**Rethinking Desalination: Go-to Solution or Last Resort?**

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**Abstract:** Desalination has gained prevalence transforming drinking water management across various parts of the world. Broadly due to the rising demand and impact of climate change on water resources, desalination is hailed as the go-to solution. Use is more common in the Middle East where freshwater is scarce, and salt water is plentiful. These fossil fuel hungry infrastructures are making their way to other parts of the world such as Bangladesh. Led by the development and private sector, the emergence of such plants has been geographically uneven in the country and can lead to unintended consequences. Taking Saudia Arabia and Bangladesh as case studies, this paper discusses the nature of the two countries and suitability of desalination as a drinking water source. This paper aims to enhance our understanding and proper planning, shedding light to the varying context and circumstances under which desalination is implemented.

**Keywords:** desalination, water scarcity, Bangladesh, infrastructure, Saudia Arabia.

On April 20th, upon arriving at the Hazrat Shahjalal International Airport in Dhaka, I was informed that my flight to the UK had been cancelled. With 40 kilograms of luggage with me, I was lost, rethinking my entire plan and next steps. There were hundreds of passengers like me, many in worse conditions, stuck in Dhaka which would initially simply be an hour transit for them. I returned home with my family being more in awe than myself. That is when the severity of Dubai floods struck me and the recent experiments around cloud seeing came to my attention.

The purpose of this paper is not to discuss cloud seeding, floods or climate change, but aims to draw attention to the materiality of infrastructure and the compounding effects it may have. Showcasing two cases in Saudia Arabia and Bangladesh, it explores the use and advancement of desalination plants amidst a water crisis. Public attention to precipitation enhancement by cloud seeding (Al-Hosari et al., 2021, Borenstein, 2024) brought about by the disastrous flood in Dubai and part of the Persian Gulf, has made the global water crisis more apparent. Given the rise of consumerism, and increasing population, adverse weather conditions, the water crisis is increasing. Given such stressful times, a number of alternative technologies such as desalination plants are on the rise.

**The Case of Sadia Arabia**

Saudi Arabia is a desert country with no permanent rivers or lakes, receiving an average of 114 mm of rainfall each year (FAO, 2003; Abdella et al., 2024, Chowdhury & Al-Zahrani, 2013). Water is derived from non-renewable groundwater sources, renewable surface and groundwater sources, desalinated water and treated wastewater (Chowdhury, S., & Al-Zahrani, 2015). The country has been tackling rising water demand successfully given its stable economy and prosperity (Abdella, 2024). Desalination is a popular practice in the kingdom producing the most desalinated seawater in the world, accounting for 22% of worldwide consumption (Abdella, 2024).

Liberal water use and careless water supply management coupled with unchecked population growth, irresponsible agricultural policies, and years of war have led to an unsustainable culture of water usage in Saudi Arabia (DeNicola et al., 2015). Desalination plants are popular, and well-known for their high energy consumption. High-income, wealthy communities drive desalination investments in gulf countries such as Saudia Arabia. It is deeply connected to fossil fuel energy regimes where oil and gas resources are abundant (Williams, 2022). These energy-hungry technologies have the potential to increase fossil fuel consumption, increase greenhouse gas emissions (GHGs), and exacerbate climate change if renewable energy sources are not used for freshwater production.

**The Case of Bangladesh**

Bangladesh is a riverine country, but it would be restricted to assume that the country’s abundant rainwater and freshwater resources make it water secure. Rising sea levels, adverse weather events such floods, cyclones, storm surges, challenges in management and distribution, especially in the dry season, often leads to water scarcity. The impacts are worse in the coastal areas of the country where saline water affects several areas.

Small-scale desalination plants are on the rise powered using renewable, non-renewable or hybrid sources of energy (Kariman et al., 2023). This highly commodified mode of water production technologies (Williams, 2022) is usually brought about by donor funded projects and private investments, recently witnessing a boom with 131 plants being mapped in Khulna district (Hoque, 2023). Many have failed in the region due to a stark mismatch in electricity bills and sales. Furthermore, these technologies are mostly in demand during dry season, where lack of rain force communities to look for alternative options. Over time the technology itself is becoming more feasible and affordable due to increased availability of parts.

The income, availability of resources such as fossil fuels to run such plants, are quite different for Bangladesh. However, the technology through which they are responding to the crisis is quite similar. Wastewater from desalination plants is also a concern. At present, there is no mechanism at place to treat discharge and are disposed directly into nature. The arsenic poisoning tragedy caused by numerous tubewells throughout the country, calls for more apprehension and proceeding with caution. Just how tubewells aligned with the Millennium Development Goal (MDG) to improve safe water access, proliferation of RO meets the target 6.3 of Sustainable Development Goal (SDG).

**Conclusion**

Desalination predominantly concentrated in the Arabian Peninsula are growing in the Global South to address water challenges (Williams, 2022). Desalination holds the power to “continue to reshape the practices, politics and political economy of water throughout the 21st century” (William, 2022, p 194). Countries such as Bangladesh with limited technical and economic resources, mostly in the coastal region where water scarcity is high, need to be cautious in including the technology within communities. It may seem like a clean, easy alternative to fresh drinking water supply, but can have political and environmental consequences beyond anticipation, both during construction and operation. The discussed perspectives are not to banish desalination or dismiss it, it is simply to contour the differing contexts and expand our understanding a

The technology is predominantly for high income and technologically advanced groups. Inequity is water provision is easier to happen in countries like Bangladesh with poor governance structures, stipulating more caution to the desalination approach. Highly salty and toxic, discharge water should also be taken into account. Desalination may seem like a straightforward implementable technology for many, especially to the development organizations working in Bangladesh to ensure water security. It is now also a lucrative business opportunity for coastal communities. However, this easy fix can be problematic since it holds the power to shift our view from sustainable alternative solutions which may be comparatively laborious, but nevertheless achievable.

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