Communal Care for the Piushaven

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Abstract

This is a situated design project taking place in the Piushaven, the living harbour of Tilburg. A socially thriving place, with an ecosystem with lots of potential, but in need of a continuing community of local caregivers. Therefore, we designed a regenerative practice in the form of a material driven paper making workshop for human neighbours of the Piushaven.

The workshop introduces a hands-on making cycle that includes harvesting an invasive, exotic water plant, milfoil (Myriophyllum heterophyllum), processing and crafting with milfoil in combination with grass, and finally feeding the ecosystem by returning the nutrients of the organic materials back to the water. Residents can do the workshop by borrowing the **circular guide** with **video tutorial** and a set of tools stored in **public shared boxes** placed around the harbour. By engaging actively with local, organic material, the workshop aims to support ecological maintenance and stimulate communal responsibility and creative care for the living harbour.

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Introduction

In facing of increasing environmental stress from climate change, plastic pollution and others, local ecosystems worldwide have been observed to experience destructive effects [17], [28], [39]. Wakkary questions whether this current crisis is a result of decades of a human-centred approach to design, in which nonhuman entities are treated as passive resources rather than active participants in shared worlds [45]. Similarly, Forlano advocates to decentre the human and consider the role and perspectives of nonhumans in shared urban environments [11]. These perspectives suggest a need for design projects in which ecological and regenerative needs to take a central place.

Within the HCI and design (research) community, this shift has inspired a range of situated and participatory projects that explore how design can improve the connection between people and local environments. Such as the ‘Situated Design, and False Creek Futures’ Project which sought to challenge typical citizen science narratives by exploring how design can be used to gather data through interventions that encourage and listen to eco social geographies and help in creating future plans [35], or the ‘Redesigning Ocean Futures Literacies’ project which presented a speculative, and participatory design workshop which sought to reimagine how shoreline engagement on anthropogenic debris is understood and performed [38]. These projects demonstrate the potential of communally oriented, situated design projects that stimulate dialogue on issues of environmental health and communal responsibility towards local ecosystems.

Building on this body of work, this project combines a regenerative design perspective with approaches inspired by civic design [10] and systemic design [18] that emphasize working with existing stakeholders, practices and infrastructures to address complex societal challenges.

With this framing as a starting point, the project aims to incorporate both human and non-human voices in the design of a regenerative practice for the human neighbours of the living harbour, the ‘Piushaven’ in Tilburg, Netherlands. The Piushaven has a history of community engagement in protection of the local ecosystems from development plans [7] but has reportedly suffered from declining community stewardship in recent years. This context provided an opportunity to use design to reinforce a local community of ecological caregivers.

Introducing the Outcomes

The project outcome is a regenerative practice in the form of a situated, material driven [12] paper making workshop with an invasive, exotic waterplant, milfoil. Human residents are positioned as active stakeholders in both the material process as the ongoing care for the Piushaven. To enable them to independently perform the workshop, a site-specific, step by step circular guide with video tutorial was developed which combines all the experiential and research learnings from the pilot workshop results and material tests through clear instructions, rich information and discussion questions.

This pictorial will discuss the context of the design project, present emergent design steps, document material development and testing, share outcomes of a pilot workshop, define the final design, and introduce an implementation strategy before concluding with a discussion and conclusion of the project.

Methodology

Contextual Inquiries and Situated Design Practices

This project uses situated-knowing methods to inquire understanding of the Piushaven and form the regenerative practice. Wakkery proposes situated knowing as a component of nomadic practices in his book Things We Could Design For More Than Human-Centered Worlds [45]. It is argued that knowledge emerges in action, is context-dependent, and evolves over time. A grasp from the practical implementation of this are autoethnographic studies [5] at the Piushaven and exploratory-, and expert interviews [14], [3] with local residents and knowledge partners. This was further supported by water biographies [27] of the designers, to trace personal encounters with water, and reflections on personal tensions in water-human relationships to gather care requirements and opportunities from a first-person perspective [9].

Material Exploration

In the beginning practices were inspired by material drifting [12], where paths were created throughout the making by listening and close engagement with the material at hand, milfoil. This was done in parallel with thinking-with from Maria Puig de la Bellacasa [33] who proposes to think with humans and non-humans. Documentation was informed using a “material travel” approach, following writings by Bruna Goveia da Rocha [12].

Our goal to create a circular material whose beneficial nutrients can be returned to the water was inspired by regenerative design practices, which aim to restore materials and give back to ecosystems [21]. In later stages, the explorers followed a second-person perspective [40]. Still being the one who performed the exploration, however, the requirements from the local stakeholders and ecosystem onsite were leading.

Data analysis on paper qualities

Within the material exploration qualitative and quantitative data was collected to choose the final recipe of the paper. To compare the strength test results to other data, a method inspired by the Miner-Palmgren Rule was used integrating time under load [23], [34].

Design Implementation

Working with the Loopholes circular toolkit [42], helped design a circular ecosystem, strengthening our focus towards: Developing Competencies, Shared Governance, Extend Producer Responsibility and Circular Revenue Model.

Design implementation was informed through systemic design principles and a social ecological technological systems perspective, focusing on the interaction between ecological processes, social participation and enabling infrastructures within a local context [18], [24]. This inspired us to design a situated system rather than an isolated workshop. Using transition design theory, change was deemed more likely when new practices are embedded in existing rituals and structures [41].

The entrepreneurial feasibility of the project can be understood through the common's theory, in which value is created through shared care, participation and responsibility for a specific place rather than being profit-oriented [4]. The focus is on generating social value through active involvement of local residents [43] as well as on generating ecological value through regenerative actions rather than extraction [36].

Process overview

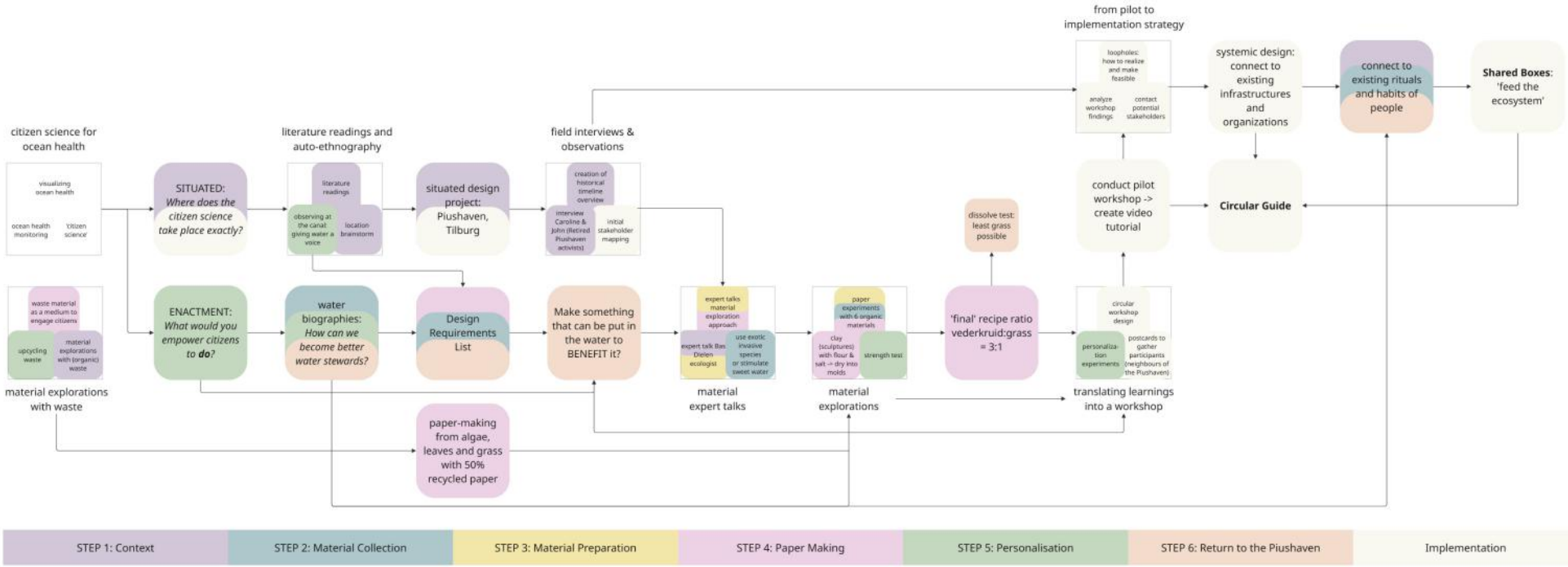


Figure 1: Process overview diagram colour coded by influence on final workshop stages

Four months of project work have been summarized in the process overview above. The squares contain key design activities and directions. They are color-coded according to which steps of the final workshop were informed by the them. The black lines in between visualize how one activity flowed into another and how earlier key moments are revisited later on in the process.

As mentioned in the previous section the project was approached through a mix of methods, which sometimes contradicted each other. For example, a bottom-up material-driven approach was at times done in parallel with a more top-down situated and systemic approach. Weekly reflection and documentation was therefore essential in order to balance our approached intentionally according to the project's goal.

Context : Step 1

In the first step of the regenerative practice the human residents get the possibility to enlarge their relational connection with the Piushaven. In the final design (See Figure 1) an educational boat tour is suggested to accomplish this. In this report section, it is discussed why the Piushaven is chosen for this design project and how the designers position themselves towards this context.

The Piushaven in Tilburg, the Netherlands, was opened in 1923, built to receive and send goods across the country. In its prime period of use between 1950 and 1960, it received everything from coal to potatoes and served as a symbol of progress for the small town [30]. In the 1960s however, this activity started to slow as a larger harbour was constructed nearby. By 1983 practically all shipping activities ceased in the harbour; its proud industrial heritage being slowly forgotten. As a result, urbanisation projects in the area called for plans to fill the harbour, and build a road on it instead.

At this point, members of the local community revolted against these destructive plans, calling for the local government to recognise the wealth of life in the Piushaven, and cancel their construction plans [8]. Caroline Docters van Leeuwen and John La Haye being the pioneers of this activistic movement [29]. Through the success of their efforts, the Piushaven is now a lively area, surrounded by restaurants, cafes, homes and parks.

After this success, two of the most proactive voices (Caroline and John) of the harbour have retired in 2023 and shared concern about the loss of knowledge on care for the harbour, and an increasingly human-centred urban planning approach (Appendix J). Furthermore, in an interview with local ecologist Bas Dielen highlighted issues on being able to measure the cleanliness and health of the eco-system (Appendix L). This context exploration formed our design challenge:

How can we reinforce a community of human residents of the Piushaven to care for the ecosystem at place?

To investigate our own relational connection with aquatic ecosystems, each researcher made a water biography for themselves (Appendix K). These were made to familiarize with the topic and find our own positioning towards care for water ecosystems. It included meditations next to water bodies and visual and material storytelling. From this, a requirements list about what would be necessary for us to be willing to show care for a water body was concluded. This list has been a leading tread throughout the forming of the workshop and the eventual systemic design around it.

Water biographies requirement list:

1. **Actively co-engage with the organic material**
2. **Low enactment threshold**
3. **Situated application**
4. **Fits inside existing habits of the community**
5. **Improves understanding and empathy for the 'living harbour'**

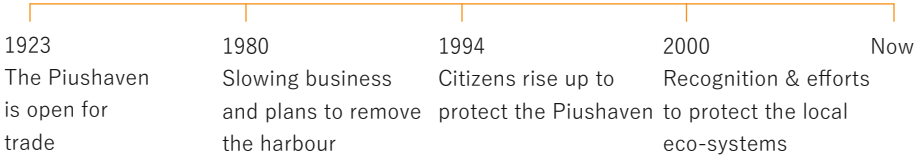


Figure 2: History of the Piushaven timeline

Material Collection : Step 2

The second step in the regenerative practice is material collection. The specific materials are chosen in collaboration with Bas Dielen.

Bas Dielen is an ecologist of the municipality of Tilburg, who overviews the caretaking of the living harbour. In our first interview he informed us on several invasive exotic species living in the Piushaven. When the site was visited one of them was overflowingly present, namely milfoil (see Figure 2).

Since the plant is invasive to the ecosystem, it should be removed and because it is impossible to remove it effectively with only machinery, it seems as a promising start for communal care to remove this.

To be able to reach the vederkruid and to enrich connection with the biodiversity it is suggested in the circular guide to collect the material by renting a water bike from Aquafun4you [1]. Water activities are done all year round at the Piushaven [31] so collecting the materials with the water bike also corresponded to our requirement that the enactment should fit inside existing habits of the community.

Besides vederkruid, grass needs to be collected too. The grass can be cut from the side-banks of the harbour. It grows there in overflow, and it is confirmed by the Bas Dielen that removing this grass will not harm nature's balance. The grass needs to be collected to provided strength for the paper, this will explained more in the paper making section.

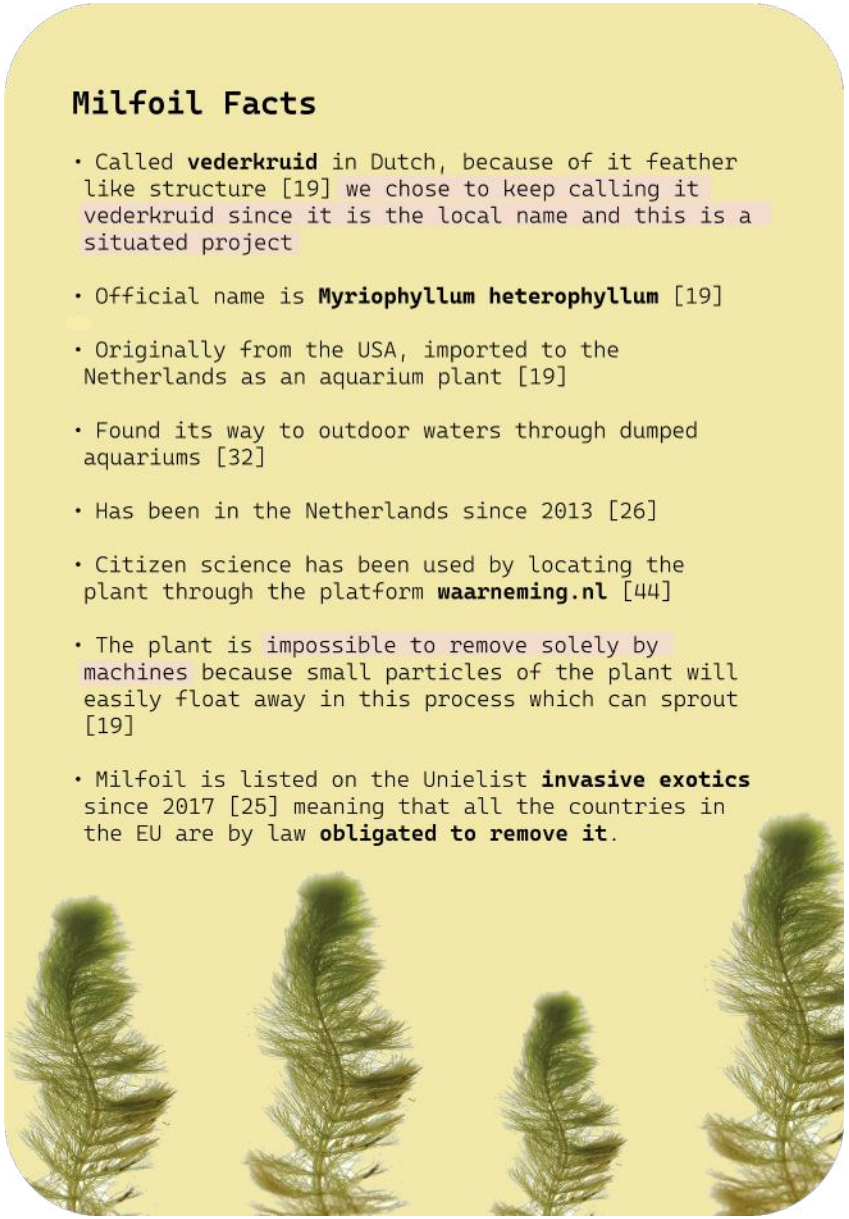


Figure 2: Facts about the vederkruid

Material Preparation: Step 3

The third step in the circular guide is material preparation, processing the material to prepare it for paper making.

The grass and vederkruid needs to be cooked, this will make the material softer so that it can be cut and blended. Making the material this fine is necessary so that when the material is scooped, it will create a thin layer on the deckle.

Thereby cooking the vederkruid kills the enzymes in the plant that are necessary for it to sprout again [15], [16]. So, by cooking the vederkruid it results in an unharmful plant that is still rich in nutrients. These nutrients are beneficial for the rest of the ecosystem in the Piushaven (interview Bas Dielen).

The last step of the preparation is to squeeze out all the water, so that it can be weighted to get the correct ratio and amount during paper making. After testing several methods like squeezing with hands and pressing it out, it was found that using a cheese or teacloth to wring it out is the most effective method.

Figure 3: Images of material preparation, alligned with illustration of steps

Paper Making: Step 4

The fourth step of the circular guide is making the paper with vederkruid and grass.

In this section it will be discussed how we came to paper making through thinking-with, and why only grass and vederkruid are included in the paper. In the final design a ratio of 3:1 vederkruid grass is suggested, a ratio derived from extensive material testing which will be deliberate further on in this section.

Paper making as a practice of thinking-with (these decisions have been made from a first perspective). See Table 1.

Conclusion: Working so intensively with your hands in this material that felt a bit foreign was perceived differently. Thereby with clay it did not feel that you as a maker shaped the material into a new material with its own qualities. The clumps of clay stayed, only in a different form. In contrast with the paper making techniques were a non-woven was created with a rich scala of new qualities.

Only grass and vederkruid

During the material exploration other onsite materials have been tried out, see Appendix E, like fallen leaves and reed as well as biodegradable store-bought items, agar-agar, glycerine and the slime and fibers of the okra plant. Leaves made the paper fragile, and reed was too labour intensive to work with. The store-bought biodegradable items made the paper overall more flexible and durable to work with; however, this could also be done with the addition of grass. To make the practice as most onsite as possible and to feel more entangled while designing-with the ecosystem we aimed for a closed loop of local available materials in this section.

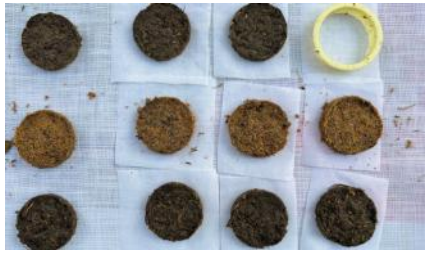
When a site visit was done, debris, such as paper menus were floating in the water, letting us hope for a biodegradable alternative.	
Paper made with 50% recycled paper, and 50% biomaterial, Appendix H.	
While trying out paper making, we started claying with the left-over materials,Appendix G	
Various types of clay compositions were also tested.	
Paper made from only biomaterials (appendix E) this step is informed through an expert interview with Bianca (appendix M).	

