

Flanders Bays

Safe, natural, attractive, sustainable, developing

Vlaamse Baaien

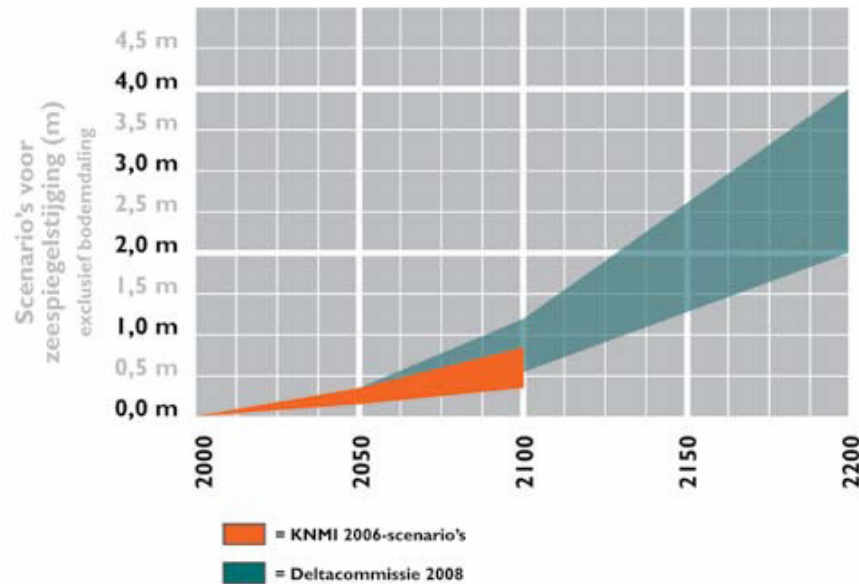
Veilig, natuurlijk, aantrekkelijk, duurzaam, ontwikkelend

Bart Verboomen, Baggerwerken Decloedt & Zoon
(DEME Group)

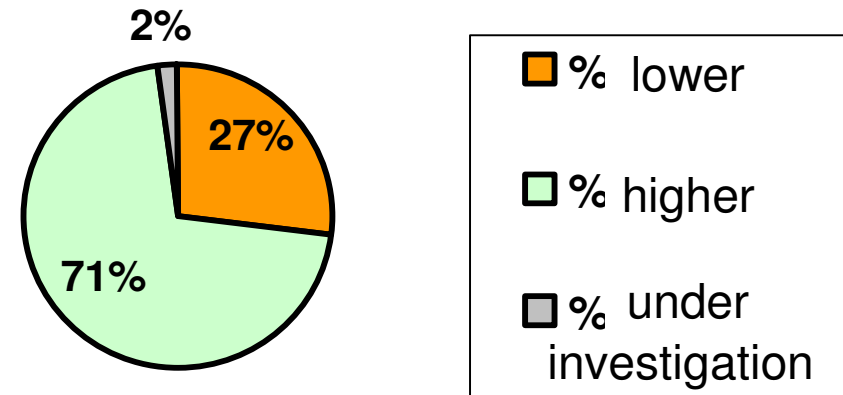
EUDA 3/11/2010



CHALLENGE : CLIMATE CHANGE – COASTAL PROTECTION



Safety level to a storm occurring once in thousand years



- Flanders Bays is a challenging plan from now to 2100 to protect the Belgian Coast and the Scheldt Mouth for severe storms and sealevel rise
- Based on worldwide experience of Expert Group of companies



SUSTAINABLE DEVELOPMENT FOR TODAY'S CHALLENGES

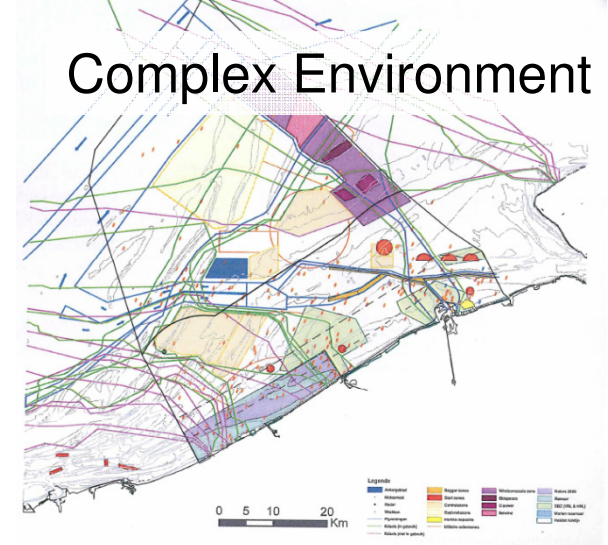
Attractive ?



Natural ?



