COAST & OPEN LAND

BUILDING with NATURE

pilebyg

BUILDING with NATURE
COASTAL

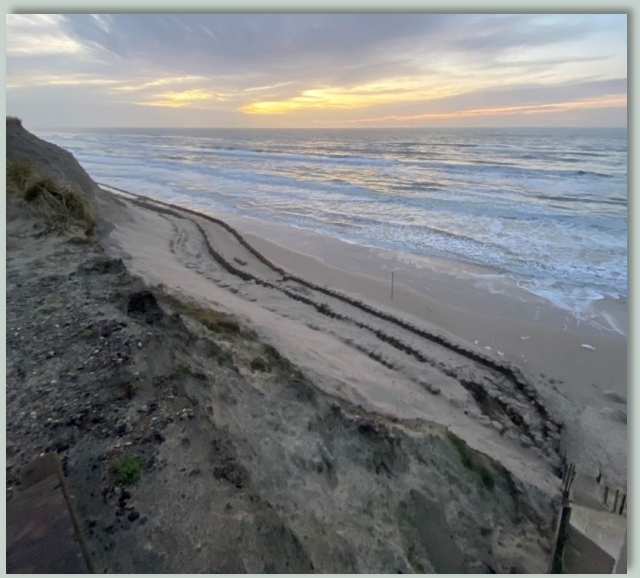
✓We develop the historical tradition of building with nature along coasts, slopes and fjords. Fences, fascines and cut trees such as pine have always been used to secure shores, beaches, lakes and streams.

✓Climate forest - willow trees - is processed into powerful fascines and nature fences that can be discreetly integrated into nature's existing landscape; and otherwise enter into its perishable circuit.

✓Outset is mainly German and Dutch experiences; the latter is used at two coastal protection facilities at Nr. Lyngby, where the experimental facilities are referred to as biological coastal protection.

✓New BwN technology with natural fences and fascines can be developed to supplement or replace the solutions used today.

✓PileByg has more than 30 years of experience with Green Engineering / Nature Based Solutions.



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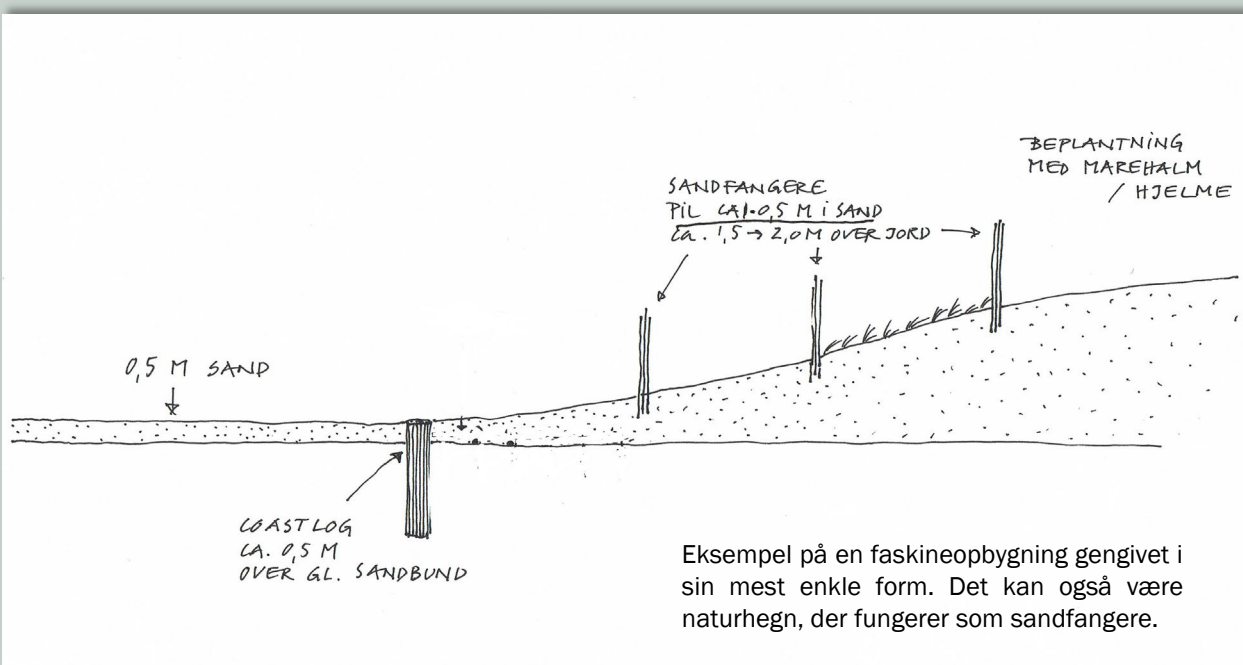
PRINCIPLE

