

CALTROPe – the green lace

experimental bioarchitectural structure - concept plan



CALTROPe won Jacques Rougerie Foundation's innovative architecture competition in Category "Architecture & Sea Level Rise" in 2013. Its modular system offers an organic and nature-oriented answer to the challenges evoked by sea level rise and land loss.

The aim of the project is to synthesize and balance the natural dynamics and forces of the delta regions applying an easy-to-install modular structure. The main goal is to preserve and, if possible, extend the areas of tillable lands through the harmonization of resources, materials and natural processes with the least intervention.

CALTROPe is a lace-like structure that is able to catch and collect river sediment with the help of mangrove plants, so integrating natural and architectural elements. Working like a catalyst, it will provoke positive changes at the most critical shoreline points. This cooperative, participatory and locally supplied work can also reorganize and socialize the local population in a constructive and self-supporting manner.

The units are made of a blend containing concrete and local organic and non-organic materials as well. They are installed in several steps in a way that the ensemble can follow natural shore evolutions and help the endangered areas adapt to new conditions by capturing sediment and forming a dam. Mangrove saplings are planted in this lace-like dam system. While growing, the trees integrate into the structure and create an efficient defense line not only against sea level rise but extreme sized waves and tropical storms as well.

CALTROPe is a decent architectural element in the natural landscape. The CALTROPe -protected areas can be used agriculturally or can be populated because their soil is rich in nutrients and they are solid enough.

CALTROPe module



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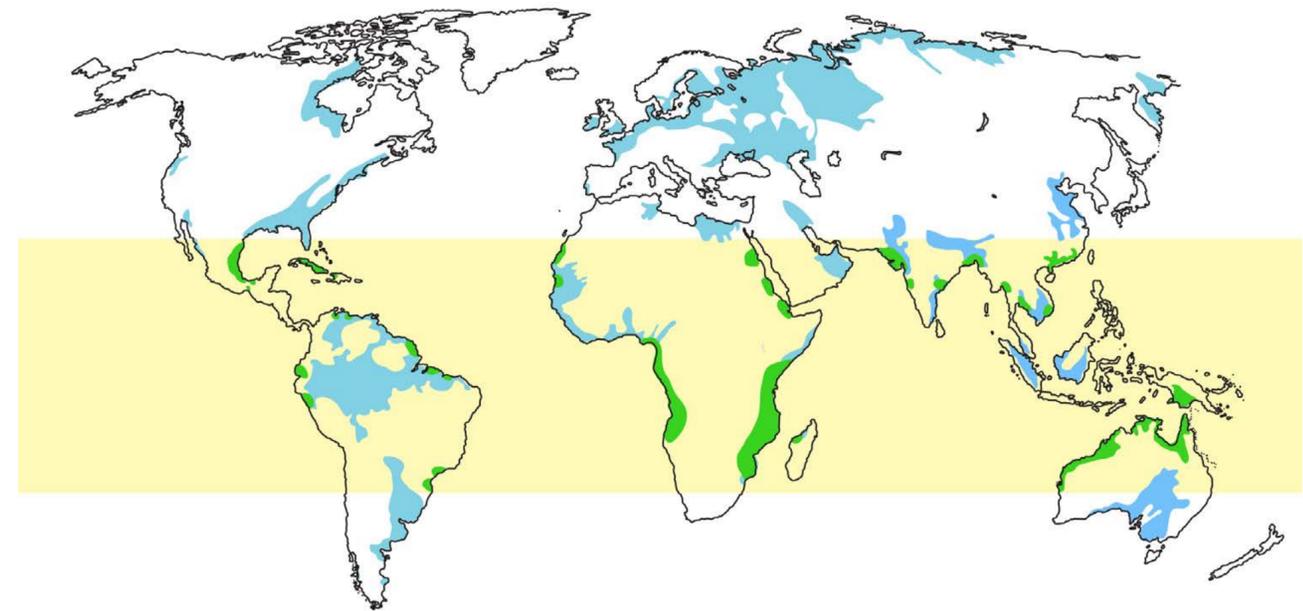
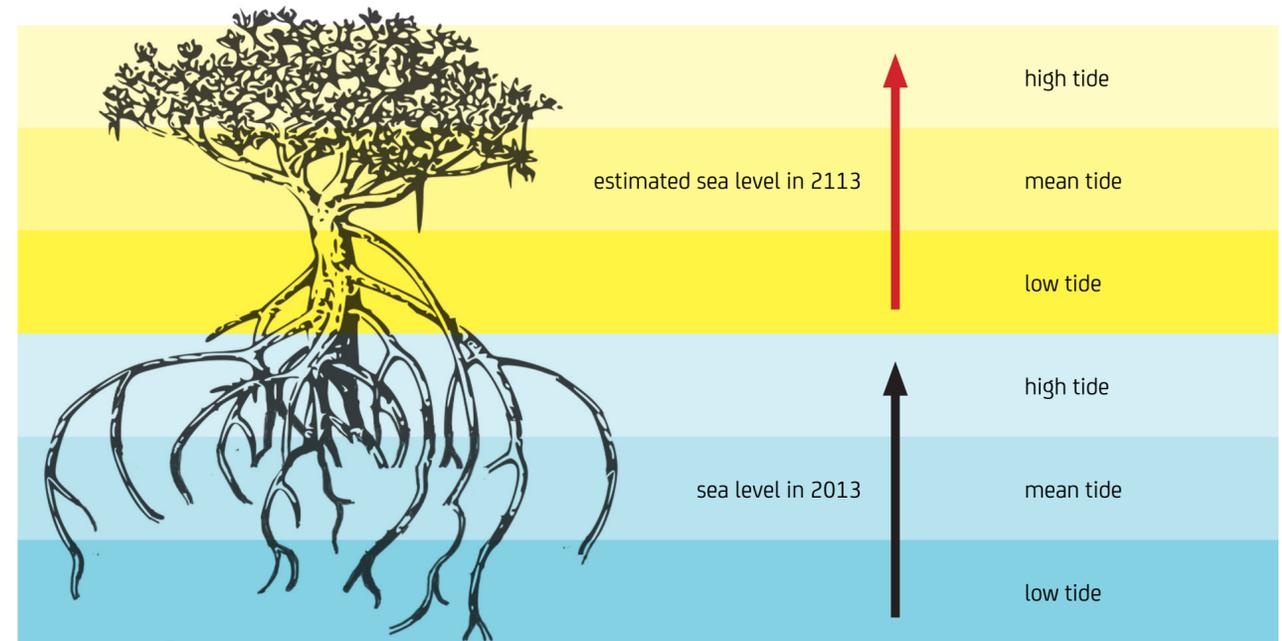
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EFFECT OF SEA LEVEL RISE