Complex Environment



Flanders Bays

Nature



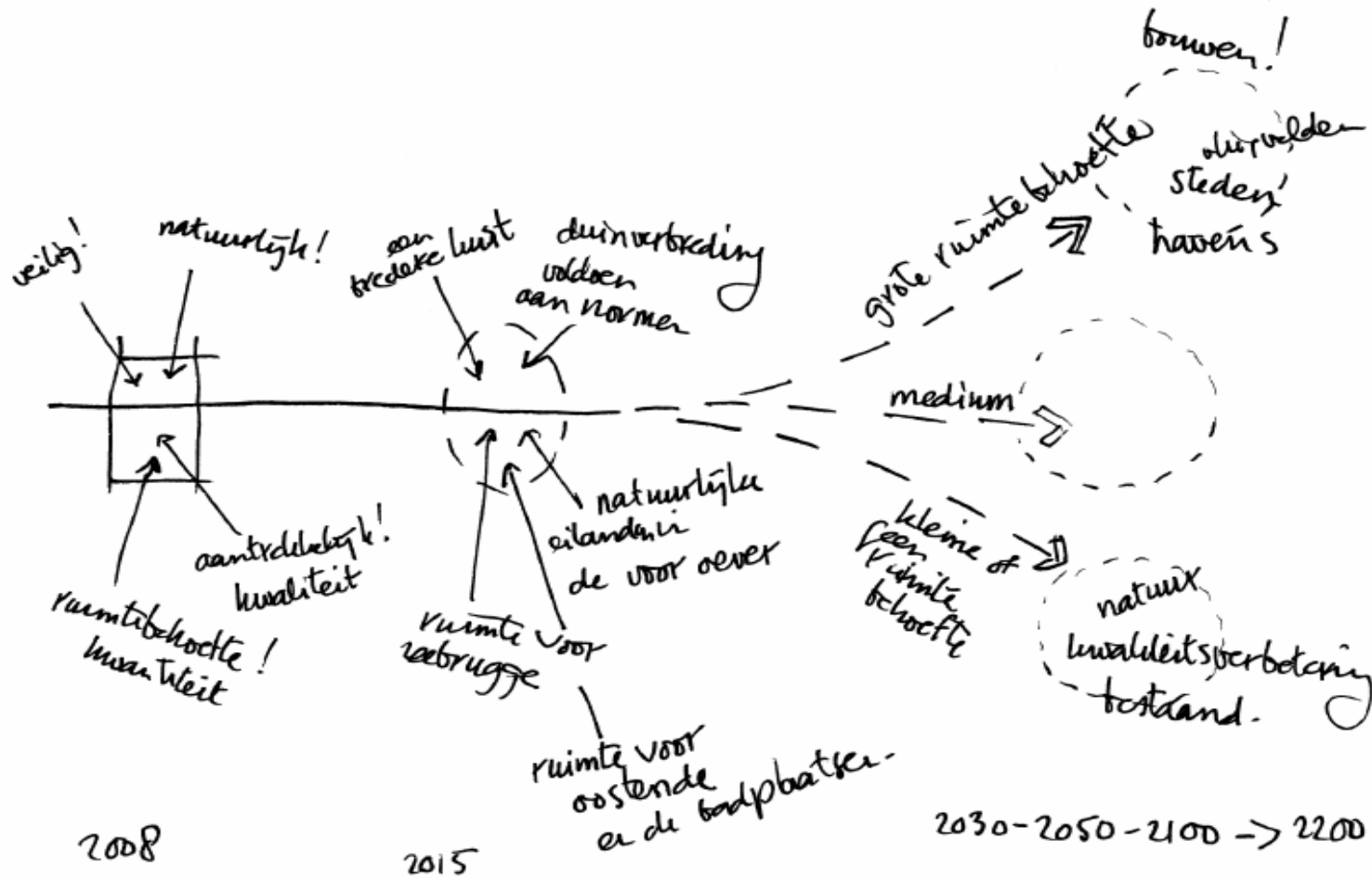
Economy



Energy ?



