SPONGY LUNG

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An innovating project based on plastic recycling: the plan consists in transforming the “Great Pacific Garbage Patch” in a post-modern dycke for Venice:
an artificial sponge-lung

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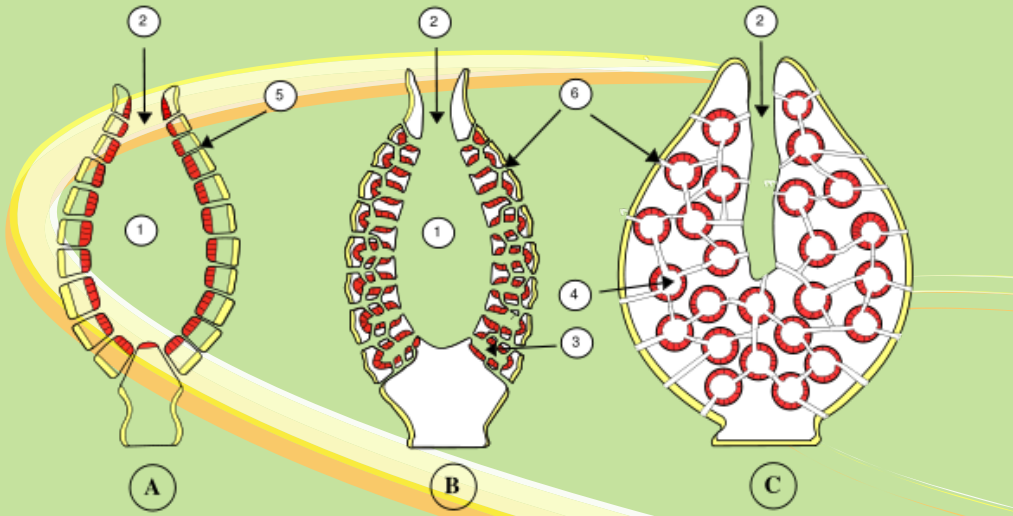
PART 2 : **Transform** the raw material in a foam plastic sponge in high technology industries of the Pô cluster.

PART 3 : **Install** these spongy modules in strategic flood sites of the lagoon.



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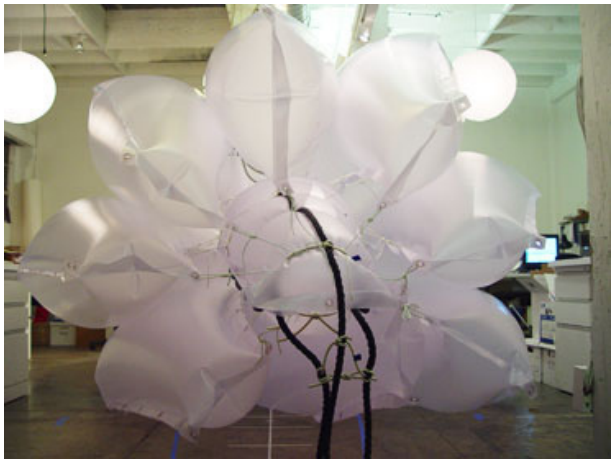
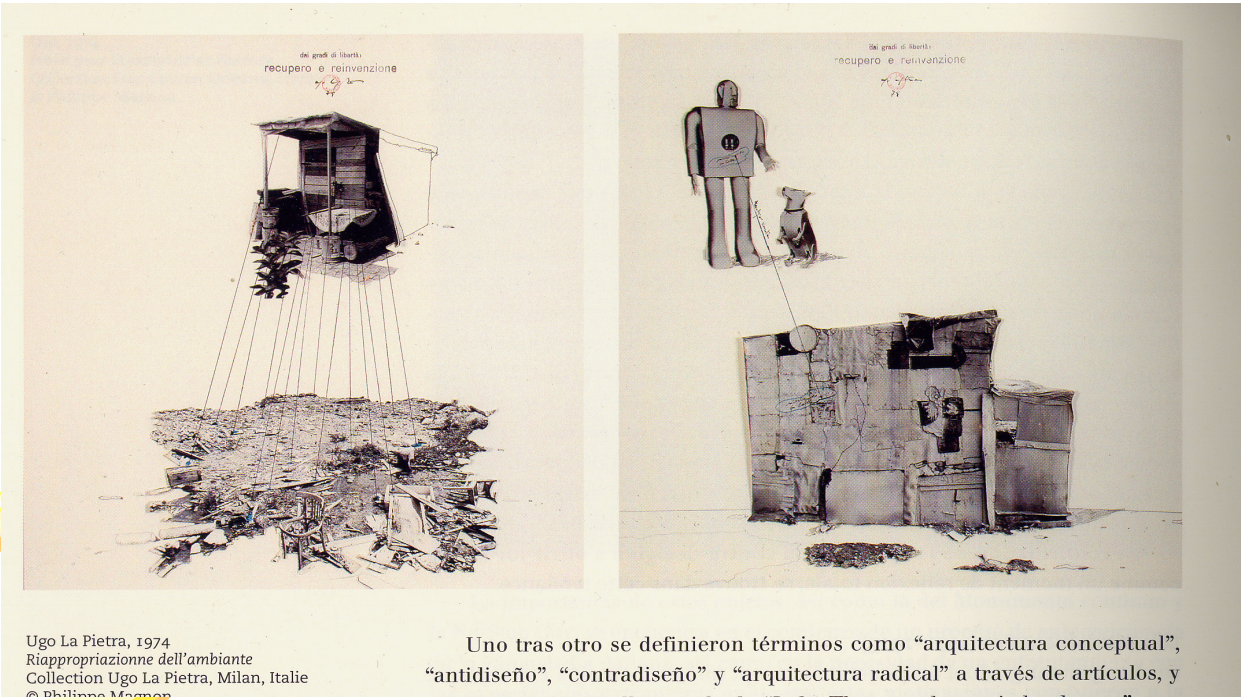
TO INSPIRE





Ugo La Pietra, 1974
Riappropriazione dell'ambiante
Collection Ugo La Pietra, Milan, Italie
© Philippe Magnon

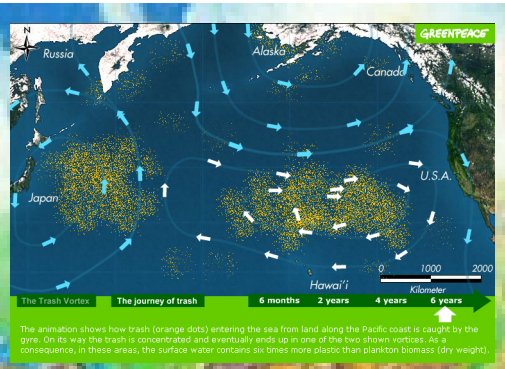
Uno tras otro se definieron términos como "arquitectura conceptual", "antidiseño", "contradiseño" y "arquitectura radical" a través de artículos, y

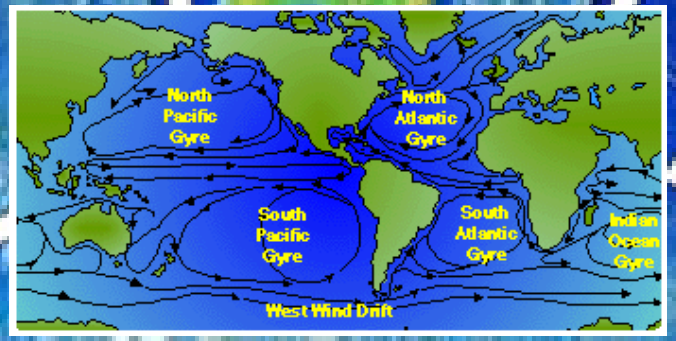
PART I : BUILD OFF-SHORE PLATFORM TO RECYCLE THE GREAT PACIFIC GARBAGE PATCH TO MAKE THE RAW MATERIAL.

➔ Trash vortex presentation

➔ Result

GLOBAL GYRES





A MINE IS ROAMING !

Estimates of plastic in the world's oceans exceed : **100 million tons.**

In the Central North Pacific Gyre, **pieces of plastic** outweigh surface zooplankton by a factor of **6 to 1.**

90% of Laysan Albatross chick carcasses and regurgitated stomach content contains plastic

Plastic also adsorbs hydrophobic pollutants, like PCBs, and pesticides like DDT. These pollutants bioaccumulate in the tissues of marine organisms, biomagnify up the food chain, and find their way **into the foods we eat**.

Born
free

SPONGY LUNG IS THE ONLY ECO-FRIENDLY PROJECT THAT WILL MINE THIS PLASTIC LAND

Micro plastics in the North Pacific have tripled during the last decade, and near the coast of Japan, gone up by a factor of 10 every 2-3 years during the same period.

If this trend continues, the importance of understanding their effects on aquatic
and marine environments will also increase. Notwithstanding the likelihood of increasing pelagic plastics, **SPONGY LUNG** project for monitoring micro plastics in the environment could exist because no gouvernement and no industry program currently, in sharp contrast to the widespread efforts that monitor airborne
contaminants, sewage, and stormwater runoff.

With **SPONGY LUNG**, the unintended consequences to the environment of the "Plastic Age" will be known; strategies will be developed to manage and exploit them.