Table 1: Five stages of the material exploration

Ratio 3:1

When the materials and the technique were established, the ratio between the materials was left to be determined; 22 samples with different weights and ratios were made (Appendix F). Multiple considerations consisted in parallel in this determination, being;

1. By utilizing a substantial quantity of vederkruid the material contributes to the sustainable removal of the invasive species. At the start in the tub there was a 5:1 ratio (vederkruid:grass). After every paper-making scoop, new dry material was added to the tub. When the samples were dried, they were weighted so that it was known how much material was scooped out of the box so that it could be calculated what the ratios for the next sample were.

2. Once the paper is scooped, it should be removable from the deckle. Qualitative notes were taken during the paper making using a form inspired by [12].

3. The material needed to be resistant to some human force so that it could be handled in the next step of the circulair guide (personalization). A strength test inspired on the Miner-Palmgren Rule [23], [34] was applied, see Appendix B.3 for the extensive results and appendix.

4. The materials in the Piushaven should dissolve to not disturb the ecosystem by the papers clumping at a specific place and to let its nutrients flow back into the system. The setup of the dissolvability test can be seen in figure X, see appendix B.1 for further explanation.

The eventual results are conflicting. For strength and workability, a ratio with more grass is required but for dissolvability and caring impact a ratio with more vederkruid is preferable; see Appendix B.2 for details and setup.

We argue that making the process doable (limiting frustrations) will result that the regenerative practice is carried out more, which will eventually result in a bigger substantial amount of vederkruid being removed from the harbour. From experience at the harbour it is known that even with the ratio leaning more towards grass the papers will sink to the bottom rather quickly, falling apart during this process. From this it can be concluded that the materials will not clump in one are by replacement of wind. Eventually a ratio of 3:1 (vederkruid: grass) was concluded.

Next to the above we looked at how easy the material would burn, how warped it got while drying, and how smooth the edges were, however these turned out to be not decision makers eventually so are therefore left out of this part but a structured and complete overview can be seen in Appendixes B.4 till B.7.

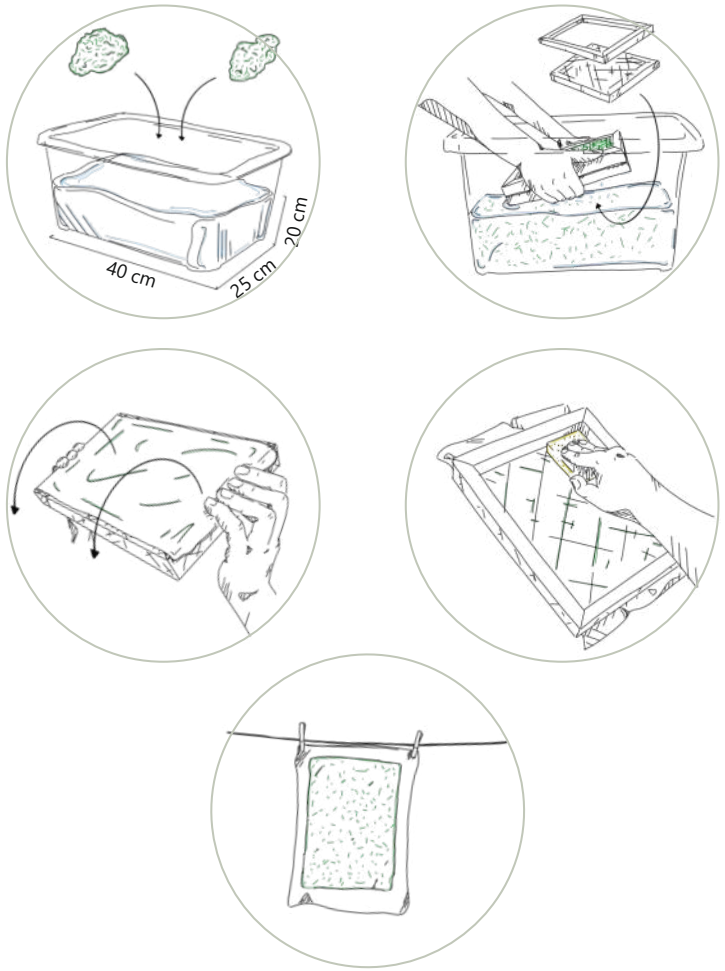


Figure 4: Paper making steps from the circular guide

Personalisation: Step 5

After creating a reliable recipe for paper, it was the intention to allow human residents to personalise their paper by making all sorts of crafts with it. This was partially inspired by a social design project “Ocean Confessional” where participants could release messages for the ocean on non-toxic dissolvable paper [6]. With the goal of eventually returning the craft to the water, this inspired exploration into environmentally safe art materials to offer inspiration and guidance on the types of making that could be done. This engagement would build a regenerative narrative of giving back to the Piushaven and may create a sense of personal attachment to the harbour.

The first experiments involved simple materials which were deemed safe after initial searches, although would require specific brands to guarantee their non-impact. These materials were chalk paint, peanut-wax or bee-wax crayon, charcoal, and gouache paint (which was decided against later on). The first experiments can be seen in Table 2.

			
Chalk paint, applied with a paintbrush offered high contrast , and a uniform finish.	Crayons worked well and kept their high saturation pigment.	Charcoal was difficult to use on the rough paper and was hardly visible.	Gouache paint offered a bright result but was found to have unsafe ingredients.

Table 2: Images and descriptions of tests with different artistic materials

Analogue tools of different technological levels were then tested with chalk paint, being the most promising material, including a paint brush, stencils, rubber letter stamps, and a typewriter. They provided a diverse look into how people could express their feelings or thoughts towards the Piushaven. Find the results below in Table 3.

			
Using a common crafts paintbrush worked well and intuitively. In heavy coats it had the tendency to leave the paper damp.	A paper stencil was made from a test image and worked well in combination with a paintbrush. However, the stencil making was time consuming and created unwanted waste.	Rubber letter stamps were tested and yielded irregular results. It was found that using a chalk-based marker was far more suitable in this use case.	By applying an initial thin coat of white chalk paint, a typewriter was found to be able to type on top of it. Unfortunately, it was unreliable and dirtied the machine.

Table 3: Images and descriptions of tests with chalk ink and analogue tools

The conclusions for these explorations were that chalk paint was the most suitable material for expression thanks to reliability and its ability to be used in several different ways. Other tested materials also worked but were not preferred. This was applied into the design by taking a special focus on the use of chalk paint, and other simpler mediums such as origami.

Release to the Piushaven: Step 6

In the last step of the regenerative practice, the personalized paper is brought back to the Piushaven. This step was fine-tuned through findings in a pilot workshop that was conducted.

For the pilot workshop residents were invited through their letterboxes and an invitation in a communal groups chat, see Appendix C. The group consisted of 5 residents from an older generation (55+) whom were all conscious of the value of the Piushaven. In the pilot workshop all the steps beside material preparation were tested.

Figure 5: Some of the participants from the workshop in picture

Overall, the practice turned out to be engaging, and the residents were moved by the paper making, see a more in-depth qualitative analysis in Appendix D. However, a lot of friction was discovered in the return to the Piushaven step. All of them had a hard time ‘destroying’ and ‘throwing away’ their hard work. They created a sense of ownership of their creations and were hesitant to give it back. Some were so fond of the material that they cut of a piece of their paper and made something different with it (See Figure 6).

After discovering in the pilot workshop that returning the paper back into the water presented friction for participants, we sought out existing narratives of care around the Piushaven that could be better understood for human residents. One such narrative that had been previously observed was public signage dissuading people from feeding the ducks.

Figure 6: Personalisation someone did at home with vederkruid paper

Duck feeding is known to be harmful to the ducks and local eco systems, but is still conducted. It is proposed to station the circular guide in shared boxes placed by the public signage so that residents are possible already in a mindset of care when they enter the workshop. This concept is worked out further in the final outcomes. Thereby in the guidance of this step on the circular guide some more time is taken to ease people into the idea of sharing with the Piushaven.

Figure 7: Vederkruid papers released into the living harbour

Design Outcomes and Implementation

The learnings from material explorations and contextual inquiries walked through in the previous chapters, have all been tied together in one medium to translate the findings in an understandable way to the human residents. This took the form of a circular guide: a foldable, site specific map with step-by-step instructions, contextual information and reflective questions about the six steps of the regenerative practice. It also includes a QR code linking to a video tutorial showcasing the steps of the workshop, shown on Figure 8.

A map of the Piushaven is visualized on the back of the circular guide, marking spots relevant for the regenerative practice: the location of the Shared Boxes and the location of the educative boat tour and pedal bike rental.

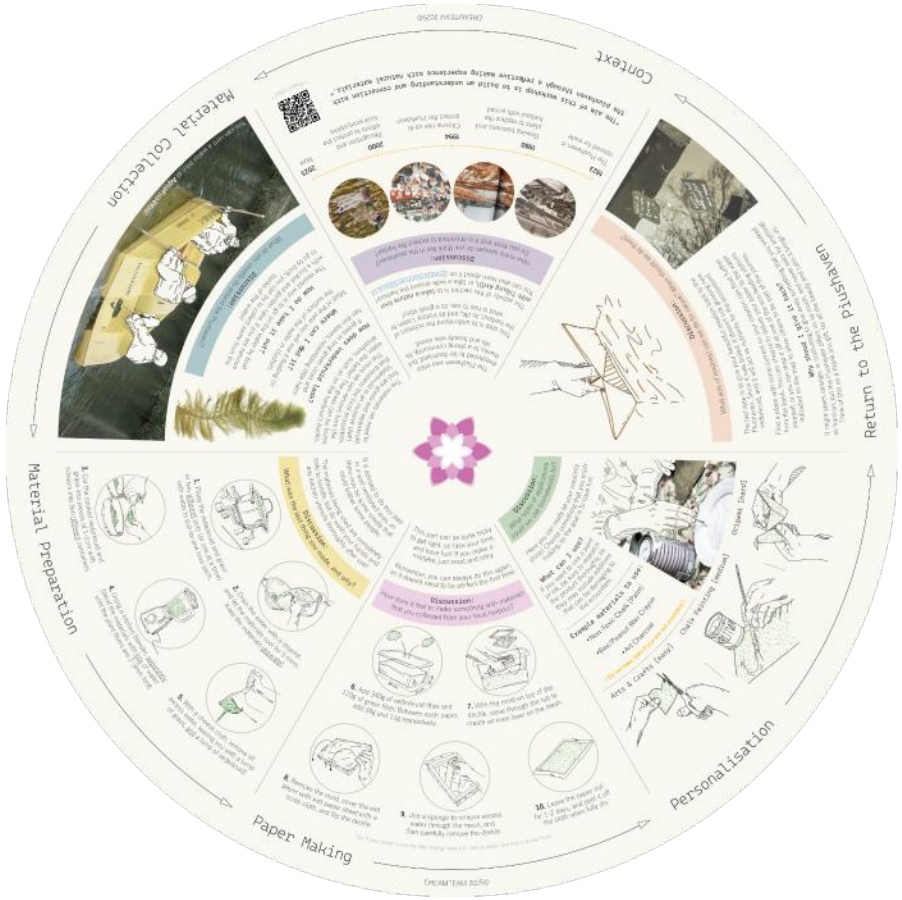


Figure 8: Final designs of the circular guide

Shared Boxes

Residents can borrow the circular guide and necessary tools from one of the three Shared Boxes. Materials available include mould and deckle sets, stamps and paint brushes, The Shared Boxes are located next to existing ‘don’t feed the ducks’ signs around the harbour. Places where people are trying to perform care, but are causing unintentional ecological harm. This specific placement is in line with transition design theory, which to design a transition build into an already existing ritual, rather than designing an isolated product [41]. Moreover, our water biographies listed the requirement that our final design needs to fit into existing habits within the community.

The shared boxes make tools and knowledge accessible to human residents and lowers financial, temporal, and skill-based barriers to active participation. Creating this enabling infrastructure is in line with [22] that design for social innovation often consists of creating the conditions for other people to act.

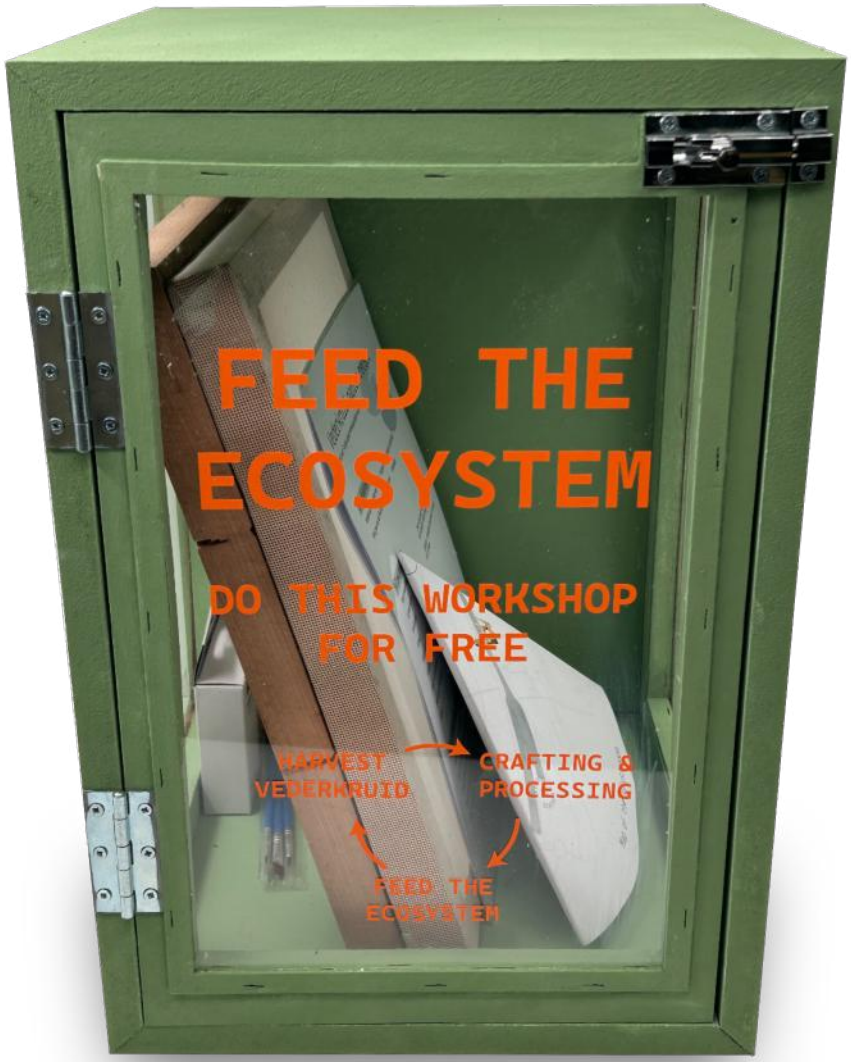


Figure 9: Design for sharebox implementation

Implementation Strategy

The implementation strategy is collaborating with existing local actors and spaces, positioning the project as a community-embedded practice rather than an externally introduced intervention.This was one of the five focus points derived out of our water biographies requirements list. In line with systemic design principles, the project aligns existing actors, resources and relationships toward a shared regenerative purpose, rather than introducing new parallel structures [18] (Conversations have been held with relevant entrepreneurs active around the Piushaven. The three following collaborations are currently most important to improve feasibility, engagement and help create project continuity:

[tilburgahoi.nl]

1) Stichting Ahoi - educative boat tour company. The tour guide will finetune the information given during the boat trip based on the information needed for the regenerative practice.

[aquafun4you.nl]

2) AquaFun4You - pedal bike rental service. Because the pilot workshop showed that collecting the vederkruid on pedal bikes increases engagement and enjoyment compared to harvesting from the water side.

[piushaven.nl]

3) BIZ Piushaven - a collaboration of entrepreneurs, investors, project managers and the municipality of Tilburg. The BIZ supports the realization costs for the circular guides and shared boxes and acts as a shared governance partner [42] that anchors the project within existing entrepreneurial and municipal structures. Suggested by the BIZ, a public kick-off event will activate the system. Locations like ateliers near the waterside and restaurant terraces can be made available and promotion is performed through their Piushaven Boulevard network.

Commons based value creation

This project operates as a commons based value practice rather than a conventional profit –oriented business model. Drawing on commons theory as described by Helfrich and Bollier [4], value is understood as relational and collectively produced through shared care, participation and a feeling of responsibility for a specific place.

In line with sustainability-oriented business literature, value is understood as relational and multi-stakeholder. Social value is created through the active involvement of local residents in material practices and shared care [43]. Ecological value is generated through regenerative actions that work with local water ecologies, reframing material use as temporary stewardship rather than extraction [36].

Financial flows function as enabling mechanisms that support maintenance and continuity. The project generates indirect economic value for local stakeholders such as AquaFun4You, Stichting AHOI and waterside restaurants, as more lively area with social activities, generates more income for these parties. This is the main reason why initial funding for this project is provided through collective area investment of the BIZ. The realization costs are largely front loaded (see attached budget, Appendix I) because of durable and reusable design of the workshop tools and the use of abundant regenerative material.

Impact continuity depends on continuing maintenance of the shared boxes and materials, aligning with the understanding that maintenance is the activity that keeps things going [37]. Extended Producer Responsibility [42] will be created by finding local partners who remain accountable for the long-term care of the designed infrastructure introduced into the public space. Therefore, we are in conversation with existing local roles, such as the harbour master or Stichting Thuishaven Tilburg, who already hold responsibility for the health of the Piushaven ecosystem.

Through future efforts the business model can be turned into a circular revenue model [42] with a focus on maintenance rather than profit. Opportunities to do so include voluntary participant donations, small revenue contributions from collaborating partners, and paid participation during seasonal kick-off events.

Discussion and Open Endings

The number of different angles and approaches included within this project, has the downside of not being able to completely dive into one side. Because of this, we acknowledge that in multiple phases several elements remain incomplete, forming starting points for future iterations.

Material performance

While the material recipe with ratio 3:1 vedekruid:grass performs well structurally, the exact dissolving time remains unknown. Further testing is needed to determine this and further material exploration may find opportunities to reduce grass or replace it by another local organic fiber that dissolves faster while maintaining sufficient strength.

Target group and user validation

The pilot workshop attracted residents aged 50+. However, as the project aims to support a continuing local community of caregivers, it is essential to also get younger generations involved. In collaboration with the BIZ this will be approached through modest forms of promotion. Next to this, a digital aspect like mobile documentations can be integrated in the workshop.