FLANDERS BAYS : INTEGRAL LONG TERM VISION



Safe



Natural



Attractive

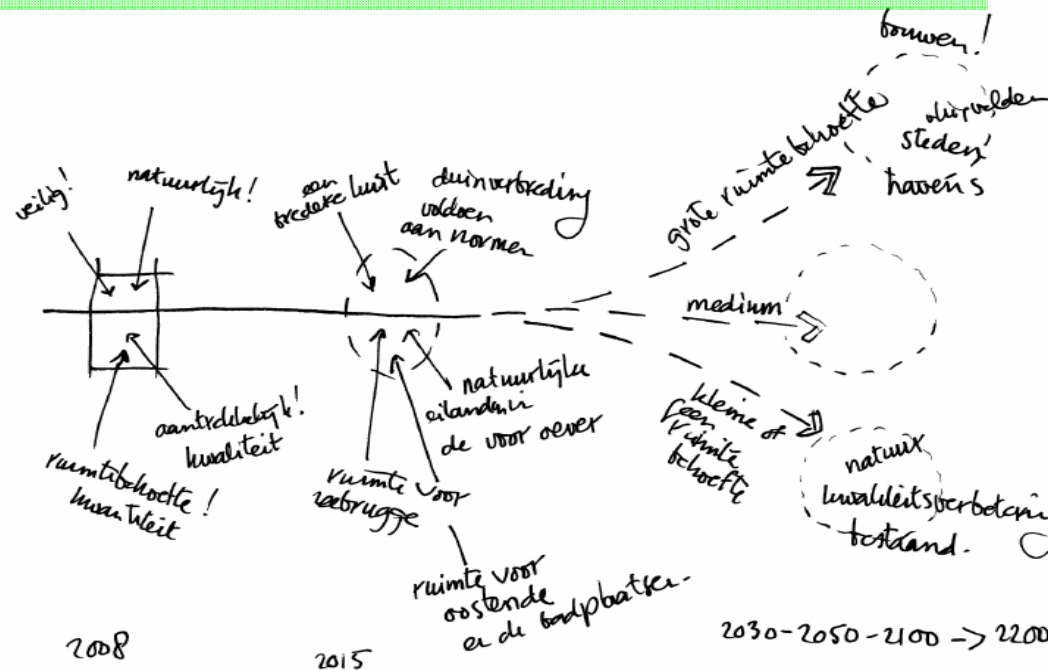


Sustainable



Developing

FLANDERS BAYS : INTEGRAL LONG TERM VISION



- No Regret : Preserve Ecosystem, Preserve Investment
- No Sustainable Development without the Guarantee of Safety
- Economical apply ecosystem and forces of nature



Safe



Natural



Attractive



Sustainable



Developing

FLANDERS BAYS : INTEGRAL LONG TERM VISION



Vlaamse Kust



00| KUSTREDDINGSPLAN
Waterbeheersingswerken langs/leem de kust

NU STARTEN	START TUSSEN NU EN 2020	START TUSSEN 2020 EN 2050	LANGE TERMIJN, TOT 2100
█			



01| KUSTBESCHERMING DOOR OPHOGING VLAAMSE BANKEN
Smalbank, Nieuwpoortbank, Middelkerkebank, Oostendebank, Wenduinebank, Stortzone S1

█	█	█	█
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02| EILANDEN VOOR DE VLAAMSE KUST
Eiland Nieuw Ter Streep (Oostendebank)
Marine natuurontwikkelingszone
Eiland Wandelaar

	█	█	█
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Vlaamse Oostkust



03| HAVEN VAN ZEEBRUGGE
Buitenhaven Zeebrugge I
Achterhaven Zeebrugge
Buitenhaven Zeebrugge II

█	█	█	
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04| STRAND KNOKKE-HEIST / ZWIN
Baai van Heist
Natuurreservaat Baai van Heist
Jachthaven en Marina Heist
Strandmeer Knokke-Heist
Reservaat Zwin
Tijltingang Zwin
Uitbreiding tijgebied Zwin

█	█	█	
█	█	█	



05| JACHTHAVEN BLANKENBERGE
Nieuwe havenmond Blankenberge
Blankenberge Nieuw-Strand

NU STARTEN	START TUSSEN NU EN 2020	START TUSSEN 2020 EN 2050	LANGE TERMIJN, TOT 2100
		█	



06| MARIENE RESIDENTIE BLANKENBERGE - ZEEBRUGGE / STRAND AAN LAGUNE

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Vlaamse Middenkust



07| HAVEN VAN OOSTENDE
Voorhaven en achterhaven
Oostende offshore diensthavens - fase 1
Oostende als Centrum voor Duurzame Energie - fase 2

█	█	█	█
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Vlaamse Westkust



08| NIEUWPOORT EUROPEES ZEIL- EN WATERSPORTCENTRUM
Watersportinfrastructuur
Natuurreservaat IJzermonding
Maritieme uitbouw

█	█	█	█
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Duurzame mariene projecten



09| MULTIFUNCTIONEEL EILAND (SCHULHAVEN, OFFSHOREDIENSTEN)

		█	█
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10| INFRASTRUCTUUR MARITIEME ENERGIEWINNING
Windenergie
Getijdenenergiecentrale