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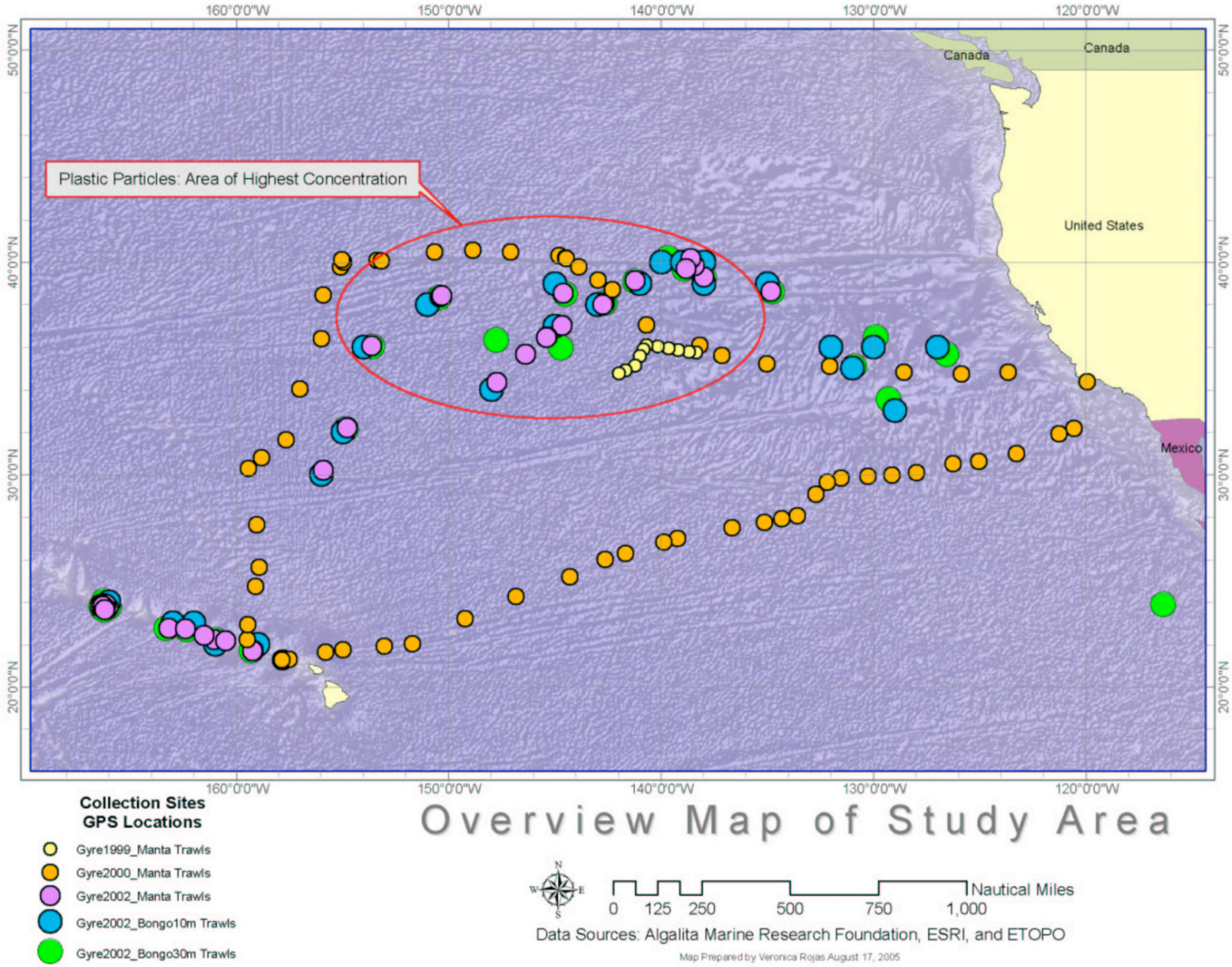
160°0'0"W
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130°0'0"W
120°0'0"W
50°0'0"N
40°0'0"N
30°0'0"N
20°0'0"N
Canada
Canada
United States
Mexico
Plastic Particles: Area of Highest Concentration
Collection Sites
GPS Locations
Gyre1999_Manta Trawls
Gyre2000_Manta Trawls
Gyre2002_Manta Trawls
Gyre2002_Bongo10m Trawls
Gyre2002_Bongo30m Trawls
Overview Map of Study Area
N
W
E
S
0 125 250 500 750 1,000
Nautical Miles
Data Sources: Algalita Marine Research Foundation, ESRI, and ETOPO
Map Prepared by Veronica Rojas August 17, 2005


SPONGY LUNG


RESULT
SPONGY LUNG

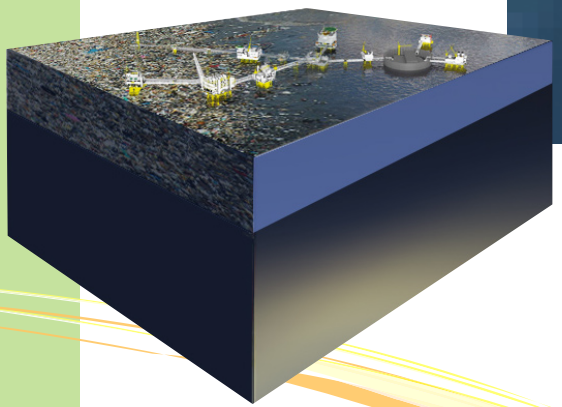
HOW TO COLLECT PLASTIC?

Build a network of platform

to COLLECT the TRASH VORTEX
through optimal performances

to develop shipping stocks

to ship them to recycle



SPONGY LUNG

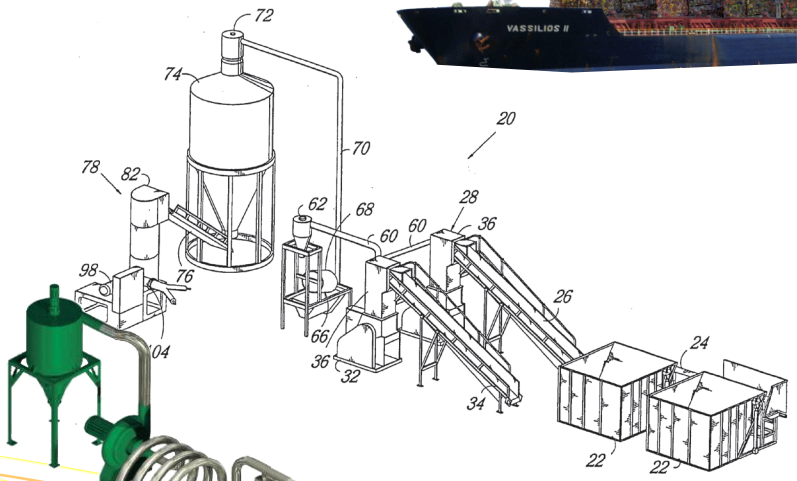
PART 2 : TRANSFORM

➔ How ?

➔ Where ?

SPONGY LUNG WILL PULSE A NEW ECO-INDUSTRIAL BREATH

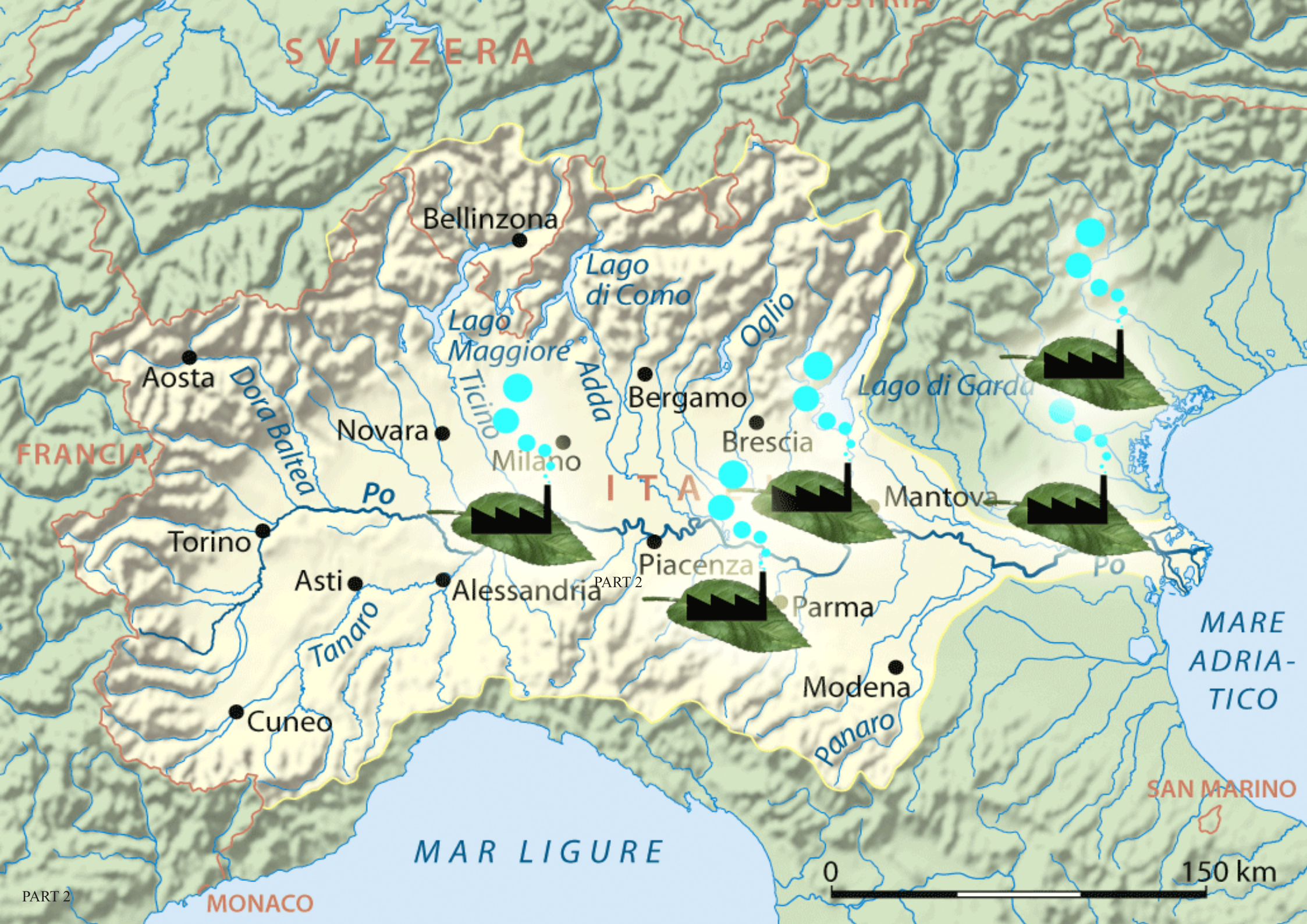
Transform the raw material in a foam plastic sponge in high technology industries of the Pô cluster.