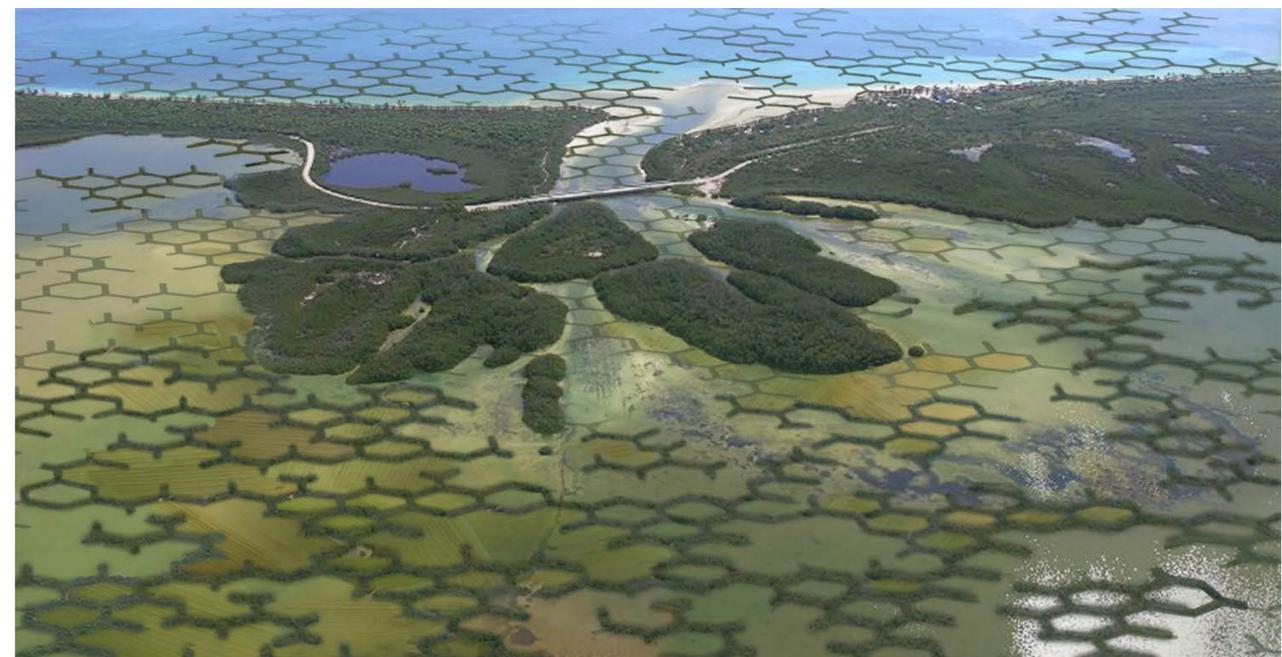
By today human activity transformed significantly the run and hydrodynamics of our planet's huge rivers, including the cycle of river floods thus the quantity of transported alluvium as well. The increasing sea level rise accelerates the deterioration, entailing a huge loss of valuable and nutrient-rich agricultural land on the long run.

