Eco-Seed

Sustainable Cycle Design
Innovation Design

This project use sustainable design concepts to simulate biological swallow nest habits, in order to solve the damage caused by people's excessive closeness to nature.

How might we design an outdoor product that allows people to approach nature while weakening the impact on it.

BACKGROUND RESEARCH

ENVIRONMENT STATUS

Humanity

Eco-Anxiety

" A chronic fear of environmental doom ." defined in 2017, by American Psychological Association (APA).

Flora and Fauna

Nature's "Anxiety"

As people get too closer to nature, whether it's hiking, cross-country skiing or riding all-terrain vehicles, has negative effects on wildlife. And humans' outdoor activities can degrade habitat that wild species depend on for food, shelter and reproduction. Human voices, off-leash dogs and campsite overuse all have harmful effects that make habitat unusable for many wild species. Animals may flee from nearby people, decrease the time they feed and abandon nests or dens.

PHENOMENON

Symptoms

- digestive problems, such as stomach pain and nausea
- insomnia or restlessness
- excessive sweating
- difficulty concentrating
- unexplained muscle pains
- frequent headaches
- racing heart
- trembling or shaking

Camping

Campsites in the northern Minnesota has been found that 44 percent of campsite trees had been damaged and approximately 18 trees per campsite had been cut down, primarily for firewood.

Campsites in large, flat areas are frequently expanded by campers.

Other impacts include trampling of native vegetation, causing erosion of soils, contaminating water, attracting wildlife with food and displacing wildlife from preferred habitats.

BALANCE

Managing Eco-Anxiety

Taking individual action

Making greener choices, including recycling and following a sustainable diet.

Fostering a stronger connection with nature

Practicing positive self-care

Spending more time in the natural environment and forming a personal connection with nature is the best way to alleviate eco-anxiety.

Harmonious Coexistence

Renewable Design — The "Living Seawall"

Its ingenious structure provides complexity required for marine environment, which is more suitable for marine life to live, and naturally benefits the clean seawater and also protects the harbour.

Recyclable Materials — MycoComposite

The manufacturing process has the potential to be carbon neutral and can be grown to specifications, thereby reducing waste. It can be completely biodegraded and returned to the soil through compost.

CAMPING LINE

ARRIVE AT THE CAMP

- Park the car
- Moving camping supplies
- Kids and off-leash dogs running around

SET UP

- Get the tent up
- Get the rain shelter up
- Light up lantern
- Prop up a camping table and camping chairs

COOKING

- Light a campfire
- Cook food

GET REST

- Free from skyscrapers
- Relieve anxiety
- Enjoy the nature

NATURE THOUGHTS AND FEELINGS

Vehicle crushing and excessive human trampling will cause me to wither.

I became dry because people stomped me tightly, so it was not easy to absorb water.

I will hide immediately when people show up.

I may change my habitat when find the human footprint.

I often get dug out when people are setting up tents.

In order to fix the tent, people often nailed me.

My habitat have been changed and destroyed, and I cannot live there anymore.

The campfire often burns me, and axes often cut me off.

People often set fire on me without taking any precautions.

I don't like campfires and the smoke it produces.

I will be polluted by kitchen waste.

GET HURT

- Habitat that wild species depend on for food, shelter and reproduction can be degrade.
- Animals may flee from nearby people and abandon nests or dens.
- Erosion of soils
- Trampling of native vegetation
- Contaminating water

Plant Soil Small animals Large animals / Birds Water

PRIMARY RESEARCH

QUESTIONNAIRE

Warm-up questions

What do you usually go camping for?
How often do you camp and when was the last time you camped?
Can you recall a camping trip that you remember most?

Arrive at the camp

How do you usually go camping?

Set up the camp

What kind of site do you prefer to set up your tent in?
When you go camping, what do you bring that is different from others?

Entertainment

What else do you do while camping, besides cooking and staying in a tent, can you describe it?

Cooking

How do you cook? Can you describe the process of your cooking?
Does the process of cooking generate additional waste?

Before leaving

What will you do with the trash before camping is over?