Laminar polyolefine plastic material recycling installation

Document Type and Number: United States Patent 6644572

Abstract:
Equipment for the recycling of polyolefinic plastic sheeting material that comprises: breakers (6) for plastic material; separating devices (10) for separating material of higher density; crusher mills (26); and water separating tanks (62, 68), with a lower outlet and with a feeder that carries the material to the bottom (72) of the tank (62, 68); the equipment also comprises a pump (78) connected to the outlet (74) and equipped with an outlet (80); several movable devices (82) suitable for promoting suction flow of this water and materials through the inlet (76) and a propulsion flow through the outlet (80); and a motor (84) of variable speed suitable for driving the movable devices (82), such that a variation in the speed causes a variation in the flow rate of the flows.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AUSTRIA
Bellinzona
Lago di Como
Lago Maggiore
Oglio
Ticino
Adda
Aosta
Dora Baltea
Bergamo
Lago di Garda
Novara
Brescia
FRANCIA
Milano
Po
Mantova
Torino
Piacenza
Asti
Alessandria
Parma
Tanaro
Modena
Cuneo
Panaro
MARE ADRIA-TICO
SAN MARINO
MAR LIGURE
MONACO
0
150 km

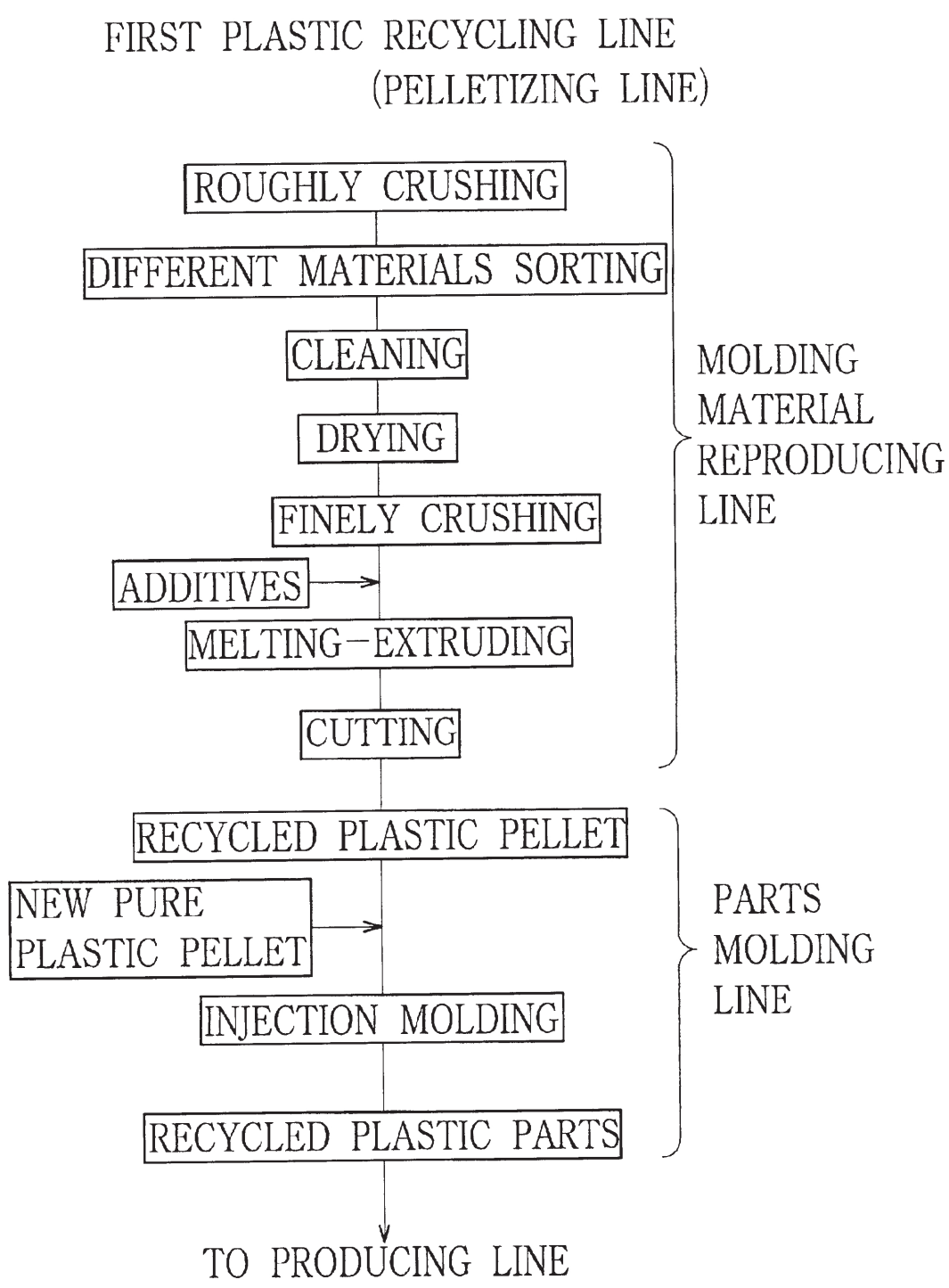
PART 2

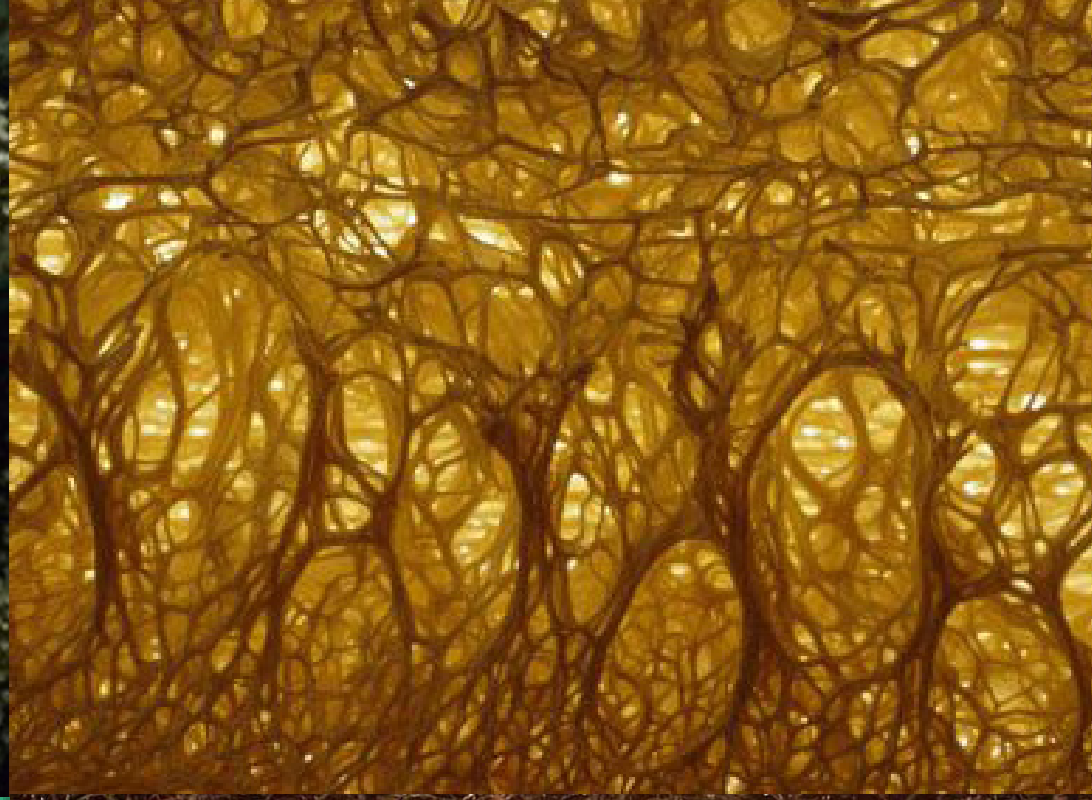
SPONGY LUNG factories

Method of recycling molded plastic parts for photosensitive material and recycled plastic molded parts

