

SENIOR FACULTY:
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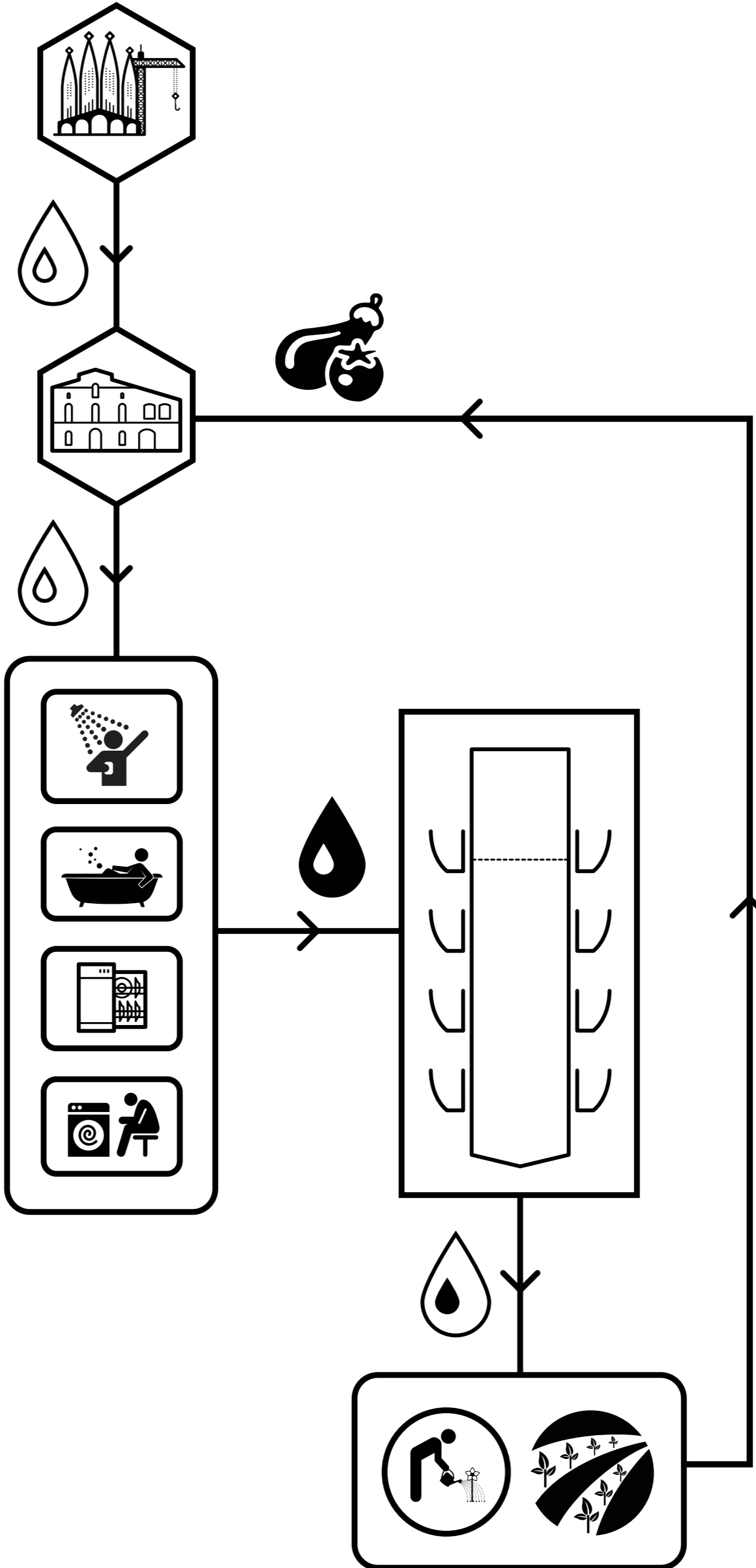