█	█		█
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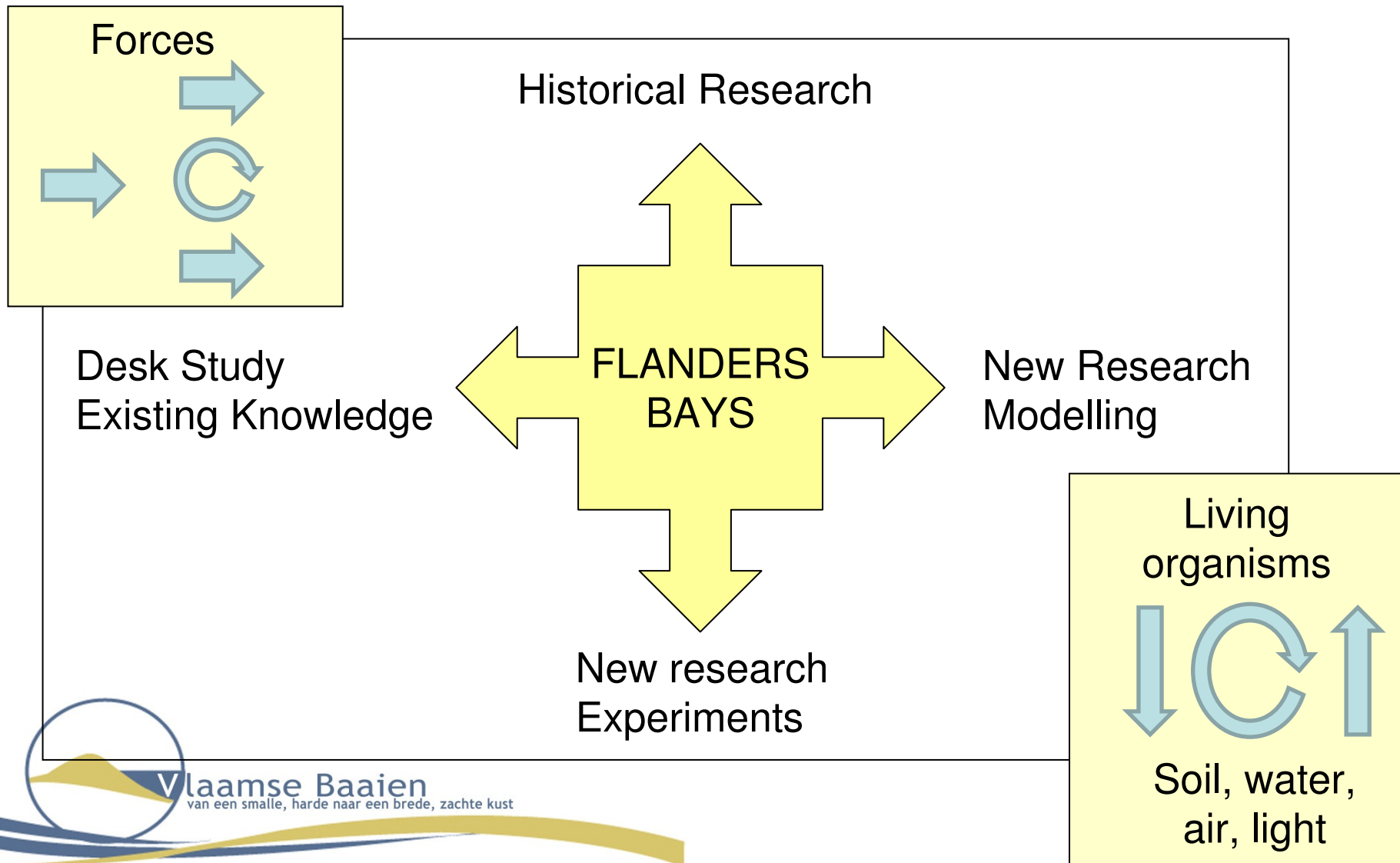
FLANDERS BAYS : ECOSYSTEM APPROACH / FORCES OF NATURE

UNDERSTAND

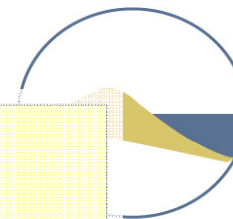
RESOURCES

CO-OPERATE

WIN



FLANDERS BAYS : APPROACH



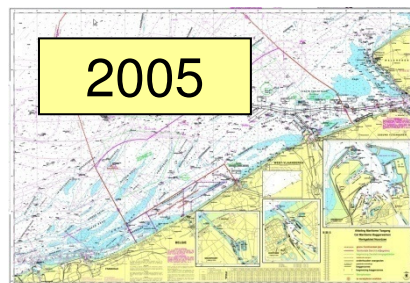
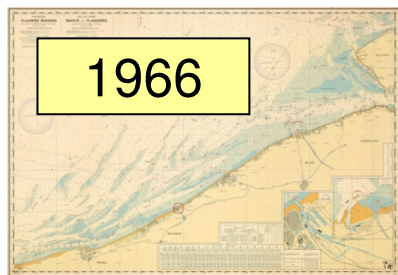
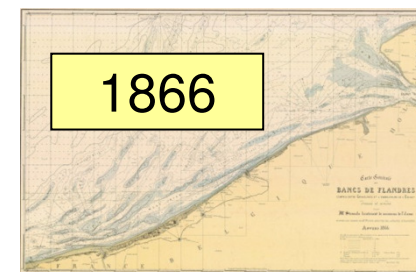
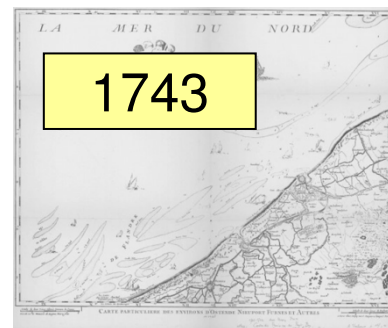
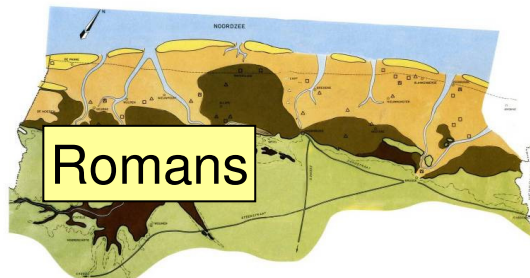
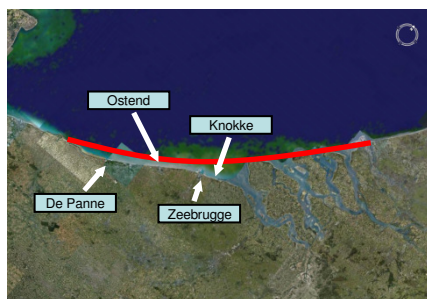
UNDERSTAND