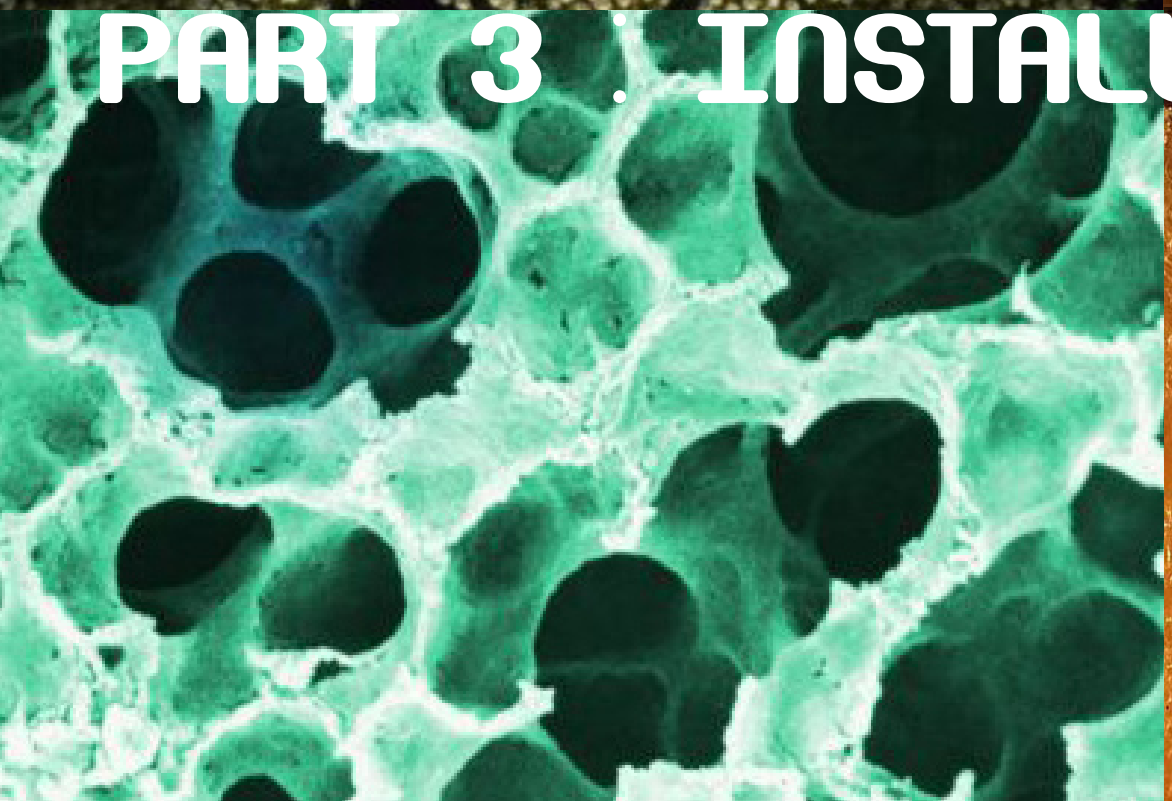
Document Type and Number: United States Patent 6783715

Abstract:
A front cover, a rear cover and a base portion are crushed into a crushed material, and further pelletized into a recycled plastic pellet. The recycled plastic pellet is used as a part of a molding material to produce mold plastic parts for a photosensitive material. When the molding material is melt in heat, a thermoplastic resin is deteriorated by heat or modified. Therefore, properties and qualities of recycled plastic mold parts are less than those of new ones. Further, when the thermoplastic resin is deteriorated by heat, the photosensitive material reacts with the thermoplastic resin to decomposed products having an bad influence on photographic characteristics. In order to prevent the deterioration by heat, oxidation inhibiting materials are added, and in order to absorb the decomposed products, carbon blacks are added.





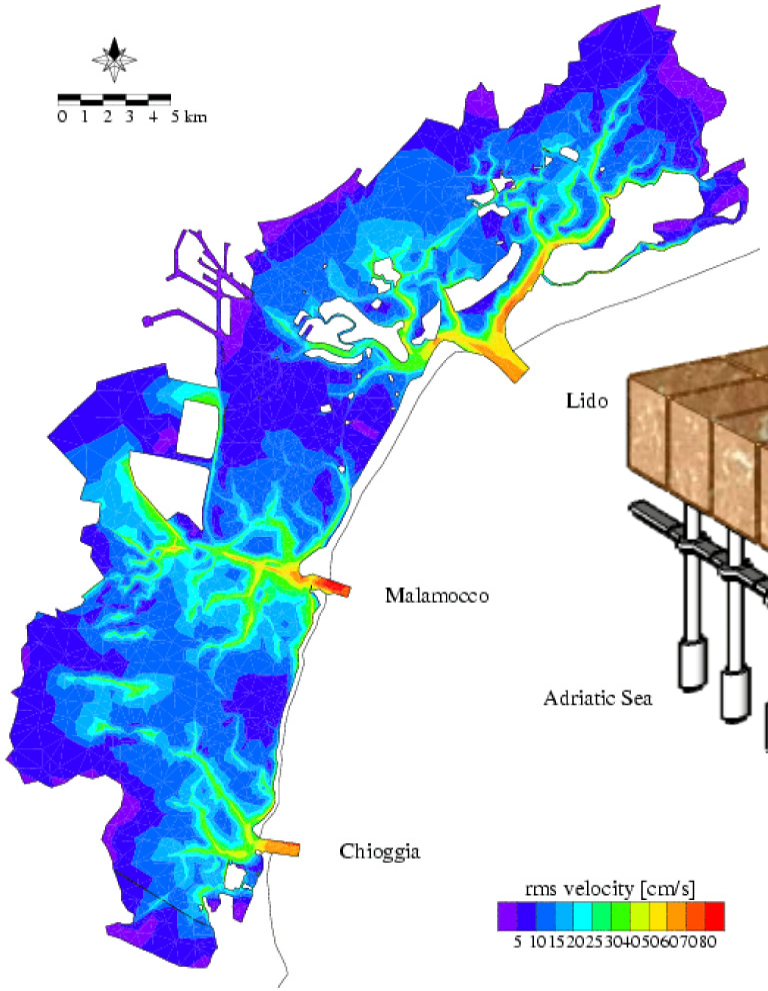
PART 3 : INSTALL

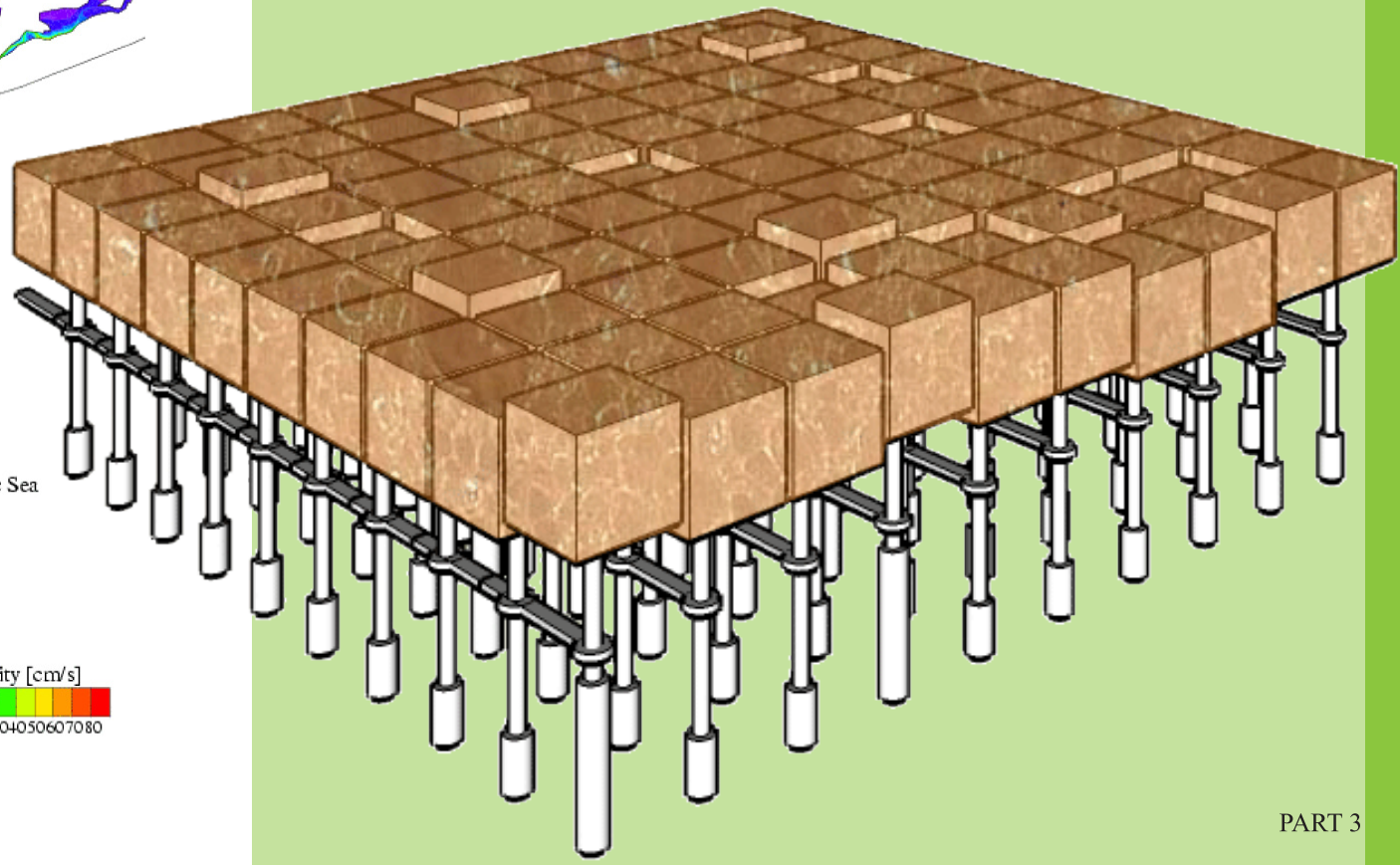


- ➔ A innovative breathing dycke.
- ➔ Venice matters
- ➔ Long term protective project
- ➔ Sponge module absorbtion
- ➔ Starting a successful commercial sponge aquaculture farm