Environment

Do campers have any protection for the campsite during the camping trip?
Can you list some possible environmental and animal impacts of your camping process, using a recent camping trip as an example?

Other

In which conditions would you prefer to camp? On the ground, in a tree, in mid-air, why would you choose that?

Questionnaire link: https://miro.com/welcomeonboard/ZWh0bIZZU3FoQjlESlZkTWhYb-zg3ZEh5akN5bGQzZUpZM2YyS1V1aGRZbkJnSlBYR3NYU1NRYUJFUGRKVHJqN3wzMDc0NDU3MzYyMDM3Mzg2NDEx?invite_link_id=834332471626

INTERVIEW

"After the sun went down, the beach was full of small crabs that crawled particularly slowly, and then **after about two or three years, the crabs were gone**."

"Camping can occur in a variety of **unexpected situations**, such as heavy rain, typhoon, **making people feel very insecure**."

"When lighting a campfire, we usually **dig out a round pit** that can hold the campfire first, and then use the excavated soil to make a fireproof layer."

"We will **burn the cans and bury them**."

"We like to look for wilder places and **drive the car directly to the ground** where the vegetation is more lush to set up camp."

"People **disacrd disposable tableware willfully**, bringing a lot of unnecessary waste."

THINGKING PROCESS

PROBLEMS

FINDINGS

Getting to camp
- Motor vehicles run over lawns and their sound affects animals.

Set up
- The nails of the tent will destroy the turf and vegetation.
- Digging a hole in the woodland to start a campfire, damaging the turf.
- Rainstorm/typhoon days, feel very unsafe when camping.

Cooking
- Food waste littering, causing beach caking.
- The use of disposable tableware leads to a large amount of garbage.
- Breaking branches to make chopsticks.

Entertainment
- Human footprint encroaches on beach crab habitat.
- Injuring wildlife with assault weapons.
- Carry chemical materials that are likely to cause secondary pollution.
- Blessing activities generate a lot of garbage.

Before leaving
- Tiny plastic garbage was missed and polluted the soil.
- Campers burn cans and landfill them.
- The land becomes bald after filling up the campfire.

CONSIDERATION

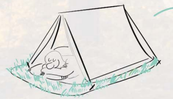
Initial thoughts	Sustainability	Biodiversity possibilities	Material	Possibility of advancement	Landing
Composting (27)					
More centralized waste disposal and reuse of resources.	10	0	3	7	7
Biodegradable materials (27)					
Making disposable tableware recyclable in nature.	8	1	8	5	5
Storage (33)					
Collect and take away garbage more conveniently.	6	7	6	6	8
Sowing (34)					
Achieve a closed loop of claiming and returning to nature.	9	7	6	6	6
coexistence scenarios (32)					
Build camps where humans and animals can live without disturbing each other.	7	7	7	6	5
Bionic Camping (34)					
Close to the environment while better guarding their own safety.	7	10	7	5	5

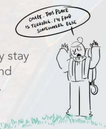
DEFINITION

HMW

use methods of biodiversity to help restore Green field and reduce the impact of camping on nature.

- In the process of camping people will leave some "traces".





- The next camper will usually stay away from these "tracks" and choose another intact lawn.

- If we don't learn to restore the original state, not only will the camping experience be ruined, but the "paradise" that keeps people away from the hustle and bustle of the city will also cease to exist.

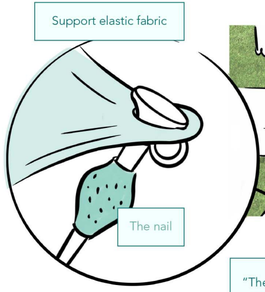
IDEATION

STORY BOARD

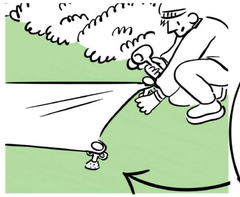
Mix grass seeds, fertilizers and non-toxic biodegradable glue, extruded and formed into finished products and send to outdoor stores

An outdoor store, a customer who is about to go camping purchased eco-friendly nails

"Looks good, let's camp here!"
"COOL!"



