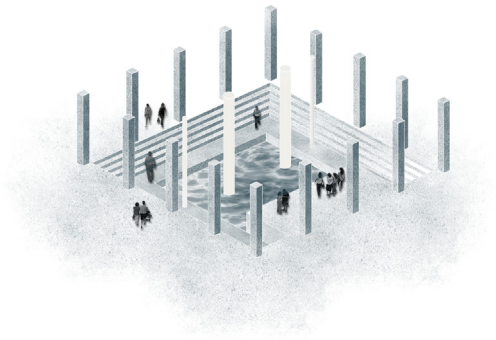
THE URBAN IMPLUVIUM

Water as a Social Collector



Definition of Impluvium
noun | im·plu·vi·um | \(')im¦plüvēəm, əm'p-\
plural | impluvia

An impluvium is a roman architectural device used to collect rainwater which is directed into it by a sloping compluvium roof. The central position allows it to cool surrounding spaces and become a place for social interaction within the building.

The thesis is an investigation into public space as the context for sustainable water generation, treatment and celebration in response to water becoming an increasingly scarce resource as a result of a changing environmental and social climate.

By using the architectural themes of transparency, permeability and cohesion the proposal aims to create a sustainable public resource which responds to existing hydrological needs of the community of Madrid, securing people's right to water in a future climate of water scarcity, rationing and high water prices. The proposal's use of the water collection principles of the compluvium and impluvium in conjunction with atmospheric water generation creates a design which not only collects water and cools the surrounding environment but acts a social collector by providing a permeable and cohesive public oasis within the city where water can be enjoyed and it's management and treatment made transparent. This transparency is a responce to the hidden nature of Madrid's water supply and although necessary for protecting these systems, creates an illusion that this resource is infinite. As an inland city, Madrid can not benefit from methods such as desalination for emergency water therefore other methods must be considered.

Madrid's relationship with water stems from it's very inception as a city when the Moors discovered a small stream which became the Manzanares river, to the development of innovative hydrological infrastructure such as water towers and public wells which created points of social interaction throughout the city. As a result of modern hydrological systems, the presence of this infrastructure has been replaced by more efficient means of distribution but therefore has created a network which is now hidden. This lack of visibility and awareness leads to over consumption which is problematic in a city where water is scarce.

The thesis is a response to the changing climate of Madrid, both environmental and social. The city is moving towards an arid climate and with Madrid's existing social culture found largely within its plazas and streets, this will cause notable impacts in the ways in which open, public spaces throughout the city are used in the future. The proposal hopes to provide for the autonomous community of Madrid by securing the use of public space and people's right to water. By using existing public spaces within each district, the proposal hopes to secure their use in the future through the sustainable generation and management of water.

Madrid's water companies have always been seen as a public entity but in recent years, there has been great debate over the privatisation of the Canal de Isabel II, the company which manages the city's water supply. The thesis works within the anticipation of a future scenario where water is now a scarce resource as a result of the shift towards an arid climate as well as an increasingly expensive resource for the community of Madrid as a result of high water prices and rationing due to scarcity and privatisation.

By looking at existing hydrological uses within the city, the proposal provides a place for these public resources to be enjoyed in the midst of water scarcity through the implementation of a virtuous cycle. As an inland city, Madrid can not benefit from the generation of water from desalination. In response to this, the thesis uses existing technology which can pull moisture from even the most arid conditions to generate the water which is distributed throughout the proposal. This water is then treated through a multiple barrier system in order to be resused. In order to bring awareness of water back to the city, the proposal aims to create a transparency between the user and the water process through its programme and form. As a whole, the design aims to create a cohesive environment where people and water can interact together despite the occuring changes around them.

SITE

Madrid's water usage is 67% residential, therefore public spaces have been chosen as a response to their residential nature. The choice of Parque de la Reina within the district of Lavapies stems from it's scale and the district's diverse and social community. Its scale allows the thesis to test how this public resource could work at its largest potential whilst develop the design rules which will be implemented within these public spaces throughout the city. The multi-cultural community of Lavapies allows the thesis to become a place of social cohesion whilst it's sloping topopgraphy allows for a collection of water.

THE VIRTUOUS CYCLE

1.Collection 2. Treatment 3.Celebration 4.Reclamation 5.Waste 6.Storage

The design acts on a virtous cycle where water is generated, recycled and reused in order to create an off-grid public resource. First, water is generated using atmospheric water generators powered by solar energy whilst a filtering edge which surrounds the whole site captures any rain and storm water which flows into the site as a result of topography. This water is then treated using a multiple barrier system and distributed throughout the programme in order to be celebrated: bathing, the laundrette, educational facilities, research and labs, community hydroponic farm and the public, community kitchen and cafe. The programme is a response to the residential water usage needs of Madrid as currently the majority of the city's water is used for bathing, showering and laundry. Therefore by collecting all of these activites in the one place, the proposal acts as a public resource which allows existing high water usage activities to be carried out sustainably.

Once used, water is then reclaimed through the central impluvium within each block where it is taken through a gravity filter before being treated once more within the central processing tower for further distribution or moved into storage by moving through the central gathering space, creating a visual connection to an underground source. In order to complete the cycle all waste which is produced by the hydroponic farm, waterless toilets and the water treatment process is then taken to be anaerobically digested in order to produce a biogas which can then be used on site.

URBAN FORM

Using existing urban grid and topography

The form of the design is a response to the site's sloping topography and streets. The city's urban form and topography creates a number of vein-like streets which lead towards the site whilst the location of surrounding plazas creates a social flow towards the proposal, collecting surrounding people and adding another destination for both people and water as a result of topography. Each block is orientated for it's purpose and to allow channels of movement to flow into the site. The overall form sits within the centre and follows the existing urban grid. The positioning and proximity of each block also allows the central social space to be shaded to encourage social activity to occur around the tower and to provide a place where people can escape the intensity of the city heat.

The design acts on a series of levels and overlapping. The sloping topography is leveled within the centre to allow for people and water to flow down into the space and to allow the programme to spill out onto the shared surface creating an overlap of activity. Movement between spaces on the upper floor is then facilitated by the central tower. This movement then spirals up in to the hydroponic community farm, creating an extension of the park.

THE NEW WATER TOWER

Water Treatment and Community Hydroponic Farming

The tower acts as the water processing core for the proposal and is the main part of the proposal which is replicated throughout the city, creating a series of cooling islands as a result of the central impluvium. The veil of the tower acts as a passive moisture reclamation device which reclaims any moisture which occurs from the movement of water below in the central impluvium/gathering space and the transpiration of the hydroponic plants. Any water collected is then given back to the hydroponic system. It's opaque material shades but also allows through ventilation during the day which is a requirement of a hydroponic system. This materiality choice then creates an attraction during the night.

To conclude, the design aims to create a cohesive environment where people and water can interact together despite the changing environmental and social climate around them. It's a current scale focuses on creating mass production of sustainable water in order to accommodate a city wide scale however it would be interesting to see how this could work in a smaller scale. Although water scarcity will become a problem in Madrid, this problem already exists throughout the world. The thesis acts as an example of how water scarcity can be managed and act as a catalyst for the discussion of creating sustainable and social environments throughout the world, in both a large city wide scale and smaller community scale.