A INNOVATIVE BREATHING DYCKE

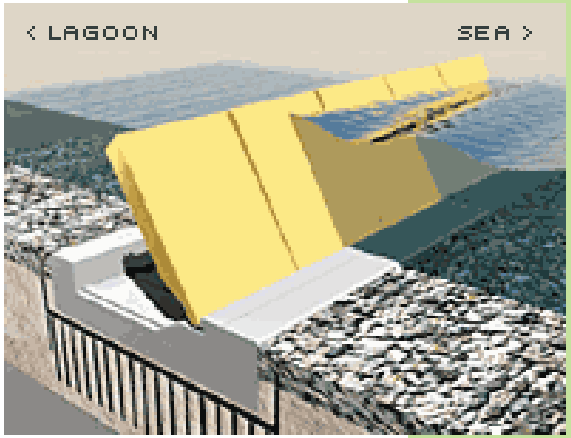
Lagoons are porous areas that enable earth and sea to breathe together. They appear as sponges or lungs; they proceed with purification.





VENICE MATTERS

FLOODING, SUBSIDENCE, ECONOMICS...



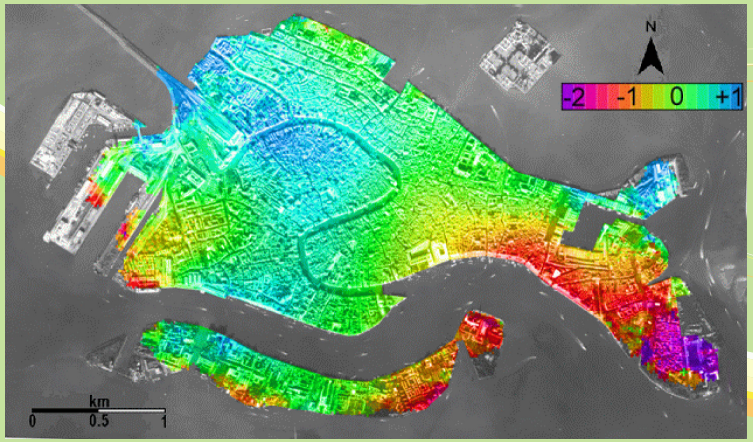
‘Venice is sinking while the sea level is rising’

➔ Avoid catastrophic scenarios (increasing lagoon erosion, sudden modifications of biological equilibriums, loss of wetlands, salt aggression and an increasing frequency of exceptional high tide events)

➔ Search for a reliable interpretative tool to measure sealevel changes

➔ Consider the peculiar hydrodynamics of the northern Adriatic Sea and the complexity of the freshwater inflow from the Po River

➔ Suggest a more cautious approach to the scenarios yet proposed for the next century.



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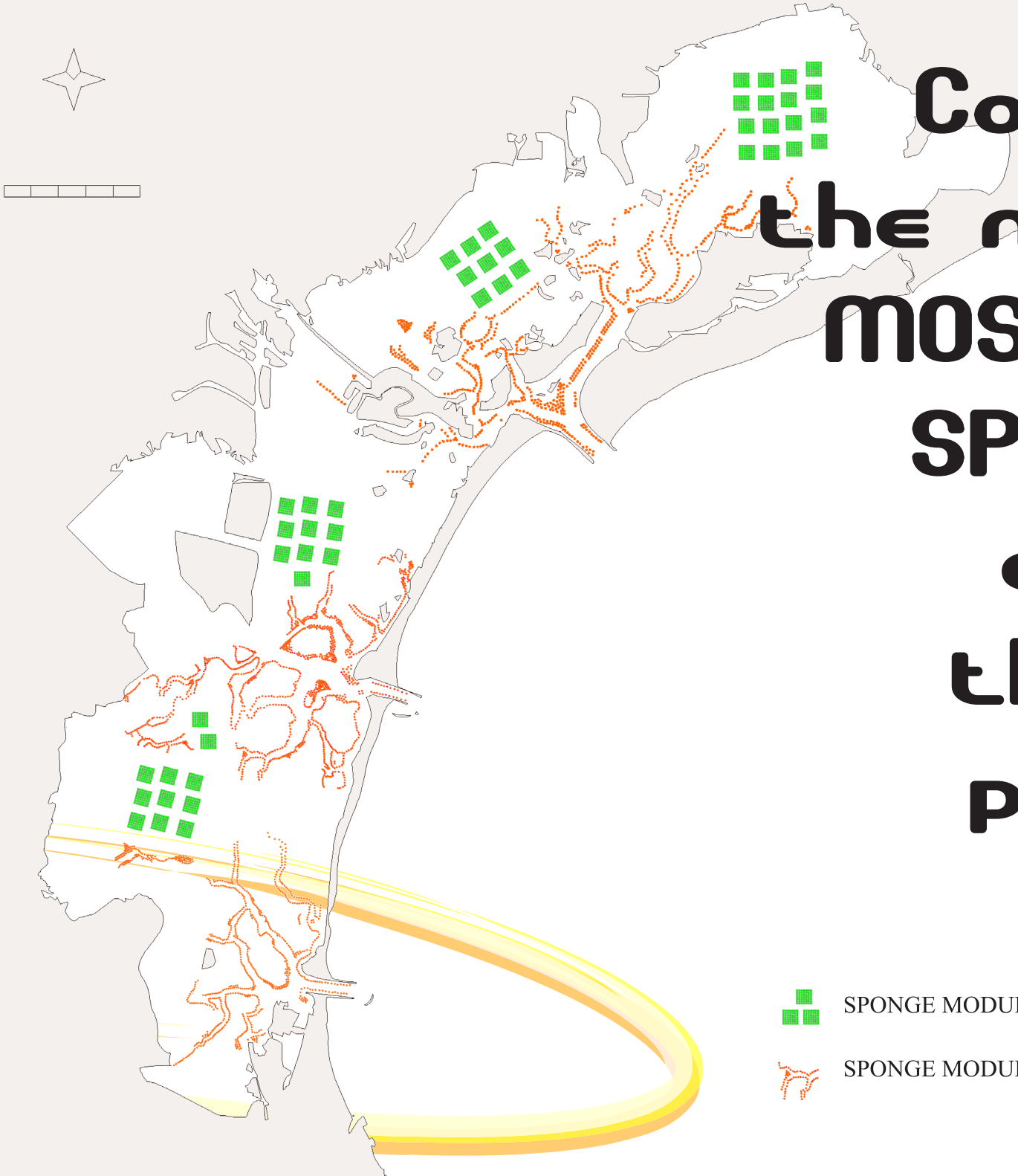

Contrary to the monstrous MOSE project, SPONGY LUNG deals with the natural process of breathing

SPONGE MODULE FIELD

SPONGE MODULE TAMPON

IS THE MOSE PROJECT TO SAVE VENICE ALREADY OBSOLETE?

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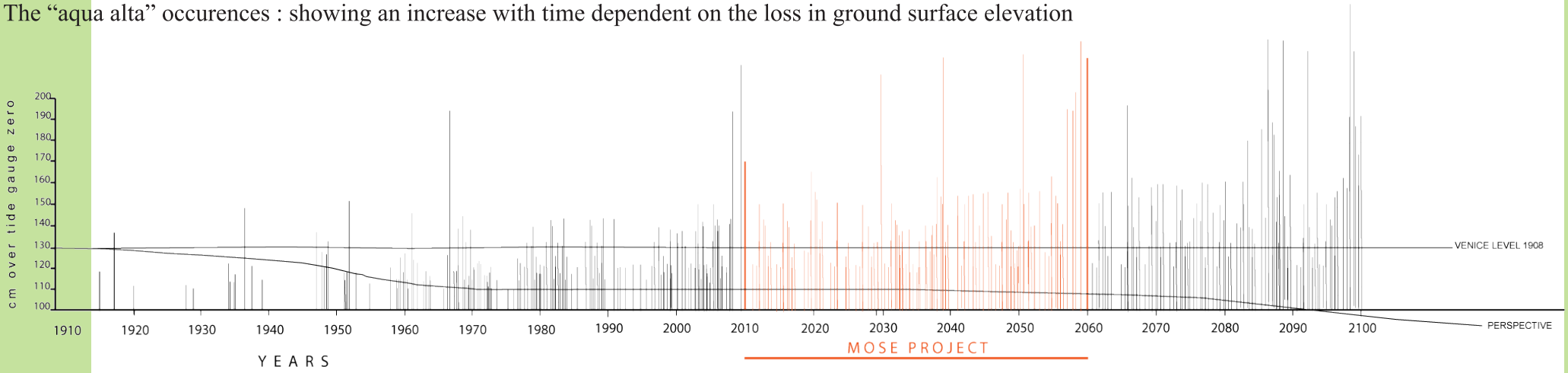
Five meteorological and surge events that occurred during the last decades are analysed, simulating that a relative sea-level rise of 0.5 m (average IPCC prediction for the year 2100 + local subsidence) has taken place and that the "MOSE" gates (the planned mobile protection against flooding of Venice) could have been in operation during the events. In all cases considered, flooding would have occurred in the lowest parts of Venice, lasting for dozen hours, in spite of raising the street level to the +100 cm, or even to the +110 cm levels above the local datum. Problems would start for a sea-level rise of about 25–30 cm, or even of only 10 cm for a repetition of the 1966 event. This is both because the projected gates are not watertight, and rainfall and river discharge contribute to raise the average water level in the lagoon. Therefore, the "MOSE" would be inadequate to protect Venice in the case of the near-future sealevel rise predicted by climatic models for this century. This project might be useful to attenuate surge peaks, but would not prevent gradual floods when the closure durations implied by a sea-level rise will increase.