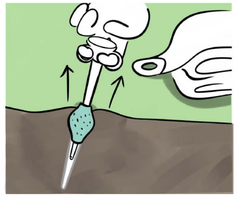
"The instructions suggest that we set up the platform first, and then just put the tent on the platform."



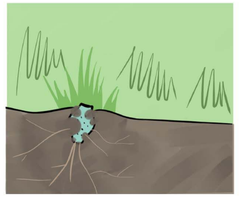
"Flatten this piece of fabric, then use nails to prop up the four corners."
PS. The seeds part should be buried in the soil

"Don't feel the cold and fear the insects on the ground! The lawn will also not afraid being crushed."

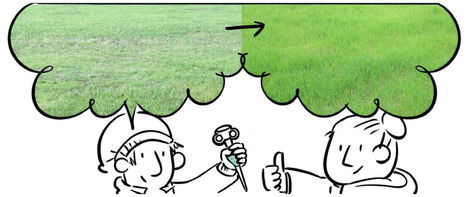
"First take the support fabric off."



These nails are reusable and the seed part is left in the soil when the nails are pulled out



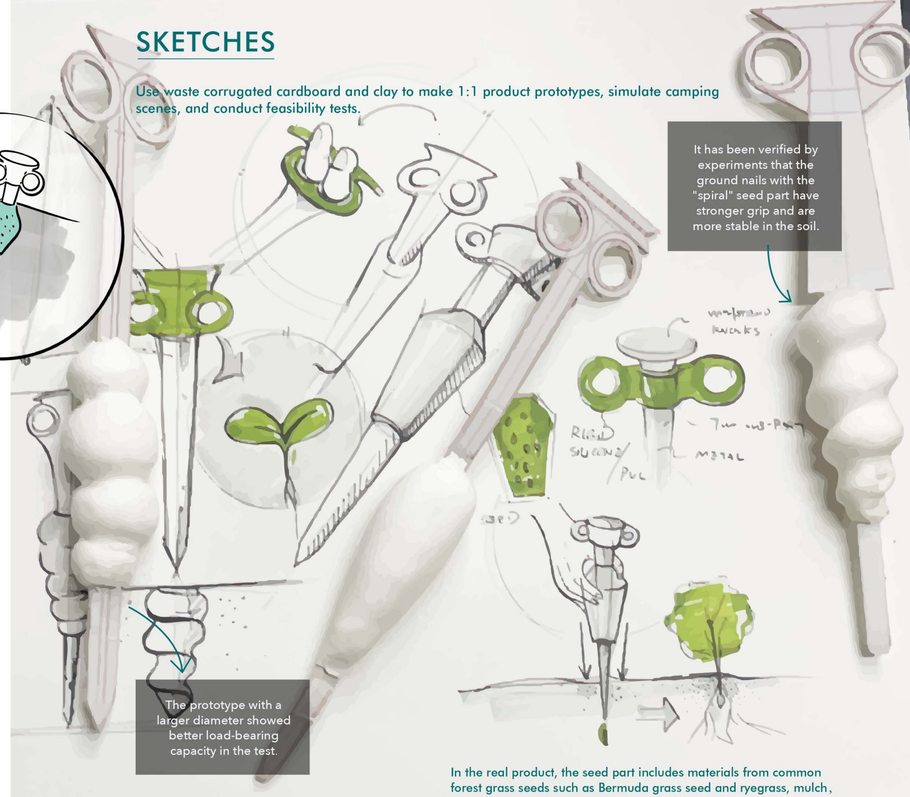
The seed part will slowly degrade in the soil, and usher in the germination of grass seeds with the right climate



These nails not only support the platform to protect the native grass when people camp, but also sow seeds to minimize or restore the impact on the native environment and maintain the relative balance

SKETCHES

Use waste corrugated cardboard and clay to make 1:1 product prototypes, simulate camping scenes, and conduct feasibility tests.



In the real product, the seed part includes materials from common forest grass seeds such as Bermuda grass seed and ryegrass, mulch, amendments, compost, peat moss, a thin layer of starter fertilizers.

