01 VENICE | water as urban identity + urban crisis

venice, italy
45°26'03.61"N 12°20'19.62"E

SUBSIDENCE + SEA LEVEL RISE

Venice faces the dual challenges of global sea level rise as well as local subsidence within the lagoon. Salt water destroys historic buildings and foundations, and the costs of maintenance drive many residents out of the city.

The historic decision to divert all rivers from the mainland outside of the lagoon in order to prevent siltation has robbed the lagoon of sediment. The tides, in part due to changes in the morphology of the inlets, remove more sedment than they deliver.

The Venetian lagoon sits atop layers of aquifers that extend 1000m below the surface. During the 20th century, groundwater extraction for industrial and urban use was a major contributor to subsidence and has subsequently been banned in Venice. A ban is anticipated in 2012 on all groundwater extraction in throughout the lagoon.

HABITAT LOSS + WATER QUALITY

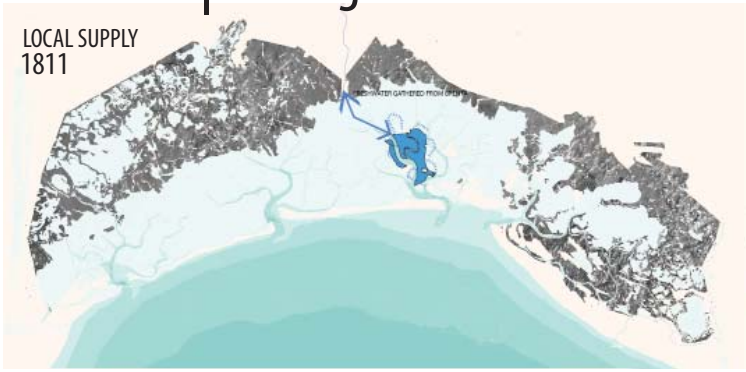
Several forces have lead to the loss of marsh habitat in the Venetian lagoon. Erosion and the disruption of riverborn sediment deposition have caused the lagoon to turn from a shallow, variagated tidal marsh into open bay. Landbuilding for human settlement and industry have filled wetlands, and the dredging of navigation canals and the wakes created by motor boats have futher compromised the health of wetlands in the lagoon.

The petrochemical factories constructed at Porto Marghera in the early 20th century have contributed dioxins, PCBs, mercury and other chemical compounds to the water and subsurface soils of the lagoon which have been fatal to flora and fauna.

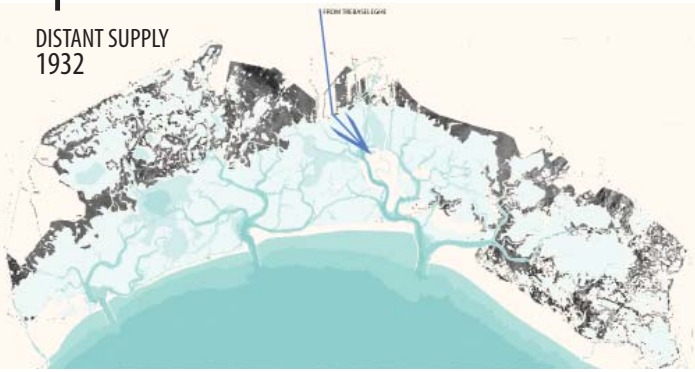
ECONOMIC MONOCULTURE + ECOLOGICAL TRADEOFFS

After its decline as a major global trading center, Venice has struggled to reinvent its economy. Many of these attempts, such as the industrial port, have severly degraded the economy of the lagoon while their economic sucesses are mixed at best. Venice is highly dependent on tourism, but the demands of these tourists on the sewerage and waste systems of the city jeopardize the physical structures of the city.

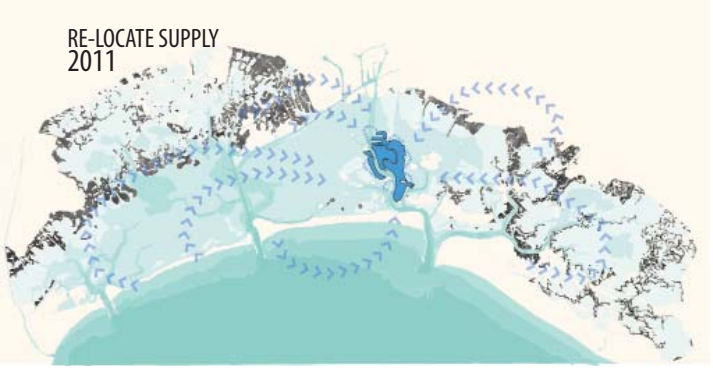
02 VENICE | tracing a historical relationship with water



