GRADUATION PLAN

Circular Paquetá

ARGUMENTATIONS OF CHOICE OF THE STUDIO

The thematic focus of the Architectural Engineering Studio is in line with my personal interest and specialization of the last couple of years: circularity, productiveness of the city, and similar approaches in response to the current take-make-dispose economy.

The studio coordinators approved my choice for a different location (Ilha Paquetá, Rio de Janeiro, Brazil), so it was not necessary to, alternatively, embed it in Explorelab.

GOAL

Improve the ecological footprint of Ilha de Paquetá, by making a building where a wasted resource is reprocessed into something valuable and at the same time the local economy (jobs), culture and identity is enhanced.

PROBLEM STATEMENT

I. Waste

The current take-make-dispose economy have led to considerable environmental issues. Natural resources are depleting and waste is polluting the oceans.

On Ilha Paquetá, an island in the bay of Rio de Janeiro, this linear process is very much visible: on one side of the island new products such as food, water and energy arrive by boat, while on the other side another boat returns to the mainland with the waste that is generated. The beaches are polluted with solid waste from the surrounding mainland and the water quality in the bay is disastrous.

The amounts of resource consumption and waste generation increase by the great number of tourists visiting the island. The system of import-consume-discharge is very much observable during two major events: Carnaval and Festa Junina. Around 15,000 people visit the island, all demanding for at least the basic needs such as alimentation and sanitation, increasing the in- and outflow.

II. Little economic opportunities

Most economic activities on the island mainly relate to tourism. Located one hour by boat from Rio de Janeiro, Paquetá receives many tourists for day trips. Despite of the environmental issues of the bay, the island is still known as an idyllic place: calm, car-free and very safe.

The one-sidedness and the small size of this local economy result in a lack of work opportunities for the residents. Therefore, youngsters often leave Paquetá to work on the mainland, while elderly who look for a peaceful living environment replace them. Demographically, this leads to an aging population.

OBJECTIVE

The aim is to reduce the inputs and outputs of Paquetá, by reducing the demands or turning wasted resources into valuable products. The incentive for the local community to get involved are the opportunities that this new economic activity brings, while solving the environmental problems of the island at the same time.

From a broader perspective, the aim is to show the possible benefits of circular economy applied in the built environment related to environmental, economic and social issues. To connect top-down system-level interventions with the local conditions and desires from society. The location of Paquetá is therefore strategic, since it’s quite small and therefore easier to implement solutions, but at the same time in the Guanabara bay and very close to Rio de Janeiro.

The result is the design of a building where the reprocessing of a certain wasted resource takes place, generating economic activity and jobs this way.
isolated economy
few jobs
little stuff to do
protection economy: high costs of living

product import: high costs of living

costs for waste disposal

polluted Guanabara bay

polluted beaches and swimming water

loss of local culture and identity

strong community

tourism

tourism peaks

ill. 1: map of pains
OVERALL DESIGN QUESTION
How can architectural and urban interventions facilitate the utilization of wasted resources and generate new economic activity on Ilha de Paquetá?

THEMATIC RESEARCH QUESTION
What are the dimensions of the current energy, water and material flows on Ilha de Paquetá, and what are the opportunities for system-level interventions?

METHODOLOGIES
The main topics that will be studied to answer the research question can be be divided in two tracks: one is related to the context (Ilha Paquetá) and the other is related to the objective that is aimed for: reducing the in- and output flows.

The outcome of these two research tracks will define the program of the building to be designed, that will facilitate new synergies on Paquetá, reducing the in- and outflow quantities. The program is correlated with the economical and social aspects of intervening in the current situation on Ilha Paquetá. Important aspect is the proudness of the local residents on their history and identity.

Paquetá-related: context
To gain insight in the current material, water and energy flows of Paquetá, a Material Flow Analysis is the outcome of the research paper. Furthermore it is important to understand the history, culture and traditions better.

Literature study and desk research is combined with more practical field work, data collection and interviews on site (17 April - 7 May).

The sub-research questions are:
• What can be learned from the history, culture, traditions and social structure of Paquetá?
• What are the current material, water and energy flows of Paquetá?
• What system-level interventions can reduce the in- and output flows, based on the MFA?
• How do the consumption pattern, behaviour and demand of tourists look like?
• How is the local economy organized?
• What are the physical, spatial and geological conditions of Paquetá?
• What are the local building methods and traditions?
• How is the current waste management system organized?
• What do residents and tourist think of the island and what would they like to change?

Urban metabolism and circularity: flow
Knowledge about urban metabolism, circular cities and circular economy in general is currently being developed and applied worldwide. Other islands will be studied, since they are most likely to provide insights in the possibilities for creating synergies on Paquetá. Apart from the case studies, also literature research will be conducted.

The topics to be studied are:
• What can be learned from studying different types of cyclifiers in urban environments?
• What interventions are possible to decrease the system-level in- and output flows of an area?
• In what ways can waste be turned into resources?
• What can be learned from other islands related to decentralized resource management?

Connect top-down and bottom-up viewpoints
This way, a top-down system-level strategy to improve the ecological footprint of the island is combined with thorough bottom-up understanding of the context and local needs and desires.

The Material Flow Analysis and the proposal for system-level interventions are the focus of the research paper.

A list of the relevant literature can be found at the final page of this graduation plan.
How can architectural and urban interventions facilitate the utilization of wasted resources and generate new economic activity on Ilha de Paquetá?
In an age of increased environmental concerns, with depleting natural resources and waste pollution, this graduation project seeks alternative solutions for this current linear system. Addressing these issues is not new, many system changes and specific projects have been spread already (Circular Economy, Industrial Ecology, Cradle to Cradle, Permaculture, Performance Economy, etc.).

On the island Paquetá, all products are imported from the mainland. After use, the waste is transported back with diesel-powered ferries. This represents in a very clear visual way the way the current take-make-dispose economy works. Economically, Paquetá relies mostly on tourism, given its very attractive qualities. Result: very little economic diversity. Thirdly, there is the external factor of the pollution of Guanabara Bay the island has to deal with.

This is exemplary for the challenges that islands have to deal with worldwide: resource pressure, limited economic diversity and vulnerability to external factors (climate change).

However being most urgent on islands, these kind of issues are global challenges that call for a circular economy approach. Considering their clear, natural boundaries, islands are perfect isolated test grounds to test how decentralized resource management systems work in practice.

This graduation project emphasizes on (1) the spatial aspect (how can a cyclifier be spatially integrated in the built environment?) and (2) the social aspect of it (how can society become naturally involved in the transition to a circular economy?). Using an island as test ground is a strategic choice, considering the urgency, scale and scope.
LITERATURE: CIRCULAR ECONOMY, MFA METHODOLOGY, SOCIAL INCLUSION, ILHA DE PAQUETÁ LITERATURE, CITY METABOLISM, CIRCULAR CONSTRUCTION


de Oliveira, R. R. S., Lemes, M. W., & Lopes, C. A. S. Análise comparativa entre o desmatamento e o aumento populacional da Ilha de Paquetá/RJ. Históriagmbcp, 143.


Case studies:

- Islands: Samso, Maledives, Sardinia, El Hierro, San Andres, Vlieland
- Upcycling facilities and material warehouses (Wesley Verhoeven, Frederice Koch, Eric Eisma)
- Social (recycling) projects: Rede Asta (women), Favela Maré, Precious plastics, New Marble, Rue Rangoli, Waste Transformers, Gone Rural