

**Reflection Paper**

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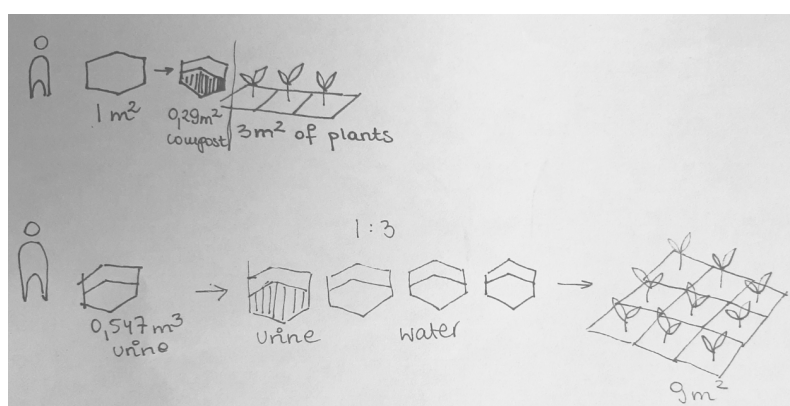
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Before starting the reflection, I would like to say a few words about the initial fascination which would clarify the starting point of the research. The idea was to accommodate more space for nature and intervene it with buildings. In the ideal scenario, the landscape layer would wrap the building - I see now how delusional that was. Along with going deeper into the subject of nature in the city - the relation between artificial and natural - I concluded that it is impossible to make the biota come back to its origins as I dreamed. First of all picking, the species for designing the habitat already narrow downs the biota which is allowed. I have to find good reasoning what this bird, not the other, which was already pointed out as a weak point by my research tutor. Second, there is no such thing as original nature as it evolved all the time and it is still evolving. Therefore instead of focusing on the biota itself, I tried to tackle the subject by the elements without which biota won't exist. In other words, I analysed the nature at the system level with its flows - nutrients, water, oxygen etc.. based on the Millennium Ecosystem Assessment which describes the ecosystem's services.

### The relationship between research and design

In the Netherlands, wastewater treatment plants treat 93% of industrial and 98% domestic wastewater. Sometimes the rainwater is also conveyed to the central water system. It means that most of the wastewater flow is directed to one location, treated and released to rivers. (Leenaers, (Ed.) 2012, p. 73) Even effectively treated wastewater can have extensive effects on stream ecosystem structure and function as it unnaturally introduce the water with different chemistry levels than the one in the output location. (Gucker, Brauns, Pusch, 2006). The research was focusing on the possibility of closing the waste (grey and black) in the city, through decentralizing the existing water treatments. The outcome was the system which treats faeces and urine to safely introduce them into the landscape making the circular model.

Due to the sanitation treatment atypical for the Netherlands, the program of the building had to be partially changed. Instead of pipes connected to the regional water treatment, the residents had to transport the waste into the communal compost-alkaline treatment room to later after 6 months apply the compost to the landscape. Urine separated in the toilet with water 1:3 ratios is transported to the plants on the balconies, the output is a natural fertilizer for the plants.



*The outcome of the research in simplified diagram*



### *The general approach in the design*

The outcome of the research – elements needed to be accommodated in the building in order to have local waste treatment - was already clear but the challenge was to make it possible in the existing building. Placing the elements of the waste treatment in provided space was feasible but I had some doubts with the human comfort. Due to few floors building height people have to learn new way to interact with it. My concern is if the new habits of e.g. transporting toilet waste meets the standards and comfort of the Western Europe culture.

The process from research into design even though the outcome of the research clearly informed the design was challenging. The way of thinking from finding resources on every statement had to change into finding creative solutions and designing. After my P2 my feedback was to focus more on the human experience than sanitation system as some elements in the social values were missing. After that through making physical models, sketching and virtual models I study the spatial aspects of architecture to bring more these qualities in the design.

### **The relationship between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)**

The focus of the studio is second life which in my graduation project follows the aspect of how to reuse the existing structure and add a new value to the residents and surrounding. As for research paper and outcome the new life is brought by the nature accommodated into the skin layer of the building (see Steward Brand diagram). The nature is one of the elements required in the local toilet's waste treatments, and at the same is a design tool bringing social and environmental values into the existing building. The intervention is done though adding a new layer of balconies which improves the climate and a living quality ( more space, private outdoors space) for new residents.

### **Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.**

The topic of closing the nutrient cycle follows the studio approach which is about finding architectural solutions for environmental and societal throughout all scales in architecture. In the research paper the strategy was research-by-design, which in this case is experimental strategy supported by literature review to gather relevant data for schematical prototype. This way the research outcome could be smoothly applied into design. The method with schematic diagram in the research paper eliminated inaccuracy and errors on the system level, but more knowledge on water sanitation and waste treatment technologies could introduce different solutions on moving components into the natural cycles of the landscape. The research outcome did not take into account the transportation of the waste. In the design process with the given existing building the possibilities were studied and conclusion was involving human action in the beginning of the treatment (the transportation phase), which influenced the programme of the building.

### **Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.**

Nowadays, the urban settlement is designed with priority and comfort for people. Humans are disconnected from the natural environment as the knowledge of processes is deficient and fragmented. The artificially engineered infrastructures extract and utilise resources avoiding naturally occurring ecosystems. The traditional architectural projects either reduce impacts on nature or compensate for any residual effects - it seems like the natural ecosystem is perceived as a necessary burden in the design process. The research outcome - schematical prototype – can be applied in any architecture scale design and in any climate zone. It is a simplified version of the sanitation treatment which doesn't take into account site, so for further development the knowledge of local culture and environment is required. Thus the graduation project shows the alternative solution of the toilet waste treatment following the reuse design principle. The project can serve as a basis for discussion on the feasibility, human comfort while using this unconventional system in the Netherlands.

**Discuss the ethical issues and dilemmas you may have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.**

It is generally taboo to bring up the subject of faeces and urine. From my experience in architecture, it is not talked about as often as, for example, about climate comfort or materials. As a rule, the toilet is connected to the regional sanitation system and that will be the case. For this reason, I had to go beyond my prejudices to thoroughly study the subject of sanitation in the human settlements. The results for research with combination with graduation project can be applied in the design of the building, redefining the conventional sanitation system.