



# RE-HYDRATING JAIPUR

Scarcity | Security | Metropolitanization

Towards a Sustainable Integrated Urban Water Management for the region of  
Jaipur, India

Masters Graduation Thesis 2018-19  
P5 Reflection

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## Project Overview and Personal Motivation

My personal motivation to conduct this research comes from the context and location which has been chosen. Being born and brought up in the city of Jaipur, I have been inclined to explore the different facets of the city. The issue of water shortage comes from the same journey where water would be available from the central supply for 1 hour in the morning and evening to fill up our underground water tanks. Although supplying limited water before summer even begins in order to survive the harsh months seems like a smart idea from the government, but what happens to the unfortunate, the people who don't have access at all? While the fortunate can pay for private tankers, the effect on the lower income groups and rural areas is much higher. Furthermore, it affects the food production in the region as well.

Therefore, 'the relevant question to ask is not: how much water do we need and from where do we get it, but rather: how much water is there and how can we best benefit from it?' (Falkenmark, 1989). In a city like Jaipur, with water shortage and frequent droughts and ground and surface water as the only source, the objective is to propose a strategy which makes the best use and proper management of available water, rainwater harvesting, recharge, and reuse of existing.

The graduation project 'Re-hydrating Jaipur' which proposed a sustainable integrated water management strategy for the region of Jaipur, explores the hybrid model of water management with a multi scaler, multi user approach. The aim was to adopt a system where micro scale approaches help in mitigating macro scale water problems. In other words, adopting decentralized approaches to harvest, supply, recharge, recycle, treatment and reuse water and reduce pressure off the central system. In order for this change to happen, it is essential to develop and promote awareness among different stakeholders involved in this sector, the challenges of macro scale water shortage and its effect on micro scale. The current supply-oriented water management approach is not the solution in the long run. Change doesn't happen overnight, but it starts by understanding the problem.

## Relation Between Research and Design:

Research has been the main aspect throughout the entire graduation year. It has been an essential driver for developing the methodology and design process of this project through various tools and skills of mapping, literature review, multi scaler analysis, observations, interviews and site visits in order to have a better grasp of topics such as climate change, water management, urban water cycle and ecology of a city. This project has been done as 'Research by Design'. After detailed analysis of the metropolitan trends and issues at hand, the tools and skills were used to answer the research questions, which were eventually interlinked through the theoretical framework. After extensive review of literature for all fields, analysis of the city was done based on these theories. Based on conclusions from each, potential areas of interventions were recognized and categorized according to water harvesting, water treatment and stormwater drainage. One intervention area from each category was chosen for further detailed analysis and design. These interventions are analyzed and designed in a way to demonstrate as an example for other intervention areas. Through the entire process, having to do trial presentations and peer reviews was a helpful tool to evaluate the strategies and overall development of the project.

## Inter-Disciplinary Growth:

The four main fields in this research are urban planning, landscape architecture, water management and civil engineering, as explained in the methodology. Though, urban economics should also be part of the dialogue, as not all infrastructure is affordable for everyone. For example, innovation of traditional management systems such as stepwells, requires more civil engineering, but in order to create a network that also stretches to a functional use for them requires the inhabitants to be part of the system. Creating a drainage piped system that connects terraces to the stepwell can be an expensive affair for the individuals, however, if the government provides subsidies for rainwater harvesting, this could be easily adopted by everyone.



Urban Planning  
and Design



Water Management



Civil Engineering



Landscape  
Architecture

## Relation Between Research and Theme of the Studio:

The studio 'Transitional Territories' along with landscape urbanism helped me develop a strong methodology to understand the dynamics between the natural and built environment. The project has been developed keeping in mind the technical and infrastructural difficulties that developing countries encounter, and so a detailed analysis has been done for each method and intervention area. Personally, the most interesting part of this research was to innovate the traditional systems with new technology in order to make them suitable for cities. As a counter to the scientific and societal gap between engineers, planners and designers, the project offered me enough flexibility to dive into the technicalities of the engineers, spatial dimensions as planner and designer and calculations as a water manager. Through this project, I also got to learn aspects of environmental planning, geography and watershed management. Enquiring into green infrastructure and nature-based solutions which have been developed extensively in landscape and urban design offer the opportunity for all countries, especially developing nations to adopt more ecofriendly, sustainable and effective solutions for development in the long run.

## Limitations:

Although the process of development of this project was fairly flexible, but due to time constraint, it was bound through certain limitations. I believe any urban project needs to be inter-disciplinary and not a one man's job. Thus, to conduct an informative research on the wide topic of water management requires more than 10 months and a team of engineers, water managers, hydrologists, landscape designers and planners. This project was also discussed with mentors from the Civil Engineering faculty who are working on a similar project of water treatment in Delhi and students of landscape architecture. The learning from the discussions have been kept in mind while working on this proposal, but may still lack in technicalities.

The second limitation was the broad range of topic that water management offers. Although the project has kept in mind the environmental, sustainable, social and cultural considerations of water sensitive urban planning and design however, I am aware that inquiring into water governance, stakeholder management and urban economics is equally important. The dynamics of cities in developing countries are much more complex in nature and require a team of expertise from other fields. Therefore, I acknowledge the lack of actual feasibility of the project in the context. For example, the technologies for water treatment and management proposed are based on basic understanding of civil engineering and hydrology, but the type of treatment plant to be used is based on the quality of water that exists, for which water testing is needed.