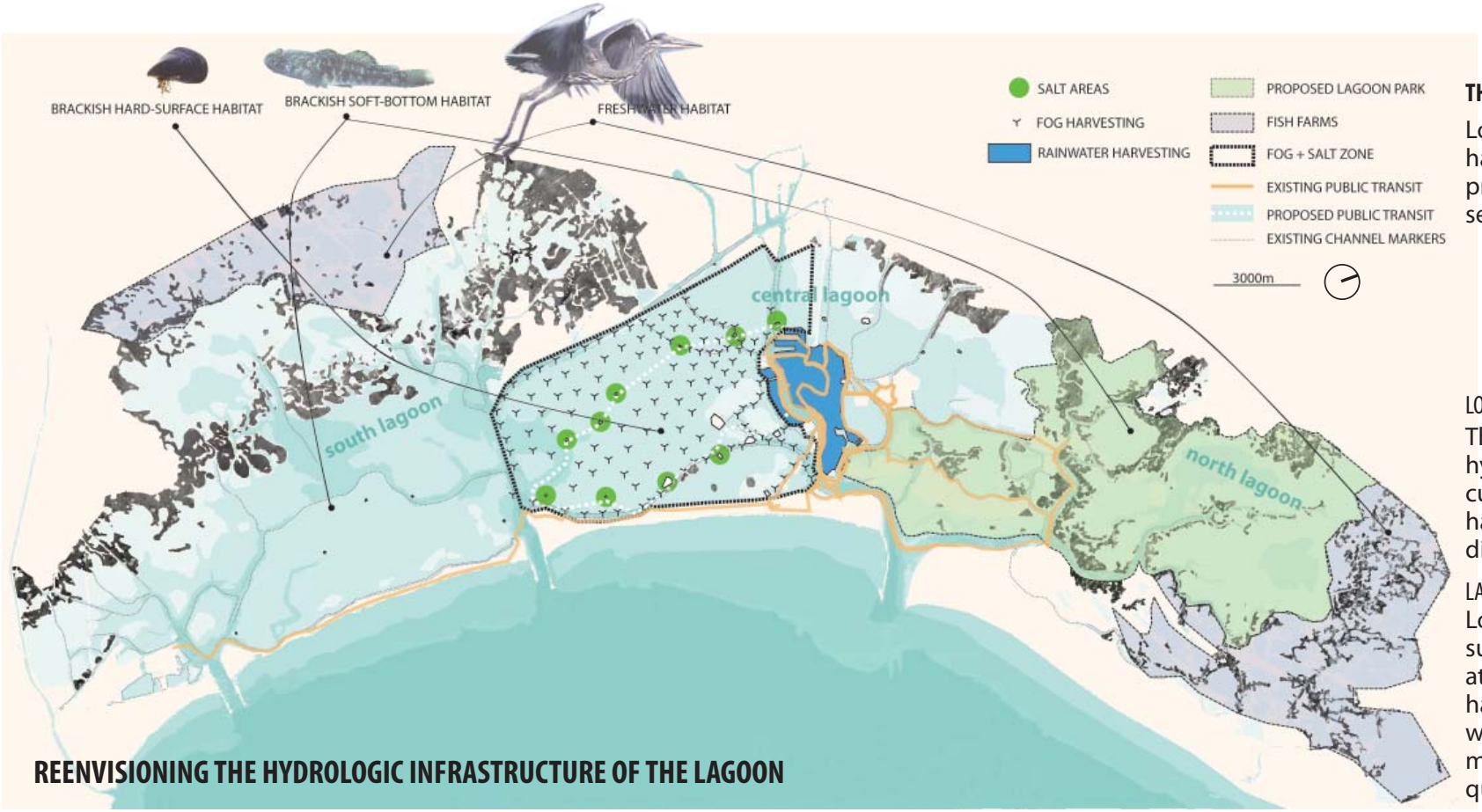
Cisterns within Venice collect rainwater and filter freshwater for the city. Rainfall is supplemented by freshwater gathered from the Brenta River by the water guild, the 'acquaroli'



In 1884, an aqueduct is built to gather freshwater from wells deep in the mainland near Trebaseleghe amid fears of cholera outbreaks given evolving ideas about germ theory and public health



Propose to re-activate the water generating capacity of the city and lagoon to create new social spaces, provide the foundation of a water economy, new habitat types, and stabilize the eroding lagoon



REENVISIONING THE HYDROLOGIC INFRASTRUCTURE OF THE LAGOON

THE CHALLENGE

Located in a brackish lagoon, Venice has always struggled with how to procure freshwater to support human settlement

LOCAL FRESHWATER RESOURCES

This plan proposes to reimagine the hydrologic infrastructure of Venice by cultivating local or 'guerilla' methods of harvesting water rather than depleting distant freshwater sources

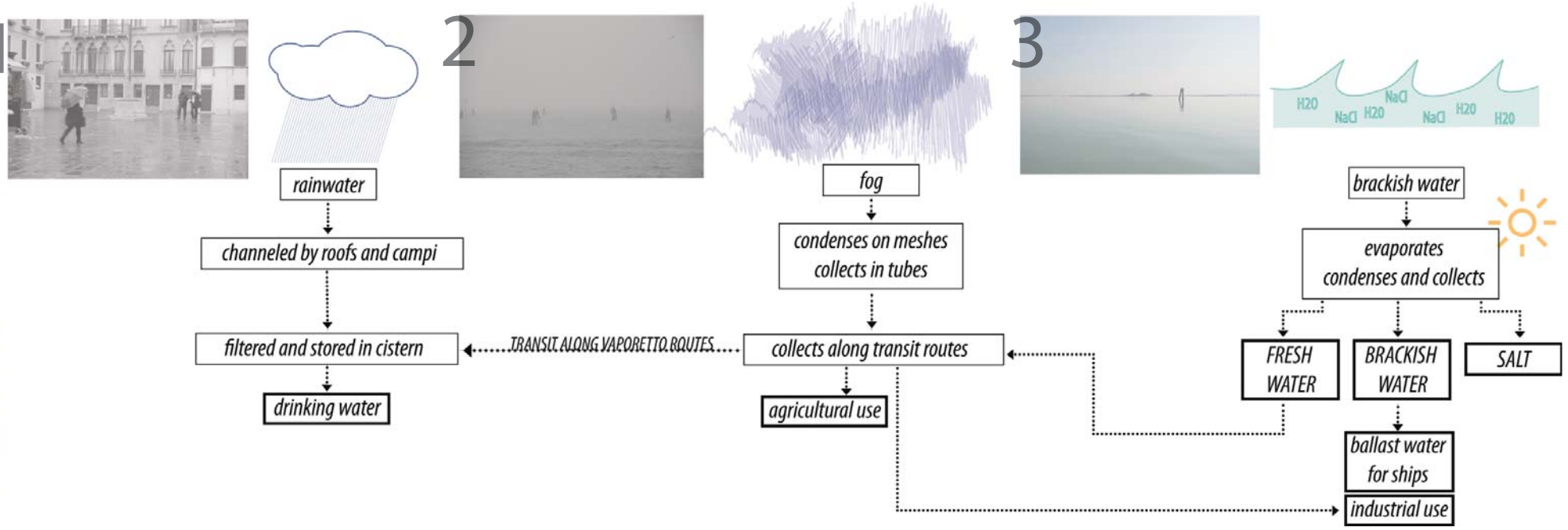
LAGOON ECOLOGY

Local freshwater procurement could support habitat restoration and creation. The lagoon supports a variety of habitat types, and the addition of new water infrastructures could create micro habitats and improve water quality