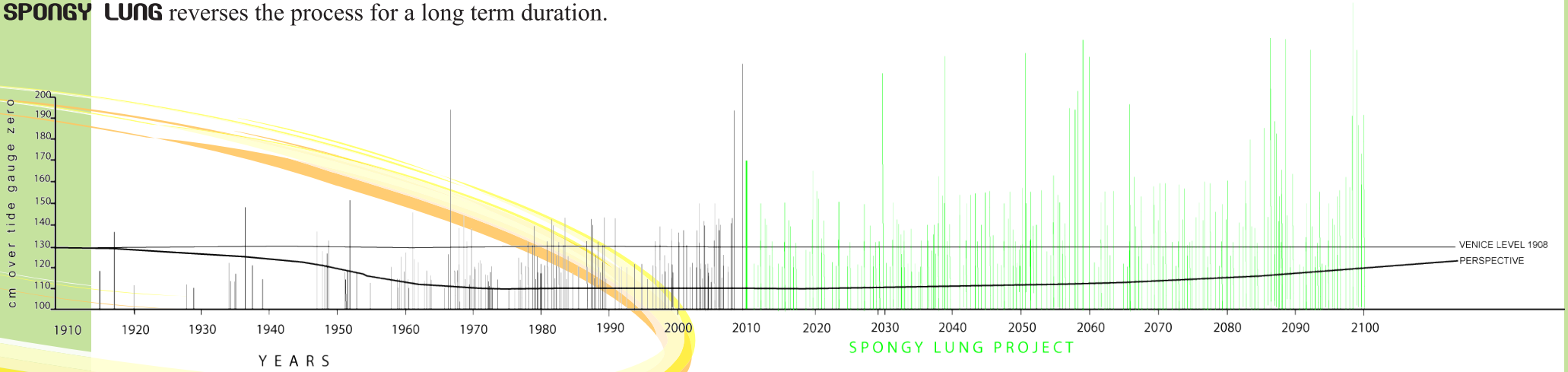
Temporary "diffuse" interventions seem preferable to the "MOSE" gates because they would be safer for the environment and bring back the frequency of flooding to the very acceptable level of about one century ago, thus making possible to gain a few decades. This would give time to verify ongoing evolution and probably to narrow the large uncertainty ranges of present-day estimations. Only with a closer assessment of near-future sea-level rise will it be possible to decide which type of "hard" defence would be eventually necessary to save Venice and its lagoon. Anyway, a stricter control of water pollution should be a priority intervention.

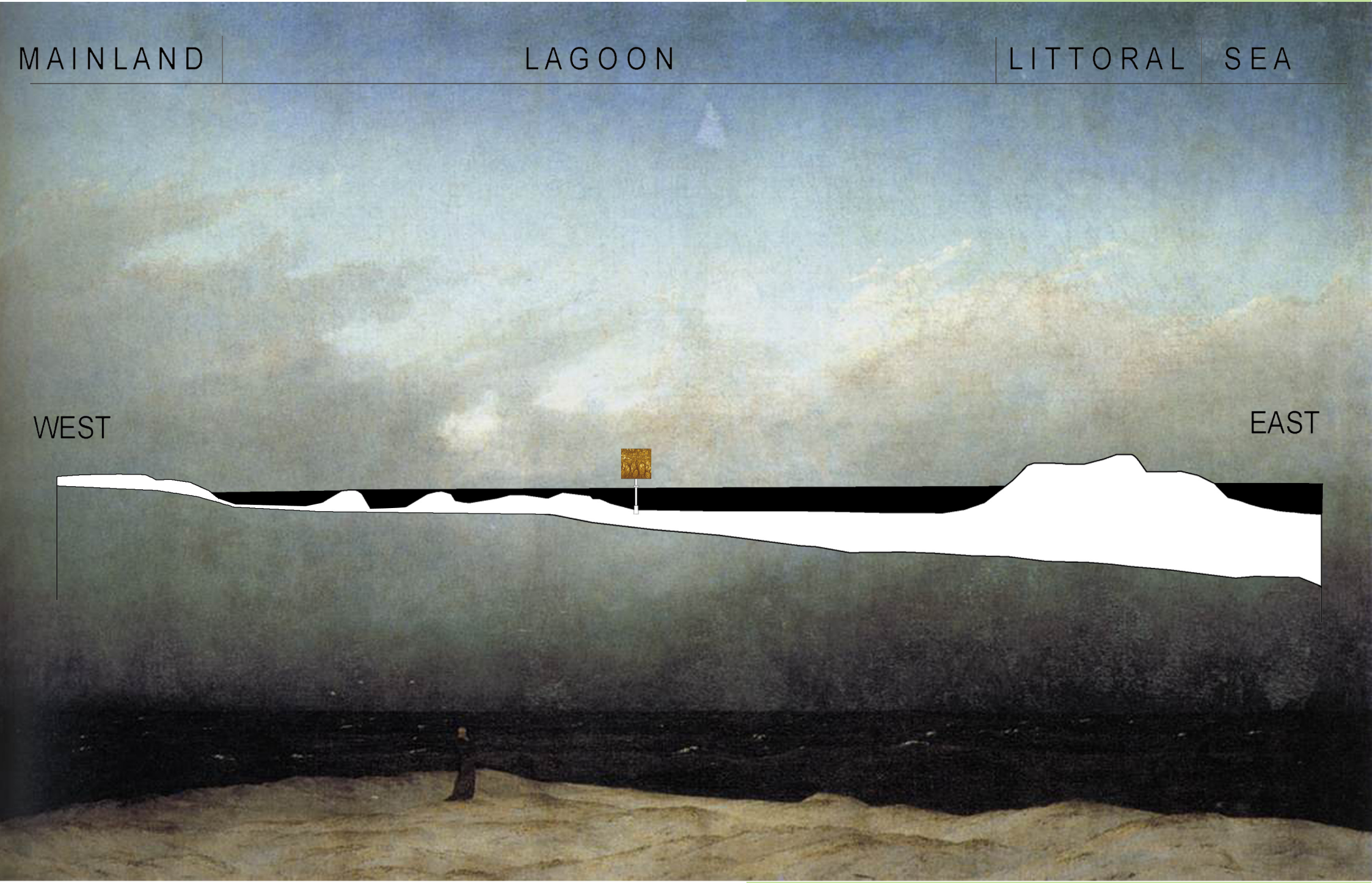
SPONGY LUNG IS A LONG-TERM PROTECTIVE PROJECT

The “aqua alta” occurences : showing an increase with time dependent on the loss in ground surface elevation



SPONGY LUNG reverses the process for a long term duration.