PRODUCT RESEARCH

There are many different shapes of spikes for different terrains. Considering the Grassland-oriented and woodland-oriented design and the **requirement for high strength and strong grip**, I chose the following three spikes as my reference.

Y-Shape Nail

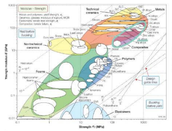
Nail-Shape Nail

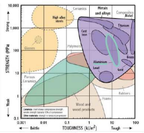
Cyclone Nail

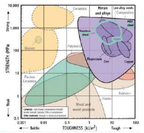
	Y-Shape Nail	Nail-Shape Nail	Cyclone Nail
Advantages	Hight grip Light weight	High strength	High grip capacity
Disadvantages	Too light resulting in insufficient strength	Not very grippy	Average strength

Based on the analysis of research, **my product needs to be based on high-strength Nail-Shape Nails and incorporate some of the features of Y-Shape Nails** to obtain relatively stable support and grip.

STRENGTH ANALYSIS







Standard	Grade	Major constituents	Min tensile strength MPa	Max temp °C	Remarks
BS 1506	111	0.65Mn 0.25I 0.15C	400	300	Min –20°C
BS 3692	8.8	(Steel)			
BS 1473	HB 30-TF	98Al 1SI 0.7Mg 0.6Mn (Al alloy)	240	200	Cryogenic applications

$\sigma = F/S$

$F = \sigma S$

$S_{min} = \pi r^2 \cdot S_{Openings} \approx 98mm^2$

$\sigma_{Steel} = 400N/mm^2$

$\sigma_{Al\ alloys} = 240N/mm^2$

$F_{Steel} = \sigma_{Steel} S = 39200N = mg$

$m_{Steel} = F_{Steel}/g = 4000kg$

$F_{Al\ alloys} = \sigma_{Al\ alloys} S = 23520N = mg$

$m_{Al\ alloys} = F_{Al\ alloys} = 2400kg$

$G_{2people} = mg \approx 1364N$

$G_{2people} < F_{Al\ alloys} < F_{Steel}$

In theory, **a steel or Al alloys solid stake with a cross section of 98mm² is strong enough to withstand a longitudinal tension of 2400 kg**. Therefore, the choice of steel or aluminum alloy to make ground nails is strong enough.

PROTOTYPING

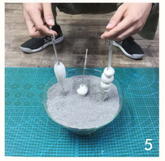
PRODUCT STABILITY TEST

I used cardboard to make three 1:1 models with different widths

Using clay to make three different shapes of seed parts

Testing the stability of seed part in sandy soil

I buried these solid stakes in the sandy soil and invited people to pull them out



The stability of the streamlined seed and the beaded seeds are not stable enough

Spiral seeds are relatively stable

SEED PART

Bio-glue production

Seed part production

Raw materials | Mix materials and Dry | Repeated coating of bio-glue

STEP 1 - Mixing

Mix the seeds of the grass with the bio-glue and use them just like swallows building their nests.

STEP 2 - Polishing

Wait for the bio-glue to be dried and sand the outer surface of the seed part.

Germination test

After 5 mins	After 3 days	After 7 days	After 10 days
buried in the soil	(With sufficient water)	**(With sufficient water)**	(With sufficient water)