03 VENICE | alternative sources of water

LOCAL WATER RESOURCES Capture water locally using the unique resources of the lagoon | Three tiered approach of investigating techniques for low-intensive desalinization, rainwater and fog harvesting

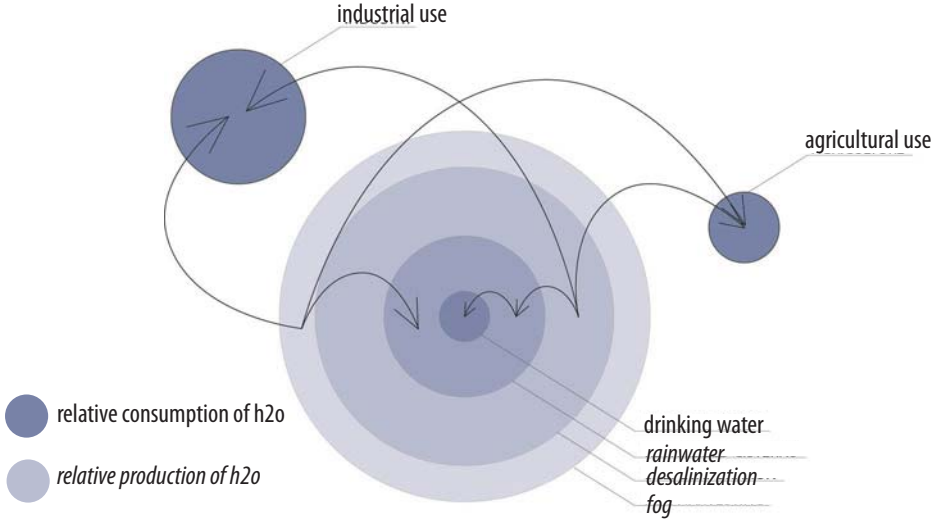
HYDRO-ECONOMY



ECONOMIC CATALYSTS

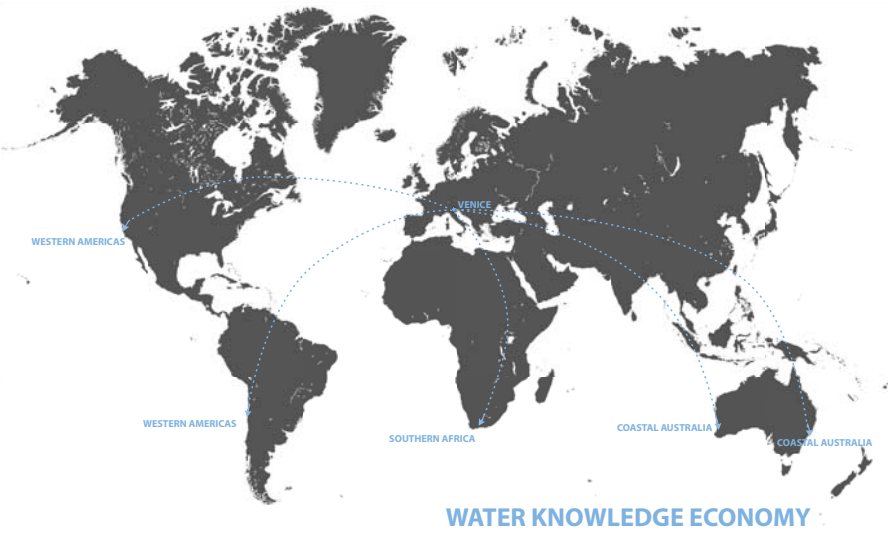
Local water production could benefit and catalyze several of the industries in Venice

These industries could help subsidize each other through investments in mutually beneficial infrastructure



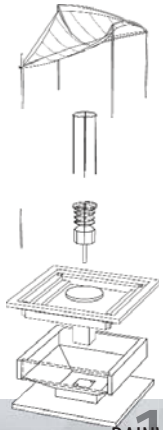
INNOVATION ECONOMY

Research into local, districbuted and sustainable water procurement could be shared between regions facing water challenges

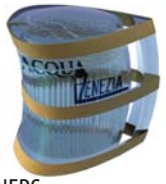


A NEW HYDROLOGIC INFRASTRUCTURE FOR VENICE

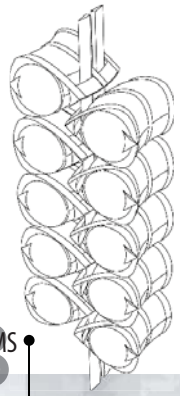
Our proposal rethinks the water systems in Venice, looking across scales from the procuremnt of water to its distribution. It leverages the tourist industry to help support these new systems and empowers a more sustainable tourism through eliminating plastic water bottle waste and reliance on distant aquifer supples.