- ✓ The principle of the bWn coastal protection is based on Dutch experiences, which are also known in Danish variants, for example at Rømø. Developments in coastal protection - also in the Danish Coastal Directorate, are concerned with supplementing known techniques with new knowledge about Building with Nature, where coastal protection is based on site-specific coastal processes.

- ✓ The naturally occurring plant and animal species - and the existing landscape - are used when designing coastal protection. We are at the beginning of this development, and in PileByg we are building, among other things on experiences from Nr. Lyngby. The plant at Nr. Lyngby shows an influx of sand, which together with the fascines has kept the foot of the dune slope dry since 2018.

- ✓ The plant shows that the fascines act as natural sand traps, reducing the strength of the sea's influence; they slow down the speed of the sea, sand is deposited, and at the same time they act to a certain extent as drains for the incoming seawater. It counteracts sand escape and provides a basis for re-establishing natural flora to protect the slope. When the sloping foot has been re-established and strengthened, i.a. with planting, the fascines will be able to decompose slowly and naturally without contamination; and if necessary, replaced by new ones.

- ✓ The fascines, working as sand traps, are soft interventions; the lifespan and effect will vary while the cost of establishment is limited. The system is environmentally less damaging and economically cheaper than conventional coastal protection.



Eksempel på en faskineopbygning gengivet i sin mest enkle form. Det kan også være naturhegn, der fungerer som sandfangere.

NØRRE LYNGBY I

FASCINES

NOVEMBER 2018 – ESTABLISHMENT.

DECEMBER 2018 – WINTERSTORM, FASCINES ABOVE TERRAIN

AUGUST 2019 – ALL FASCINES VISIBLE

FEBRUARY 2020 – FASCINES ALMOST HIDDEN

FEBRUARY 2020– ONE ROW OF FASCINES NOW HIDDEN BY NEWLY TRAPPED SAND.

NOVEMBER 2020 – ALL FASCINES COVERED BY SAND.

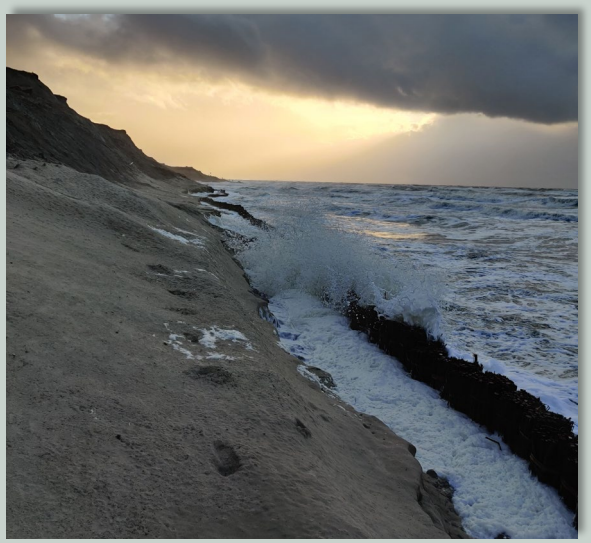
NØRRE LYNGBY II

FASCINES

NOVEMBER 2019 – NEWLY ESTABLISHED

DECEMBER 2019 – FASCINES PARTLY COVERED

JANUARY 2020 – FASCINES ARTLY COVERED -
FOLLOWING THE NATURAL LANDSCAPE COASTLINE



FEBRUARY 2020 – STORM AN RAISED SEALVEL, SOME
DAMAGE TO THE CORNES OF NEWLY ESTABLISHED PLANT

OCTOBER 2020 THE DAMAGE I BEING REAPIRED

JANAURY 2021 – WELL ESTABLISHED.

