

REFLECTION

Contact information

Resilient communities

How resilient flood-risk protection can contribute to the living quality of communities.

REFLECTION

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Date: 17 June, 2014.

P2 REFLECTION

Theme

Delta Interventions

Title of the graduation project

Resilient Communities

Argumentation of choice of the studio

Working with the university on an international project of this scale is a nice opportunity to meet others in the field. To face the challenges in the urbanized deltas of today, expertise from different fields, engineering, design, ecology, will be needed. The fact that the TU Delft is shortlisted for the Hurricane Sandy Rebuilding Task Force, shows the expertise we have in this faculty regarding these problems.

Problem statement

As this is a graduation project within the field of urbanism, the problems should be able to be addressed with the research and design methods learned as an urbanism student, and result in spatial interventions and/or regional strategies. What is the most pressing issue at the moment is the lack of flexibility towards and absorbing capacity to future flood hazards on a local scale. A lot of effort has been

spent on rebuilding and recovering from hurricane Sandy. That this is going to become harder over time is evident, as the rapid urbanization of flood prone areas will increase the costs to rebuild and future storms will become more frequent and more intense (Gornitz et al., 2002). The negative effect that the lack of basic amenities has on the social quality of the community is enormous and results in the deterioration of these living environments. The research question is therefore as followed:
How can resilient flood-risk protection contribute to the living quality of communities?

Goal

The aim of the Resilient Communities graduation project will be a spatial design on Coney Island that will decrease the flood-risk by means of spatial measures.

The problems described in the problem statement all occur in this area. The combination of high density, current and future flood-risk issues, as well as the diverse social and spatial characteristics of the communities, make this an interesting and exemplary location for this graduation project.

These spatial measures will increase the social and spatial quality of the different communities, increasing the overall living quality. To acquire the knowledge needed to create such a design, a broad research on flood hazards, resiliency and social and spatial quality will be done. By analyzing the area of Coney Island, specific knowledge is obtained to form the base of the design proposal. Later in the graduation project, the design proposal and the specific knowledge acquired on the communities of Coney Island will be investigated to discuss the lessons that were learned on this location. These generic lessons can help future developments of flood-prone communities world-wide.

Process

For creating resilient communities, an integral approach from different fields is needed. As a result the methods used to address different problems and solutions are also diverse. The methods that will be used are briefly explained below.

Literature study: By studying literature knowledge is gained on specific subjects that are related to the graduation project. By reviewing other literature about the discussed topic, forming an opinion and building a recommendation for this graduation

project, it is positioned in the academic field. By learning from the experience of others, this project could build upon other literature, adding to the body of knowledge on the subject.

Data analysis: By using the existing data sets available, it is possible to underpin the decisions made in the project. Using hard data can also show the feasibility and relevance of certain measures.

Historic analysis: To understand the importance and relevance of different areas and patterns, the historical context needs to be analyzed. By overlaying historical maps, mismatches and relations can be found.

Spatial analysis: Analyzing the spatial characteristics is vital to understand the working of a community.

Reference study: Comparing how other locations cope with similar issues and building up an inventory of different projects. This can be used as an inspiration during the design process.

Inventory: A list compiled to give an overview on a particular subject. The types of water hazards or the flood-risk protection measures for instance.

Classification: A list as described as an inventory, but now each item has a certain arrangement. By valuing some elements higher than others, this type of list already gives an idea of what elements are most important or best suited.

Literature and general practical preference

The theoretical framework in which this graduation project is positioned is based on the relation between three terms: social quality of communities, resilient flood-risk protection and spatial quality. With answering sub-research questions regarding these terms, shared goals and communal objectives are found. A literature review regarding the definition of these terms will be the base for further analysis of the context of Coney Island.

In literature, there is some uncertainty of the definition of the term resiliency. In this graduation project, resiliency is defined as the 'capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function and identity' (Walker, 2004, p.17). Other authors such as Cannon, T. and Cutter, S. who have dealt with resiliency in the context of flood-risk management, also use this definition (Van Veelen, 2013). Looking at the current flood-

risk management, resiliency is the necessary factor. It will create a more flexible flood-risk mitigation system that can cope with the uncertainties of climate change and sea level rise. This will result in a greater capacity to absorb the impact of hazards. A resilient flood-risk protection will both decrease the exposure to flooding, as the absorbing capacity will be greater, and will decrease the consequences of flooding, as the reorganizing capacity will decrease the vulnerability of communities (Walker et al., 2004). These two elements together will decrease the overall flood-risk for a community greatly. In this research, spatial quality will be assessed by the matrix discussed in the book *Kwaliteit in meervoud* by Habiform. This matrix combines the three basic principles of spatial quality with four criteria which play a role in the design of space, namely the economic, the social, the ecological and the cultural criteria (Hooimeijer et al., 2001). This matrix will provide an instrument to research the spatial quality of the different communities in Coney Island objectively.

