K-broker system as a prototype system to improve knowledge transfer in an organisation	( <a href="#">Kim, Suh, &amp; Jun, 2011</a> )
<b>Knowledge brokering</b>	Intermediary roles between research and practise which are thought to have considerable translation potential	To examine intermediary roles from the role-holders and the potential impact of these individual-level consequences for the longer-term viability of intermediary roles as a knowledge-translation solution	( <a href="#">Chew, Armstrong, &amp; Martin, 2013</a> ), ( <a href="#">Braun &amp; Islam, 2012</a> ), ( <a href="#">Canadian Health Services Research Foundation, 2003</a> ), ( <a href="#">Petit et al., 2011b</a> ), ( <a href="#">Ward, House, &amp; Hamer, 2011</a> ), ( <a href="#">Kim et al., 2011</a> ), ( <a href="#">Malik, 2012</a> )
<b>Knowledge brokerage</b>	Bringing knowledge to decision makers so that it can inform practises and	To develop knowledge brokerage strategy and evaluation of its implementation.	( <a href="#">Dagenais et al., 2015</a> ), ( <a href="#">Partidarion &amp; Sheate, 2013</a> ), ( <a href="#">Sheate &amp; Partidarion, 2010</a> )

<b>Bridging</b>	<b>Locating critical connectors in a network</b>	To show how bridging measures correlates with existing network measure such as closeness centrality and betweenness centrality
<b>Brokerage</b>	A role that ensures that actors connects the unconnected parts of a social systems	Structural holes in an organisation implies there are brokerage opportunities for some actors in organisational
<b>Brokers</b>	Individual or organisational actors who carry many exclusive links, that is, links to groups that would otherwise not be in direct contact with each other	To indicate the roles and structural positions in a natural resource management
<b>Network brokers</b>	Connecting different actors of the system to overcome market or system failures.	To indicate how innovation intermediaries share and spread information, establish possibilities for meetings and exchanges.

# Identifying knowledge brokers and brokerage opportunities

## Results



Papers	Identification of KB	References
12	Case study based investigations to identify KB potentials	(Dagenais et al., 2015; Gould & Fernandez, 1989; Jessani, Boulay, & Bennett C., 2015; Kim et al., 2011; Malik, 2012; Pettit et al., 2011b; Reinecke, 2015; Schroter et al., 2015; Sheate & Partidarion, 2010)
8	Betweenness centrality in networks	(Bodin, Crona, et al., 2006; Crona & Parker, 2011; Gould & Fernandez, 1989; Kim et al., 2011; Pettit et al., 2011b; Prell et al., 2008; Sozen & Sagsan, 2010; Valente & Fujimoto, 2010).

# Generating and integrating innovation

## Results

Papers	Outcomes	References	Organisations
4	Innovations were generated by brokerage	(Abbate & Coppolino, 2011; Kogut, 2000; Malik, 2012; Schroter et al., 2015).	Natural resource management sectors
2	Opportunities and challenges fostered by knowledge brokers in co-creation of knowledge	Long et al. (2016), Abbate & Coppolino (2011)	ICT firms
1	Identification of brokers for conflict resolution	(Ngaruiya & Scheffran, 2016).	Water, wild life and agricultural sectors
1	Knowledge was diffused within the network of a group of firms brought positive returns on technology transfer (success to the supplier)	Kogut, 2000	Automobile company (Toyota production system)



# Value of brokerage

## RESULTS



- ❑ Crosses boundaries, bridges hole ( ‘structural hole and homophily) in trans-disciplinary teams (long et al. (2013), Kim et al. (2011) and Ngaruiya & Scheffran (2016)
- ❑ Uncovers needs systematically, shares ideas to increase quality and long-functional relationships in organisations
- ❑ Resolves conflict between and among actors in organisations
- ❑ Potentials to enhance capacity building among different stakeholders
- ❑ Brokers are considered to be the most important structural positions in networks Bodin et al (2006)
- ❑ Mediates between science and practice in natural resource management (Pettit et al. (2011)

# Implication for water supply projects

## Conclusions & Recommendations



- ❑ Water sectors setting is rich in isolated clusters in need of connectivity (Different stakeholders)
- ❑ Integrative networks seeks to bring dissimilar groups together for effectiveness and co-activeness
- ❑ KB have potentials to improve integration among disparate groups caused by division and barrier - due to different cultures and professions
- ❑ KB synthesises sources of information, increases understanding and cooperation among disparate groups & generates innovative ideas for effective outcomes
- ❑ KB is proposed to identify gaps/bridges in water supply sectors to uncover vital knowledge areas - 1) **Appropriate technology**, 2) **availability of spare parts of water supply facilities**, 3) **manpower training**.
- ❑ The development of more compelling planning frameworks involving **knowledge**<sup>17</sup> **brokers** for sustainable water supply projects is highly recommended