Also, the final iterated version of the workshop, together with its materialized system, has not yet been tested, so the impact of the changes has not been confirmed yet. Moreover, as the pilot workshop was held with only five participants, this project currently lacks sufficient validation on the user side. However, the amount of interested stakeholders, being: Stichting Thuishaven Tilburg, the BIZ and the municipality of Tilburg to take this project further, does show significant interest. Still it is essential to set up a second pilot round to test if the current design outcomes are clear, before entering into larger production of the circular guide for example.

Realisation and stakeholder roles

To ensure impact continuity, the roles and responsibilities of stakeholders involved require further clarification, including the designation of a local maintainer. Also, a small revenue is needed to support maintenance costs of the designed infrastructure. Next to this, to keep the workshop relevant and innovative over time, it could be needed to organize seasonal events as moments of reactivation.

Seasonality and adaptability

The practice currently assumes that vederkruid is present throughout the whole year. If availability changes or other invasive plants become dominant, a new material exploration is needed to make the system work with other organic material.

Ecological opportunities

During interviews with Bas Dielen, it became clear that citizen science (community monitoring) is relevant and needed to better understand the current health of the Piushaven ecosystem. This is currently not integrated in the workshop but could be. Also, it would be good to conduct quantitative water quality measurements to specifically know what nutrients are out of balance. According to Bas Dielen, it is then beneficial to supplement these nutrients for example by mixing it through the chalk paints.

Visibility in the local community

This project focuses on the act of stewardship rather than functional product outcomes. However, the amount of feedback about potential in this field does show that it is worth exploring if the creation of physical objects from vederkuid, such as coasters or placemats placed at waterside restaurants, are valuable to increase project visibility and engagement.

Conclusion

This project explores how ecological stewardship can be practiced through making in a local context. Situated in the Piushaven, a living harbour in Tilburg, the design focuses on reinforcing a bottom-up practice of communal care by the human neighbours of the harbour. During the emergent design process, it became clear that acts of ecological stewardship can be made tangible by actively engaging with organic material. Therefore, this pictorial presents the design of a regenerative workshop, translated into a circular guide that walks residents through a regenerative cycle of harvesting and crafting with milfoil, an invasive water plant, and bringing its nutrients back to the ecosystem.

The pilot workshop showed that material engagement can quickly lead to emotional attachment, resulting in people wanting to keep their crafts rather than giving them back to the ecosystem. These moments of friction, show how the workshop can challenge extractivist ways of thinking, and introduce people towards more regenerative ways of doing.

This pictorial ends with describing how the regenerative workshop was not designed in isolation, but rather takes into account and collaborates with the rich infrastructure of local entrepreneurs and places it is being placed in. Shared boxes are designed, from which residents can borrow workshop tools function as enabling structures that lower thresholds for participation. Intentionally these are placed next to ‘don’t feed the ducks signs’ to counter a ecologically harmful with a ecologically beneficial action. Also, ongoing active stakeholder collaborations is essential in the implementation of the designs, as this is key to ensure maintenance and impact continuity. By seeing environmental care as something that needs to be organized, locally supported and evaluated, the designers position the outcomes of this project not as a perfect solution to a big problem, but as a catalyst of new relationships between people, materials and place. The designers stay curious on if and how such design practices can continue to exist, evolve or scale without losing their situated and personal values.

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Appendix

A. Individual Contributions

We have balanced the workload of this project amongst all four team members in an equal way, listing to what each member wanted to learn and the preferences and skills at hand. In the table below most design activities are listed and stated who mainly performed it.

Design Activity:	(Mainly) done by:
Material explorations with waste	Jasmijn, Ben
Ocean health research and conceptualization	Gina, Wietske
Creation of first concepts: citizen science at the beach	All
Observing at the canal: giving water a voice	Ben, Jasmijn, Wietske
Literature readings	All
Water Biographies	All
Field interviews in Tilburg	Jasmijn, Wietske
Field observations in Tilburg	Ben, Gina
Paper making from algae and leaves	All
Setting up list of design requirements	All
Historical timeline & circular map design	Wietske
Map of the Piushaven design	Gina, Ben
Expert interviews for material making	Gina, Wietske, Jasmijn
Paper and clay making experimentations	Jasmijn, Wietske, Ben
Making mould and deckle	Ben
Personalization step	All
Strength & dissolve testing + visualizations	Gina
Postcards pilot workshop	Ben, Jasmijn
Recipe design for workshop	Ben
Ethical review approval	Wietske
Facilitation of pilot workshop	All
Conduct pilot workshop	Jasmijn, Gina, Wietske
Loopholes integration	Wietske
Circular guide design	Ben
Demoday paper making	Jasmijn
Demoday stand design and preparations	All
Contact potential stakeholders, present our project	Wietske
Edit demoday video	Wietske
Make Shared Box	Jasmijn
Make budget for funding	Ben, Wietske
Report: Abstract, introduction, methodology, context	Ben
Report: Process overview, abstract, introduction, final design, impementation, discussion, future work and conclusion	Wietske
Report: Context, material preparation, paper making, personalization, return to the piushaven, appendix	Jasmijn
Report: Paper making, references, appendix	Gina
Report graphics	Ben

B. Quantitative data analysis of material explorations

B.1 Dissolvability: Vederkruid testing

An attempt was made to measure the dissolvability of our samples. However, due to the added grass, this process would be too time-consuming (Figure A). Initially, the sample was soaked in the water for 2 days and then stirred for 15 to 20 minutes. But hardly any fibers were separated from each other.

Instead, we tested the dissolvability of Vederkruid. We found that after two hours of soaking the Vederkruid paper, it would fall apart after 6 minutes of simple stirring with the milk foamer. The test set up can be seen in Figure B.

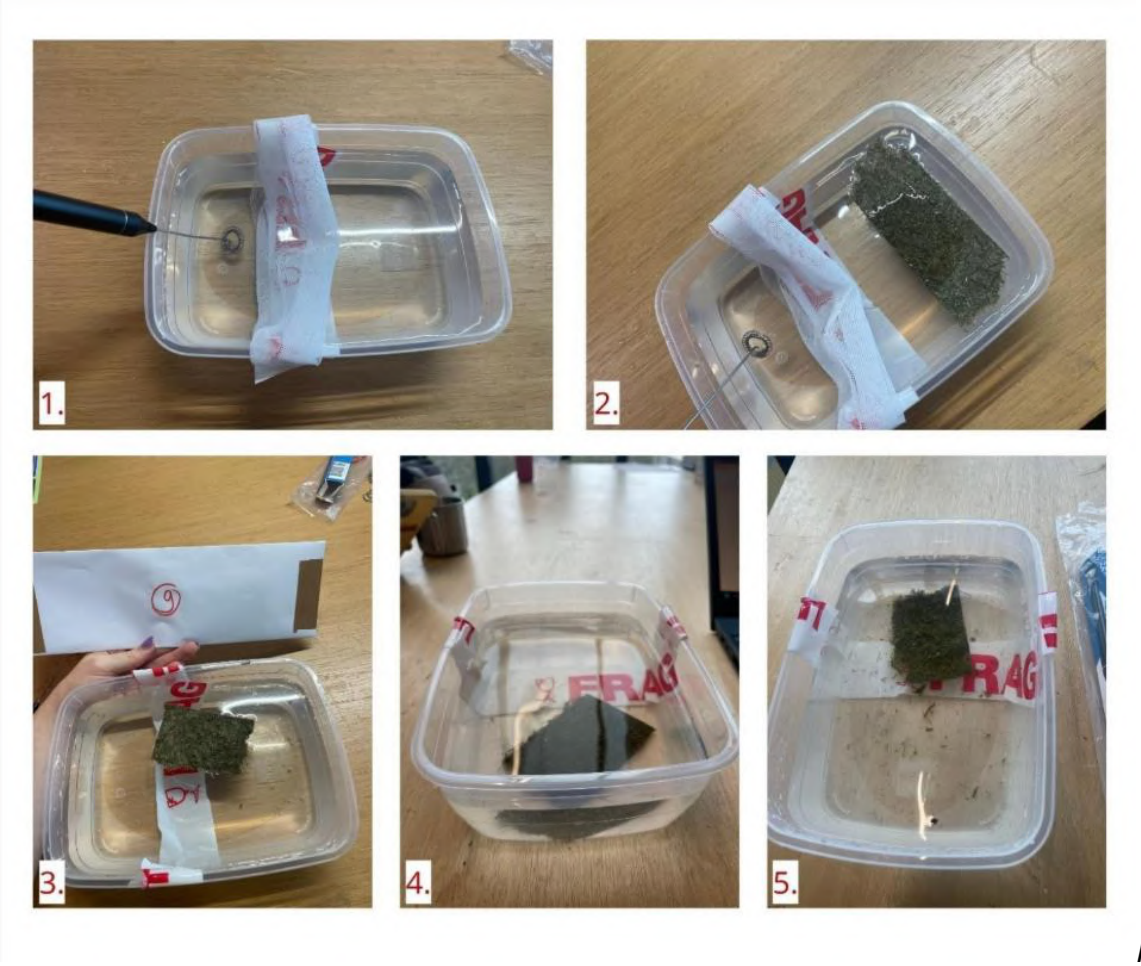


Figure A: 1) The set up of the small bucket of water, a milk foamer to stir the water and a mesh to prevent the material from clogging up the milk foamer. 2) The set up with the sample. 3) After half an hour of stirring it was decided to leave the sample to soak for 2 days, in this case sample number 9. 4) After 2 days of soaking the material was in this state. 5) After stirring for 10 minutes the material only let go of a few fibers.

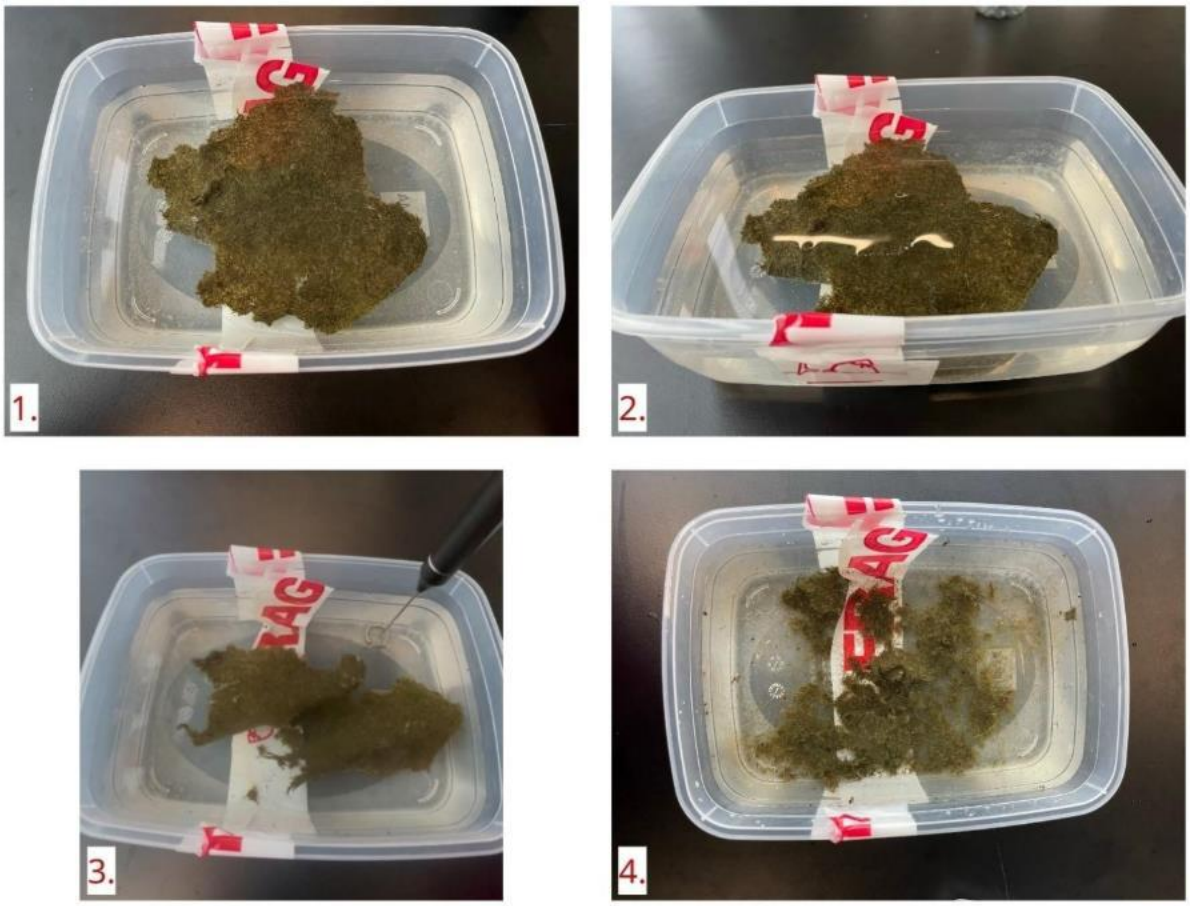


Figure B: 1) The sample of only vederkruid. 2) The sample after 2 hours of soaking. 3) The set up of the moving water. 4) The sample after 6 minutes of stirring with the milk foamer.

B.2 Research on dried grass decomposing in nature:

Oven-dried grass was utilized in production. Since the project has a strong focus on circularity and thus biodegradability, the ingredient was investigated. To decompose heated grass, like hay, it needs to be rehydrated so microbes can recolonize and break it down [2], [46]. Normal grass clippings decompose in a matter of a few days to weeks [20]. Hays' decaying process relies on various factors like initial moisture content, temperature and microbial activity. Eventually it will decompose, although it may take up to a year to do so [13]. From conducting the workshop, it came forth that, the material would fragment quicker than expected. Suggesting a more rapid decomposing process than hay. However, more extensive testing would need to be done to support this claim.

B.3 Strength Test results

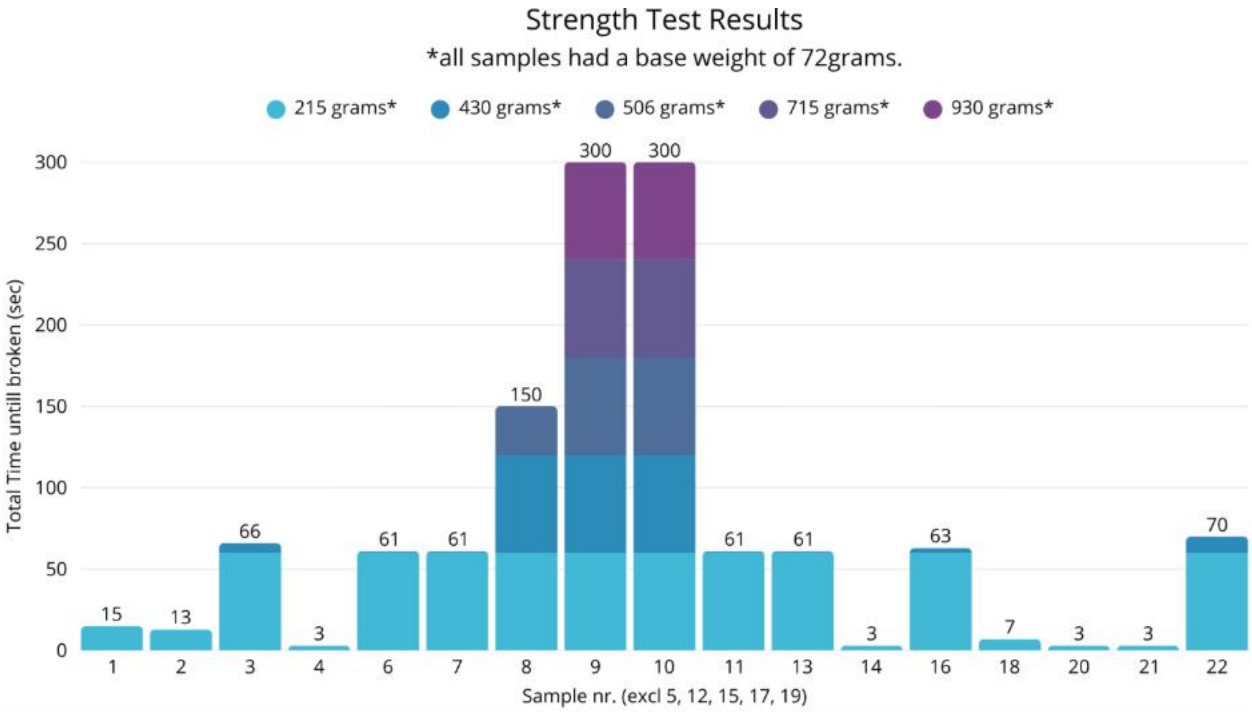


Figure C: Strength test results per sample.

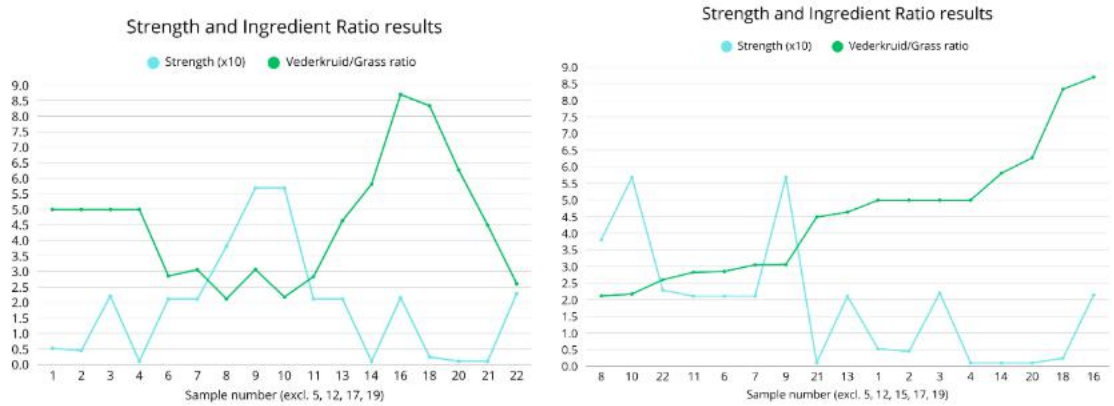
Above are the raw results from the strength test. From Figure C we can see that sample numbers 9 and 10 were the strongest and passed all the tests. The test set up consisted of 2 weights of 215 grams, 1 weight of 506 grams and two self-made holders of each 72 grams. Every sample had a strip roughly 5 cm wide and 21 cm long. Every strip was tested and hung between the two holders (FIGURE D). Some did not hold the holders and thus failed to 'compete' in the strength test. These samples were excluded from the dataset. The remaining samples were tested with increasing weight after 1 minute each time. For example, sample 3 held the weight of 215 grams for 1 minute long. After the minute passed, a second weight of 215 grams was added, resulting in a total weight of 430 grams. The sample held this weight for 6 seconds before it tore.