MAGNIFICENT MANGROVE

Mangrove trees adapted to the waving, tidal fluctuations, and anaerobic circumstances of the littoral swamp by evolving a profuse strong lateral root system for better foothold and special above ground pneumatophores to provide the organism with oxygen. By means of this abundant root system trapping sediment and acting as a natural breakwater these plants prevent neap tide backwash from eroding the coast and contribute highly to soil formation.



- tropical and subtropical zones
- current mangrove forests
- estimation of flooded areas until 2113

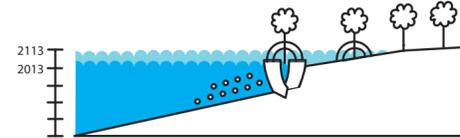
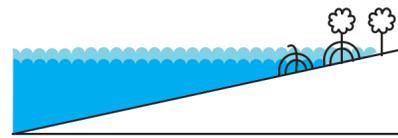
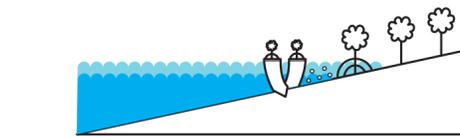
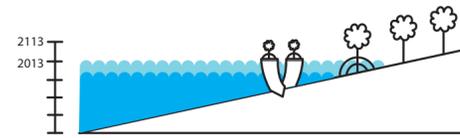
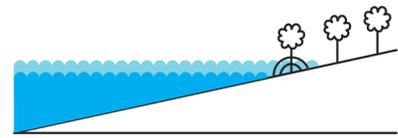


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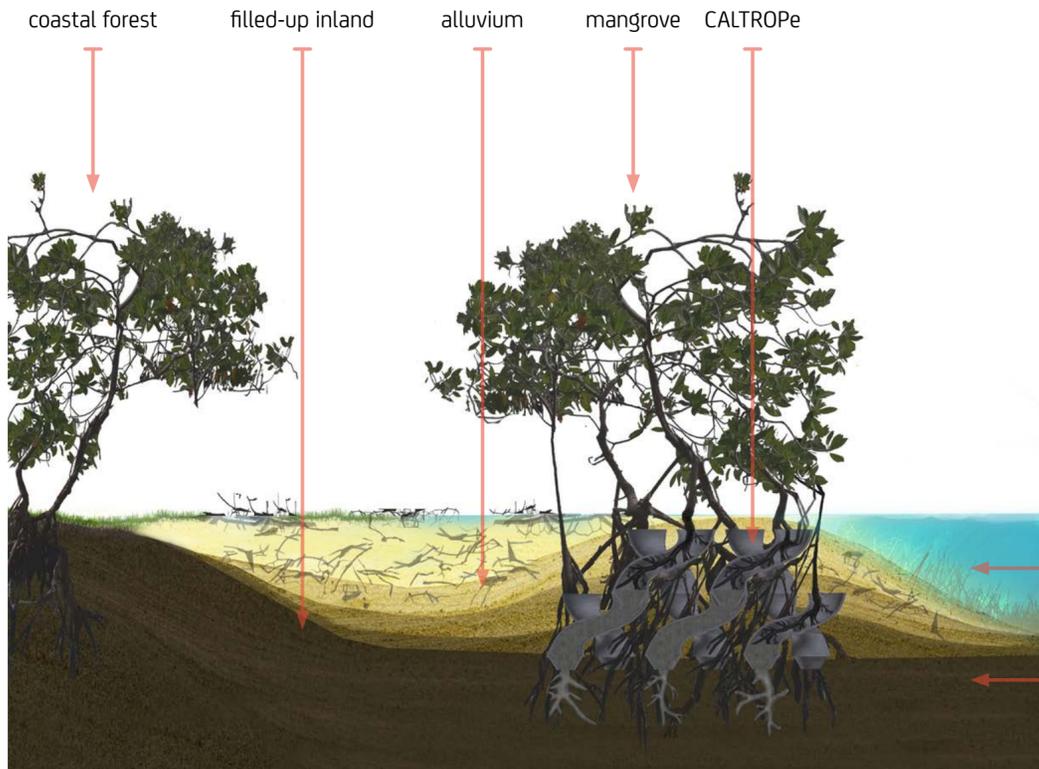
HOW DOES IT WORK?