RESOURCES

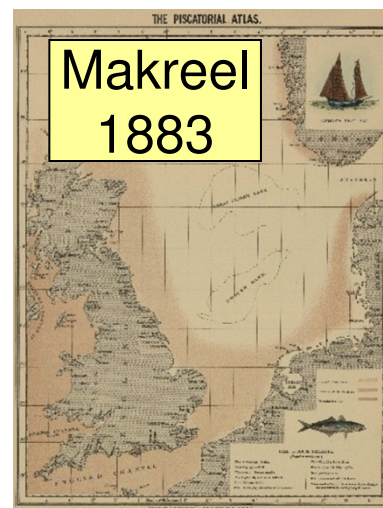
CO-OPERATE

WIN

HISTORICAL RESEARCH

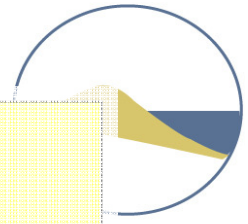


Morphology / Hydrodynamics



Fish Population

FLANDERS BAYS : APPROACH



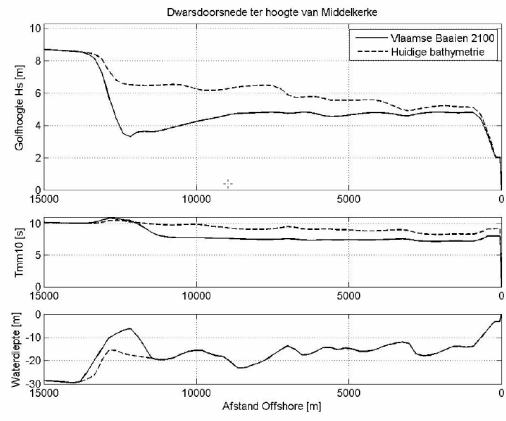
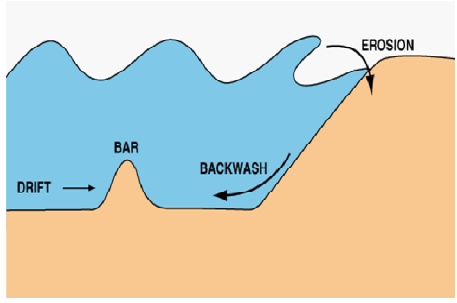
UNDERSTAND

RESOURCES

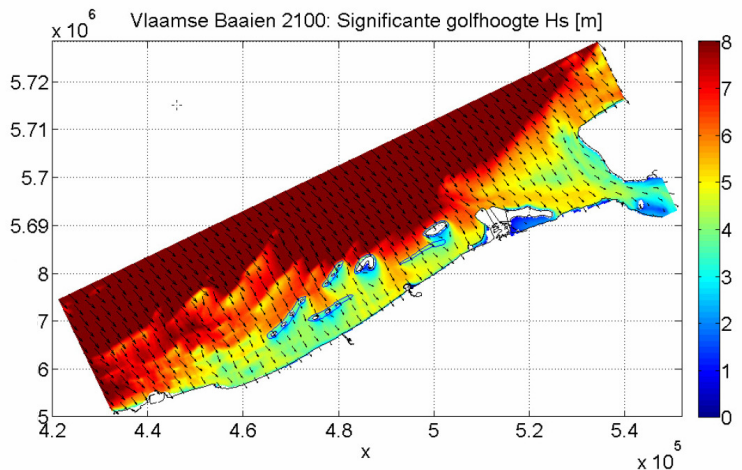
CO-OPERATE

WIN

MODELLING



Figuur 5-1: Langs een doorsnede loodrecht op de kust ter hoogte van Middelkerke wordt de afname van de golffhoogte en golfteriode door de eilandengroep (volle lijn) vergeleken met de huidige situatie (gestippelde lijn).