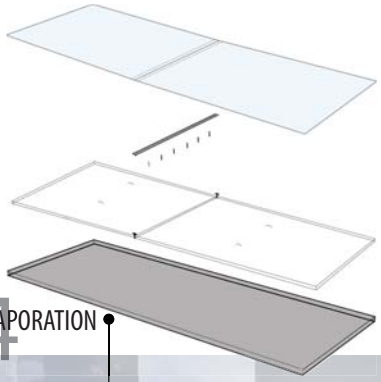
1 RAINWATER HARVESTING



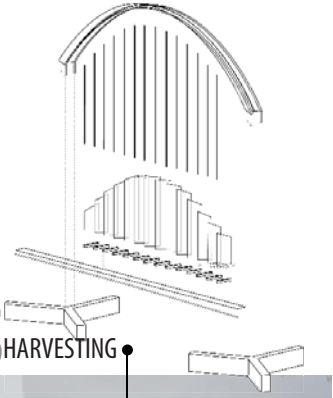
2 REUSABLE CONTAINERS



3 TRANSPORTATION SYSTEMS



4 SALTWATER EVAPORATION



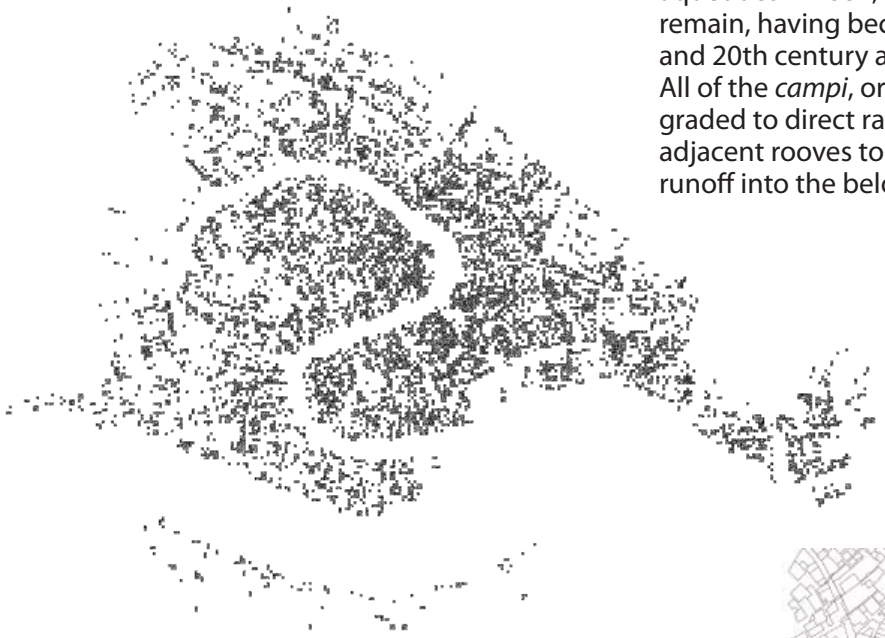
5 FOG HARVESTING

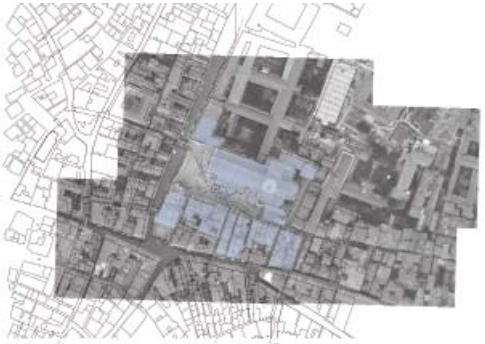
05 VENICE | cisterns as urban infrastructure

CISTERNS TODAY

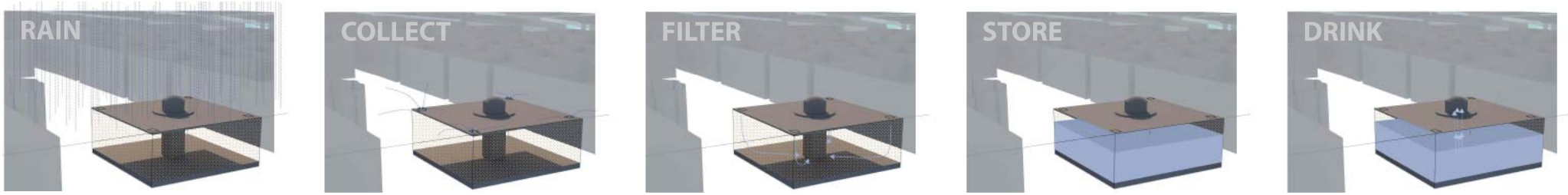
WATER AS URBAN FORM

Securing freswater was an essentail precondition to the settlement of Venice, and the construction of cisterns began as early as the 9th century. Each dot below represents one cistern - over 6000 exist beneath the surface in Venice.
Largely ignored since the introduction of an aqueduct in 1884, only about 200 well heads remain, having become a prized object for 19th and 20th century art collectors across the world.
All of the *campi*, or public squares, in Venice are graded to direct rainwater into cistens, and all adjacent rooves to the campi are piped to drain runoff into the below ground cistern.