The third limitation was based on the struggle to find reliable data and opinion. This is partially due to the governance system that is reluctant to share their information with anyone outside the governing bodies. All research in this project is based on data from journals, books, NGOs and majorly from observations and site visits in various parts the city. However, this research presents a central idea to potential water management strategies which can be used for further research in this field.



## Scientific Relevance

Water scarcity has been and will continue to be a recurring problem for cities across the globe. The past and ongoing investments in order to reduce the complexity of this situation, use the conventional approach to water management and work with a narrow approach. This has resulted in compromising the multiple objectives of this planning paradigm, making our cities more vulnerable to the effects of climate change. Therefore, “it requires urban water planning to protect, maintain and enhance the ‘multiple benefits and services of the total urban water cycle that are highly valued by society’” (Wong & Brown, 2009), further integrating them into one system so as to ensure environmental sustainability for future use. The project emphasizes on establishing a strong bond between spatial planning and water management in cities, especially for those located in arid and semi-arid conditions. This approach has already been adopted in developed countries; however, the Indian planning system, like many other developing nations, still work on the piecemeal approach. This research develops on the study done by Rebekka Brown, N Keith and T.H.F. Wong which present a framework for 6 distinct yet cumulative transitional stages of development of urban water management in the developed cities of Australia towards a more sustainable future.’ While the different transition states have been simply represented as a model of liner progression, there is no evidence to suggest that cities could not move in both directions across the continuum as well as jumping and/ or straddling based on changing circumstances’ (R Brown, R., Keath, N., & Wong, T. (2009)). To apply this framework for developing nations, a new paradigm shift has been presented which proposes an integrated framework that does not follow a linear approach, but rather a culmination of transitional stages that developed countries followed.

In order to develop a cohesive strategy, the project proposes a holistic view, considering the principles of water sensitive urban planning and design, the role of landscape and green infrastructure, highlights the value of traditional practices in the region and elaborates on the added benefits that can be obtained by bridging the knowledge gap between the old and the new by inquiring into both traditional and contemporary water systems and amalgamate them for efficient water resource management in arid and semi-arid zones. By integrating these practices, resilience against climate change and water conflicts can be ensured in a sustainable manner. As the ‘Waterman of India-Rajendra Singh’ proudly quotes, ‘When are lives are connected with nature, we draw from indigenous knowledge, which is also science, but with common sense’. These methods along with nature-based water sensitive landscape and urban design developed by several organizations, could further be used by other cities facing similar situations. This project also address the SDGs set by the United Nations which include: 6. Clean Water and Sanitation, 11. Sustainable Cities and Communities 12. Responsible Consumption and 13. Climate Action



## Societal Relevance

Resiliency towards climate change and water scarcity should be addressed at all scales in a city, especially when located in arid zones with increasing desertification. Resource scarcity, especially of water, deepens the cracks of segregation in society. Being a basic need, the scarcity generates a deprived population who often has to fight for or settle for lower quality of water, resulting in poor health and increased poverty. This can be specifically observed in the rural, peri-urban and informal settlements of Indian cities, areas which are not fortunate enough to receive water from the central systems due to failed governance, lack of infrastructure and the urban poor divide. Access to basic necessities of food, shelter and water is a human right. These shortages could lead to disasters, internal conflicts among people and even nations. However, as Folke emphasizes “the major challenge is to develop governance systems that makes it possible to relate to environmental assets in fashion that secures their capacity to support societal development for a long time into the future” (Folke, 2006). Taking lessons from the past, this can be strengthened by local communities which ensure sustainability and water sensitive decision making. The microscale approaches proposed in the research and design emphasize on the value of stakeholders in managing their own water resources. Therefore, the research also promotes the public participatory model which could be applied at local scales by creating awareness for efficient and responsible consumption of water and conserving it for future generations.

## Ethical Considerations

The project aims to critically review existing government policies and interventions in the sector of water management in Jaipur. The idea is to not entirely reject the original approach, but to provide a more cohesive solution which supports the existing model for better performance, incorporating the existing metropolitan trends and ensure equal and effective distribution of clean water, efficient recycling of wastewater and responsible consumption for various functions. Since a large part of the catchment area and edges of the river basin has been encroached by informal settlements, the potential solutions will also take them into consideration and their right to the city and clean water. As an example, a large sector of the population and textile industries discharge sewerage directly in the river, majorly due to lack of strict regulations and planning at the governmental level. By promoting in situ treatment and considering the requirements of these industries, the project proposed sustainable decentralized solutions which help in mitigating river pollution and recycling of wastewater, thus promoting and maintaining more sustainable livelihood practices.

On a positive note, the region has ancient water wisdom in the form of traditional water systems which have been abandoned over the years. Although they may not be able to meet the demands of the entire city, but as part of the cultural heritage that needs to be preserved. Therefore, the project proposes revival and re- functioning of such systems on a local scale and how they can be used as a base layer for safeguarding water for future. On ethical grounds, the project aims to create a more just society by valuing the existing systems as well as reviving familiar practices involving all the stakeholders equally.