

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Ivana Martin Kafedjian
Student number	6467033

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Stephan Verkuijlen	Design Tutor
Second mentor	Jos de Krieger	Research Tutor
Argumentation of choice of the studio	During my architectural education the focus has always been on conceptualising and developing strategies for the social side of design. As a final academic exercise, I am interested in challenging myself with better grasping the implications of the technical side of research and design, and ultimately producing an innovative project that is grounded in reality and truly works.	

Graduation project	
Title of the graduation project	Creating Value for Local Communities in Bali, Indonesia, Through Recycling Locally-Sourced Plastic Waste into Building Materials
Goal	
Location:	Bali, Indonesia
The posed problem, research questions and design assignment in which these result.	[Problem Statement] – see below [Research Question] – see below [Design Assignment] – see below
<p>Research Questions:</p> <p>How can plastic waste be recycled into building materials? Would recycling plastic into building materials in Bali be a viable approach to dealing with the waste problem on the island? How could the local community benefit from such a move? What groups can be empowered in their activity/initiative? How could sustainable tourism practices be incorporated in the local activities to tackle the issue of overtourism? What are the implications of designing and building for Bali (environmental, cultural, financial considerations)?</p>	

Problem Statement:

Bali is struggling with its waste management. Currently only 4% of all the waste produced on the island is recycled, less than half of it is piled in landfills, and the rest is either burnt unofficially by residents, or ends up in nature due to improper disposal. In 2021 the government closed down the landfills, as they were operating beyond their capacity. Tourists and locals alike are talking about the issue, often blaming sicknesses and infections to pollution, and complaining about "islands of waste" floating around them as they swim by the popular beaches. At the same time, the local population is growing, the government is aiming to double the number of international tourists in Indonesia, and there are no regulations to protect nature and the local lifestyle from losing their cultural value in the face of overtourism. Currently, new buildings are mostly constructed out of concrete blocks, the cement for which is imported to the island, making the process even less sustainable. Therefore, this research looks into how these challenges could be addressed holistically through architecture. It proposes recycling plastic waste into building materials, with which to clean the environment, support and empower local communities, and provide an opportunity for more local and sustainable ways of tourism for temporary visitors. Ultimately, this would be another proof of the value that could be utilized if the government managed waste better, and incentivize it to take action.

Design Assignment:

The result of this research would be a community centre for an existing community, called PKP. The community centre focuses on teaching skills and building capacity for women from Balinese villages, allowing them to become entrepreneurial and financially self-sufficient. Currently, they welcome anyone (women, men and children) who wishes to expand their skills and knowledge, and offer 23 different activities to facilitate that. Tourists are encouraged to join too, even when the activities are focused on increasing locals' wellbeing. My task would be to provide a stimulating and inspiring space for all activities to take place, allowing multiple groups to be engaged at the same time, which is currently not possible. I will be searching for a sustainable and mutually-enhancing way for tourists and locals to live together and learn from each other, which is one of the fundamental goals of the founder of the community: Ibu Sari.

Process

Method description

The research began with a desktop study. The topic of recycling plastics into building materials is relatively recent, so the study included mainly online sources like articles, academic journals, government publications of the Balinese and Indonesian governments, and reports by the UN, World Travel and Tourism Council, UNICEF, etc. The choice of client/user of my project has been informed by a study of existing organizations and initiatives that target topics like increasing equality and creating more opportunities for individuals in the less privileged areas of Bali (typically villages).

An important part of the research has been a site visit, conducted in the second half of January. During that period, I spent time with the community of choice, discussed my project with its founder, which allowed me to learn about their current challenges, needs, plans for the future and dreams. This conversation informed the choice of plot on the island.

In addition, the trip allowed me to visit recycling centers on the island and inquire about what they do and what processes they employ, how they get plastic for recycling, what the main challenges to waste collection are, etc.

IN terms of architectural inspiration, I had a meeting with the team of Bamboo U, from which I explored the potential of creating a new vernacular using a familiar material in an innovative and unseen before way, utilizing its unique qualities. The Bamboo U campus is a good example of a setting for a well-functioning community. The team also informed me of some factors that need to be considered when designing for the Balinese context: climate, orientation according to the local Hindu beliefs, earthquake resistance, etc.

In addition, I have a scheduled meeting with an architect from the design firm IBUKU, who will give me additional information about the implications of architecture in Bali.

Finally, I am planning a visit to the Green School and Green Village, as they are examples of the new architectural language that is now associated with Bali, they incorporate a sustainable approach to living in a hot and humid climate, and pioneer a new way of comfortably living with nature. I hope to gain an insight that I could incorporate in my own project.

Literature and general practical preference

Bali Partnership. (2021, June 7). *Solving Waste Management Issues Together - Bali Partnership Platform*. https://www.balipartnership.org/en_gb/

Beat Plastic Pollution. (2022, March 1). <https://www.unep.org/interactives/beat-plastic-pollution/>

Brunner, P.H.; Rechberger, H. (2004). *Practical Handbook of Material Flow Analysis*. Lewis Publishers, New York.

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3(7). <https://doi.org/10.1126/sciadv.1700782>

Global Plastic Action Partnership & Indonesia National Plastic Action Partnership. (2020). *Radically Reducing Plastic Pollution in Indonesia: A Multistakeholder Action Plan*. In World Economic Forum. World Economic Forum. Retrieved December 25, 2022, from https://quest4action.org/wp-content/uploads/2020/09/NPAP-Indonesia-Multistakeholder-Action-Plan_April-2020.pdf

The Pew Charitable Trusts & SYSTEMIQ. (2020). *Breaking the Plastic Wave: A Comprehensive Assessment of Pathways Towards Stopping Ocean Plastic Pollution*.

In The Pew Charitable Trusts. Science. Retrieved December 25, 2022, from https://www.pewtrusts.org/-/media/assets/2020/10/breakingtheplasticwave_distilledreport.pdf

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

My graduation project would be a community centre that hopefully serves as a model and a precedent for future projects that give back to the local society in places that need such support. I believe that architecture is about empowering people, providing enjoyable and stimulating environments for them and creating a sense of belonging. Thus, my chosen topic aligns well with my views and reasons for choosing this degree.

The relation to the studio topic is in the technical part of the research and the choice of a main material for the building complex: plastic. During the design phase I will be further researching the possibilities in which plastic can be used in architecture and construction. An inspiration for me is the design firm IBUKU, who have managed to use a well-known material: bamboo, in an innovative, sustainable, and very aesthetically pleasing way. I hope to be able to extract the essence of working with plastic in a similar way as they have discovered some unused potential of bamboo.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

My research is studying how the latest technologies available to address the growing challenge of plastic waste, could be used for the purposes of architectural practice and community empowerment.

Numerous locations in the world are experiencing the consequences of solid waste pollution, and usually the worst affected places are the ones with the most vulnerable residents. I will aim to develop principles in the design of my project, both technical and social, that can be universally applied (through cultural adaptation) to various locations around the world.

Combining tourism and authentic local life is a topic that I have a personal interest in. I believe there is a fine balance to it and if found, it could revolutionise the tourism practice, providing social sustainability in places facing overtourism, and a better experience both for visitors and for hosts.

From the architectural standpoint, I hope to create an example of how plastic could be used sustainably and beautifully, ultimately pursuing its unique characteristics, qualities, and appearance, rather than mimicking the appearance of other materials, as it has been used in the past (ex. laminated flooring).