Social quality of the living environment is something that is difficult to define. In this graduation project the term is defined by Gehl as; 'Social quality is

the fruit of the quality and length of other types of activities than necessary activities. It occurs spontaneously when people meet in a particular place. Communal spaces in cities therefore become attractive when all activities of all types occur in combination and feed off each other' (Gehl, 2008, p.26). In the design phase of the graduation project the methods discussed by Gehl will form the base for creating conditions to increase the social quality of communities.

Reflection

Relevance

The current approach of rebuilding and recovering is not enough. Inhabitants are aware of the necessity to adapt to future flood hazards. The lack of thrust in the current flood-risk protection encourages communities to take action themselves (Nelson et al., 2007). The current individual flood-risk protection could however deteriorate the social and spatial quality.

Another problem with individual measures is that they have no coherence with other projects, have limited effect due to lack of expertise (Godschalk, 2003), and are only based on flood defense, not on other water hazards or spatial improvements. In

a sense, these do-it-yourself measures could even aggravate the situation or deteriorate other spatial qualities. There is therefore a need for urbanists as ourselves to integrate flood-prevention with other spatial interventions to improve community life as a whole. The social relevance of the graduation project is therefore twofold; there is a need to decrease the overall flood-risk of the entire communities while using these measures to improve the living quality of communities.

Academic debate

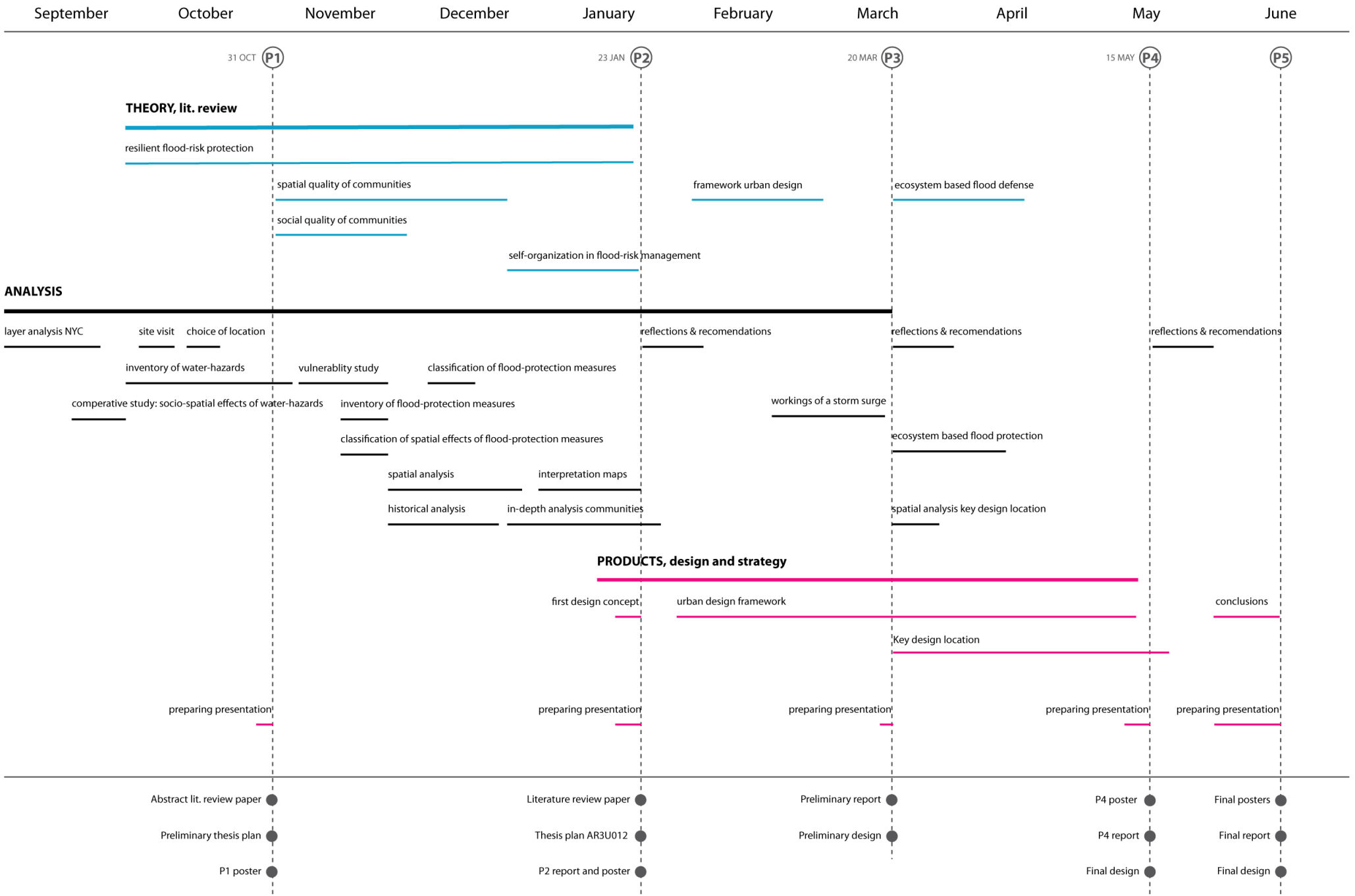
Current strategies for flood protection are only based on spatial elements. The Urban Waterfront Adaptive Strategies of the NYC Department of City Planning developed a catalogue that identifies the range of possible strategies to increase the resilience of urban coastal areas to water hazards. This catalogue combines the geomorphology and the hazards with the desired protection measures (NYC_Planning, 2012). What they do not take into account however are the occupation, network, or social conditions. Different approaches have a different impact on the spatial and social aspects of a community. It is therefore necessary to expand the framework to come up with more context-driven solutions. This