Figuur 4-2: Overzicht van de berekende golffhoogte (H_s) langs de Vlaamse kust tijdens een superstorm met een terugkeerperiode van eens in de 10.000 jaar voor het ontwerp van de Vlaamse Baaien

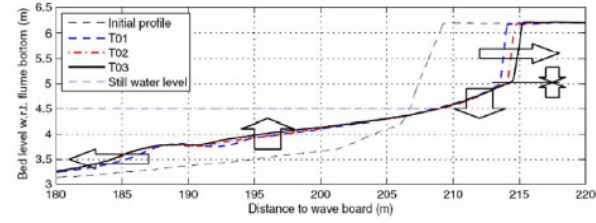
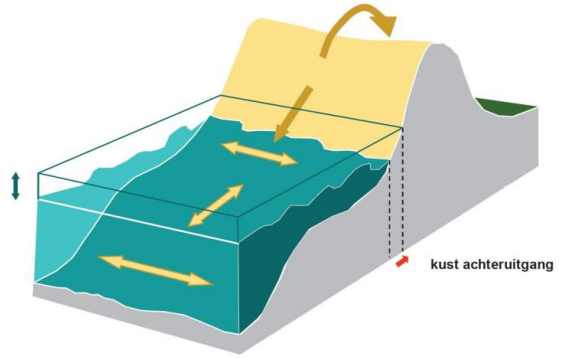
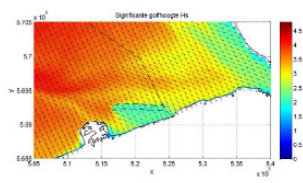
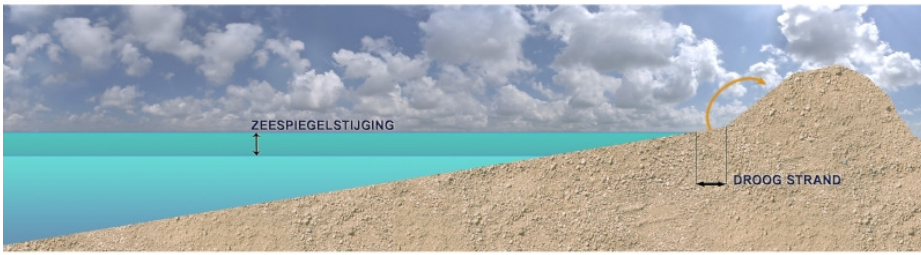
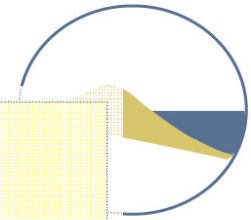


Fig. 3. Comparison of measured bed profiles after 6 hours (model scale) in Tests T01, T02 and T03 and indications of qualitative effects of wave period on erosion profile.



- Natural coastal protection system using large volumes of sand
- Natural grain size for dynamic dune management

FLANDERS BAYS : APPROACH



UNDERSTAND

RESOURCES

CO-OPERATE

WIN

NATURAL RESOURCE - TECHNIQUES

Example

Resource	Win economical	Win societal	Win ecological
Maint. Dredge Dumpsites	+++	++	+++
'Exploratiezone'	--	+	--
Silt	+/-	-	+
Clay	+	-	-

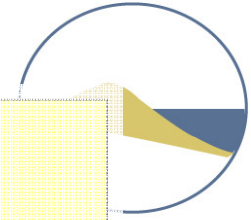
Flanders Bays

Solutions are designed to maximise the ecosystem's approach and use of natural forces

Dredging Techniques : GHG, Turbidity, Contaminants Spread, ...



FLANDERS BAYS : APPROACH



UNDERSTAND

RESOURCES

CO-OPERATE

WIN

CO-OPERATION

Private sector

- Contractor's approach and experience

Government

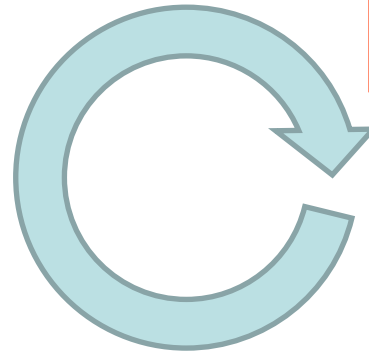
- Legislation
- permits
- fundamental research

Research Institutes

- knowledge

Financial partners

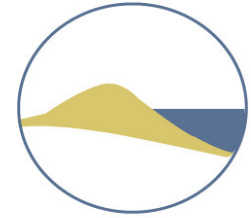
- Creative financial solutions



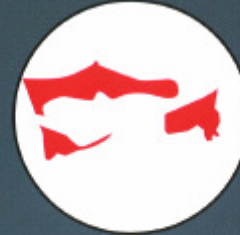
Integrated approach and large scale vision allows for economical use of ecosystem's approach and forces of nature. Co-operation will lead to successful win-win-win situations.