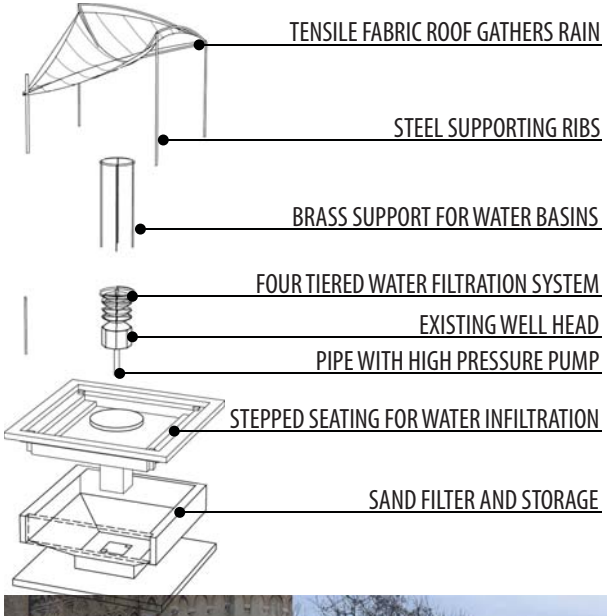




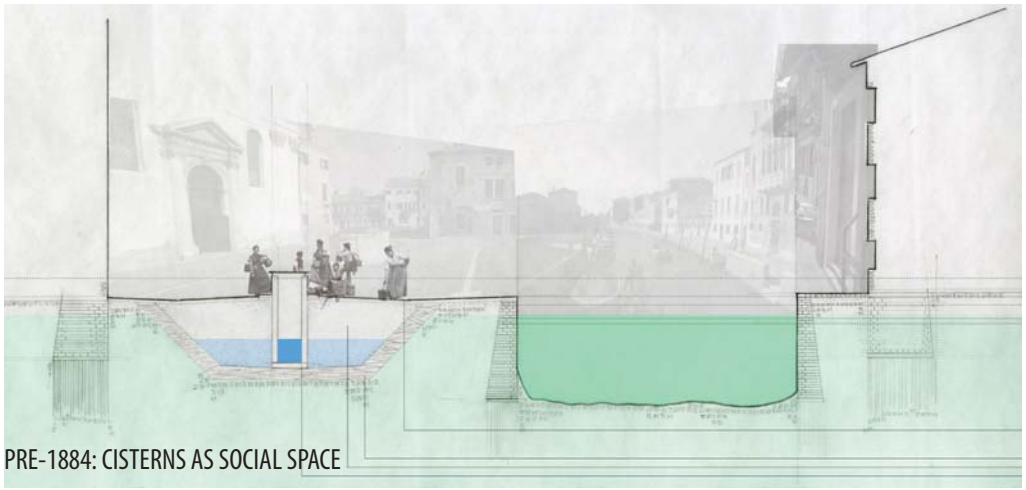
CISTERN "WATERSHED" AND FUNCTION



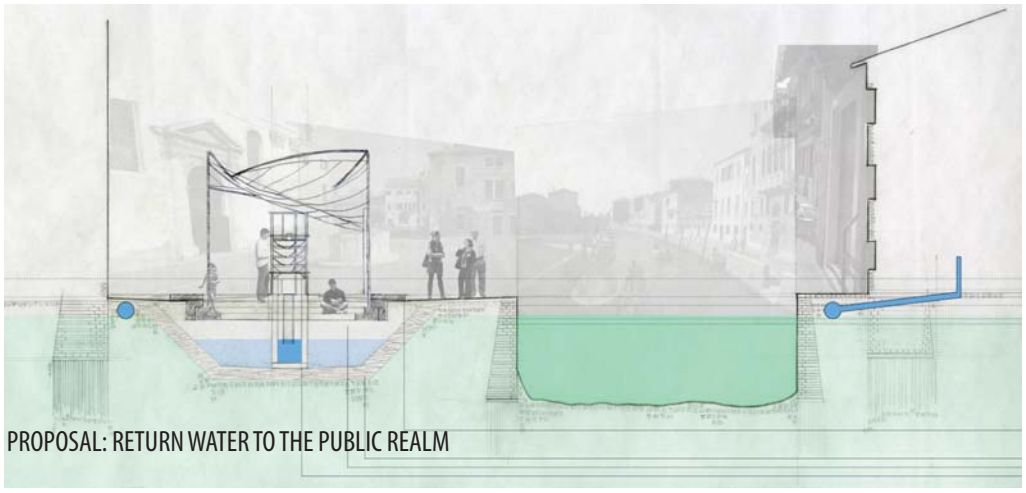
06 VENICE | revitalized infrastructure | new technology



NEW CISTERNS IN THE HISTORIC CORE
Our proposal would restore the network of cisterns in Venice, making them available as public fountains. The sand filter would be repaited and brought into line with modern standards, and water filter would be added above ground to bring water to drinking quality. A lever on the pump would pull water through these filters.
Cistern fountains would collect rain of city surfaces and could be supplemented with freshwater gathered throughout the lagoon.


PRE-1884: CISTERNS AS SOCIAL SPACE

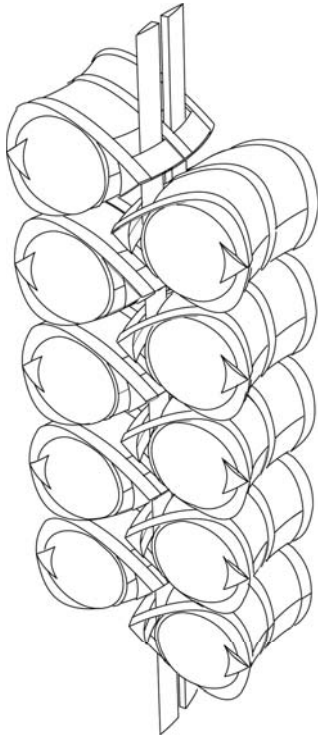

POST-1884: AQUIFER MOVES WATER TOWARD A PRIVATE COMMODITY


PROPOSAL: RETURN WATER TO THE PUBLIC REALM

07 VENICE | toward more sustainable tourism

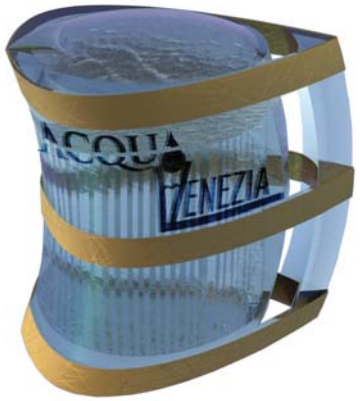
CONTAINER PURCHASE AND RETURN CENTERS

Tourists would be able to purchase containers at several key locations throughout the city. They could put down a deposit and then choose to keep the container as a souvenir or return it for their deposit. The bottles can be easily stacked for transport to washing facilities on outer islands. The container could be filled throughout the city at cistern fountains.