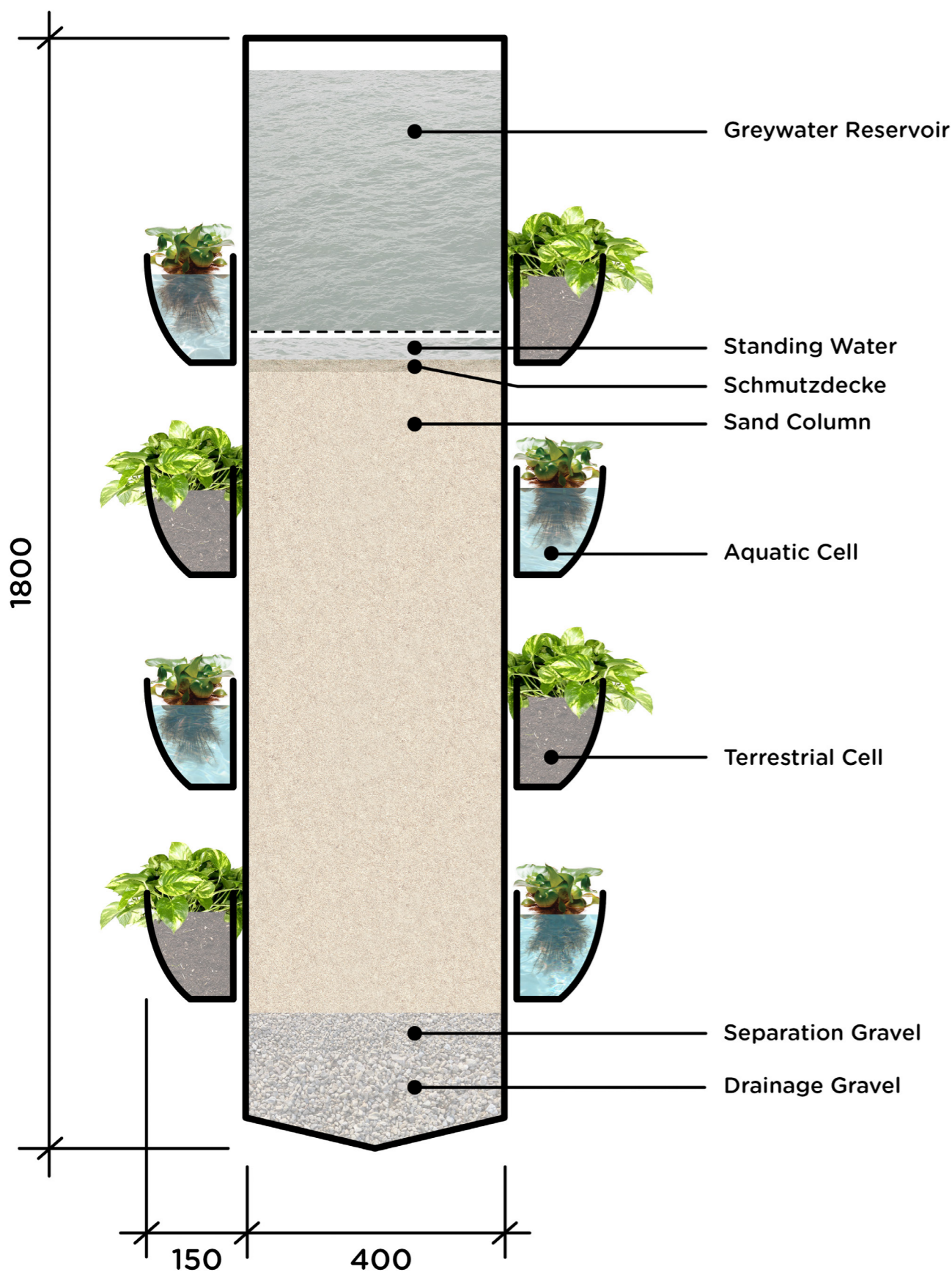
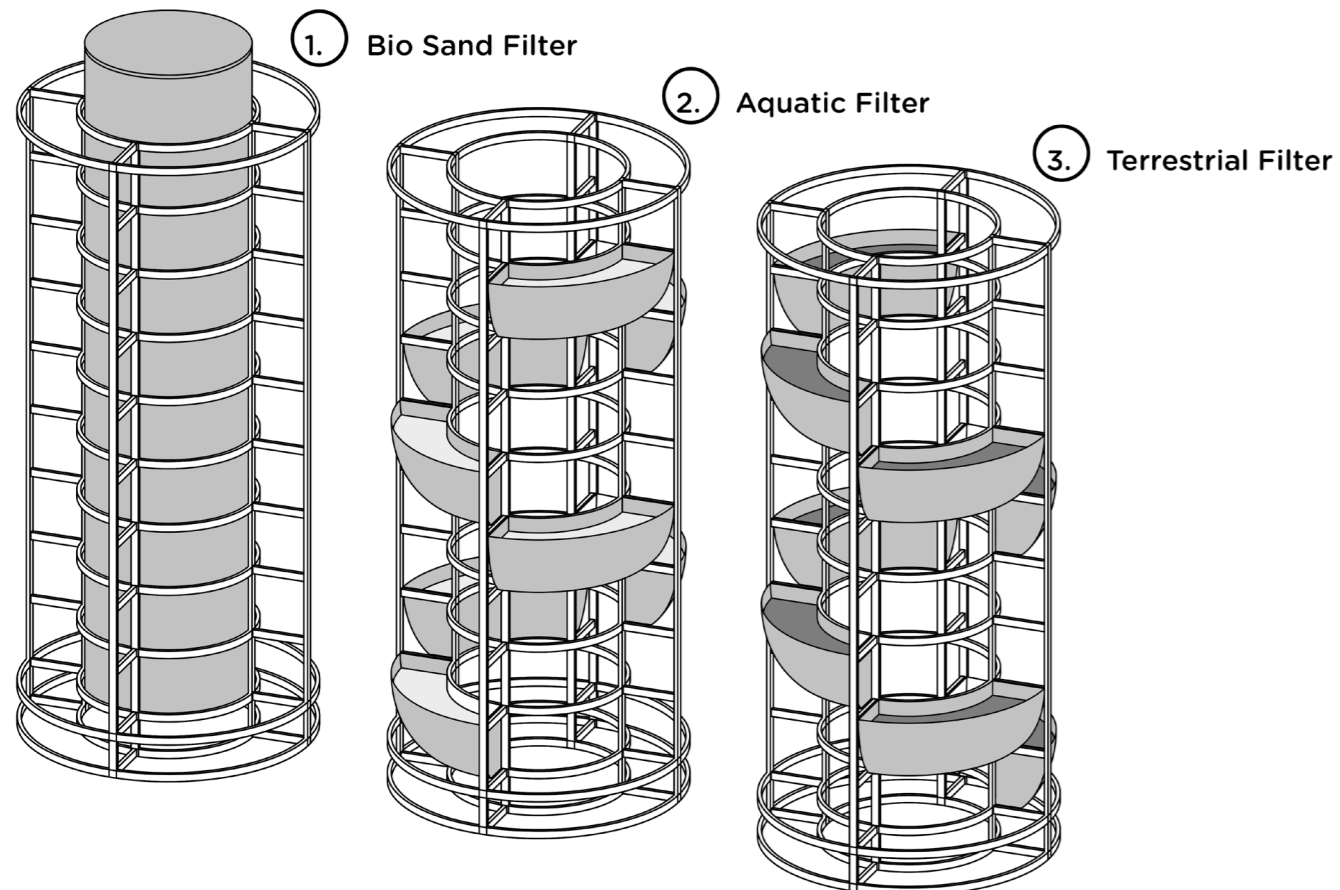
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INTRODUCTION