Vlaamse Baaien

Veilig, natuurlijk, aantrekkelijk, duurzaam, ontwikkelend

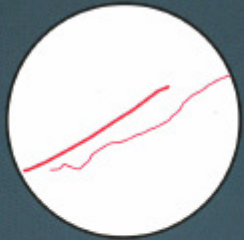


03 |
Haven van
Zeebrugge



04 |
Strand van
Knokke-Heist en Zwin





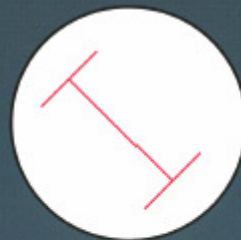
00 | Kustbeschermingsplan



05 | Jachthaven van Blankenberge

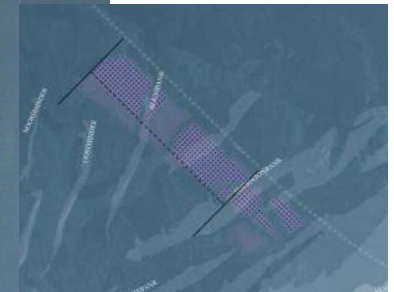


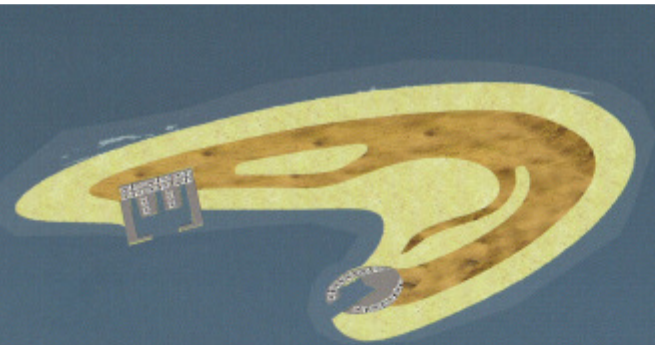
06 | Mariene residentie van Blankenberge en Zeebrugge - Strand aan lagune



10 | Infrastructuur voor mariene energiewinning

10





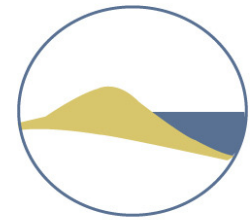
09



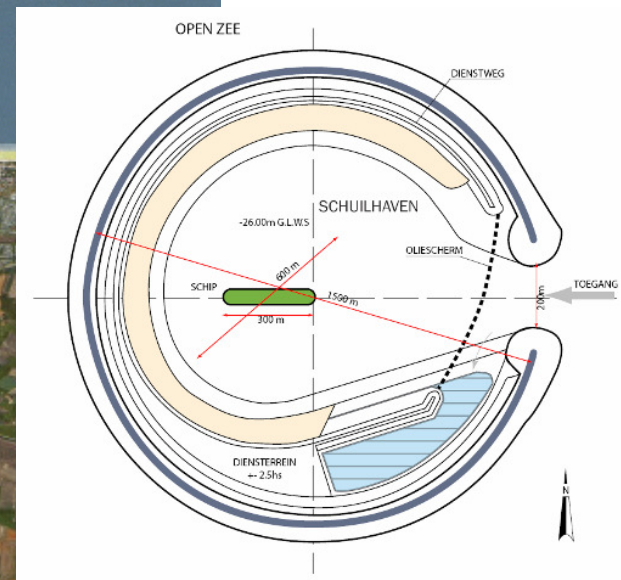
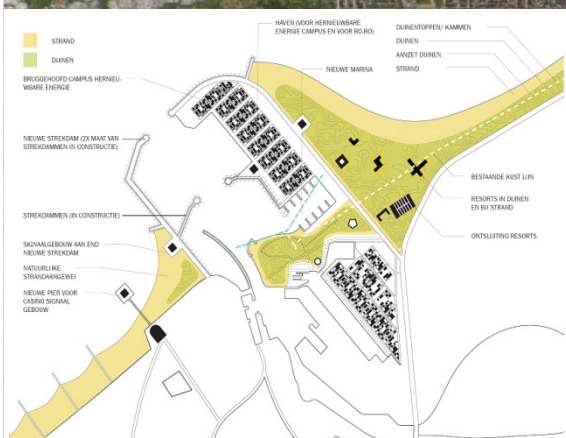
07 |
Haven van
Oostende

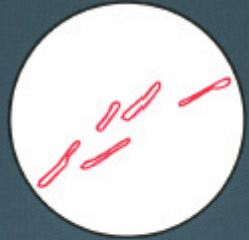


09 |
Multifunctioneel
eiland

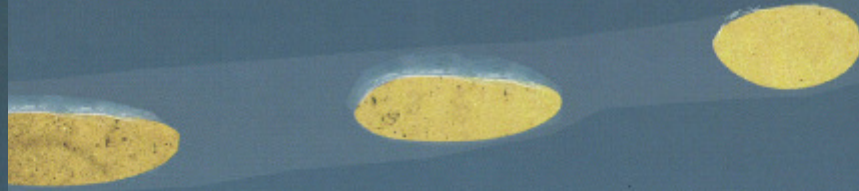


07





01 |
Kustbescherming
door ophoging
Vlaamse Banken



- 1cm/year elevation of the banks = 50 cm in 2050 mastering the wave-attack and protecting the coast
- Combining forces of nature through history to shape coastal protection and coastal structures



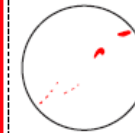
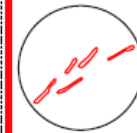
KUSTREDDINGSPLAN