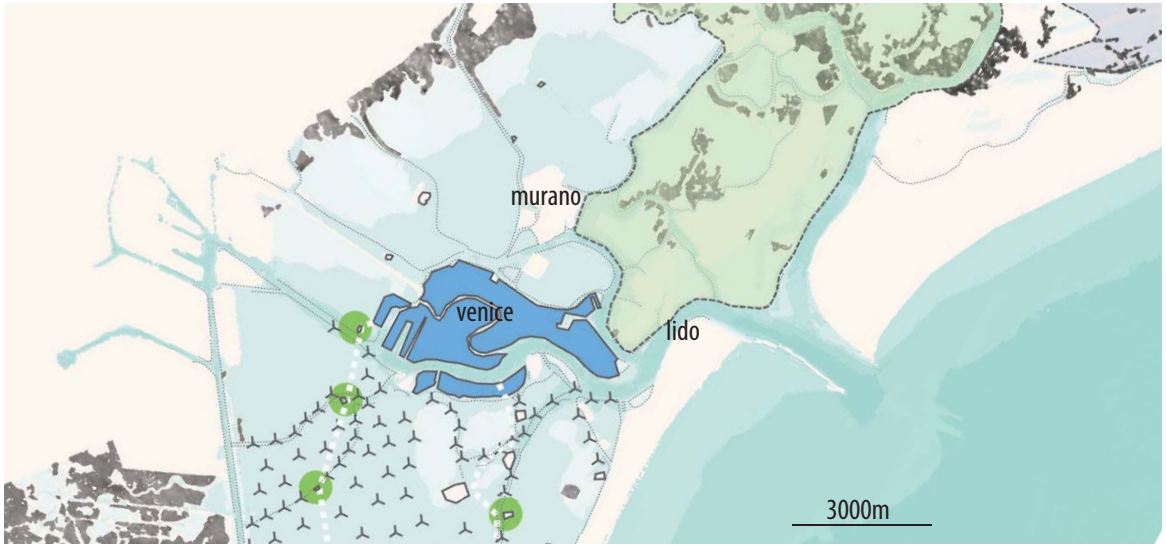
PLASTIC BOTTLE WASTE

Italians have the highest per capita consumption of bottled water in the world. Collecting these bottles in Venice presents major challenges, as garbage is collected by hand at great cost to the city. Our proposal addresses the local problem of bottled water consumption, as well as the additional pressures of the tourist economy which can bring an additional 50-60,000 visitors, and their trash, a day. It encourages more sustainable tourist practices and supports the glassblowing industry on Murano which would manufacture the containers.



REUSABLE GLASS CONTAINERS

The containers would be manufactured on the island of Murano which is known historically for its distinctive glass. Currently struggling to compete with cheaper imitation products from abroad, our proposal would help develop a market for local glass and create a more meaningful economic exchange for tourists.