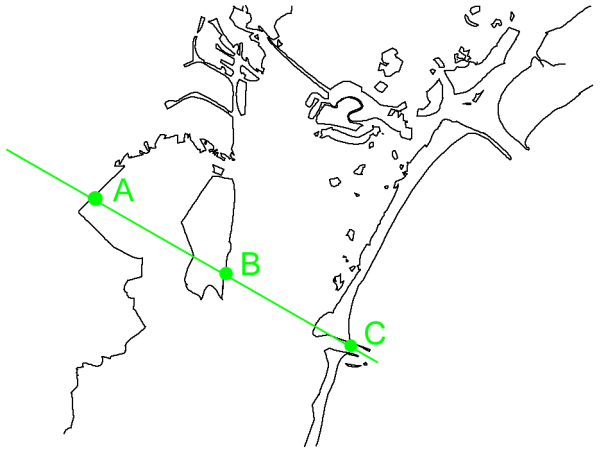


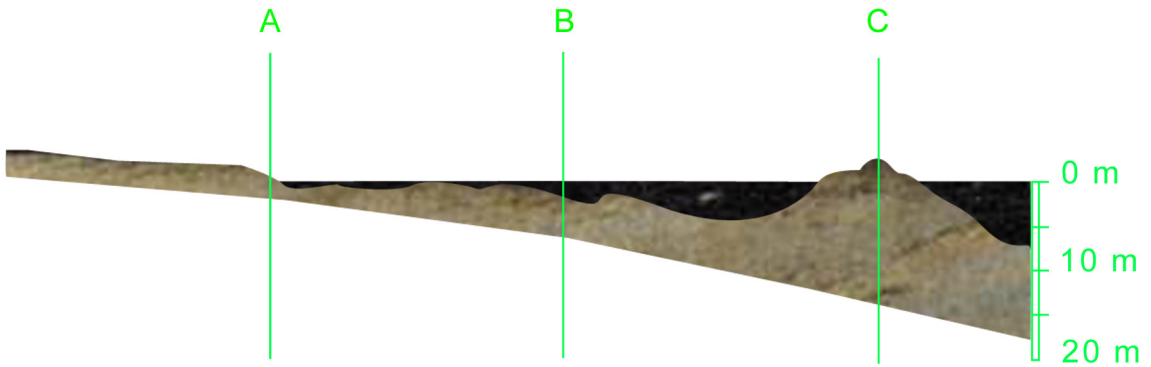

MAINLAND
LAGOON
LITTORAL
SEA
WEST
EAST

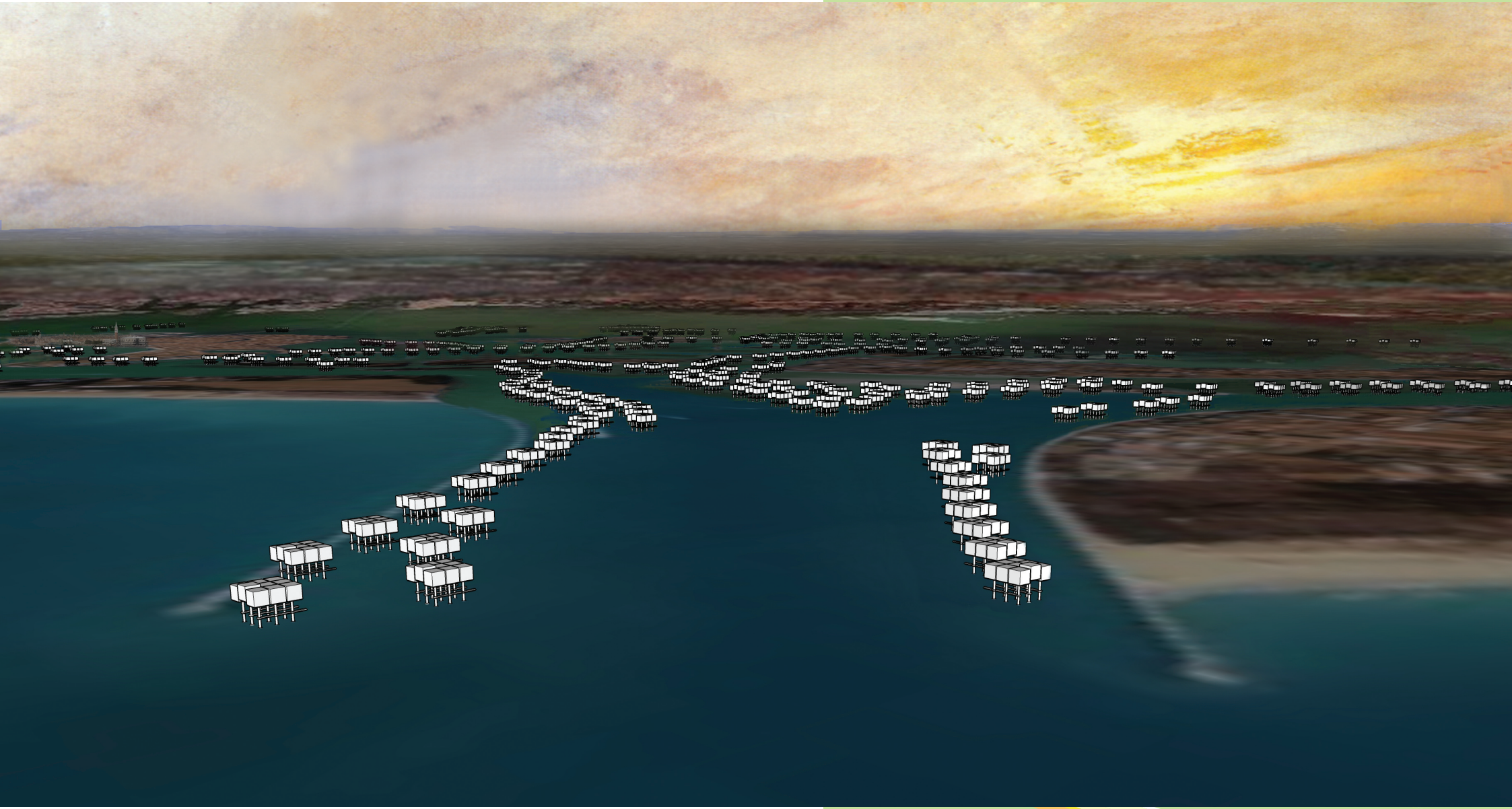
SPONGE MODULE FIGHTS SUBSIDENCE

Thanks to the natural sponge farming and the sponge module location allow the life increases. SPONGY LUNG absorbing process stops sea making soil erosion.

The lagoon soil is rising.







SPONGE MODULE ABSORBTION

$$L_e = \left(e^{-2kz}\right)L_b + \left(1 - e^{-2kz}\right)L_w$$

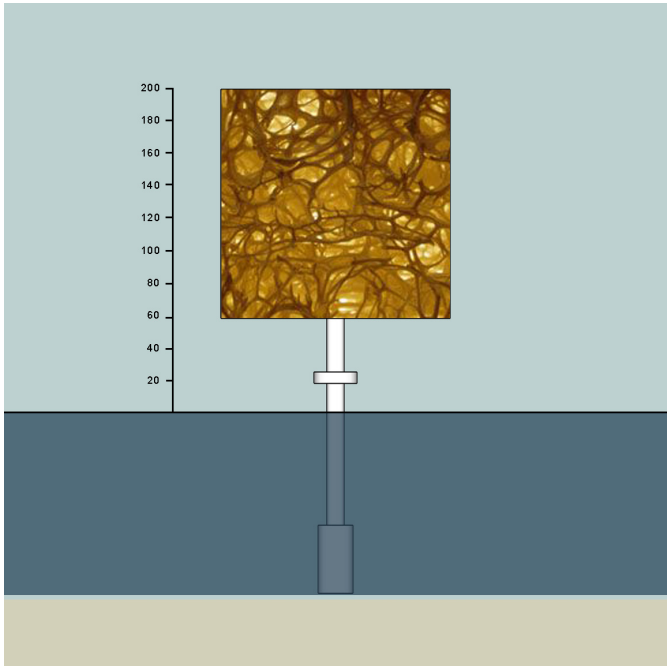
BATHYMETRY AND ALGORITHM SPONGE ABSORBTION

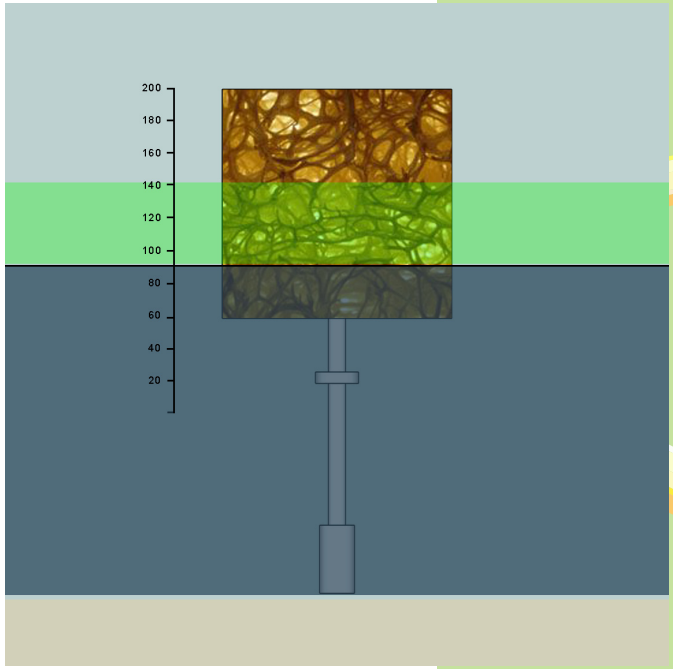
Electromagnetic radiation that cross a water column suffer an attenuation due to the joint action of diffusion and absorption of the medium. Considering a bundle of monochromatic light, the relative loss of radiant flux is proportional to the size of the path, to less of a coefficient of proportionality (extinction coefficient). A model that finds large employment in literature to reconstruct the bathymetry in coastal zones from RS multispectral data, is the depth of penetration zone (DOP) method proposed by Jupp (Jupp, 1988)

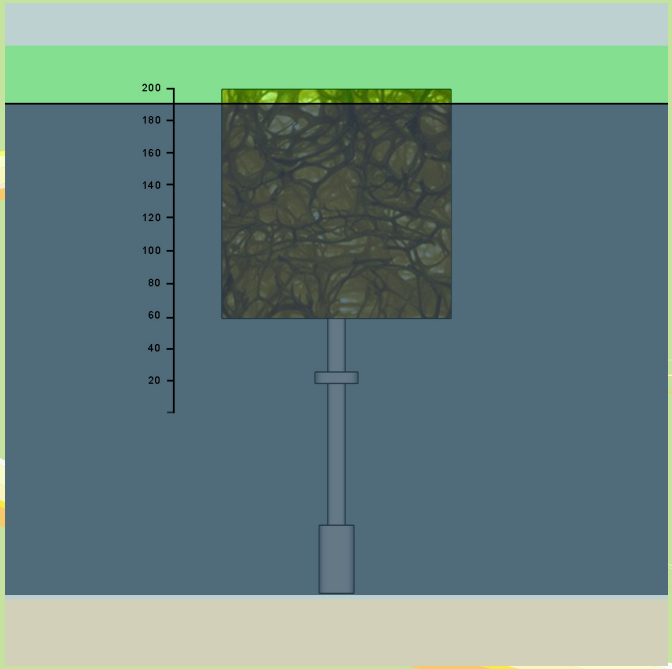
where Le = measured at-sensor radiance
Lb = emergent radiance from the seabed
Lw = emergent radiance from the different layers
z = depth
k = coefficient of absorption

Hypothesizing negligible the term of Lw, directly related to quality of the water (suspended sediments), and for small changes in seabed, then, among the depth of the water column and the logarithm of the measured at-sensor radiance there is a linear correspondence. Under this conditions, rearranging Eq.