Figure D: From left to right; The basic set up for each sample strip with the two bases. The set up with one weight attached to the strip. If the weight became too much the strip would tear as seen in the last photo.

To compare the strength test results to other data the results had to be calculated as follows: A ratio for each load phase was calculated and later summed. In this way each load contributes proportionally to the stress level. This method weighs the time by the load actually applied during that time. This method is inspired by the Miner-Palmgren Rule used by engineers integrating time under load [23], [34].

B.4 Strength VS Vederkruid/Grass Ratio

For the analysis, sample numbers 5, 12, 15, 17 and 19 were excluded, since they were too burned to pass the start of the strength test. Since no strength data could be collected, they were removed from the data set.

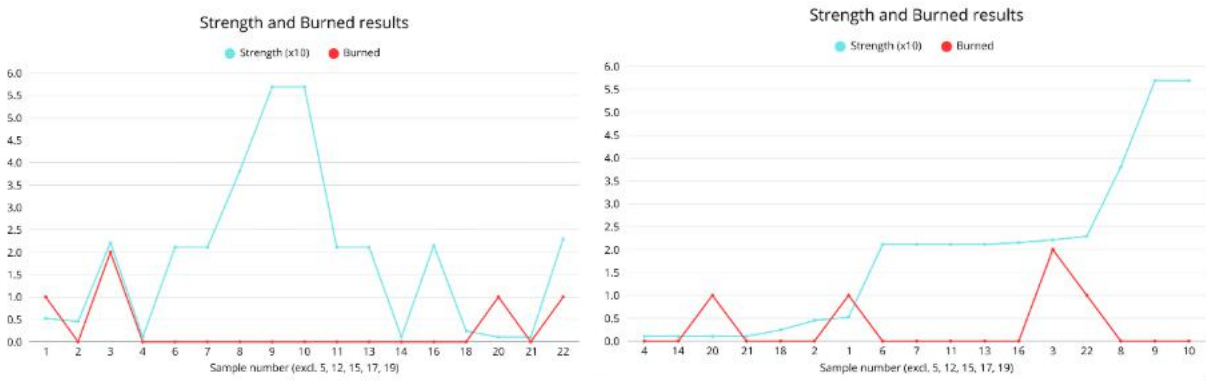


The graph on the left shows the findings on the x-axis in order of sample numbers, while the graph on the right shows them based on increasing Vederkruid/Grass ratios. From the left graph, it appears that the highest strength values occur at lower ratios. However, from

the right graph, this pattern is less clear. Although higher ratios frequently correspond with lower strength values, various outliers are detected. Sample numbers 8, 9, and 10 support this supposed trend, but sample numbers 6, 7, 11, and 22 suggest the opposite, with low strength values despite higher ratios. Hence, why a clear correlation cannot be concluded, only a supposed trend.

B.5 Strength VS Burned

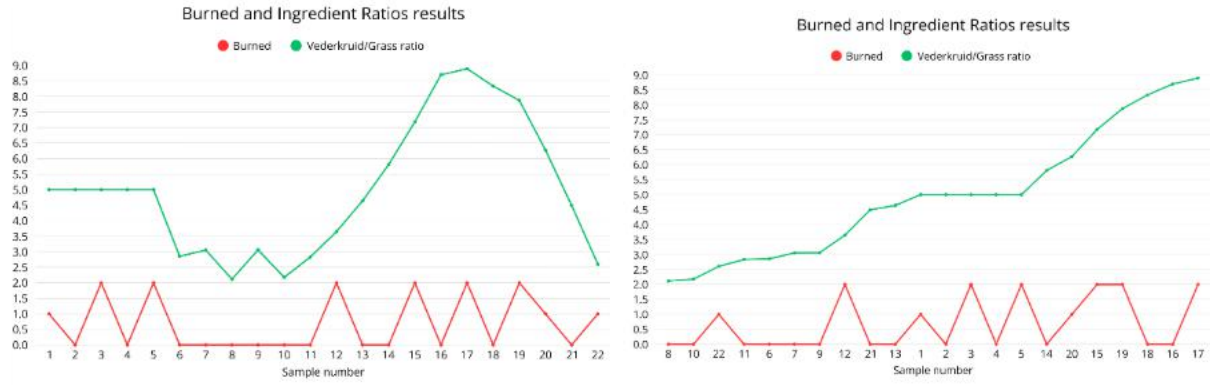
For the analysis, sample numbers 5, 12, 15, 17 and 19 were excluded, since they were too burned to pass the start of the strength test. Since no strength data could be collected, they were removed from the data set. Moreover, the Burned results are divided into three degrees of burn; a 0 is equal to 'no burning', a 1 is equal to 'tan' and a 2 is equal to 'burned'.



The graph on the left shows the findings on the x-axis in order of sample numbers, while the graph on the right shows them based on increasing strength values. The left graph would suggest a pattern between a high strength value and no burning. The graph on the right could suggest a similar pattern but has outliers such as samples 3 and 22. However, the burned values seem too sporadic to draw a conclusion on correlation or trend.

B.6 Burned VS Vederkruid/Grass Ratio

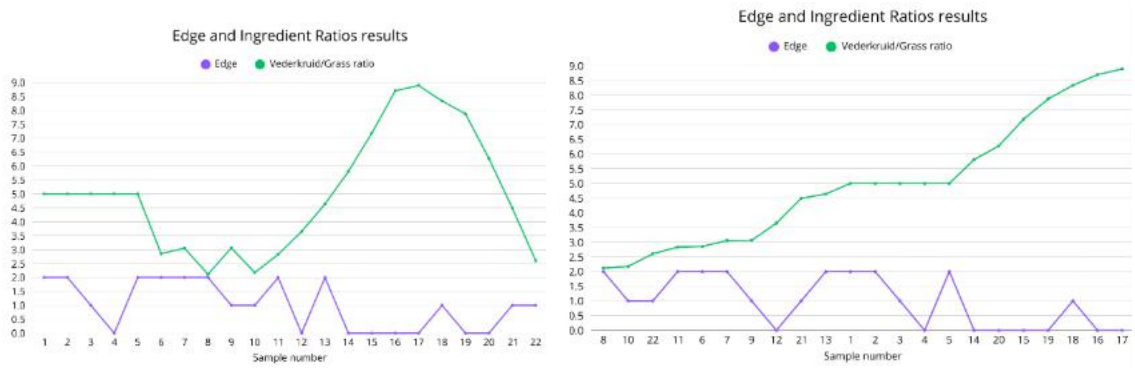
The burned results are divided into three degrees of burn; a 0 is equal to 'no burning', a 1 is equal to 'tan' and a 2 is equal to 'burned'.



The graph on the left shows the findings on the x-axis in order of sample numbers, while the graph on the right shows them based on increasing Vederkruid/Grass ratios. Although it may seem as if there is a pattern of a low ratio with no burning from the left graph, upon closer inspection in the right graph, this trend is entirely absent. The burned values are too random to be able to draw any form of conclusion on correlation or trends.

B.7 Edge VS Vederkruid/Grass Ration

The Edge results are divided into three types of edges; a 0 is equal to 'smooth/consistent', a 1 is equal to 'wavey/not consistent' and a 2 is equal to 'rough/lots of gaps'.



The graph on the left shows the findings on the x-axis in order of sample numbers, while the graph on the right shows them based on increasing Vederkruid/Grass ratios. From the left graph, it may seem as if there is a pattern of a low ratio with rough edges. However, upon closer inspection in the right graph, this trend is not as visible. Although sample number 5 onwards in the right graph hints at a possible pattern of higher ratios with smoother edges, the findings are too infrequent to confirm it. It merely suggests a trend rather than a clear correlation.

C. Invitations to workshop

Papiermaakworkshop

met materialen uit de Piushaven

Hallo! Wij zijn masterstudenten Industrial Design van de TU/e en doen een project om de biodiversiteit van Piushaven te beschermen. Een belangrijk onderdeel van dit project is om inwoners van Tilburg uit te nodigen om mee te doen en hen te helpen de Piushaven beter te begrijpen en er een sterkere band mee te krijgen.

Wanneer:

Zondag 23 november
van 10:00 tot 12:30 uur

Waar:

Jan Pietersz. Coenstraat 72,Tilburg

Wilt u uw deelname bevestigen?

Stuur een bericht of bel Jasmijn om het te bevestigen:

+31 6 37277421

Ben je nieuwsgierig? Dan nodigen we je graag uit voor onze gratis workshop, waar we papier maken met behulp van een invasieve plant: vederkruid.

Programma:

- Zelf aan de slag met het verzamelen van vederkruid in de Piushaven
- Warme chocolademelk, koffie of thee drinken
- Leren hoe je het papier maakt
- Creatief aan de slag gaan met het papier
- Beslissen wat je met het resultaat gaat doen

D. Thematic analysis: pilot workshop

General notes:
A pilot study was carried out to test the workshop in the field. An abundance of letters were posted in the letterboxes around the harbour and send in communal group chats. Five persons showed up as a result. Participants attended voluntarily due to intrinsic interest, which resulted in more authentic feedback. The group consisted of an older generation (55+) and were all conscious of the value of the Piushaven.

The workshop had a duration of 3,5 hours, in which participants collected vederkruid, made paper, personalized it and returned it to the harbour. The step of preparing the materials for the workshop was done prior and thus excluded from the pilot test. This would have resulted in a total time of 5 hours for the entire workshop.

Every step of the regenerative practise was executed. The part with the water bikes from AquaFun4U was thoroughly enjoyed and created an initial bonding moment between the participants. During the paper making stage comments such as “It's great that it can be done at home and is so easy!” and “This is very fun! Practical work!” They responded positively to the ease of the traditional paper making with the mould and deckle and appreciated that it can be done in a kitchen.

While the papers were in the oven, a brief interview was conducted. During this time, it was found that the participants had a product-oriented perspective and were quite inventive in their ideas for how to use the material. From origami boats to Christmas cards to wall insulation. Once the papers were out of the oven some made comments such as “this is a nostalgic smell” and “this feels like felt”. Once they were told they could deliver a message to the Piushaven using chalk paint, some initially did not know what to write. After providing examples from our own experiments, they creativity flowed. Some painted artworks like flowers and hearts, some tried using the typewriter to create a short poem, some stamped short activist slogans and others wrote a short appreciation to the harbour. Once the personalisation step was completed, it was time to return to the harbour. This was the stage the participants felt friction. All of them had a hard time ‘*destroying’* and ‘*throwing away’* their hard work. They created a sense of ownership of their creations and were hesitant to give it back. Some were so fund of the material that they cut of a piece of their paper and made something different with it. The main reason they experienced difficulty was due to the personalisation stage. They stated, “why go through the personalisation step, when you can just boil it and dump it back?”, which clarified that the circularity and aim of the practise was not clear enough.

THEME 1 – making generates care

Working with the organic material slowed participants down and conversations started about who is responsible for taking care of the harbour and other care related topics. This shows that making with is not just a layer of fun, but can engage participants fully in the activity, making the act of stewardship tangible.

Design implication:

Focus on short, accessible, hands-on making steps that immediately connect people to the bio-material.

THEME 2 – temporary use and the intention of return

Participants expressed a strong desire to keep their creations, at least temporarily. One for example cut a piece of their paper and made a Christmas tree for a postcard back at home. Also the participants called it 'throwing it back into the water' like if they're throwing trash into the water. A big contrast with we call it: 'returning it', 'giving it back', 'like a ritual'. This taught us that this connection should be made more clear in the final design outcomes. Or we come up with a ritual cycle that includes temporarily use:
make → personalise → use temporarily → return to water.

THEME 3 – continuity through local infrastructure
Participants came up with a lot of ideas on how project continuity can be better ensured when connected to local infrastructure, like: restaurants, ateliers, boat rental companies and schools as natural hosts for the workshop. These connections will keep the practice active, visible around the Piushaven.
Design implication:
Make partnerships central.
Examples:

1. restaurants using bio-plates for tea bags
2. ateliers creating molds
3. boat rental companies hosting "vederkruid collecting moments"
4. schools using the workshop method

THEME 4 – the boat as a clear symbol of return
One idea returned consistently during the workshop: making small boats from the material. Participants felt that a floating object would make the logic of return more clear and made giving it back to the water more intuitive. The symbol of a boat also connects play, care and place, where children and for example restaurant events could engage with, organizing for example 'boat races'.

E. Material exploration with additional biomaterials materials (okra, leaves, glycerine, reed, agar agar)

Sample: Weaving with fountain Grass

Project name: Exploring bio-materials
Project description: Exploring possibilities with materials from the Piushaven, Tilburg
Goal: Test what this combination can mean for our project's direction & possibilities.
Ingredients: ~~[illegible]~~ Fountain Grass collected from the side of the harbour. self-clipped
Process & Approach: Layered fountain grass processed in a Table Loom.
Insights: very soft & fluffy + feels like fake fur + fun to interact with + very compact & holds well together
Properties & Behaviour: flexible & doesn't shed too much
Hardware: Table Loom

Sample: Weaving with reed

Project name: Exploring bio-materials
Project description: Exploring ~~[illegible]~~ possibilities with materials from the Piushaven, Tilburg
Goal: Test what this combination can mean for our projects' direction & possibilities.
Ingredients: reed collected from the side of the water pre-clipped
Process & Approach: Layered reed ~~[illegible]~~ processed in a ~~weaving machine~~ Table loom
Insights: it's light & flexible and fun to do
Properties & Behaviour: Stays together well + flexible and light to move
Hardware: Ta[illegible]

Sample: Round 2 - Sample 3

Project name: *Composition of ingredients*
Project description: *Testing different combinations and ratios of ingredients*
Goal: *To find a fitting composition of ingredients and preferable material characteristics*
Ingredients: milfoil + fine grass
Process & Approach: *Paper making process and air-drying*
Insights: Sturdy, feels like thin velt + flexible
Properties & Behaviour: foldable + gaps on the edges + compact
Hardware: *Mould & Deckle + Blender + cotton cloth + Big bucket of water + scissors*

Sample: Round 1 - Sample 5

Project name: *Composition of ingredients*
Project description: *Testing different combinations and ratios of ingredients*
Goal: *To find a fitting composition of ingredients and preferable material characteristics*
Ingredients: okra + vederkruid
Process & Approach: *Paper making process and air-drying*
Insights: it doesn't smell as much thickness of layer matters in strength once dried
Properties & Behaviour: inflexible, quite weak
Hardware: *Mould & Deckle + Blender + cotton cloth + Big bucket of water + scissors*

Sample: Round 1 - Sample 4

Project name: *Composition of ingredients*
Project description: *Testing different combinations and ratios of ingredients*
Goal: *To find a fitting composition of ingredients and preferable material characteristics*
Ingredients: okra + ~~water~~ milfoil
Process & Approach: *Paper making process and air-drying*
Insights: Cracks when cut but stays together. Curls up from the outsides inwards
Properties & Behaviour: Strong & cracking
Hardware: *Mould & Deckle + Blender + cotton cloth + Big bucket of water + scissors*

This documentation has been influenced by:

Goveia, B., Andersen, K., & Tomico, O. (2022). Portfolio of Loose Ends. https://doi.org/10.1145/3532106.3533516

Sample: Round 4 - Sample 3

Project name: *Composition of ingredients*
Project description: *Testing different combinations and ratios of ingredients*
Goal: *To find a fitting composition of ingredients and preferable material characteristics*
Ingredients: milfoil + leaves
Process & Approach: *Paper making process and air-drying*
Insights: not holding together + brittle + see through. Feels like just crumbles
Properties & Behaviour: breaks immediatly, almost powder like
Hardware: *Mould & Deckle + Blender + cotton cloth + Big bucket of water + scissors*

This documentation has been influenced by:

Goveia, B., Andersen, K., & Tomico, O. (2022). Portfolio of Loose Ends. https://doi.org/10.1145/3532106.3533516

Sample: Round 4 - Sample 1

Project name: *Composition of ingredients*
Project description: *Testing different combinations and ratios of ingredients*
Goal: *To find a fitting composition of ingredients and preferable material characteristics*
Ingredients: 125 grams milfoil 85 grams leaves
Process & Approach: *Paper making process and air-drying*
Insights: very much individual pieces + fragile
Properties & Behaviour: crumbles and is very weak
Hardware: *Mould & Deckle + Blender + cotton cloth + Big bucket of water + scissors*

F. Material exploration defining grass vederkruid ratio

Sample: Non woven grass and milfoil [22]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket

ratio 2.6:1
481 grams in bucket

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

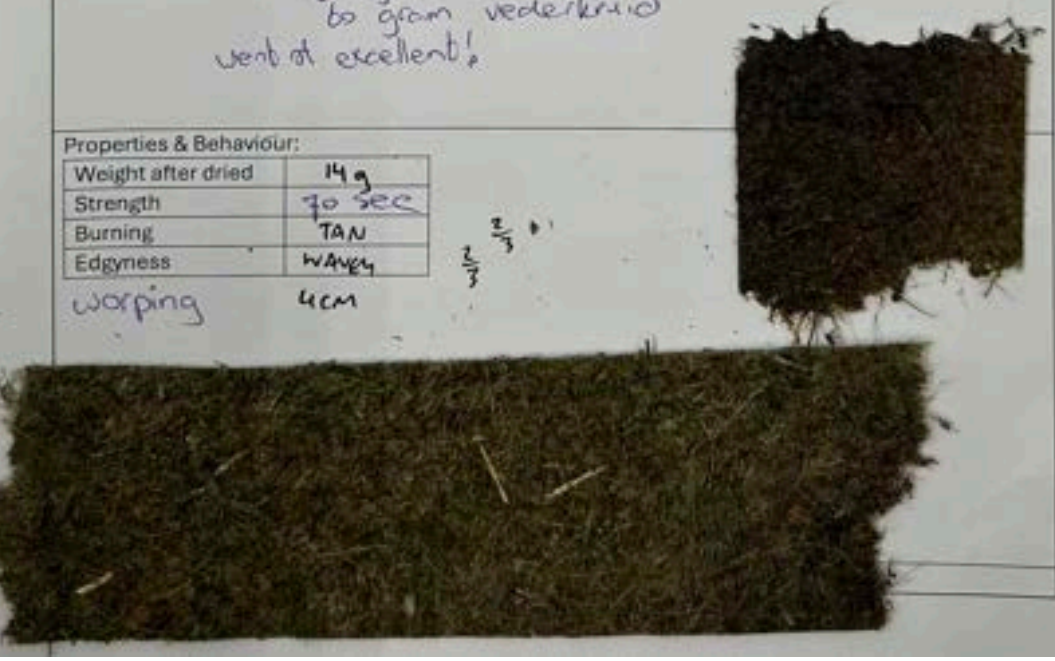
added
60 gram grass
60 gram leaves
60 gram vederkruid
vent of excellent!

