

Adaption through architecture

How architecture can support adaptation of the new peat landscape of Midden-Delfland

Research plan
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2. Abstract

This research addresses the challenges faced by the peat polders of Midden-Delfland, which are subsiding and emitting significant amounts of CO₂. The area, one of the lowest in the Netherlands, is nonetheless seeing new developments, contingent on meeting Nitrogen emissions requirements. The architecture firm ZUS has proposed a masterplan to flood parts of the landscape to divert stormwater, store fresh water, halt land subsidence, and potentially aid in peat regrowth for CO₂ storage. However, this would result in the loss of farmland. The research explores alternative farming methods suitable for this transformed landscape and investigates how architecture can support farmers in this transition. It also examines the potential for a student housing complex to connect a farming business and students in this new landscape. The economic viability of farming in these conditions and the dependency of modern farming on governmental subsidies are key considerations.

3. Keywords

Peat polders | Wetlands | Water storage | Agriculture | Paludiculture | Climate adaptiveness |
Architecture

4. Problem statement

The peat polders of Midden-Delfland are subsiding and in doing so they are emitting a lot of CO₂ gas into the atmosphere (Fritz, 2014). The area is also one of the lowest area's in the Netherlands with depths up to 6,5m below sea level. Nonetheless new (housing) developments appear in this area. That is, if the requirements for Nitrogen emissions can be achieved. Lately the farmers of the Netherlands have been protesting due to incoherent and ever changing Nitrogen emission rules and regulations from the government.

The architecture firm of ZUS developed a new masterplan (figure 1) for the area of Midden-Delfland, as part of the research group for the *Redesigning deltas* Study. In this masterplan ZUS proposed to

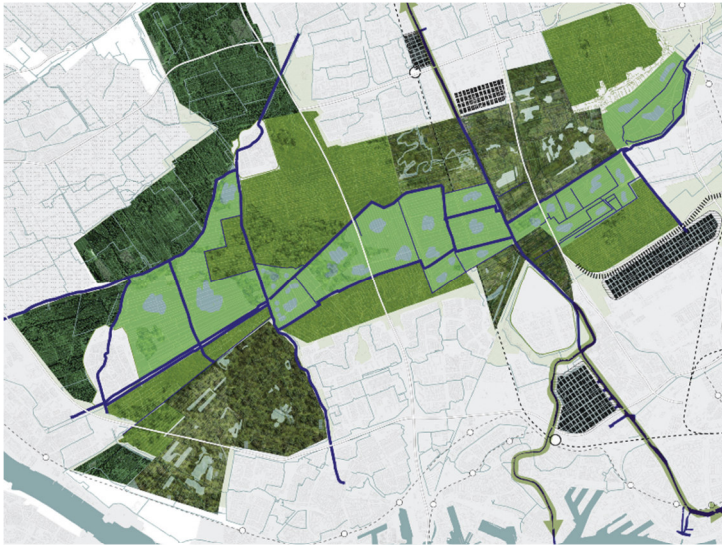


Figure 1 | Master plan of ZUS (ZUS)

flood a large part of the landscape (light green area's) to divert stormwater and store fresh water for the urban centres lining its boundaries. Although studies have shown that fresh water storage in peat polders does not work as well as hoped, reintroducing water into these areas will stop the subsidence of the land, and with that stop emitting CO₂. Also this could help in re-growing peat in the area, which could be used as CO₂ storage.

On the other hand, the flooding of these polders would mean that acres of farm land will be lost. The masterplan of ZUS has a preservation plan for housing and monumental sites, but the farmland will be lost to the peat landscape. However, this does not have to be the case. A new way of farming can be developed for this specific type of land. Currently the peat polders of Midden-Delfland need to be kept dry for dairy cows to be able to walk on them, but the use of cattle that is more adapt at navigating wetlands could be a solution. Also the cultivation of crops attuned to these conditions could give a new type of agricultural use to this landscape. Architecture firm Bergen-Kolpa made a plan for what such a farm could look like named "*Park Supermarkt Oregional*" (Figure 2).