approach will result in flood protection measures that address the issue of a specific community much more. This graduation project will help shift the current strategies from an approach focused on reducing flood-risk to a context-driven approach, addressing more issues that will help create a resilient flood-risk protection system and well-functioning communities.

Time planning

Illustration 1: Time planning
SOURCE: Image by author, 2014.





P4 and P5 REFLECTION

The final chapter of this graduation plan will discuss the results of the graduation project in the studio of Delta Interventions at the Technical University Delft, Faculty of Architecture, department of Urbanism. In the following paragraphs, the answer to the main research question, recommendations for future research and the relevance of the project for other flood-prone communities worldwide will be discussed. The planning and process of the graduation project will be addressed after. The main research question this graduation project dealt with is: How can a spatial framework contribute to a resilient flood-risk protection, while improving the living quality of communities? Looking at other waterfront communities the relevance of this graduation project is apparent. Rapid urbanization of flood prone areas will increase the costs to rebuild and future storms will become more frequent and more intense. That this is going to become harder over time is evident. Flood-risk defense needs to adapt to the context in which it is located to truly create resilient communities. Conventional flood-risk defense measures do not have the flexibility to adapt to future changes in demands. A reference study on both ecosystem based flood-risk protection, as well as on framework

urban designs, have shown that when using dynamic natural processes, flexibility and adaptivity within a strategy are possible. This makes the strategy resilient for future changes regarding ecology, flood-risk protection, and the needs of the communities. Another important factor is that of time, the three main themes in this graduation project all have a different timeframe and require a different amount of elaboration. By researching the three themes on both large and local scale, the relationship between different requirements and actions were found that could greatly benefit each other. The most remarkable finding of the graduation project was the use of natural dynamic processes as starting point in creating resilient communities. By reintroduction of the historical ecosystems of the location, natural phasing of erosion and suppletion, combined with the ecological benefits and recreational use of the area are achieved. The added benefits of flood-risk protection by using ecosystem based flood-risk defense therefore improve the living quality of communities. The strategic framework designed for Coney Island shows the relationships between flood-risk protection and social and spatial quality. The translation of the strategy in an urban design for Coney Island Creek shows that it is possible to create

synergies between flood-risk protection, ecological values and other important urban functions, serving as vital element for the needs within the communities.

As the design of Coney Island Creek shows, a spatial framework can contribute to a resilient flood-risk protection and improve the living quality of communities. Aspects as the adaptivity and flexibility of the strategy, addressing issues of multiple themes within the strategy, and a good understanding of using natural dynamic processes in the phasing, have proven to be the most important elements that need to be taken into account.

In the last years, different articles were written about this subject (Temmerman et al., 2014, Wamsley et al., 2012, Cadenasso and McGrath, 2013), but this strategy is never implemented in an urbanized setting. The graduation project could provide support on the use of reintroducing ecosystems as flood-risk protection in urbanized areas. It will therefore help to shift the current strategies from an approach focused on only reducing flood-risk to a context driven approach, addressing more issues and seizing more

opportunities. As 'Delta Urbanism' focusses on new approaches for design and planning of urbanized delta areas, this graduation project fits well within this theme.