Properties & Behaviour:

Weight after dried	14g
Strength	70 sec
Burning	TAN
Edgyness	WAVEY

warping

4cm



Sample: Non woven grass and milfoil [21]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket

ratio 4.5:1
354 grams in bucket

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

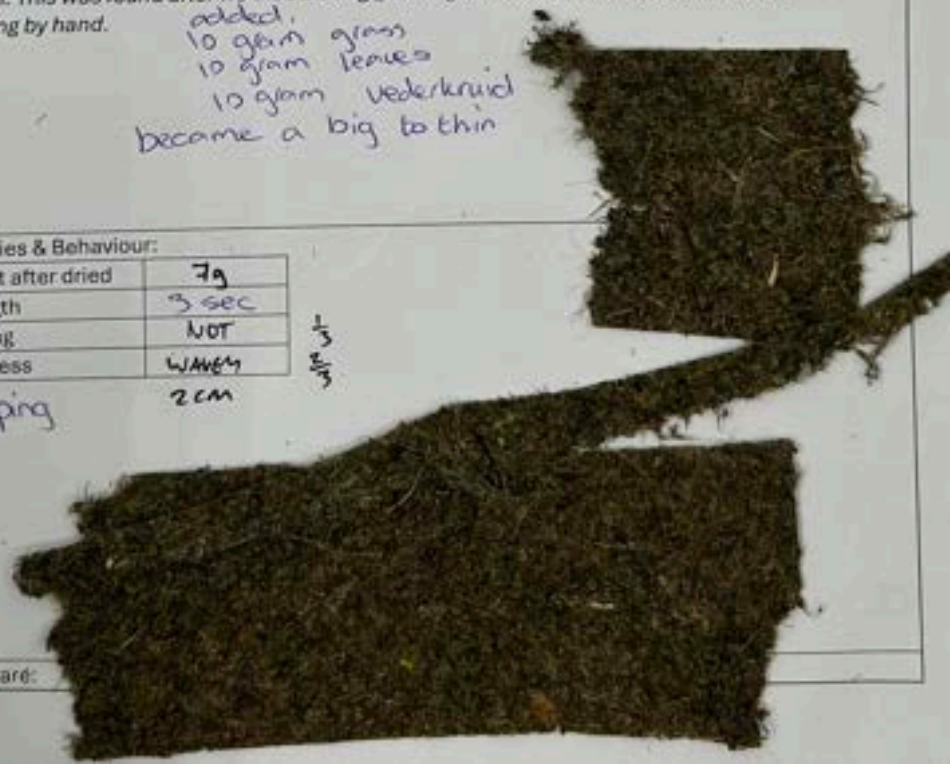
added:
10 gram grass
10 gram leaves
10 gram vederkruid
became a big to thin

Properties & Behaviour:

Weight after dried	7g
Strength	3 sec
Burning	NOT
Edgyness	WAVEY

warping

2cm



Hardware:

Sample: Non woven grass and milfoil [10]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
322 grams in the bucket
ratio 6.27 : 1

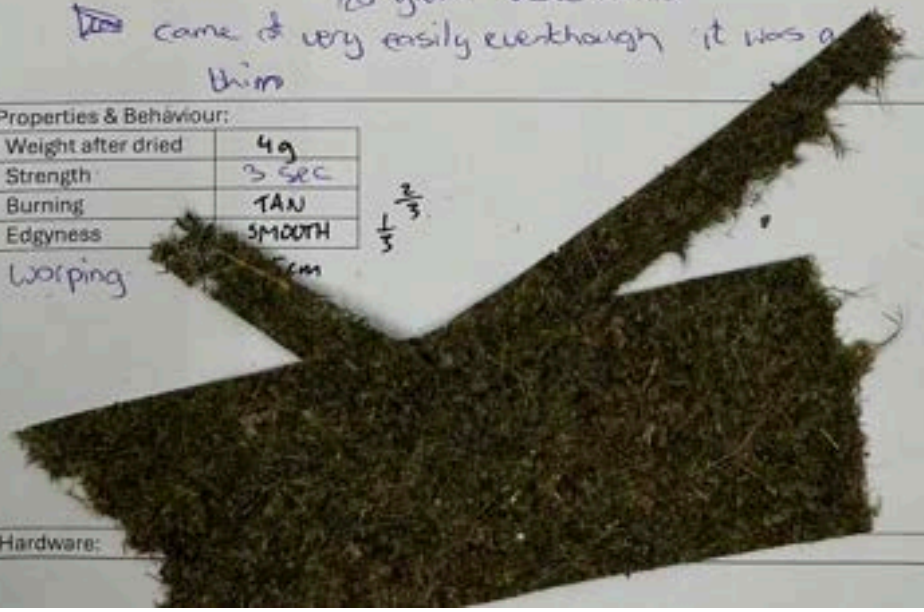
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
added
20 gram grass
20 gram leaves
20 gram veldekruid
came of very easily even though it was a thin

Properties & Behaviour:

Weight after dried	4g
Strength	3 sec
Burning	TAN
Edgyness	SMOOTH

warping



Hardware:

Sample: Non woven grass and milfoil [11]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
320 grams in bucket
ratio ?

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
5 gram grass
5 gram blended leaves
25 gram veldekruid
netting special.

Properties & Behaviour:

Weight after dried	4g
Strength	0 sec
Burning	BURNED
Edgyness	SMOOTH

warping
1cm

Sample: Non woven grass and milfoil [16]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
321 grams in bucket
ratio 8.3:1

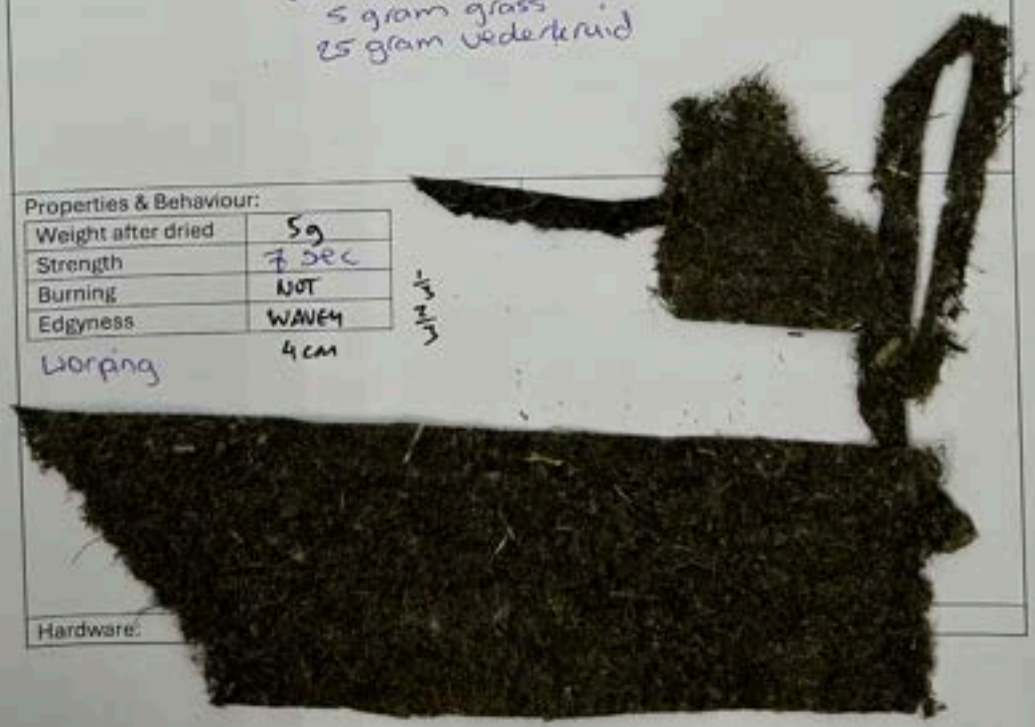
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
added
5 gram grass
25 gram vederkruid

Properties & Behaviour:

Weight after dried	5g
Strength	7 sec
Burning	NOT
Edgyness	WAVEY

4 cm
1/3
2/3
warping



Hardware:

Sample: Non woven grass and milfoil [17]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
325 grams in bucket
ratio ?

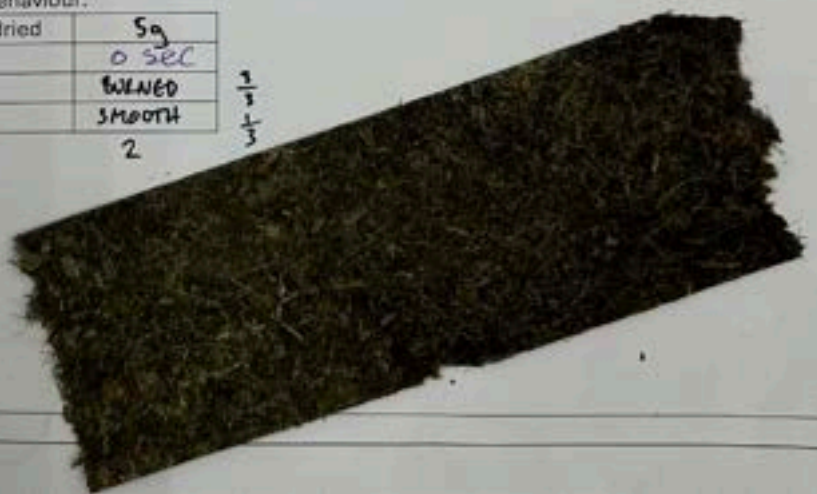
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
added:
5 gram grass
25 gram vederkruid
we did again add grass in samples looked less strong
5:1 ratio because

Properties & Behaviour:

Weight after dried	5g
Strength	0 sec
Burning	BURNED
Edgyness	SMOOTH

2
1/3
1/3
warping



Hardware:

Sample: Non woven grass and milfoil [16]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
ratio 8,7 : 1
315 grams in bucket

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
50 gram veder kruid added
we scooped nicely again.

Properties & Behaviour:

Weight after dried	6g
Strength	63 sec
Burning	NOT
Edgyness	SMOOTH

1/3
1/3
warping
4 cm

Sample: Non woven grass and milfoil [15]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
ratio : ?
292 grams in bucket

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
50 gram veder kruid added
was slightly thin but did scoop again

Properties & Behaviour:

Weight after dried	~4g
Strength	0 sec
Burning	NOT
Edgyness	–

1/3
warping
–

Hardwar

Sample: Non woven grass and milfoil [14]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the pape making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
285 grams in the bucket
ratio 5,8:1

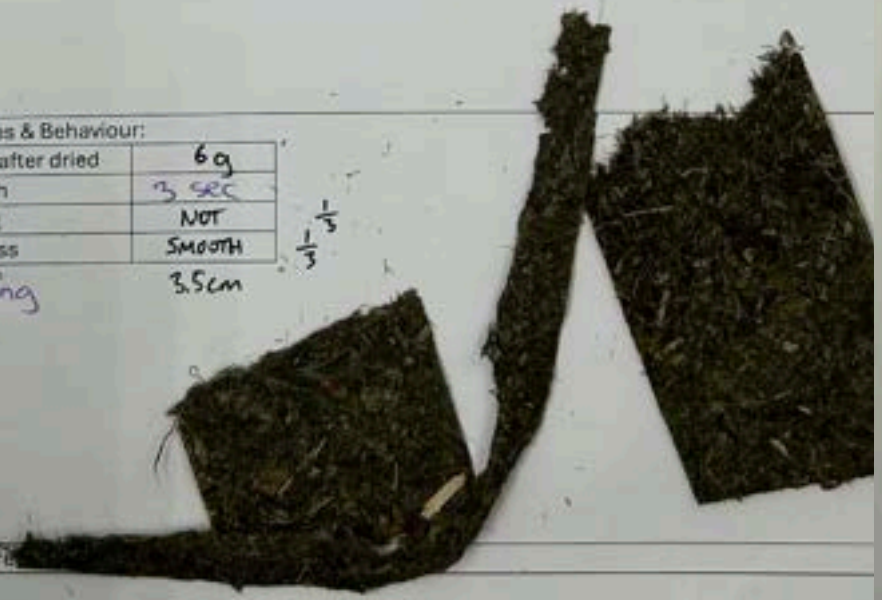
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degree and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese c tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
50 gram vederkruid added

Properties & Behaviour:

Weight after dried	6g
Strength	3 sec
Burning	NOT
Edgyness	SMOOTH

warping
3.5cm
1/3
1/3



Hardware:

Sample: Non woven grass and milfoil [17]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
277 grams in the bucket
ratio 4,6:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
50 gram vederkruid. added

Properties & Behaviour:

Weight after dried	6g
Strength	61 sec
Burning	NOT
Edgyness	ROUGH

warping
4.5cm
1/3
3/3

Hardware:

Sample: Non woven grass and milfoil [11]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 276 grams in bucket

ratio ?

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

P added 50 gram vederkruid
went of very nicely (again pressed nicely)

Properties & Behaviour:

Weight after dried	7g
Strength	0 sec
Burning	TAN
Edgyness	–

3/3

1.5 cm

warping

Hard

Sample: Non woven grass and milfoil [11]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 286 grams in the bucket

ratio 2.8 : 1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

from here we tried to slowly decrease the amount of grass in the samples
added 50 gram vederkruid

Properties & Behaviour:

Weight after dried	8g
Strength	61 sec
Burning	NOT
Edgyness	ROUGH

3/3

3/3

2.5cm

warping

Sample: Non woven grass and milfoil [10]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 278 gram in box
ratio 2:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
added
25 gram grass
we tried to press it really hard to see if it still would come of, it work and result looked less fluffy.

Properties & Behaviour:

Weight after dried	~ 6
Strength	900 sec
Burning	NOT
Edgyness	-

1/3
warping
-

Ha

Sample: Non woven grass and milfoil [9]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 303 gram in box
ratio 3:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
added:
25 gram grass
125 gram vederkruid.
we added a lot because we found that the first paper was fine in thickness when it came out of the oven
corners went well came of the meshe easily

Properties & Behaviour:

Weight after dried	~ 7g
Strength	300 sec
Burning	NOT
Edgyness	—

1/3
warping
-

Hardware:

Sample: Non woven grass and milfoil [8]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients: ratio 2:1
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 196 gram in box

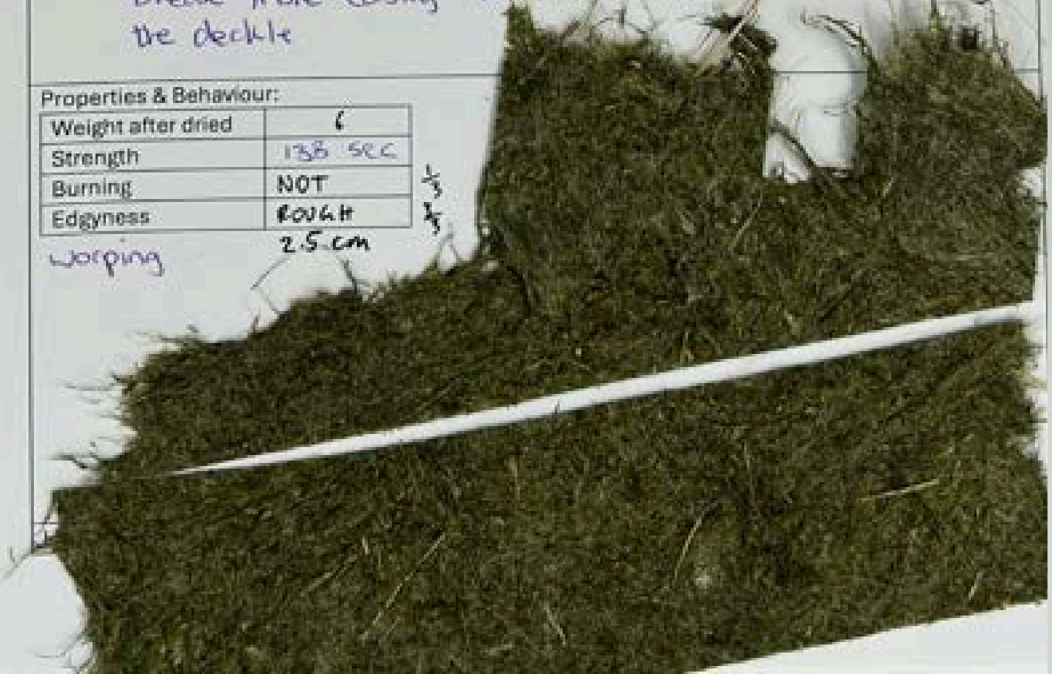
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand. added 20 gram grass

with in ratio more grass the corners of the paper break more easily when the mold is lifted from the deckle

Properties & Behaviour:

Weight after dried	6	
Strength	138 sec	
Burning	NOT	1/3
Edgyness	ROUGH	1/3
warping	2.5 cm	



Sample: Non woven grass and milfoil [7]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients: ratio 3:1
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 214 gram in box

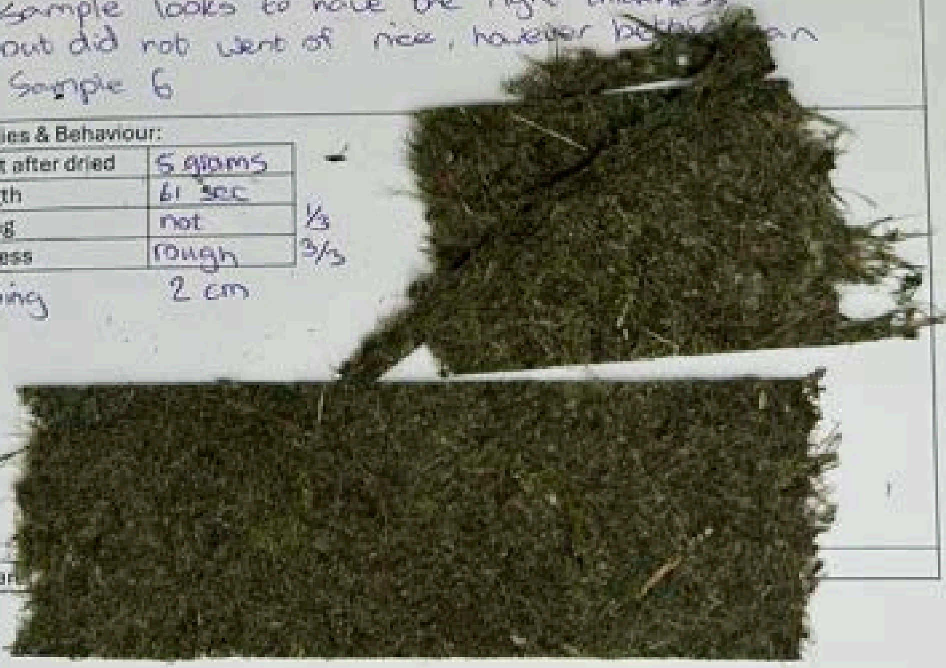
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand. added 5 gram grass 25 gram vederkruid.

sample looks to have the right thickness but did not went of nice, however [illegible] than sample 6

Properties & Behaviour:

Weight after dried	5 grams	
Strength	61 sec	
Burning	not	1/3
Edgyness	rough	3/3
warping	2 cm	



Hardwar

Sample: Non woven grass and milfoil [6]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 219 gram in box
ratio 2.8:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
We added 25 gram grass we dissolved it in 250 ml of water.
Was a thinner sample went alright but did not go nice of the mesh.