53% water absorbing
(+ - 0,7%)

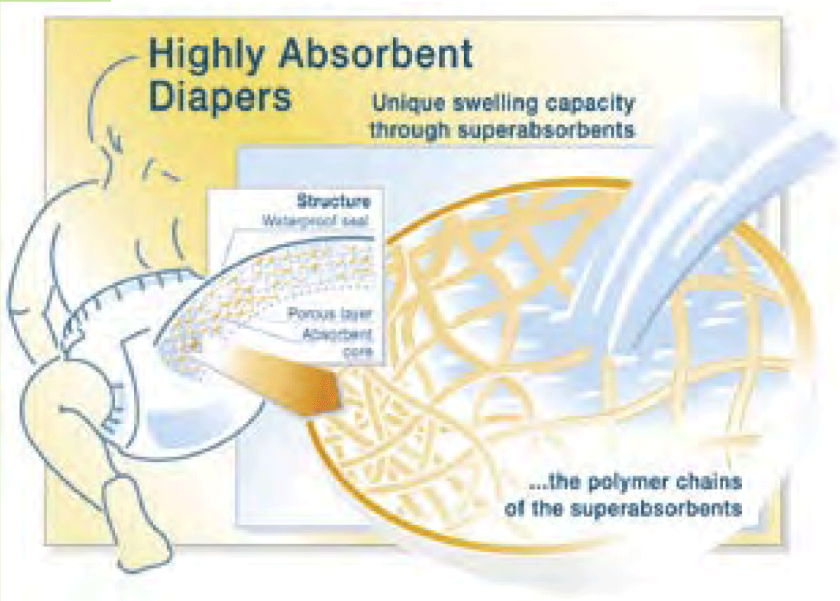






Superabsorbent polymers (SAPs)

Superabsorbent polymers (SAPs) are materials that have the ability to absorb and retain large volumes of water and aqueous solutions. This makes them ideal for use in water absorbing applications such as baby nappies and adults incontinence pads to absorbent medical dressings and controlled release medium. Early superabsorbents were made from chemically modified starch and cellulose and other polymers like poly(vinyl alcohol) PVA, poly(ethylene oxide) PEO all of which are hydrophilic and have a high affinity for water. When lightly cross-linked, chemically or physically, these polymers became water-swellable but not water-soluble. Today's superabsorbent polymers are made from partially neutralised, lightly cross-linked poly(acrylic acid), which has been proven to give the best performance versus cost ratio. The polymers are manufactured at low solids levels for both quality and economic reasons, and are dried and milled in to granular white solids. In water they swell to a rubbery gel that in some cases can be up to 99wt% water.



Why don't SAPs dissolve in water?

Cross-links between polymer chains form a three-dimensional network and prevent the polymer swelling to infinity i.e. dissolving. This is due to the elastic retraction forces of the network, and is accompanied by a decrease in entropy of the chains, as they become stiffer from their originally coiled state (figure 4).

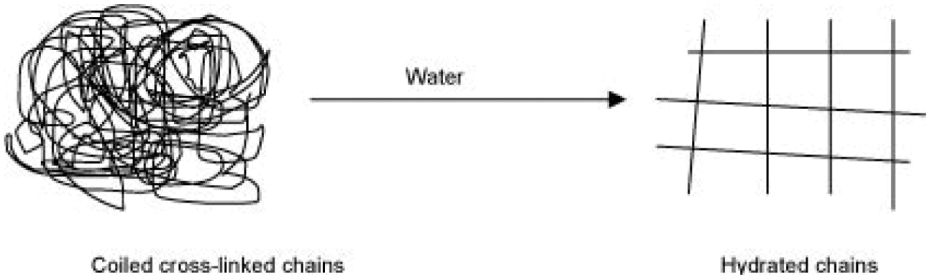


Figure 4

Water Coiled cross-linked chains Hydrated chains There is a balance now between the forces of retraction and the tendency for the chains to swell to infinite dilution. The degree of cross-linking has a direct effect on the level of swelling of the polymer and the strength of the network...

STARTING A SUCCESSFUL COMMERCIAL SPONGE AQUACULTURE FARM

Sponges are living animals whose cells are loosely arranged about a soft fibrous and glass skeleton. Sponges provide homes for many other animals, plants, and microorganisms. In many cases, they all work together in a mutual symbiotic relationship.

It's easy.

Growing sponges requires very little special knowledge, and anyone in the family, from grandparents to young children, can participate in planting, maintenance, and harvesting of the sponge crop.

It's profitable.

Although it is unlikely that anyone will get rich growing sponges, the activity can provide a farmer with a continuous income year-round, and improve his overall standard of living. Sponge farming can be a part-time enterprise, allowing time for pursuing other sources of income if needed. A sponge farmer and an assistant working three days per week can reasonably expect to plant 30,000 sponge cuttings in a year, and earn approximately 10,000 € to 12,000 €.

Local and Worldwide Markets

Your sponge crop can be sold in a number of places. Most developed nations buy sponges on the world market for industrial, medical, and cosmetic uses. To minimize shipping costs, it is best to sell your sponges to a buyer in the developed nation closest to your farm. Tourists will generally pay higher retail prices for sponges; however, this market is limited by small tourist traffic in many areas.

SPONGY LUNG

IT IS ENVIRONMENTAL FRIENDLY

Sponge farming is a relatively new business opportunity that does not harm the marine environment. Growing sponges commercially actually reduces harvesting pressures on local wild sponge stocks, making it less likely that any sponge species will become extinct. Sponge aquaculture also benefits the lagoon in which the farm is located. Cultured sponges release eggs into the water, as do their wild counterparts; new sponges will start growing in the immediate vicinity of the sponge farm. As the ropes and lines become crowded with various small “fouling” organisms, several species of fish will be attracted to the farm-site. And the sponge technology recycles soil-washing amendments.

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ANY QUESTIONS ?...

THANKS

Cécile Azoulay
Emilie Collavet
Romain Jacquet
Muriel Pierre

Artlab-San Servolo
Venice

http://www.algalita.org

This project carries on their prevention activities.

SPONGY LUNG

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SOURCES

A DNA ALGORITHM FOR THE BATIMETRIC MAPPING IN THE LAGOON OF VENICE USING QUICKBIRD MULTISPECTRAL DATA
M. Gianinetto a, G. Lechi a.

STARTING A SUCCESSFUL COMMERCIAL SPONGE AQUACULTURE FARM
University of Hawaii Sea Grant College. Program Communications Office School of Ocean and Earth Science and Technology

FLOOD WARNING LEVEL FORECASTING FOR UNGAUGED CATCHMENTS BY MEANS OF A COMBINED API-STORAGE CONCEPT
Thilo Lehmann, Hubert Holzmann Inst. f. Water Management, Hydrology and Hydraulic Engineering, Univ. of Natural Resources and Applied Life Sciences Vienna (BOKU)

LIFE OF A SPONGE IN A SANDY LAGOON
Micha Ilan, Department of Zoology, Tel Aviv University.

FLOODING AND ENVIRONMENTAL CHALLENGES FOR VENICE AND ITS LAGOON: STATE OF KNOWLEDGE
Cambridge University Press

THE MODERN PREDICTABILITY OF THE 1966 BIG VENICE FLOOD
Luigi Cavaleri and Luciana Bertotti. Institute of Marine Sciences, ISMAR-CNR, Venice, Italy

FLOOD EVENTS AND THE HYDROLOGY OF A COMPLEX CATCHMENT: THE DRAINAGE BASIN OF THE VENICE LAGOON
L. Zaggia, A. Zuliani, F. Collavini & R. Zonta, CNR – Istituto di Scienze Marine, Venice, Italy

WORLD BANK Sustainable Development East Asia and Pacific Region

IS THE “MOSE” PROJECT TO SAVE VENICE ALREADY OBSOLETE?
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OBSERVATIONS ON FUTURE SEA LEVEL CHANGES IN THE VENICE LAGOON
Davide Zanchettin Æ Pietro Traverso. Mario Tomasino

THE LAGOON OF VENICE: NATURAL ENVIRONMENTAL TREND AND MAN-INDUCED MODIFICATION
P. GATTO & L, CARBOGNIN Istituto per lo Studio della Dinamica delle Grandi Masse, CNR, Venice, Italy

ALLUVIAL SPONGE COMB .
Anderson and Anderson Architecture

THE EVALUATION OF TYPE-M FORAGER® SPONGE TECHNOLOGY TO RECYCLE SOIL-WASHING AMENDMENTS
Rhonda Spiess Fetters. A Thesis Submitted to the Faculty of Mississippi.