An important remark is the inability to truly prove this design. The lack of detailed research that has been done on the subject as well as the lack of reference projects is the main reason for this. The flood-risk protection measures implemented on Coney Island Creek are based on broad estimates described in various articles (Wamsley, 2010, Wamsley et al., 2012) and would need more input from other fields of work such as biology and civil engineering. The lack of specific requirements is caused by the large amount of variables when working with nature (Jonkman, 2013). As discussed, the shape and slope of the bay, type of vegetation, height of land and shape of coastline, combined with the variables of the storm surge; direction, energy, angle, temperature and so on, all contribute to the flood hazard (Wamsley, 2010, Wamsley et al., 2012).

Process

For a spatial framework to contribute to resilient flood-risk protection, while improving the living quality of communities, specific knowledge is needed on the requirements of ecology, community and flood-risk. The relationship between the terms was investigated with different sub-research questions, focusing on how the one could improve the other. To translate the strategic plan into a design on a key location, a more in depth research was needed. As both the strategy and the design are a translation of the requirements found through analysis, research and design can be seen as inseparable parts of the graduation project.

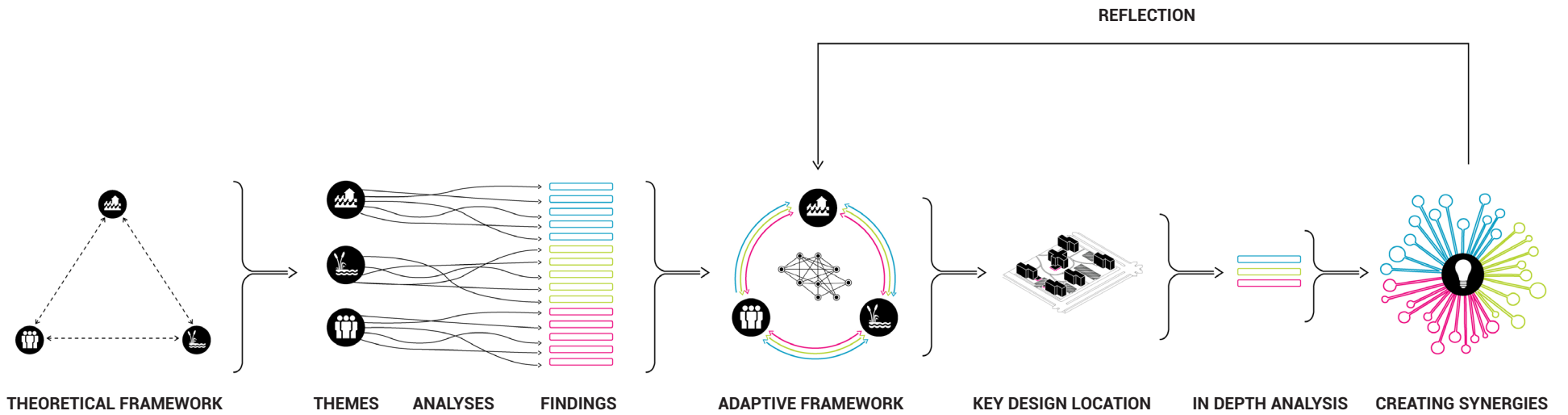
Other flood-prone communities could benefit from this graduation plan by the methods used to come to the strategy and design. The design is a translation of the needs and requirements of flood-risk, ecology and communities, found by analyzing the location, literature research and reference studies. The research structure, shown above, could prove to be an important method to come to a context driven design that will combine resilient flood-risk protection with the living quality of communities. This structure combines generic knowledge on the

themes into specific knowledge on the location.

This forms the base for the adaptive strategic plan. Development principles define opportunities for transformation. They work on different scales and across different issues from ecology, spatial quality and the program. A design on a key location of the strategy will show the translation of these development principles, showing the aesthetic value of the proposed plan.

Planning

Translating the research had, like most design processes, its ups and downs. As analyses can be planned and structured, a design processes cannot. By adding a more in depth research on the key design location of Coney Island Creek, new grips on answering the main research question was found. A new article in Nature, Ecosystem-based coastal defense in the face of global change (Temmerman et al., 2014), provided important insight on the potential and limitations of ecosystems and flood-risk protection. This article helped focus the design on the three discussed terms greatly.



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 Illustration 2: Research structure
 SOURCE: Image by author, 2014.

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