GRADUATION PLAN + REFLECTION

TU DELFT // ARCHITECTURAL ENGINEERING

BACK TO THE ROOTS

Rethinking Aruba's residential building standard

Student

Yasmijn Frederique Quandt
4498321

Tutors

Eric van den Ham
Mo Smit
Paddy Tomesen

MSc4 AR3AE100

Personal information

Name	Yasmijn Quandt
Student number	4498321

Studio

Title	Architectural Engineering
Main mentor	Mo Smit
Second mentor	Paddy Tomesen

Argumentation for the choice of the studio

With my graduation project I aim to contribute towards a more sustainable future by creating innovative responsive architectural solutions to tackle relevant contemporary issues. The AE studio offers exactly this framework while the open brief gives me the opportunity to work with a specific personally chosen context and technical fascination. Having grown up on Aruba, I feel very passionate about inspiring a sustainable shift in the standard of the built environment on this island in the Caribbean.

Graduation project

Title of the project

Back to the roots:
Introducing a responsive residential typology for the tropical island of Aruba

Location

Caribbean, Aruba

Problem statement

Aruba is a relatively tiny island off the coast of Venezuela. The island covers around 180 square kilometers of land and houses 107,000 inhabitants. Tourism plays a critical role in the islands economic growth and stability as it covers 91% of the GDP. However, the accompanying high levels of new immigration have led to urban sprawl and in turn increasing erosion of the natural landscape.

Yearly, Aruba hosts over 2.000.000 visitors of which 80% is from the United States. Especially this large tourism flow has played a significant role in the globalization of the culture and in turn an increasing alienation from the islands original identity. Lots of new public but also private buildings are designed in styles that have barely any connection to the Aruban context and history.

The widespread urban developments on the island have not only led to the erosion of the natural landscape but in turn also the threatening of endemic species and an overall loss in biodiversity.

Besides the shift in the island's representation, there is also an imbalance between the use of local resources and the extensive reliability on import. Within the framework of the built environment this means, practically all building materials are imported, mechanical appliances are used extensively to regulate thermal comfort and roughly 85% of the island's energy is being generated by fossil fuels.

The local environment offers an abundance of renewable (energy) resources such as the sun, constant cooling trade winds and natural materials such as loam and aloe vera, however they are not optimally integrated in the development and use of the living environment. Current building standards mean almost no consideration into sustainability, full reliance on imported materials and

designs that offer little to no thermal comfort without the use of air conditioning.

Aruba has been incredibly stagnant in terms of innovating for sustainability. Many things are developed based on old patterns and therefore lack the ambition to fight against climate change, for example. One of the reasons is Brain Drain. Most of the locals who go to study abroad do not return until they are much older or never even return. Thus, relatively little of the modern knowledge they have gained and the accompanying awareness of the importance of becoming more sustainable ends up on the island. Many projects, despite some sustainable visions, often fall into the rails of old habits and are therefore guilty of greenwashing rather than actually contributing to making the island more sustainable.

Research questions

How can passive design strategies be integrated in the built environment of Aruba to contribute to comfortable living conditions and minimize the reliance on mechanical appliances?

Thematic research question

How can a residential nature inclusive typology on Aruba optimally use the local resources while strengthening the islands identity and ecosystems?

Design question

The design assignment aims to inspire a sustainable shift in the standard of the built environment on Aruba by finding integral design solutions for architecture that considers the climatic conditions and the island's local resources, ecosystems and culture in the form of a nature inclusive neighborhood.

Design assignment

Process

Method description

The thematic research will focus on finding the appropriate set of passive design strategies for Aruba's specific climate to contribute to comfortable living conditions while minimizing the reliance on mechanical appliances. This technical substantiation will then function as a guideline for the architectural design process. The nature inclusive aspect of the neighborhood is framed by focusing on two different endangered endemic bird species as co-users.
The project's research is divided in a formal technical oriented research and an informal analysis of Aruba's Genius Loci. The methodology is largely covered by field, literature and case-study research and a constant feedback between them.