sedimentary processes in the nature

sedimentary processes with the CALTROPe

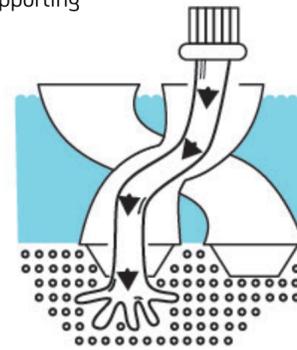
-  hide tide level
-  mean tide level
-  sediment
-  mangrove forest
-  dead mangrove forest
-  terrestrial forest
-  CALTROPe module



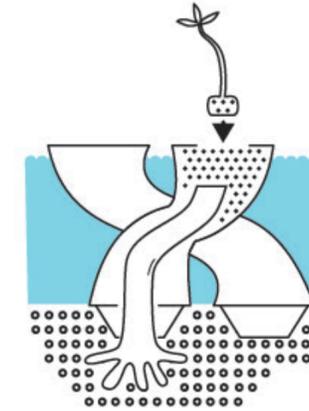
rising sea
sea bed

FABRICATION AND INSTALLATION

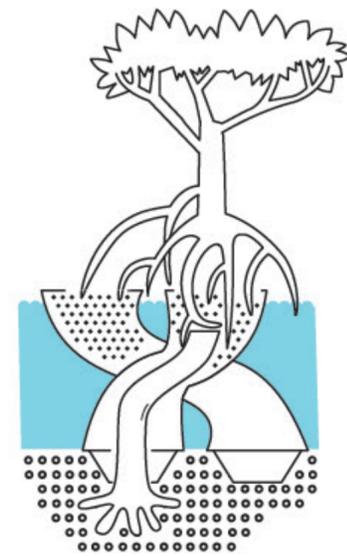
The prefabricated modules contain hollows. At installation these cavities are blown through with high-pressure air resulting in gaps under the units. These gaps are then filled up with liquid concrete, producing root-like supporting props.



after placing the modules, concrete is poured inside



pre-grown saplings are placed into the holes together with nutrients



in 4-5 years, the tree grows strong enough to be self-supportive



concrete as construction material



use of local resources

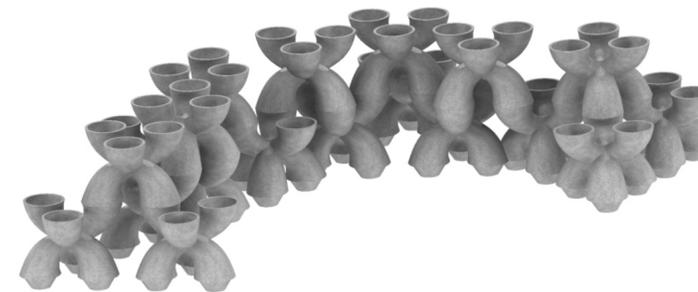


method of installation



community planting

STRUCTURE • ELEMENTS • PILING



The modules serve as containers and incubators for the young mangrove saplings that, getting stronger with time, will become self-supporting and form a natural dam. This structure is thus only a supportive frame of temporary use. The modules can create ideal environment for the plants even in deeper sea-levels. Lower sea level requires fewer levels, one element per meter is needed on average.



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STAFF OF CALTROPE - THE GREEN LACE

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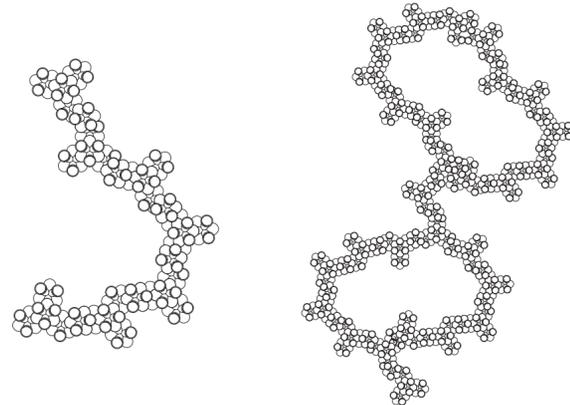
Special thanks

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Petra Aporfi Translator
Zsuzsanna Bodóné Hofecker Translator



CALTROPE STRUCTURE

The hydrodynamic particularities of the given delta taken into account, different structure elements are chosen to be installed. Water depth defines the height of the system, variable from one to three modular levels. The lace is constructed by the multidirectional piles of one single element type.



INTEGRATION

CALTROPe structure do not only function as a dam, a filter or a pier, these 'watery esplanades' are also a habitat for oysters and prawns. Local communities can earn a sustainable living based on these self-regulating natural resources. People will not only maintain these areas this way but also exploit it protectively.