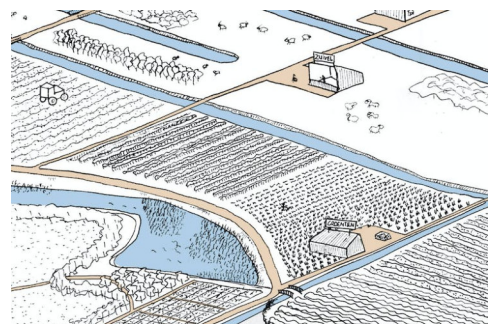


Figure 2 | Park supermakrt oregional (Bergen-Kolpa, 2010)

However, studies show that farming in these wetlands is not economically viable at the moment (Marle de Jong, 2021). This is of course a deterrence for farmers to change to wetland farming. On the other hand, other studies show that modern day farming is too dependent on governmental subsidies (Clarc, 2009). With this dependence on subsidies, farms are only profitable when they produce the crops or cattle the government subsidizes. Studies done by the Wageningen University & Research (WUR) proposes that farmers should diversify their income to decrease their dependency on governmental policies and become an economically self-sustainable farm.

5. Research question

Due to the subsiding peat-polders and the CO₂ emittance because of the subsidence, water needs to be reintroduced to the peat-polders of Midden-Delfland. This however will create a marshy peatland that will make the farmland unusable in its current form. The new models of farming in these conditions are not yet economically viable. And due to the regulations around farming, farmers have been very dependent on governmental subsidies, and therefore don't have the financial reserve or capacity to adapt to farming in this new peat landscape.

Therefore the main research question of this paper is:

In what way can Architecture help support farmers to adapt to the new peat landscape of Midden-Delfland?

And the overall design question is:

How can a student housing complex connect a farming business and students in the new peat landscape of Midden-Delfland?

To answer the main research question there are a couple of sub questions that will support this main research question. *What can be cultivated in/on this new peat landscape? What type of architecture does this new peat landscape require? And what does a farmer need to transition to this new way of farming?*

6. Theoretical framework

The basis for this research is the climate adaptation measures that need to be taken in the Dutch peat polder landscape, to stop the subsidence and the emitting of CO₂ into the atmosphere. The plan for the Midden-Delfland area, that was created by the architecture firm ZUS creates a basis for a sustainable agricultural sector in this area. However the exact workings of such a landscape are not considered in their plan.

Turning the peat polders into wetland for agriculture is a new concept. The Wageningen University & research (WUR) has done research into 'Paludiculture'. This is the cultivation of crops suited to wetland area's (WUR, 2023).

Bergen-Kolpa architecten has researched a way to use this type of landscape to inform the public about agriculture in wetlands and also create a productive landscape for farming in a polder landscape (Bergen-Kolpa, 2010).

7. Proposed methods

Before anything can be said about the role of architecture in the transition to the new peat landscape, there needs to be a plan for what a farmer can do with the new landscape. *What can be cultivated in/on this new peat landscape?* Literature research will be used to answer this question. This research will mainly focus on different types of crops and fish that can be cultivated in a wetland environment. If sufficient sources are available different types of livestock can be taken into account as well.

The entire polder landscape of Midden-Delfland will change because of the reintroduction of water to the site. This brings the question of *What type of architecture does this new peat landscape require?* For this question different cases will be studied together with literature research.

Not only the use of the land and the type of architecture need to be studied to answer the research question, also the needs of a farmer during the transition period need to be taken into account. With literature research and the findings of the first two sub questions, an architecture specific answer can be formulated to the question *What does a farmer need to transition to this new way of farming?*

The findings of this research can inform a case study that aims to design student housing to create a closer connection between a farm and a student community.