Literature review: literature and scientific articles will provide the state of the art on passive design strategies appropriate for Aruba's climate

Cultural analysis: studying the island's history and contemporary identity assist in forming a narrative that describes the cultural characteristics of Aruba as a framework for decision-making during the design phase.

Ecological analysis: by mapping the local ecosystems, they can be considered within the development and use of the architectural project.

Imagery: A personal documentation of the architecture and landscape can contribute to the narrative of the islands spatial characteristics and form the base of aesthetical inspiration for the design proposal.

Literature

Passive design strategies

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Aruba

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Aruba Birdlife Conservation

Aruba Arikok National Park

Reflection

The role of the architect has acquired an increasing complexity over the years. Essentially, she is concerned with the embodiment of space, often with specific goals in mind. Every architectural project is subject to different design choices based on technical, social and aesthetic principles that are unique to its specific context. However, in light of the current climate crisis, sustainability and circularity have become indispensable parts of the creation of architecture. As humans on this planet, we are part of an ecosystem that is currently on the brink of irreversibly being damaged. Therefore, as a future architect, I feel responsible to guide projects based on an ego-centric worldview in order to contribute to the restoration and maintenance of these balances.

The studio of architectural engineering aims to make this an integral part of the creation and use of architecture. By focusing on the technical substantiation and future perspective as a critical aspect of a project, next to for example the aesthetic, functional and social facets, architecture is approached as a holistic art. The “harvest” assignment within the studio narrows down this scope and concentrates on circular design strategies and principles in architectural nature-inclusive solutions in which the energy transition functions as a leverage for the development of responsive living environments.

The context in which the research and design has been executed, including the technical theme, was up to me to decide on. Having partly been raised on Aruba, where the development of sustainability has mostly been stagnated due to brain drain, it was only natural to choose this context for the this project.

After I graduate, I aspire to give back to the island and promote a sustainable shift in the standard of the local built environment by finding an integral design solution for architecture that considers the climatic conditions as well as the island’s resources, ecosystems and culture. Therefore, I have been highly led by the purpose of transferability to a realistic project. In hindsight, the parameter of realistic feasibility is something I would introduce in a later stage of the thought- and design process which would be conducive to widen creativity and out-of-the-box thinking.

The focus of the thematic research paper was to find the appropriate set of passive design strategies for Aruba. By analyzing the local climate and using this as a guideline during the scientific literature research, I was able to conclude what design tools would

be useful to implement in the built environment of Aruba. The ability to independently conclude (new) substantiated knowledge is what eventually makes one a master of science. To then be able to translate this knowledge into a responsive holistic architectural proposal is what makes an architect. For me, the challenge in this was to not blindly combine all the strategies in the most basic forms but to fully understand the logic and consequently achieve a nuanced design.

What I struggled with the most in the initial phase of designing was the conviction that a holistic project is created by solving all parts not just integrally but also simultaneously. This is the goal, but does not necessarily define the process in which it is achieved. By dividing the design objectives into various small exercises, the opportunity can be created to experiment more widely. Individuella zooming in on these different subjects also gave me a better feeling for the essence of the project and in turn taking combined design choices happened more organically.

Being so closely related to the unique island made it difficult for me to be objective in the design process. I am deeply familiar with the culture and landscape and therefore am very biased in the belief of what the proposal should become. However, this familiarity also presents an advantage because it means I have a deeply rooted feeling for the genius loci, something a completely objective architect might not always be able to bring forward. Unfortunately, this has become apparent when looking at the latest architectural developments on the island. That is why the title of my project is “back to the roots” as it captures the very essence of what I tried to achieve. Somewhere along the way of the island’s architectural developments there has been a disconnection to the sense of the genius loci, which in turn can be referred back to the balance of local ecosystems.

A responsive architectural typology has eventually been proposed by carefully considering the social, architectural and ecological context of the island in research and design, The project holds the potential to be translated into a new concept of residential developments when finetuned according to for example financial and manageable possibilities involving the government and/or other stakeholders.