KUSTBESCHERMING DOOR OPHOGING VLAAMSE BANKEN

EILANDEN VOOR DE VLAAMSE KUST

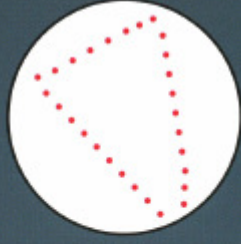


AUTOWEG





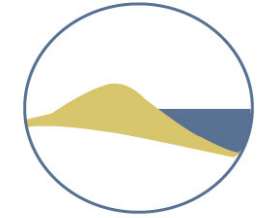
02 |
Eilanden voor de
Vlaamse Kust



08 |
Europees
Zeil- en Water-
sportcentrum
te Nieuwpoort



02



08

- Opportunities for nature development, tourism, energy
- Island and marine natural development



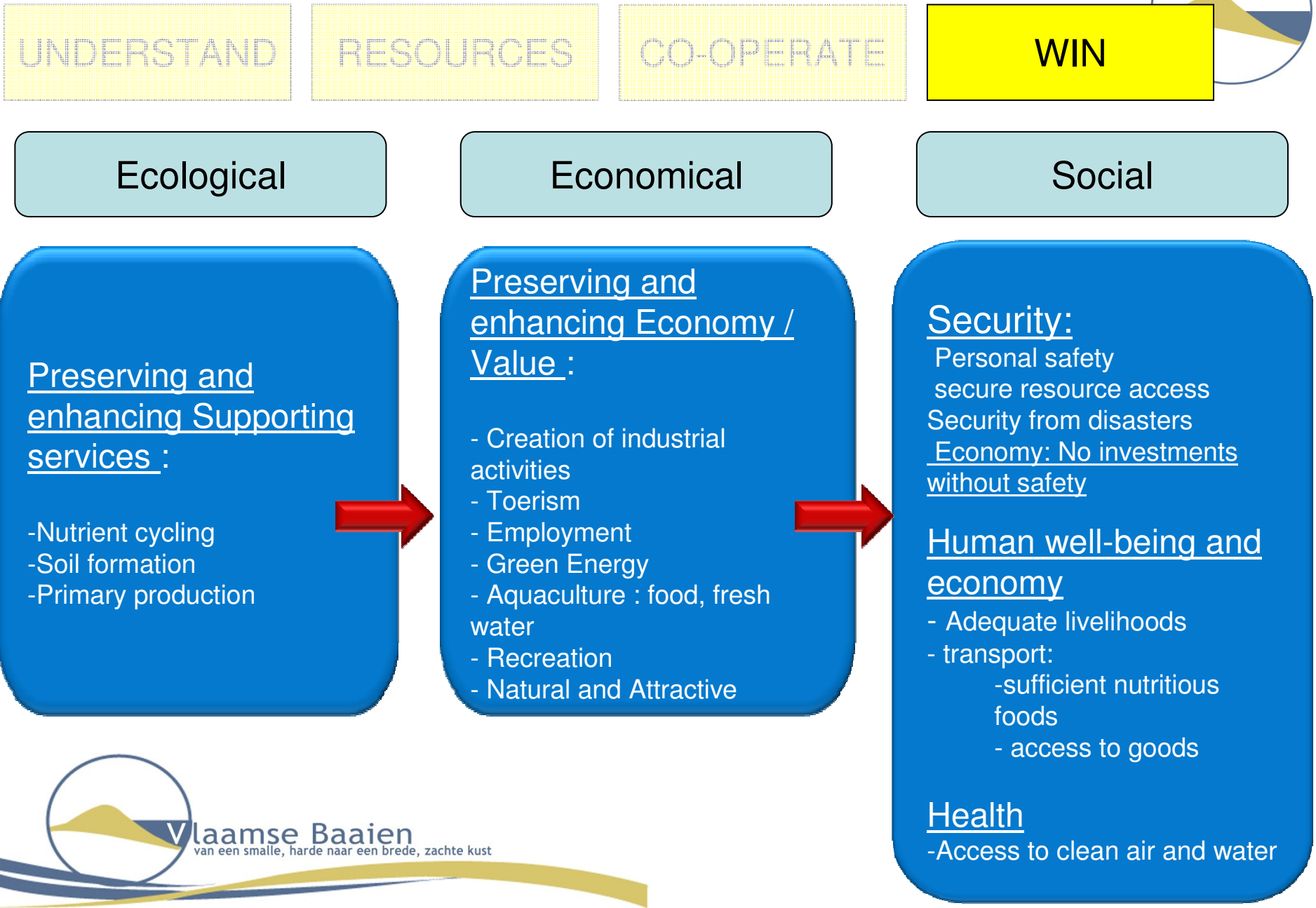
Flanders Bays: City of the sea

Green Ports examples in Europe

- **ESBJERG (Denemarken)**
 - Operating base for the Danish oil- and gas industry
 - Construction, maintenance, rescue & supply for 80 turbines
- **EASTERN ENGLAND - Lowestoft and Great Yarmouth**
 - 500 companies employ ca. 15 000 people
- **BREMERHAVEN / CUXHAVEN / EMDEN**
 - zone for offshore windenergy, production sites, test sites
 - More than 700 new jobs in the last 3 years
- **IJMUIDEN**
 - Service port for oil- and gas industry in the Southern North Sea



FLANDERS BAYS : COASTAL PROTECTION AND HEALTHY ECOSYSTEM





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