8. Diagram of the synthesis

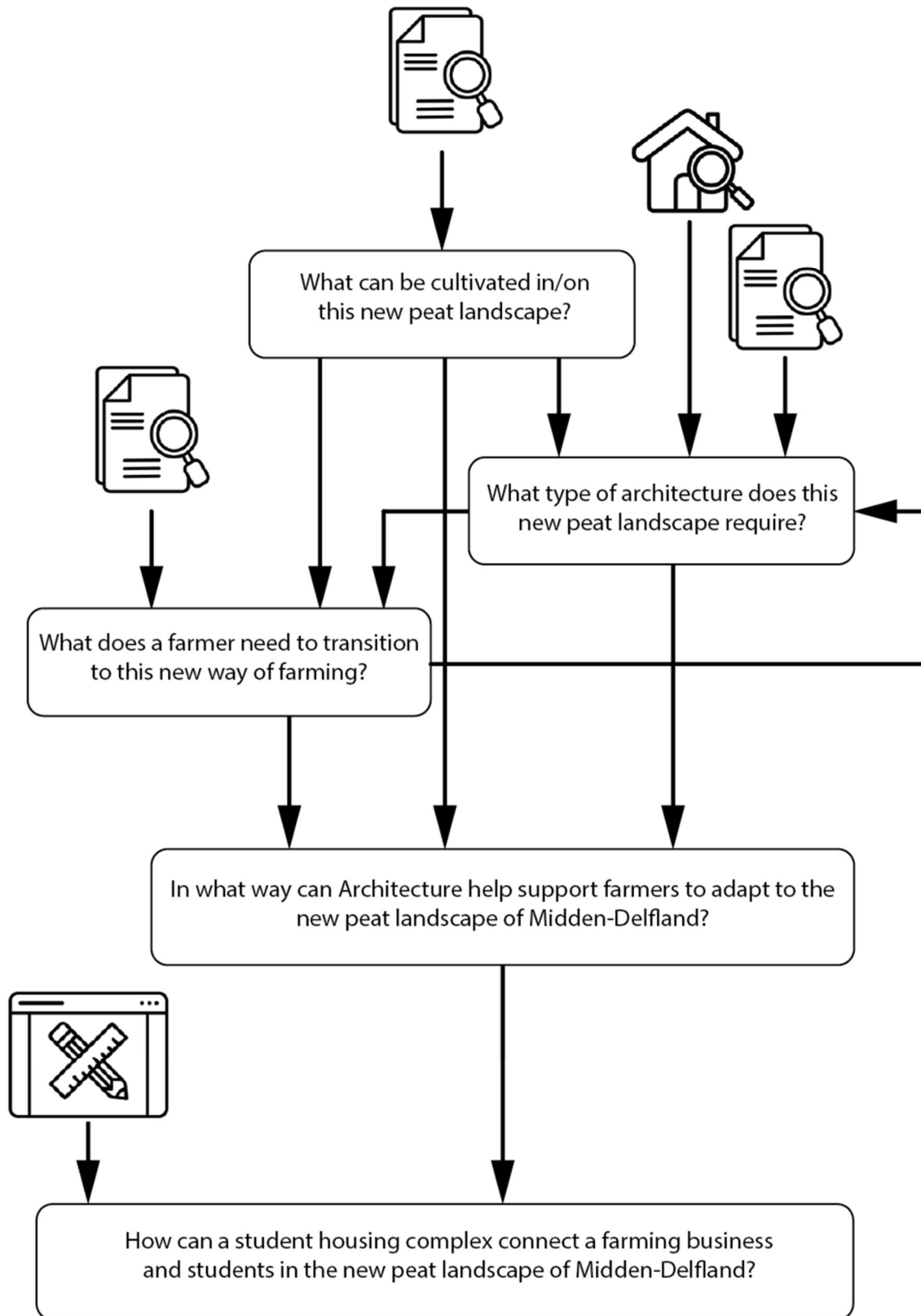


Figure 3 | Synthesis diagram

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