INFLUX OF TRAPPED SAND

Elevations for sand raising at Nr. Lyngby Strand, phase I - measured accordingly to the coastal road sign E168 in a period from 31.10.18 to 12.08.19, this showing the total influx of sand. During the period, removal of sand (lower terrain sand level occurs during gig storms and especially longer periods of raised sea level) have been registered, but there has subsequently been an influx. This rhythm has continued since the establishment of the plant.

NEWLY ESTABLISHED SYSTEM. 200-300 CM LONG WILLOW FASCINES ARE MOUNTED IN THE BEACH, AND THEY LEVEL WITH 40 CM ABOVE THE TERRAIN.

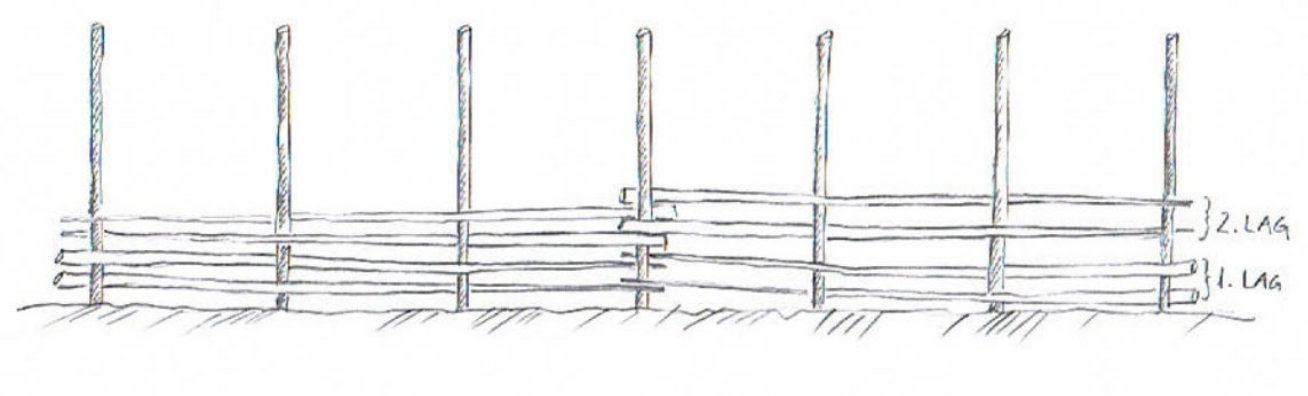
THE BEACH HAS BEEN RAISED AFTER MILD STORMS AND FASCINES NOW 30 CM ABOVE TERRAIN.

THE PLANT HAS GAINED SAND FROM THE SEA AND SURROUNDINGS FOR 9 MONTHS. THE BEACH HAS BEEN RAISED DURING THIS PERIOD, AND FACHINES NOW ONLY 5-15 CM ABOVE TERRAIN.