Properties & Behaviour:

Weight after dried	5 grams
Strength	61 sec
Burning	burned 3/3
Edgyness	rough 3/3
warping	2,5 cm

Hardware:

Sample: Non woven grass and milfoil [5]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket 234 gram in box
ratio 5:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.
We needed to scoop twice because there was a hole in the middle.
We needed to press more wet of harder then with sample 4

Properties & Behaviour:

Weight after dried	6 grams
Strength	0 sec
Burning	burned 3/3
Edgyness	rough 3/3
warping	0,5 cm

Sample: Non woven grass and milfoil [4]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 300 gram in box
ratio : 5:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

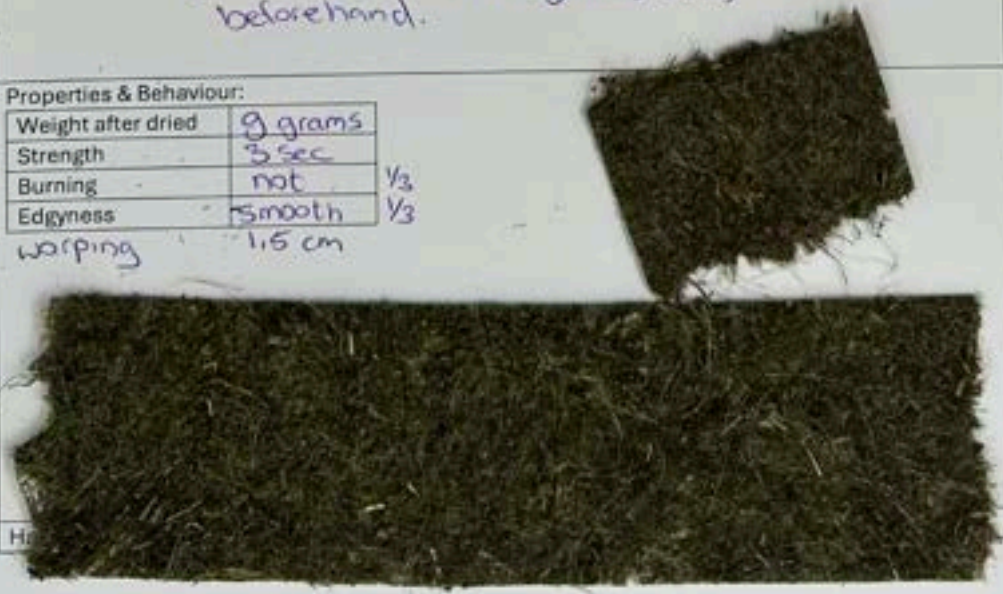
Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

We needed to press a normal amount and then it came of very smoothly
We did not add ~~anything~~ any material beforehand.

Properties & Behaviour:

Weight after dried	9 grams	
Strength	3 sec	
Burning	not	1/3
Edgyness	smooth	1/3

warping 1,5 cm



Sample: Non woven grass and milfoil [3]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket > 352gram in box
ratio 5:1

Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

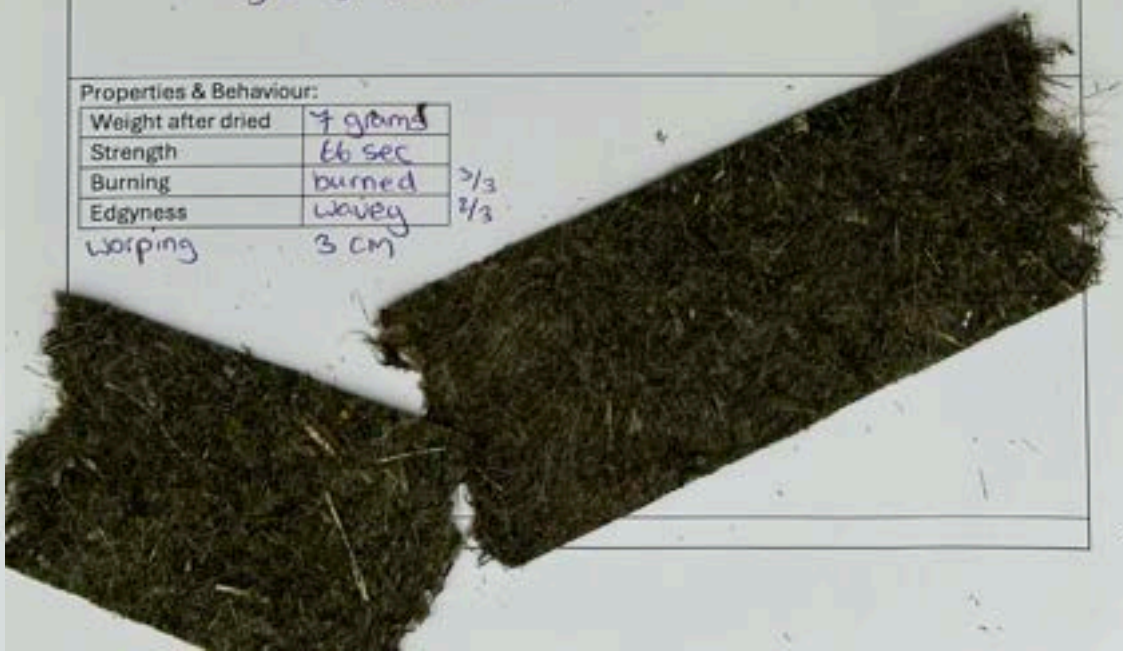
Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

here we needed to press a little bit but then it came off fully fine. We also did not any thing beforehand.

Properties & Behaviour:

Weight after dried	7 grams	
Strength	46 sec	
Burning	burned	2/3
Edgyness	wavey	2/3

warping 3 cm



Sample: Non woven grass and milfoil [2]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
> 393,86 gram in box
ratio 5:1

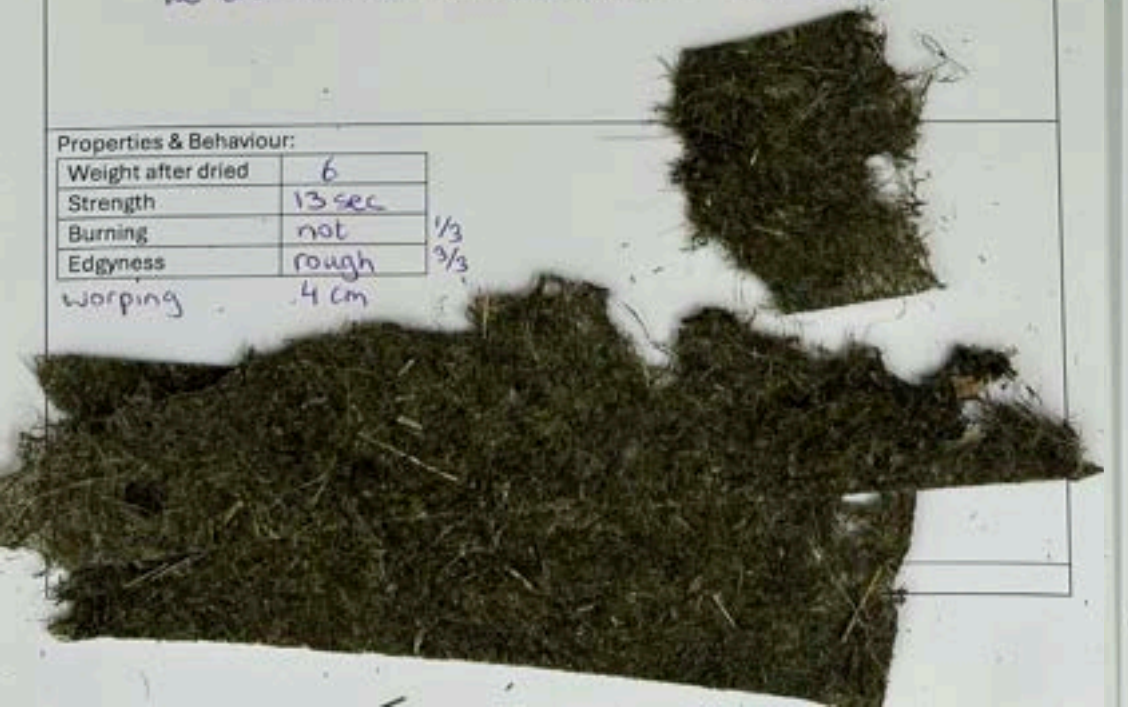
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

Here is was also not needed to press
we did not add materials before this scoop

Properties & Behaviour:

Weight after dried	6
Strength	13 sec
Burning	not 1/3
Edgyness	rough 3/3
warping	4 cm



Sample: Non woven grass and milfoil [1]

Project name and description:
Exploring ratio's of milfoil and grass. We made a big batch of non-woven milfoil and grass material to try different kind of ratio and to make enough materials to try out different personalization steps.

Goal:
Find the ratio that is the best if you look at strength, dissolvability, the fact that we want the biggest ratio of milfoil possible and how easy it is to handle when making the non-woven through the paper making technique.

Ingredients:
[ ] grams of milfoil in the bucket
[ ] grams of grass in the bucket
> 450 gram in box
ratio 5:1

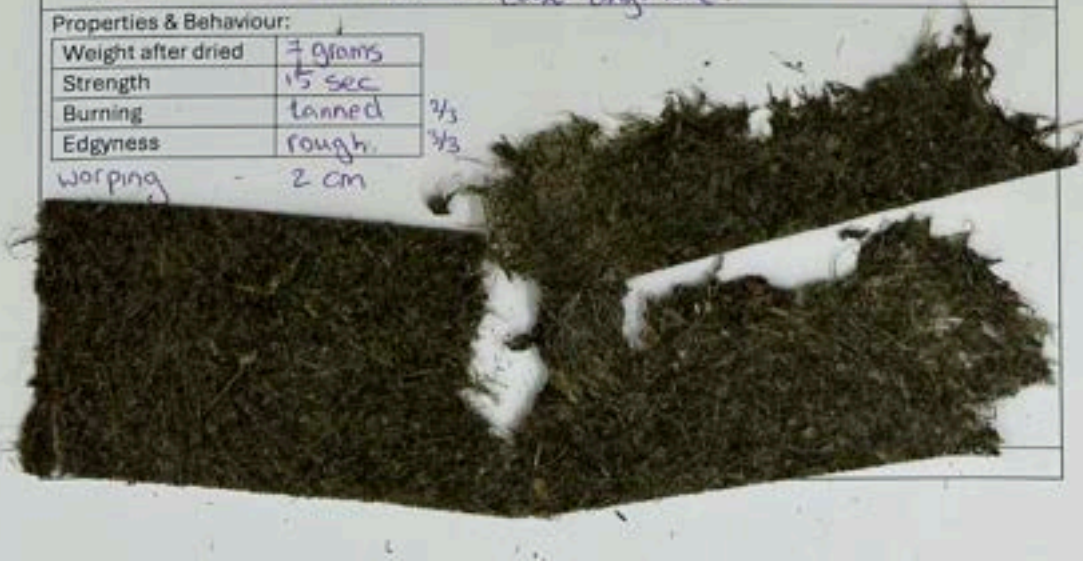
Process & Approach:
All the materials were cooked for an hour after which we blended them. Then we started with a beginning amount of milfoil and grass in the bucket and after each scoop we added some. In the end we calculated what was in the bucket before we scooped this paper. Those numbers are inserted in the ingredients list. Then we did the paper making techniques after which we dried it in the oven. Oven times and temperature heights differ and are somewhere between 200-250 degrees and 15-30 minutes.

Insights:
The milfoil but definitely the grass needs to be cut manually with a scissor otherwise the blenders will break down. Thereby it is best if you squeeze the material after it is blended out with a cheese or tea cloth. This was found after we tried sieving (pushing with a ladle through the sieve) and squeezing by hand.

first scoop was too thick (so we trew that back)
so we scooped the second one less low in the box.
we did not need to press the water out to get it from the deckle. we think that is because the paper is quite thick. After being in the oven this was not the case anymore.

Properties & Behaviour:

Weight after dried	7 grams
Strength	15 sec
Burning	tanned 2/3
Edgyness	rough. 3/3
warping	2 cm

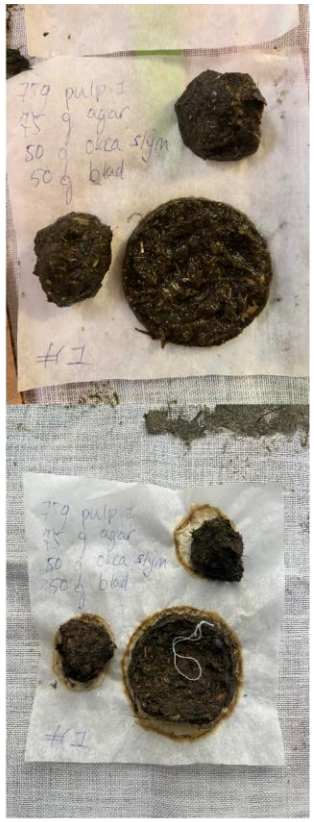


G. Material exploration with clay

First exploration session. Free in form, no direct goal

Thicker plateaus of materials
which started molding in the end

Molding the material pulp by
hands



Making clay with flour and salt

Second exploration session, goal to derive so material qualities out of it

We thought that the previous clay experiments were molded because they were drying on a water resistant under layer, so the water could not travel away. For the next exploration we try different undergrounds that are more similar to the Piushaven

20 gram Vederkruid
5 gram gras
5 gram leaves

20 gram Vederkruid
10 gram grass

20 gram Vederkruid
10 gram leaves

30 gram Vederkruid

On cotton fabric In water Next to Dommel In oven

Water

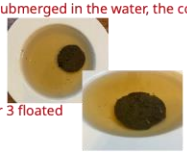
20VK10leaves crumbles

After two days, the 3 floating are still mostly intact (maybe also because the water is standing still) but 30VK is submerged in the water, the color of the ones with leaves are turned

The sample with 20VK10leaves crumbled immidiatly the other 3 floated


20VK10grass


30VK


20VK10leaves


30VK submerged


20VK5leaves5grass

Oven

All 3

VK + leaves

VK

VK + grass

After 30 min 100C and then 30 min 200C they samples were dry to the tough.
20VK10leaves was crumbling, by 20VK10grass it was visible that it did not mix

so from now on we mixed the materials first together in water, squeeze them out again and them press them in the mold

Dommel

On cotton

After two days there is more water in the cotton and the samples feel more dry

H. Primarily paper making

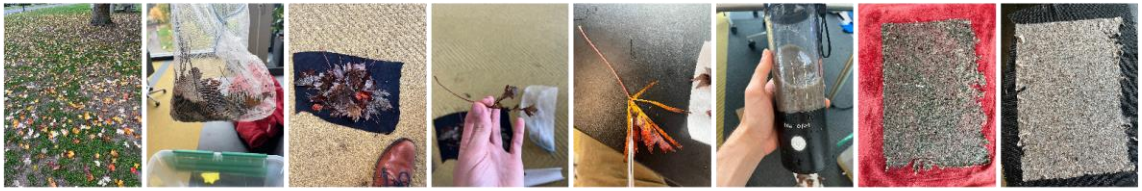
Making Frame

Very easy to do, it can be done with hand tools, and a stapler. Fabric is pulled tight. We learned that it sags when wet, so perhaps we could tighten it after wetting it.

100% recycled paper

Recycled paper was very easy to make. We learned that if the fabric on which the paper is laid is not ironed, the paper inherits its wrinkles

50% leaf, 50% rPaper



Leaf paper was rather delicate to peel, as the leaf pieces did not adhere to each other well.

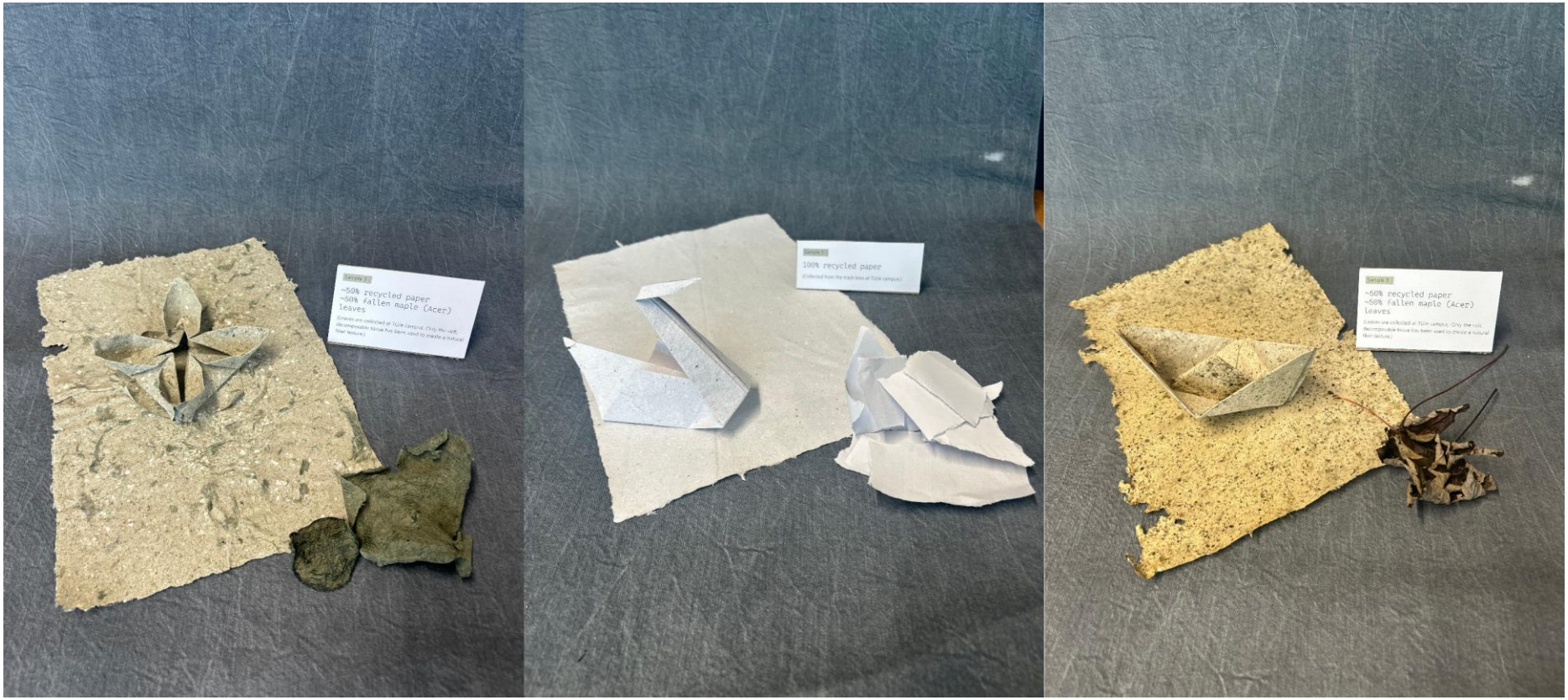
50%Algae, 50% rPaper

Algae paper was very easy to make, but kind of gross, like the last time. The paper made it hold together better, but it still warped aftrwards.