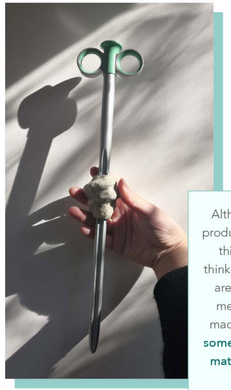
Solid stake production

3D Modeling

3D Printing

Paint spraying

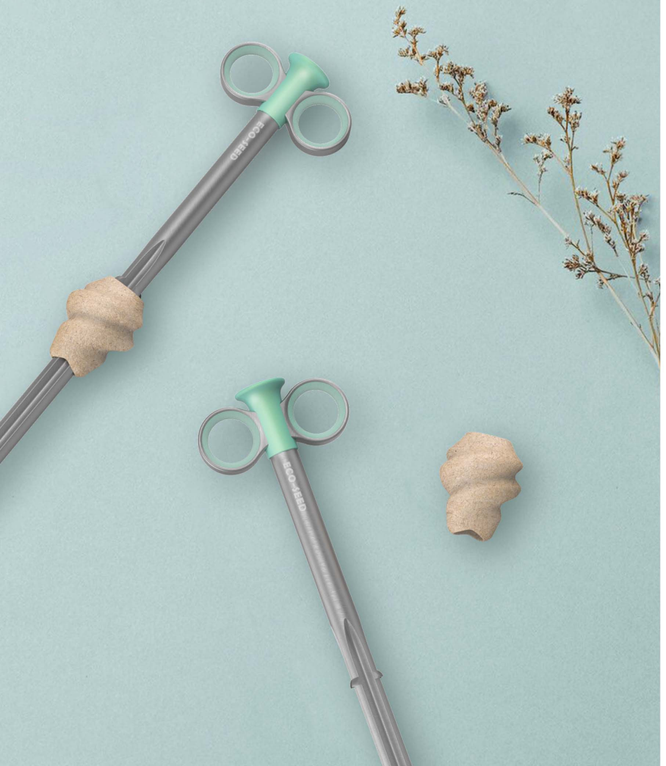
Product Concept



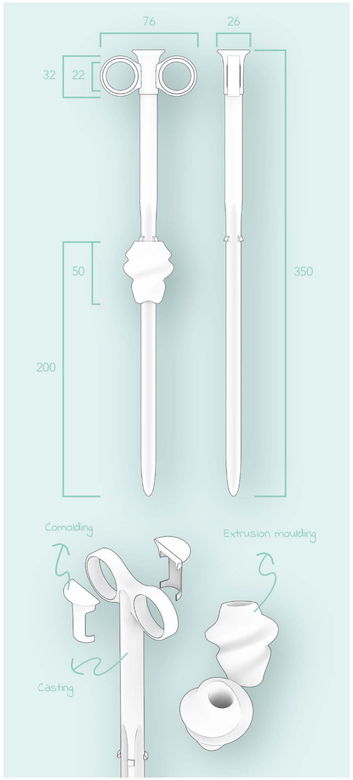
Although the whole product is presented in this way, I am still thinking whether there are other improvements that can be made, such as **using some other biological materials instead of metal.**

FINAL DESIGN

PRODUCT RENDERING



PRODUCT DIMENSIONS



PRODUCT DETAILS

Composition of

Soil (compressed)

+

Grass seeds (dehydrated)

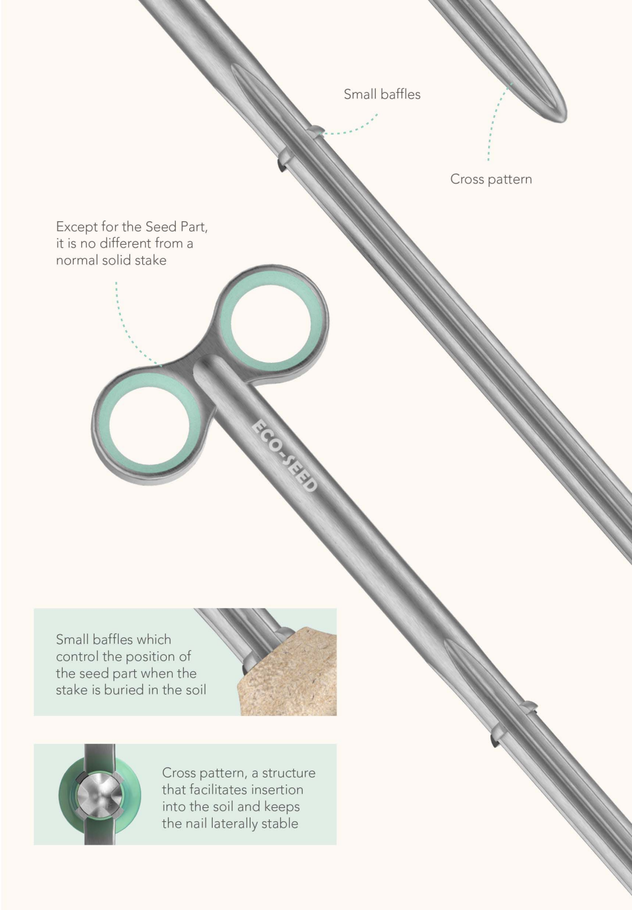
+

Nutrient binder (biodegradable)