08 VENICE | generating new transportation networks

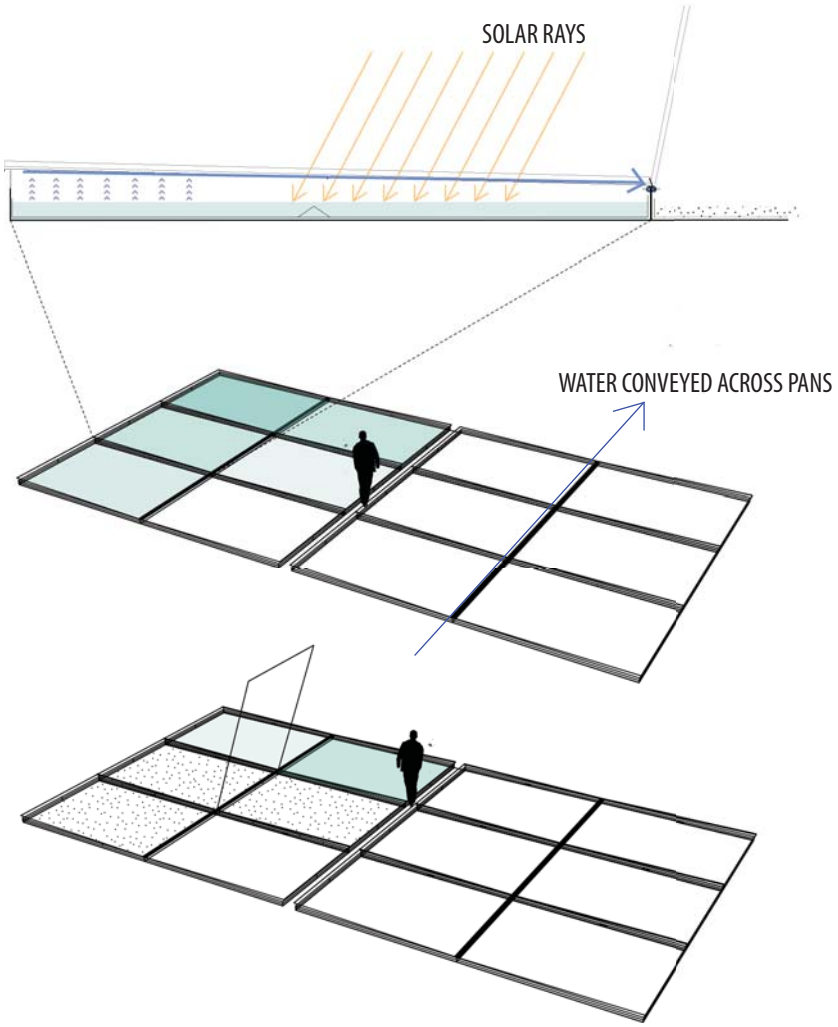
VAPORETTO AND EXISTING LAGOON NETWORKS

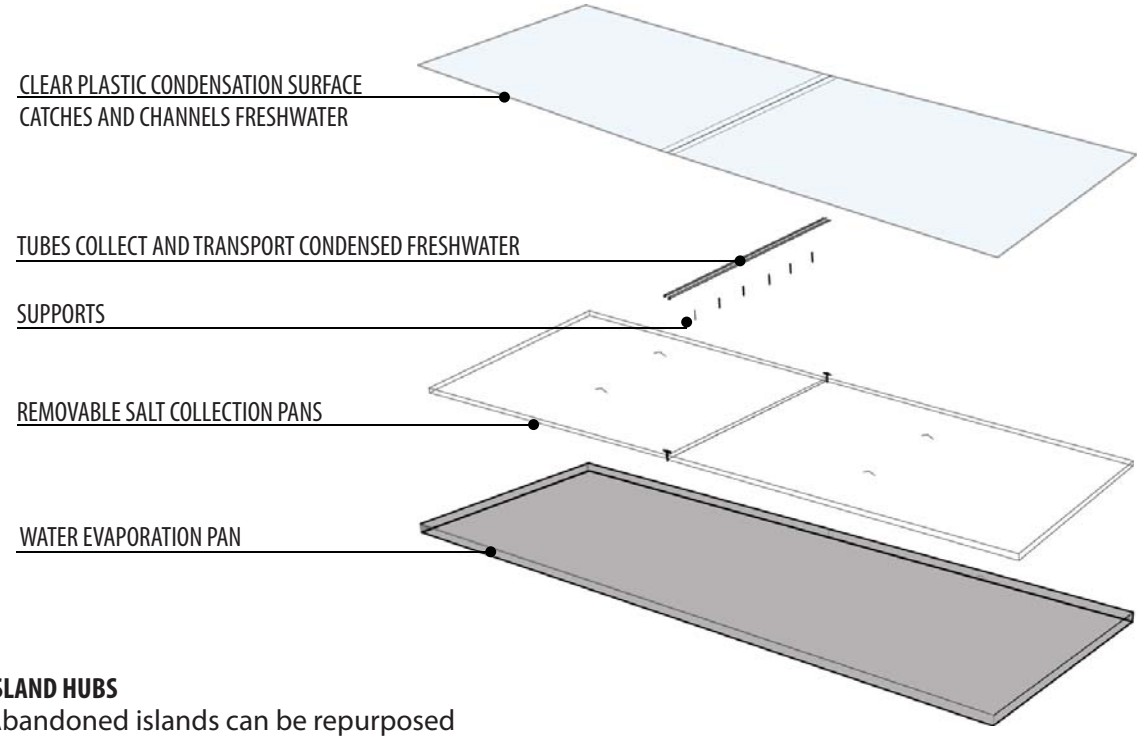
For transporting water and containers throughout the lagoon, we propose to use existing vaporetto routes that connect Venice with the other islands around the lagoon, allowing hydrologic and transportation infrastructures to support one another.
Many of the abandoned islands in the lagoon could become the hubs of the new water systems for Venice, acting as areas of water collection, container distribution, manufacture and cleaning. The new connections between these islands could be coupled with increases to vaporetto service increasing the economic viability and connections to these islands for both residents and tourists. This transportation could be the catalyst for a new future for the islands.

09 VENICE | water toward more diverse economy

DESALINIZATION BY EVAPORATION

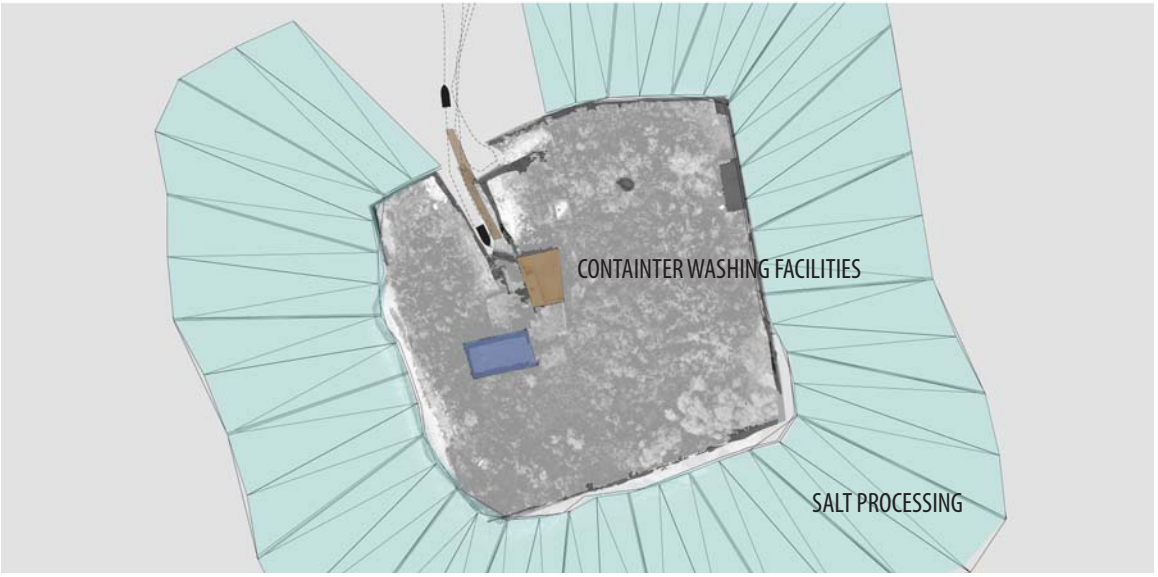
Rather than use energy-intensive methods, we propose solar evaporation to harvest water from the lagoon. Shallow floating pans will let in water which will evaporate and run along the upper surface of the trays into a collection system that runs through the pans. These conveyance tubes will be linked to walkways creating new inhabitable spaces in the lagoon.
Salt remains as a byproduct that could be used for industry.