Dried results

All papers were successful! The leaf paper did not

Final demoday samples:



I. Budget

Option 1:		Item	Explanation	Units	Material per Unit (euro)	Total Material Cost (euro)	Labour (hours)	Labour Cost (euro)	Total (euro)
Full Service, with feeding boxes and kick off.		Set Up							
		Design Refinement	Material translation and refinement	1	0	0	32	960	960
Hourly Rate (euro)	30	Workshop Guides	Help guide people to do the workshop on their own	20	10	200	4	120	320
		Feeding Boxes Construction	Build the boxes where people can get the materials	3	100	300	20	600	900
Option Total (euro)	2940	Feeding Box Set Up	Install the boxes on location	3					To Be Determined
								Design & Material Total:	2180
Office on the web Frame		Workshop Kick Off							
		Workshop Leading	Facilitating the public group activity	0	0	0	15	450	450
		Transportation	Subsidy for travel costs to Tilburg	4	20	80	0	0	80
		Waterbike Access	Waterbike rental costs for the Vederkruid collection.	6	5	30	0	0	30
		Workshop Materials	Creative materials for the workshop	1	200	200	0	0	200
								Kick Off Total (euro) :	760
								Option 1 Total (euro) :	2940

Option 2:		Item		Units	Material per Unit (euro)	Total Material Cost (euro)	Labour (hours)	Labour Cost (euro)	Total (euro)
Office on the web Frame :k off.		Set Up							
		Design Refinement	Material translation and refinement	1	0	0	32	960	960
Hourly Rate (euro)	30	Workshop Guides	Help guide people to do the workshop on their own	10	20	200	4	120	320
		Feeding Boxes Construction	Build the boxes where people can get the materials	3	100	300	20	600	900
Option Total (euro)	2230	Feeding Box Set Up	Install the boxes on location	3					To Be Determined
								Design & Material Total:	2180
		Workshop Kick Off							
		Workshop Leading	Facilitating the public group activity	0	0	0	0	0	0
		Transportation	Subsidy for travel costs to Tilburg	0	0	0	0	0	0
		Waterbike Access	Waterbike rental costs for the Vederkruid collection.	0	0	0	0	0	0
		Workshop Materials	Creative materials for the workshop	1	50	50	0	0	50
								Kick Off Total (euro) :	50
								Option 2 Total (euro) :	2230

Option 3:		Item		Units	Material per Unit (euro)	Total Material Cost (euro)	Labour (hours)	Labour Cost (euro)	Total (euro)
Without feeding boxes, with kick off.		Set Up							
Office on the web Frame		Design Refinement	Material translation and refinement	1	0	0	32	960	960
Hourly Rate (euro)	30	Workshop Guides	Help guide people to do the workshop on their own	20	10	200	4	120	320
		Feeding Boxes Construction	Build the boxes where people can get the materials	0	0	0	0	0	0
Option Total (euro)	2040	Feeding Box Set Up	Install the boxes on location	3					To Be Determined
								Design & Material Total:	1280
		Workshop Kick Off							
		Workshop Leading	Facilitating the public group activity	0	0	0	15	450	450
		Transportation	Subsidy for travel costs to Tilburg	4	20	80	0	0	80
		Waterbike Access	Waterbike rental costs for the Vederkruid collection.	6	5	30	0	0	30
		Workshop Materials	Creative materials for the workshop	1	200	200	0	0	200
								Kick Off Total (euro) :	760
								Option 3 Total (euro) :	2040

J. Explorative interview Carolina and John

Conducted on: 1 october 2025

Conducted by: Wietske and Jasmijn

Where: The drie gebroeders, there boat in the Piushaven

Caroline and John have a **mission to make people see the beauty of the Piushaven** and the surrounding nature — to help people recognize how special this area truly is. They have been committed to this cause since **2004**, when they:

- Wrote a **book** together with ecologists and biologists.
- Founded the **ThuisHaven Tilburg Foundation**, including a **scale model and vision for the Piushaven's future**.

What they do

- They organize **educational boat tours** to let people experience and appreciate the natural environment of *Het Groene Woud* (around 15,000 passengers per summer).
- They have **organized protests and public actions** to raise awareness about the importance of the harbour's ecosystem.
- They describe the Piushaven as a **"tension field"** — a place where urban development, recreation, and ecology constantly need to be balanced.

Actions and focus areas

1. Welcoming and facilitating **harbour visitors**.
2. Creating a **museum or educational platform** about nature and heritage.
3. Promoting **recreation** that respects the environment.
4. **Maintaining quality** of water, biodiversity, and the overall area.

They emphasize that the Piushaven is **an exceptional piece of industrial heritage** that must be cherished.

Municipality and collaboration

- They believe the **municipality should take more responsibility**, but in **collaboration with local businesses**(Horeca, the BIZ).
- Important contacts:
    - *Saskia Jansen* – harbour master.
    - *Bas Doefen* – ecological management.

Current situation (ecological)

- **2–3 years ago**, dredging activities caused an **80% loss of biodiversity**, destroying species such as **freshwater mussels and triangular mussels** that used to filter the water.

- **Fountain weed** (*Fonteinkruid*) is removed monthly — even though it might be suitable for consumption or reuse.
- **Diving clubs**, which used to remove dangerous underwater objects, have disappeared.
- The **municipality** has placed **warning signs** for blue-green algae and water quality issues: no swimming is aloud
- A **grass field** near the water was removed due to trash and noise complaints, reducing natural meeting spaces for locals.

Their key question

“We need you. We can no longer continue our efforts alone. How can we anchor the qualities of this beautiful place and make more people care — to raise their voices when the municipality wants to do something stupid?”

Interpretation

Their main concern is **continuity**:

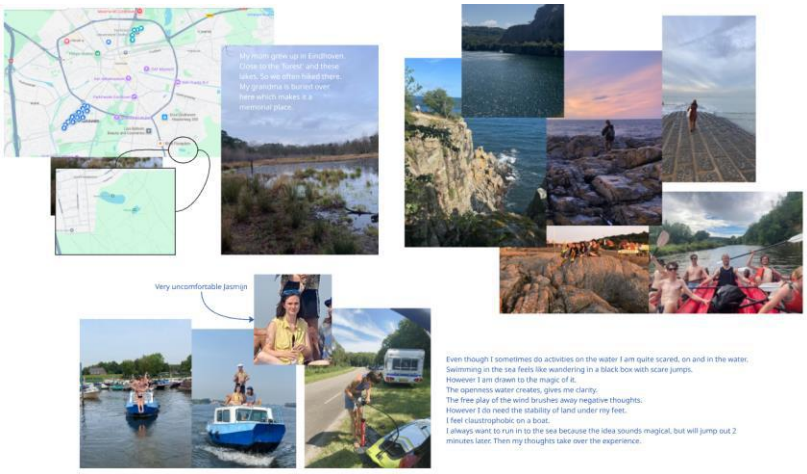
- After years of effort, they feel that the **municipality and residents quickly forget** the value of the harbour.
- They want to **involve more people** in caring for the Piushaven — to make stewardship a shared responsibility.
- They are looking for **tangible ways to keep this connection alive** — which directly aligns with your project’s goal.

Opportunities for our design project

- Design **interventions that evoke beauty, pride, and care** among residents.
- Use **local, circular materials** (such as fountain weed, mussel shells, compost, or harbour waste) to make **ecological stories tangible**.
- Include an **educational or participatory component** — similar to their boat tours, but through *making and material engagement*.
- Involve their **network** (Saskia, Bas, ThuisHaven Foundation) as *community gatekeepers and storytellers*.

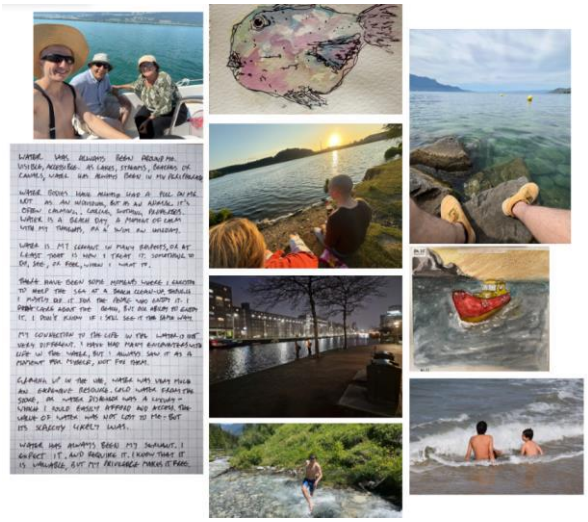
K. Water Biographies

Jasmijn:



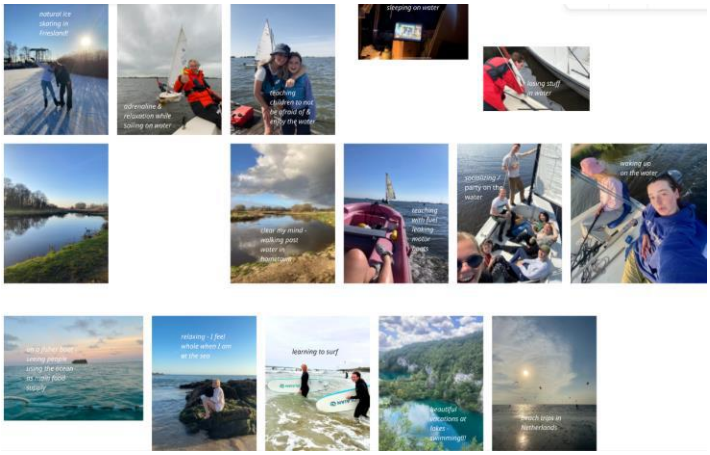
Even though I sometimes do activities on the water I am quite scared, on and in the water. Swimming in the sea feels like wandering in a black box with scare jumps. However, I am drawn to the magic of it. The openness water creates, gives me clarity. The free play of the wind brushes away negative thoughts. However, I do need the stability of land under my feet. I feel claustrophobic on a boat. I always want to run in to the sea because the idea sounds magical but will jump out 2 minutes later. Then my thoughts take over the experience.

Ben:



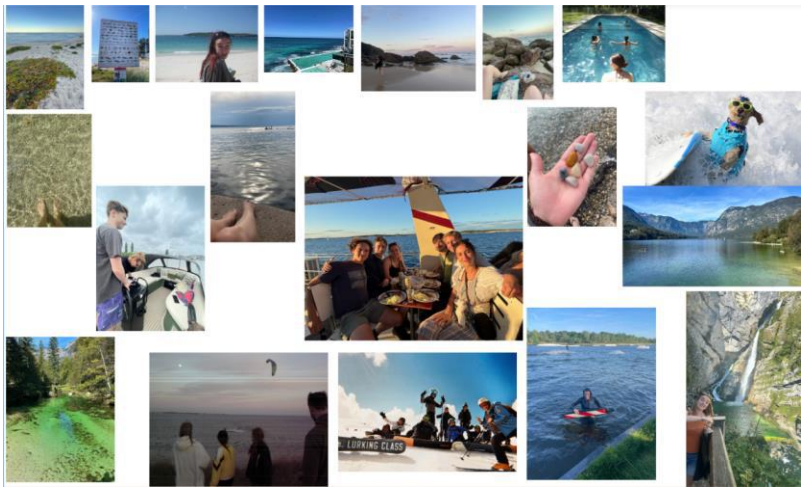
Water has always been around me. Visible, accessible. As lakes, streams, beaches or canals, water has always been in my proximity. Water bodies have always had a pull on me. Not as an individual, bt as an animal. it's often calming, cooling, soothing properties. Water is a beach day, a moment of calm with my thoughts , or a swim on some day. Water is my servant in many respects or at least that is how i treat it. Something to do, see or feel when i want to. There have been some moment where i enlisted to help the sea at the beach clean up. Though i mostly did it for the people who enjoy it. I dont care about the beach, but our ability to enjoy it. I dont know if i still see it the same way. My connection to the life with the water is not very different. I have had many encounters with life in the water, but i always saw it as a moment for myself, not for them. Growing up in the UAE, water was very much an expensive resource. Cold water from the store or water dispensor was a luxury – which i would easily afford and access. The value of water was not lost to me, but its scarcity likely was. Water has always been my servant. I expect it and require it. I know that it is valuable, but my privilage makes it free.

Wietske:



Water has always been part of my life. I grew up in the Netherlands, close to lakes and the beach, so being around water felt natural. I've slept on the water and woken up on it, and as a child in Friesland I went natural ice skating in winter. I've lost things in the water, learned to let them go, and spent countless hours swimming during lake vacations and beach trips. I've taught children not to be afraid of the water and to enjoy it, while learning myself through sailing, where adrenaline and relaxation exist at the same time. I've socialized and partied on the water, but I've also seen its fragile side through motorboats and fuel leaking. When I need to clear my mind, I walk past the water in my hometown, and at the sea I feel whole. I've been on a fishing boat and seen people rely on the ocean for food, which deepened my respect for it. I learned to surf, falling and trying again. All these experiences shaped how I understand water—not just as a place, but as something deeply connected to my life.

Gina:



I noticed that water is in everything I do and am. Not only the less physicall aspect of having a water sign in astrology, but also in the sense of proximity. I grew up surrounded by water, i could spend hours on end in the water. I grew up in the Netherlands right next to a lake and not far from the beach. I always feel at peace when im near the water, like a piece of me clicks. I admire water as a life force and the raw power it has. I see it as the essense of my life, from the drinking water i need to survive to the rain the world around me needs to the habitats it provides for so much life. Not only that i have done many sports in the water from wakeboarding and surfing to snowboarding (frozen water). However, there are many contradictions as well, because as much as i love and created a fascination, it has also always scared me. Now it has turned from fear into passion.

L. Expect interview Bas Dielen

22-10-2025

- Works as an ecologist in the policy department of the municipality of Tilburg
    - Previously he operated in the executive department
    - Has had projects in various types of ecosystems in Tilburg
    - Know the Piushaven well
- Every 20 years the municipality dredges the bottom of the harbour because there would be too much slip on the bottom floor
- Plants we do not want or we call ‘invasive’
    - Vederkruid = grows too fast and takes over the ecosystem and prevents native species from growing
    - Fonteinkruid = native but too agressive
- Vederkruid
    - Because this grows too much it hinders the ships
    - It costs money to have it be taken out of the water
- If you dont want the plant to sprout again you should boil it at at least 70 degrees celcius
- He loves the closed circle
- Vederkruid gets removed periodically, roughly 6x a year
- Van Helbot usually snips and mows the harbour
- The amount a haywagen is alwasy allowed to be taken from the harbour
- With a reek you can get the vederkruid out of the water
- April till september is the heaviest period of vederkruid
- KNNV = volunteers
- Base measure = number of mussles
- Maybe we should nature do its thing?
- We know too little about the harbours health
    - No money
    - Relay on volunteers
    - Hard to see
    - Should we intervene?
- Dreging had a major impact on the health of the water, especially removing the mussles was hard on the system.

19/11/2025

- Gathering the materials =
    - On the scale we want to do this project, gathering the materials ourselves is totally okay. During the breeding season the ecosystem can withstand some ‘damage’.
    - Normally we need to be careful when collecting the vederkruid because if small pieces stay or break, then the invasive species will spread even more. But this is impossible to achieve so we dont need to worry about it too much.

M. Expert interview Bianca Algea Queen

Context

Explain our project regarding materials. Things around and in the water.

Questions

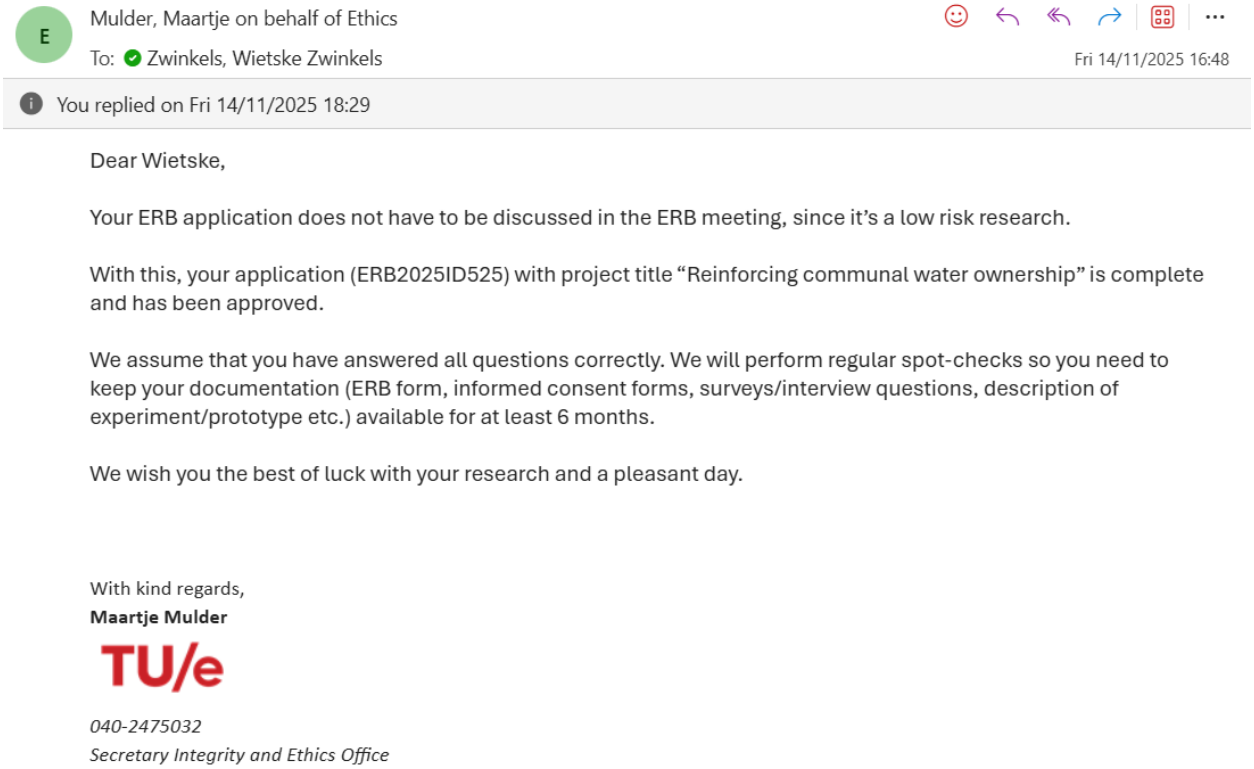
1. What type of algae have you worked with
2. What was the process like
3. What would you recommend for the process of making with the material
4. What type of binders and plastizer do u use
5. recommendations like we would like to do something with paper. are there any mediums that are very workable
6. do u have a map of all the algaes in eindhoven
7. do you know anything about poisonuos stuff regarding the algae

By adding something to is it INCREASED the smell

long hairs = older algae

- Adding glycerin and algae agar agar (red or brown seaweed extract)
    - glycerin makes it flexible and is plant based
- She used green filamentous algae
- filaments = safe, particles = poisonous (like blue algae)
- algae vs duckweek might be an interesting question
- when picking and working with algae wear protective clothing, there is nettle for instance
- she suggested to make a sheet, like a curtain or maybe a sheet to play with light somehow
- neutralize the smell; vinegar replaces the smell, baking soda or citric acid is odorless
- Try to find out what structure and algae we are using before adding an additive, such as magnesium or calcium or bigger particles
- "adding particle to a composite of fiber" -->basically by adding particles it can make the material harder

N. Ethical Approval



Mulder, Maartje on behalf of Ethics

To: Zwinkels, Wietske Zwinkels

Fri 14/11/2025 16:48

You replied on Fri 14/11/2025 18:29

Dear Wietske,

Your ERB application does not have to be discussed in the ERB meeting, since it's a low risk research.