YSTAD MUNICIPALITY

WILLOW HURDLES AS SAND TRAPPER

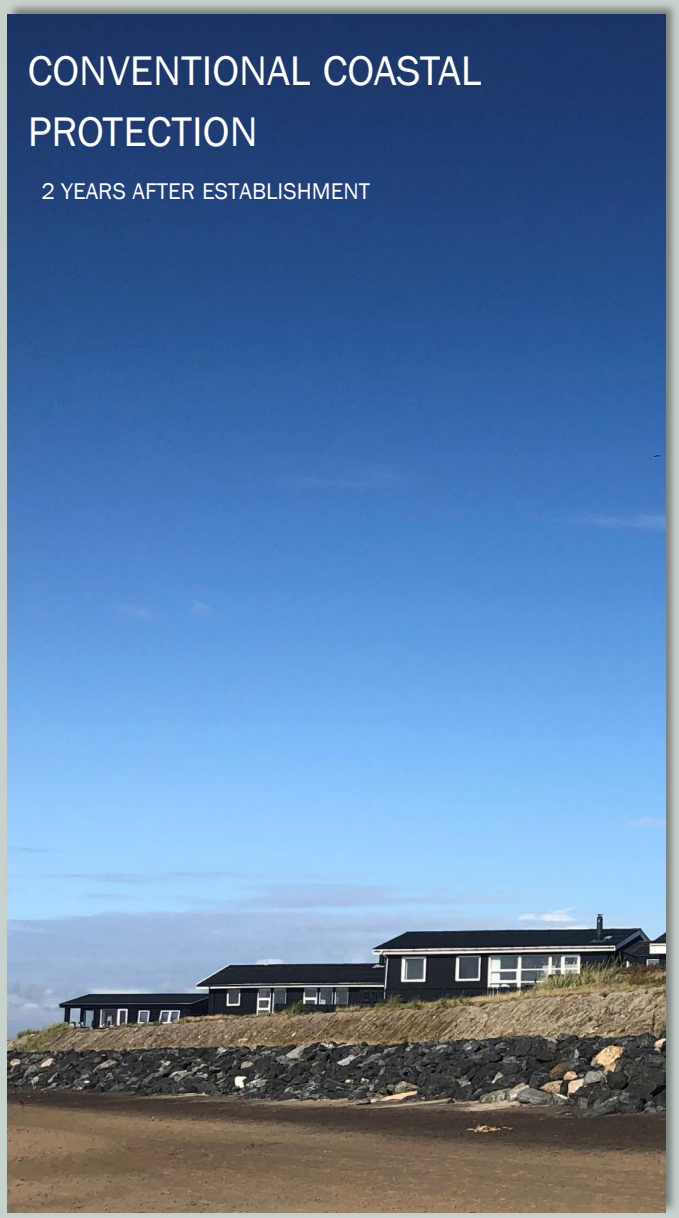
- ✓ The hurdle collects sand from the wind and the sea waves. Ideally placed along the dunes and sloapes.
- ✓ The willow tree was one of the first pioneer plants to find a foothold when the ice melted; we have traces of the use of willows since the first humans.
- ✓ Willows has always been an important useful tree - and has been used for many purposes. It is known, among other things, from frescoes from the 15th century, and in the 18th century it was mandatory for farmers to plant willow for manure.
- ✓ There are several different traditions for fences and hurdles.. The historic willow hurdle is based on the tradition of the woody fence, where you make a simple and characteristic horizontal braid between a series of poles in line.
- ✓ The hurdle used as a sandtrapper also has it use where it functions as a 'natures own' fence, with parallel posts and collected branches and woody materiales laid between the posts.
- ✓ Life expectancy varies. If not destroyed by sea waves it can last decades depending on the diameter of the stems applied.



Hurdle applied as sandtrapper at YSTAD Municipality (Sweden) – part of the LIFECOASTADAPT Program.

CLIMATE BENEFITS & LANDSCAPE PERSPECTIVE

- ✓ BwN fascines supports the original landscape and the original landscape profile.
- ✓ It is self-foddering with sand - and yes, we actually stees sand from the incoming waves and the sand delivered by wind.
- ✓ The foreshore is also increased in level and the beach for recreational use is preserved.
- ✓ Limited sand foddering provides significant climatic benefits.



- ✓ Conventional solutions with rock or concrete springs out into the landscape in dimensions similar to building foundations; it does not support the natural coastal profile.
- ✓ Conventional solutions must be covered with artificial sand lining with repetition. The rocks or the concrete will be visible for several periods throughout the year when the sand is washed away by storm.
- ✓ The foreshore is often diminished when hard rock or concrete meets the sea (and the bathing beach is reduced)
- ✓ Conventioanal solutions leaves a climate-negative imprint and is economically more costly.

TRADITION & INNOVATION

- ✓ 5,500 tonnes of CO2 are stored annually in PileByg's plantations.
- ✓ 9 of the UN's 17 world goals are everyday and part of our work.
- ✓ Everything is produced in Denmark. Minimal use of chemicals in all operations.

- ✓ Tradition of good craftsmanship and innovation are one and the same.
- ✓ Chemistry and polluting maintenance are not necessary.
- ✓ None or minimal maintenance.
- ✓ The design ages with the grace of nature - as opposed to treated wood and plastic.

- ✓ 30 years of work with production and processing of willow at home and abroad;
- ✓ Delicery to state, municipality, industry and private.
- ✓ Awarded; among other things with the Danish Design Prize.We take pride in the fact that you can always call or email for help and advice.

pilebyg

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