The head is made of tough plastic, conducive to the user's knock

Soft silicone, hook the ring with your finger and pull out the solid stake

A set of four stakes, with a storage bag, the seed part can be purchased separately



Small baffles which control the position of the seed part when the stake is buried in the soil

Cross pattern, a structure that facilitates insertion into the soil and keeps the nail laterally stable

PROTOTYPE ASSESSMENT

To evaluate the design, I went on **a mock camping trip** to a park that allows camping and **invited camping enthusiasts** to experience it with me.

Set up the tent, same as normal camping sessions.

Lay the floor mats on the ground for support.

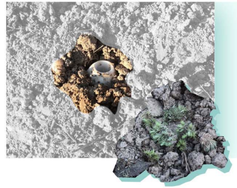
Place the pitched tent on the ground mat and start enjoying camping.

Use a hammer to drive the nails into the soil.

Pay attention to burying the seed part in the soil.

At the end of camping, step on the seed part and pull out only the stake part.

Fix the mat on the stake, and drop it up off the ground.



The seed part are left in the soil and the bio-glue will gradually be decomposed, with sufficient water, the grass will soon germinate!

BRANDING

1x 1x

ECO-SEED

3x

NATURAL TO NATURE

ECO-SEED

ECO-SEED advocates **facing nature with natural things** and minimizing the interference of human behavior with nature.

#8DCEC1

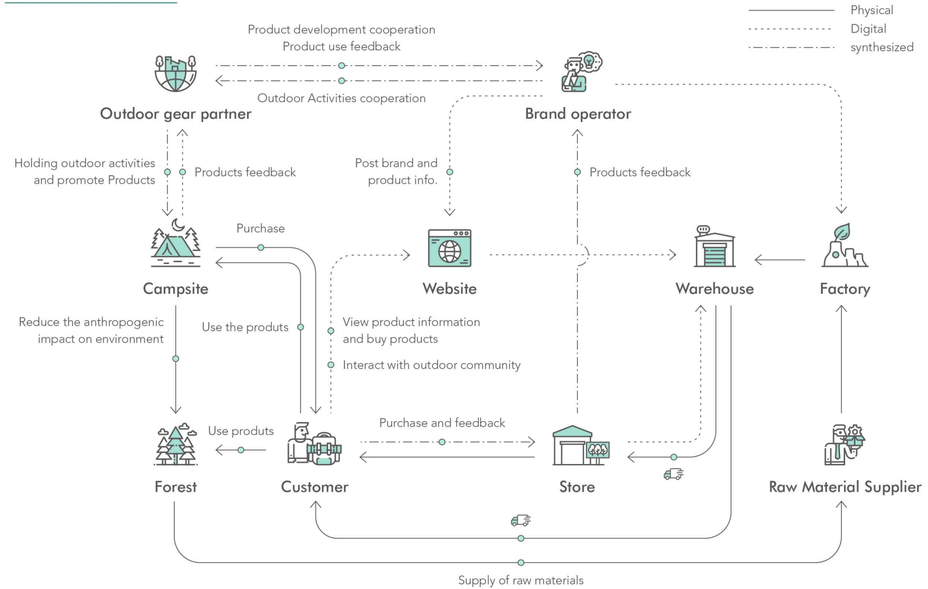
White

#595757

#FFFAF5

BRAND APPLICATION

SYSTEM MAP



FURTHER THINKING

" Today, with the rapid iteration of almost all objects, we may have forgotten that one thing remains constant in speed, and that is the growth cycle of natural life. Therefore, I hope that this project will not only bring a little reflection to modern people, but also minimize the damage caused by human activities the next time we get close to nature. "