With this, your application (ERB2025ID525) with project title "Reinforcing communal water ownership" is complete and has been approved.

We assume that you have answered all questions correctly. We will perform regular spot-checks so you need to keep your documentation (ERB form, informed consent forms, surveys/interview questions, description of experiment/prototype etc.) available for at least 6 months.

We wish you the best of luck with your research and a pleasant day.

With kind regards,

Maartje Mulder

TU/e

040-2475032

Secretary Integrity and Ethics Office

This is the confirmation letter/email from the Ethical Review Board.
On the next paged the approved ERB from in question can be found.

Ethical Review Form

(Version 2.4)

This Ethical Review Form should be completed for every research study that involves human participants or personally identifiable personal data and should be submitted to ethics@tue.nl. For more information about how this process works please click here. Please check if you are using the correct form: Ethical Review Form (version 2.4). Please click here to obtain this latest version.

Part 1: General Study Information

1	Project title / Study name	Reinforcing communal water ownership
2	Name of the researcher / student	Ben Vigliotti, Gina van der Meijden, Jasmijn Vugts, Wietske Zwinkels
3	Email of the researcher / student	w.a.a.zwinkels@student.tue.nl
4	Supervisor(s) name(s) *Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.*	Oscar Tomico Plasencia
5	Supervisor(s) email address(es) *Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.*	o.tomico@tue.nl
6	Department / Group *Additional explanation: Please specify group if relevant e.g. JADS or HTI*	Crafting Wearable Senses
7	What is the purpose of this application?	☐ Scientific study ☐ Bachelor education. Course:…….. ☒ Master education. Course: Project 1 Design ☐ Other (e.g. external, following external regulations):……
8	Research location *Additional explanation: Where will the data collection take place? On campus, in a company, in public space, online, etc.*	☐ Eindhoven University of Technology campus ☐ Other, name organization(s):…… ☒ Public space: Piushaven ☐ Online
9	Start date data collection *Additional explanation: Please state when your data collection will start.* ***Please note that the date has to be in the future. Forms with a date in the past will not be accepted.*** *Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.*	17-11-2025
10	End date data collection	27-1-2026
11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	☐ Yes. Name Funder: ☒ No
12	Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc. *Additional explanation: Describe all internal and external parties that are involved in the study or project, including:* • *researchers or research groups at the TU/e who participate in the study;* • *(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;*	Internal parties Researcher(s): Ben Vigliotti, Gina van der Meijden, Jasmijn Vugts, Wietske Zwinkels • Supervisor: Oscar Tomico

Ethical Review Form

	• *(commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis).* *Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?*	External parties • Municipality of Tilburg and Stichting ThuisHaven Tilburg (provide access and ecological advice only; no data handling).
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	☐ Yes, namely: ☒ No
14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? *Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.*	☐ Yes ☒ No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	
16	If you process personal data that are likely to result in high privacy risks for participants, you need to perform a Data Protection Impact Assessment (DPIA). Have you done this for this or a very similar project? ***Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.*** *Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR). Think of research with vulnerable people, high-risk medical research,* *The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.*	☐ Not applicable (no high privacy risks) ☐ Yes (the form is attached to the application) ☒ No
Part 2: Medical study		
1	Does the study have a medical scientific research question or claim? *Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.*	☐ Yes* ☒ No *If yes or in doubt, please contact Susan Hommerson via rdmsupport@tue.nl

Ethical Review Form

Part 3: Use of (medical) devices in the study		
1	Does your research include a device? *Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.*	☐ Yes, not self-made ☐ Yes, self-made ☒ No
2	Please describe your device or link to an online description of the device	
3a	Will you use a device that is 'CE' certified for **unintended use** (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? *Additional explanation: You can find more information about CE certification here*	☐ Yes ☒ No
3b	Please explain to what extent the device was assembled according to relevant standards and provide a risk assessment *Additional explanation: You can find more information about a risk assessment here*	
3c	Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	☐ Yes, my device or software currently has a medical purpose ☐ Yes, my device or software could have a medical purpose in the near future ☒ No ☐ I'm not sure
Part 4: Information about the study		
1	What are your main and applicable sub, research questions? *Additional explanation: You need to provide at least one clear research question.*	How can co-creation with local organic materials re-awaken care and connection among the Piushaven community?
2a	Please check the box that indicates the relevant study population *Additional explanation: Please select which persons are eligible for your study.*	☐ Students ☒ General healthy population ☐ General population with specific feature, e.g., pregnancy, specifically ..... ☐ Patients, specifically ……..... ☐ Other, specifically ……
2b	Age category of participants	☐ Younger than 12 years of age ☐ 12 to 15 years old ☐ 16 to 18 years old ☒ older than 18 years of age
3	Description of the research method (select all that applies)	☒ (Semi-structured) interviews

Ethical Review Form

	Additional explanation: Please specify your research method. *Note that you need to provide information about the research method in an additional file that you attach to the ERB form.* *E.g., for interviews you provide the interview questions, for surveys you provide the survey questions, etc.*	☒ Group workshops/roundtable discussion /co-creation sessions ☒ Diary studies ☒ Behavioral observations / field notes ☒ documentation (audio, photo, video)
4	Describe the procedures, measurements, and stimuli/treatments used in your study. If your study involves multiple stages or methods, please describe each step chronologically. For each stage, specify: • What participants will do or experience • What data will be collected (e.g., surveys, observations, physiological measures) • What tools or materials will be used (e.g., validated scales, prototypes, databases) Note: This helps reviewers understand the participant journey and the rationale behind each method.	**Step 1 – Stakeholder interviews:** local citizens, ecologists, and municipal representatives will be interviewed about their relationship with the Piushaven and environmental care. Data: Audio and optional video recordings, taken only with explicit consent. Purpose: To understand values and challenges related to stewardship and ecology. Use: Recordings enrich documentation and improve communication with stakeholders (e.g., municipality, exhibitions). - **Step 2 – Co-creation workshop:** Before the workshop: **During the workshop:** Participants harvest *excess or waste organic material* (mainly invasive exotic plants: Vederkruid) from the water of the Piushaven. To harvest them, they have the possibility to use a water bike. We specifically tell them that they are responsible for their own safety when using the water bike. The materials are being cleaned, processed, and verified safe with ecological experts to ensure no harm to participants or the environment. Participants co-create artefacts from these materials. Workshops are accessible, voluntary, and use only safe, natural materials. Documentation includes photos and video fragments (with consent) for analysis and communication. **After the workshop:** Co-created artefacts may be symbolically returned to the water, but only after validation that they are non-toxic and beneficial or neutral to the ecosystem. Participants will be invited to review recordings before any public presentation (viewing session or digital review). **Step 3 – Reflection:** Audio and video recordings are transcribed and coded thematically. Key themes are derived (e.g., connection, care, awareness). Visual materials enrich communication of findings to local partners and the public. This is highly relevant as it is a community-centered project.

Ethical Review Form

5	Describe and justify the number of participants and observations for each stage of your study. If different methods or phases involve different participant groups, please specify: • How many participants are needed per method/stage • Whether participants will be involved once or multiple times • The duration of participation per session or overall • Any compensation offered Note: Justify your choices based on the study design, expected data quality, and ethical considerations (e.g., minimizing burden, ensuring informed consent).	Approx. 10–30 participants in total. Interviews: 30–45 minutes each. Workshops: 1.5–2 hours each. No compensation provided.
6	Explain why your research is societally important. What benefits and harm to society may result from the study? *Additional explanation: What benefit will the results of your study have to society in general?*	The project strengthens community engagement and ecological care in the Piushaven. It educates citizens on sustainable material cycles and connects design with local stewardship. No foreseeable harm; results contribute to awareness and circular practices.
7	Describe the way participants will be recruited *Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.*	☒ Neighbourhood app posts. ☒ Flyers/posters in horeca near the water. ☒ Personal network and snowball sampling. ☐ Via a company, namely …….. ☐ Via a hospital, namely …….. ☐ Via an organization …… ☐ By a Consortium Partner, namely ……. ☒ informative postcards in mailboxes in the Piushaven area Through all ways it is clearly and specifically mentioned that participation is voluntary, inclusive, and unpaid.
8	Provide a statement of the risks regarding data breach, safety or well-being (think about stress, extreme emotions, visual or auditory discomfort) that you expect for the participants or others involved in the study. Explain these possible risks and describe the way these risks are mitigated. Also take into consideration any personal data you may gather and associated privacy issues.	**Physical risk:** There could have been a risk that participants could get sick from touching the organic material. However, by boiling it and following the safe working guidelines from ecologists specialised in the Piushaven area, or with knowledge about the organic materials we're using, we minimize this risk. Materials will be pre-cleaned, we make sure it is non-toxic, and safe to handle. To be even more hygenic, after touching the materials we prompt the participants to wash their hands thoroughly every time and we will have hand sanitizer at hand. Another possible risk is participants choosing to use the water bikes fall into the water. Therefore, we only allow participants with swimming license to use the water bikes and we clearly tell the participants that if they choose to use the water bikes their responsible for their own safety. Also, the organic material needs to be boiled and put in the oven. To remove the risk here for participants to get hurt by hot water or a hot oven, we carefully do this ourselves. **Psychological risk:** None. No sensitive topics. Participants may skip questions anytime. **Privacy risk:** Minimal. Photos and recordings only with written consent; reviewed before public use. **Environmental risk:** To eliminate the risk that we harm the environment by either taking out (too much) beneficial organic material, or by putting back organic material in a worse state than before, we collaborate and validate our working process

		with the Piushaven experts in the municipality and possibly more ecologists. Materials are sourced in small enough amounts to not make changes to the ecosystem, or are sourced from ecological maintenance companies. In these ways, we make sure to definitely not make the environment worse, but more probably our project will help improve the environmental state of the Piushaven.

Part 5: Self-assessment checklist

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		x
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		x
2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	x	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? Additional explanation: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.		x
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		x
5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		x
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		x
7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group		x
8a	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people)		x
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)	x	
9	Will the study involve actively deceiving the participants? (e.g., will participants be deliberately falsely informed, will information be withheld from them, or will they be misled in such a way that they are likely to object or show unease when debriefed about the study)		x
10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? Additional explanation: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.		x

11	Elaborate on all boxes answered outside of the blue boxes in part 5.	

Ethical Review Form

Part 6: Self-assessment on privacy

The following questions (1-11) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1	Will the study involve discussion/collection/processing of **regular** personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews? *Additional explanation: For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).*	x	
1A	**If yes**: Please describe which regular personal data you will collect in this study?	Names, phone number (internal use only: to make a group-chat, to give participants the chance to review video) video, audio recorder, manual notes	
2	Will the study involve discussion/collection/processing of **special category** personal data or other **sensitive data**? *Additional explanation: Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.*		x
2A	**If yes**: Please describe which special-category personal data and/or sensitive data you will collect in this study?		

If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 7. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl

		Yes	No
3	Will your project involve the processing of personal data on a **large scale**? *Additional explanation: In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:* • *Monitoring driving behavior of road users on Dutch highways* • *Collecting data of Covid patients* • *A hospital that processes patient data as part of its usual operations*		x

Ethical Review Form

	• *A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps.*		
4	Does this processing activity involve the use of new or innovative technologies? *Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.*		x
5	Does your study involve systematic (c.q. automated) monitoring of persons? *Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.*		x
6	Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data? *Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data.* *An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.*		x
7	Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract? *Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).*		x
8	Will the study process personal data to score, rank or profile persons? *Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.*		x
9	Does your data processing include activities that involves composing "**blacklists**" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc. *Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).*		x
10	Will personal data be transferred or shared outside the EU/EEA? EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway. *Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.*		x
11	Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*? ***High risk countries**: China, Russia, Iran, Turkey, and North Korea.* *If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: **an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CISO (Chief Information Security Officer) is ALWAYS required.***		x

Ethical Review Form

Part 7a: Processing of research data

1	Is consent your legal basis for processing the personal data in your study? *Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.* *In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.* *Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.*	☒ Yes and it will be obtained via …… To attain informed consent, the aim of the research, the research process, duration and what will happen with the data all is explained clearly in the start of an interview or workshop. Participants can ask questions if they find something not clear or they do not want to take part in for example the video creation. After the consent statement, we ask participants to specifically tell us if they give us consent to all of the following. In group-settings we will make sure it is a small group (max 10 participants) and they also have the chance to come to us personally to avoid that people who don't feel comfortable talking in groups, still can give consent in a comfortable way. The reason for not using informed consent forms in this research, is that, in our experience, and during the exploratory interviews with villagers, we feel it is more understandable for them if we explain the consent statement in their native language, in our own words. ☐ No, I will use another legal basis to process the data. Namely, …….. * You can download a suitable template **here**.
2	Where will the data come from?	☐ Data obtained from another party (secondary data use) ☒ New data collected only by my research team ☐ New data collected together with collaborators
3	Which of the following tools will you use to process personal data?	**Surveys** ☐ Qualtrics ☐ Limesurvey ☒ MS Forms ☐ Other, namely …….. **Interview/workshop recordings** ☒ Voice/video recorder ☒ Phone in a flight mode ☐ MS Teams ☐ Other, namely …… **Transcription** ☐ Manual transcription ☒ Microsoft Office software (e.g. Word, Teams) ☐ Other, namely ……

		Statistical analysis ☐ SPSS ☐ R ☐ Other, namely …… **Other tools**, specifically……..
4	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan.	☒ Onedrive ☐ Research Drive ☐ Network Drive

	Additional explanation: University supported-storage facilities are SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive or departmental drives (including BE Project Drive) is required.	☐ Research Manager ☐ Other, namely ……
Part 7b: Safety and security measures		
1	Will you pseudonymize/anonymize the data? *Additional explanation:* *Anonymization: remove all direct identifiers (name, address, telephone number etc.) but also indirect identifiers (age, place of birth, occupation, salary) that, linked with other information, can lead to a person's identification. Anonymization to the point that a data subject is no longer identifiable means that the anonymized data is not considered to be personal data anymore.* *Pseudonymization: replacing the unique identifier of a data subject with an artificial pseudonym. This means that identification is still possible with the identification key. The identification key needs to be stored securely and separately from the pseudonymized data. If the data subject can be identified by combining data with additional information, the data is also called pseudonymous.*	☐ ☒ No ☒ Yes* *If yes, describe how: Participants — such as local experts, community representatives, or long-term residents — can explicitly choose to have their name and face associated with the project. This is valuable for the research because: • **Context matters:** the Piushaven project studies *community stewardship*, which is inherently about *people, relationships, and place*. Anonymizing all contributions would remove essential social and historical meaning. • **Recognition and ownership:** for some citizens or experts, being visibly acknowledged strengthens their sense of ownership, authenticity, and the continuity of their long-term efforts for the harbour. • **Transparency and trust:** allowing visible representation helps local stakeholders and the municipality recognize who was involved and ensures the project's outcomes can be traced to real collaboration rather than abstract data. To respect individual preferences, participants explicitly choose one of the two options 1. Full anonymity (pseudonymized data: replacing pseudonyms, and data will be stored securely with the identification key kept separately. This ensures compliance with GDPR and TU/e data protection standards.) 2. Full credit (name and video used publicly). All participants are given the chance to review video or photo material before publication and can revoke consent at any time.
2	Is access to (personal) data restricted? (Select all that apply)	☐ No ☒ Yes, via access control ☒ Yes, via password protection ☒ Yes, access only given to TU/e research team ☐ Yes, access only given to research team, including non-TU/e collaborators ☐ Other, specify…….

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3	Who will have access to the data during and after completion of the project? (Select all that apply)	☒ Main researcher ☒ TU/e supervisor(s) ☐ External supervisors ☐ TU/e research team ☐ Other, specify…….
4	Will you store data for future research?	☐ No ☐ Yes, in a public data repository ☐ Yes, in a public data repository under restricted access ☒ Yes, in a TU/e-recommended storage (SURF Research Drive, Network Drive)
5	Will you share data outside the TU/e?	☐ No ☐ Yes, in a fully anonymized form ☒ Yes, raw or pseudonymized data* *If you selected this box, make sure that a suitable data agreement is put in place. You can contact the Data Stewards for support in preparing such an agreement
6	How long will data be stored after the end of the project?	6 months

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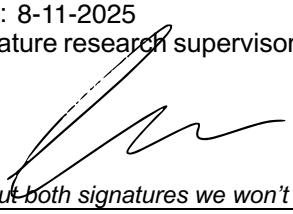
Part 8: Closures and Signatures		
1	Enclosures (tick if applicable **and attach to this form**):	☐ Informed consent form ☐ Informed consent form for other agencies when the research is conducted at a location (such as a school) ☐ Text used for ads (to find participants) ☐ Text used for debriefings ☐ Approval other research ethics committee ☐ The survey the participants need to complete, or a description of other measurements ☐ Data Protection Impact Assessment checked by the privacy officer ☒ Data Management Plan checked by a data steward
2	Signature(s)	Date: 8-11-2025 Signature(s) of applicant(s):  Date: 8-11-2025 Signature research supervisor:  *Without both signatures we won't accept the form.*