Water is the lifeblood of this planet. Since the industrial revolution, especially in the last century, water has become an abused resource. Most of our water bodies have become polluted, and we can no longer safely consume water from most natural water sources. Today's wastewater treatment systems are highly energy-intensive, require massive and extensive infrastructure, and often use chemicals and other less than ideal methods to process wastewater to potable levels. And yet we use only about 5% of this treated water for drinking purposes. Not all activities require such high quality water, and different activities produce different types of wastewater. In our current system, high quality potable water goes in, and wastewater comes out as sewage. However, most greywater is still relatively clean before it gets mixed in with blackwater to become sewage. What if we could redesign the system to upcycle and reuse greywater?

ON PRODUCTIVE LANDSCAPES

Agriculture accounts for about two-thirds of global freshwater use. In most cases, greywater is adequate for the irrigation of crops. By combining a readily available greywater supply with existing space, it becomes possible to transform otherwise unproductive landscapes into agriculturally productive ones, addressing the issue of greywater treatment while generating a local food supply. Valldaura is the perfect context for this kind of development. Since it is a location without service, water must be trucked in from the city of Barcelona, and consequently wastewater in sewage form must be trucked out. Meanwhile, the rain collected from the site is used solely for irrigation purposes. However, since rainwater is practically clean and much easier to purify to potable levels, it would make more sense to do so and then use the resulting greywater to irrigate the surrounding landscape.

THE PROPOSAL

Enter the BioHydro Upcycler. This biophysical water purification machine relies on simple technologies to upcycle greywater for reuse. Compact and adaptable, it is designed to be integrated into a domestic setting, unlike most biophysical water treatment systems, which operate at larger industrial scales. One such machine has the capacity to purify, at minimum, the daily greywater output of a single person. The physical and biological mechanisms within the machine break down and consume the pathogens, nitrates, phosphates, organic compounds, as well as other elements, purifying the greywater to a level suitable for irrigation purposes. Such a decentralized approach to water management demands minimal infrastructure and would help to alleviate the load on urban water treatment systems, while creating increasingly self-sufficient and resilient cities and communities with local food supplies.