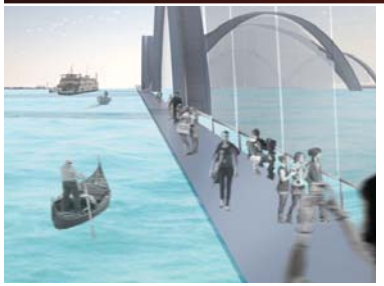


ISLAND HUBS

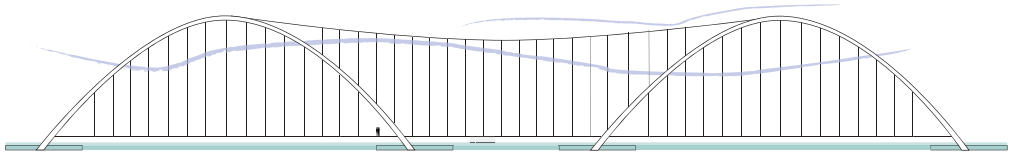
Abandoned islands can be repurposed to become hubs for the transport and processing of water supplies



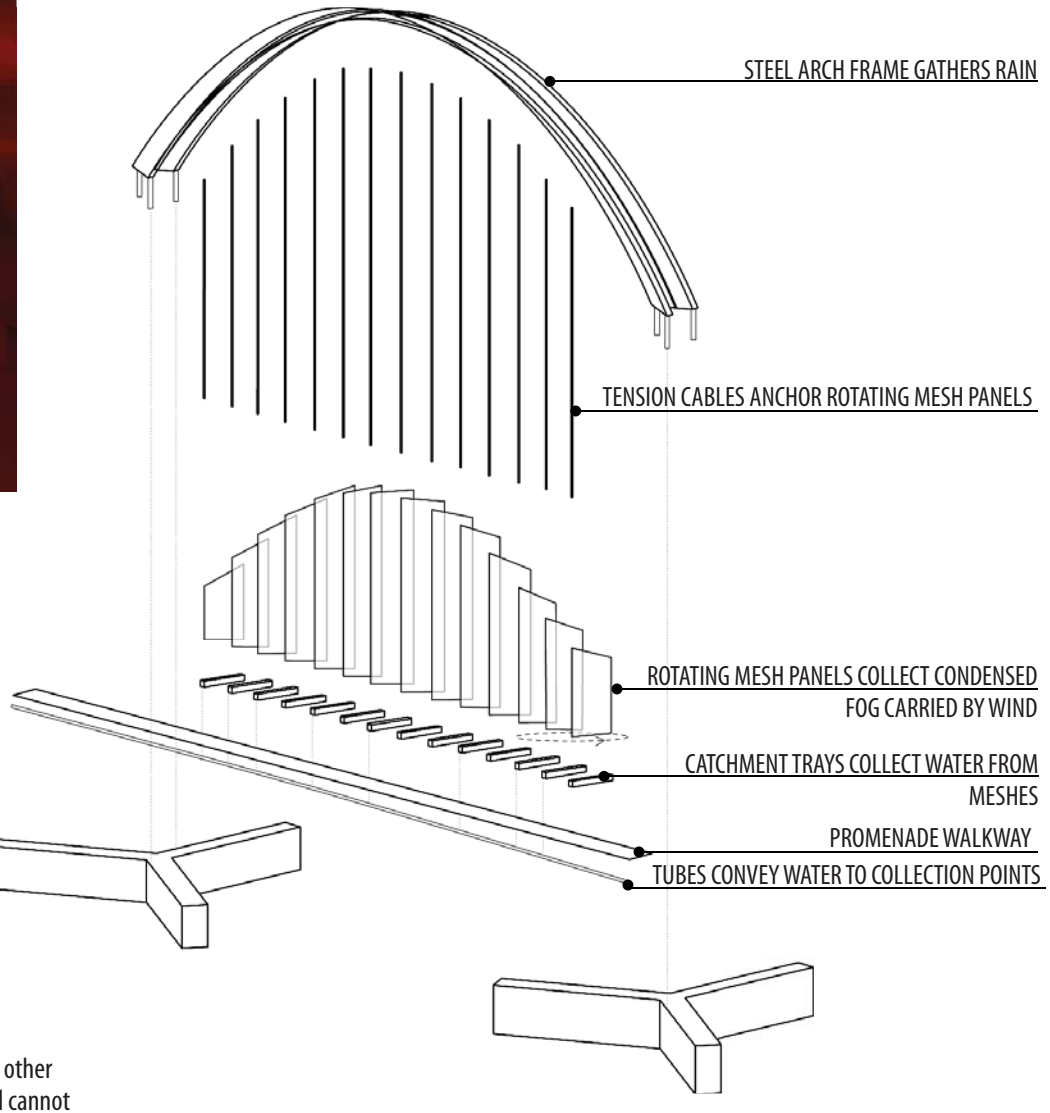
10 VENICE | water for alternative ecology and public space



NEW SOCIAL SPACE
The fog harvesters could also form a lagoon promenade, allowing the inhabitation of the lagoon in new ways, helping the lagoon to become part of the identity of Venice once again, and to take tourist pressure off the historic core.



FOG HARVESTER OPERATION



FOOTINGS: BREAKWATER + REEF HABITAT

Footings help break boat wakes that erode lagoon floor and marshes and act as groins to keep sediment from being taken by tides

Hard edges provide reef habitat for bay mussels and other biofilter species that help improve water quality and cannot anchor to the silty lagoon floor