

Future Development in Coastal Design: AN INDUSTRY PERSPECTIVE

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Scientia Potentia Est
(knowledge is power)

The most successful companies in maritime works and dredging:

- KNOW what they are doing
- KNOW why they do it
- KNOW who will do it
- KNOW how to train their doers
- KNOW HOW TO DO IT
- KNOW if the construction is stable or...”shacky”

WHY COULD ONE SAY THAT THE EUROPEAN DREDGING INDUSTRY IS PREPARED FOR THE NEW COASTAL CHALLENGES?

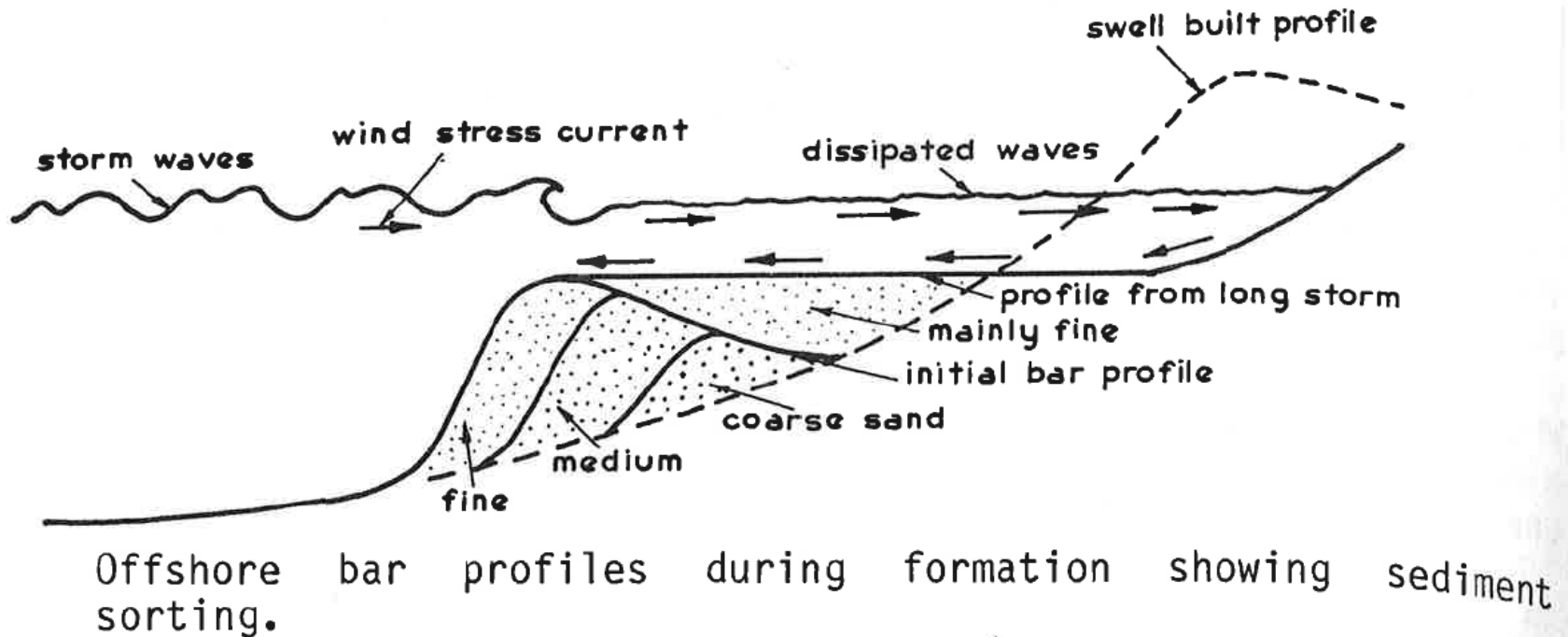
There are 5 triggers for this:

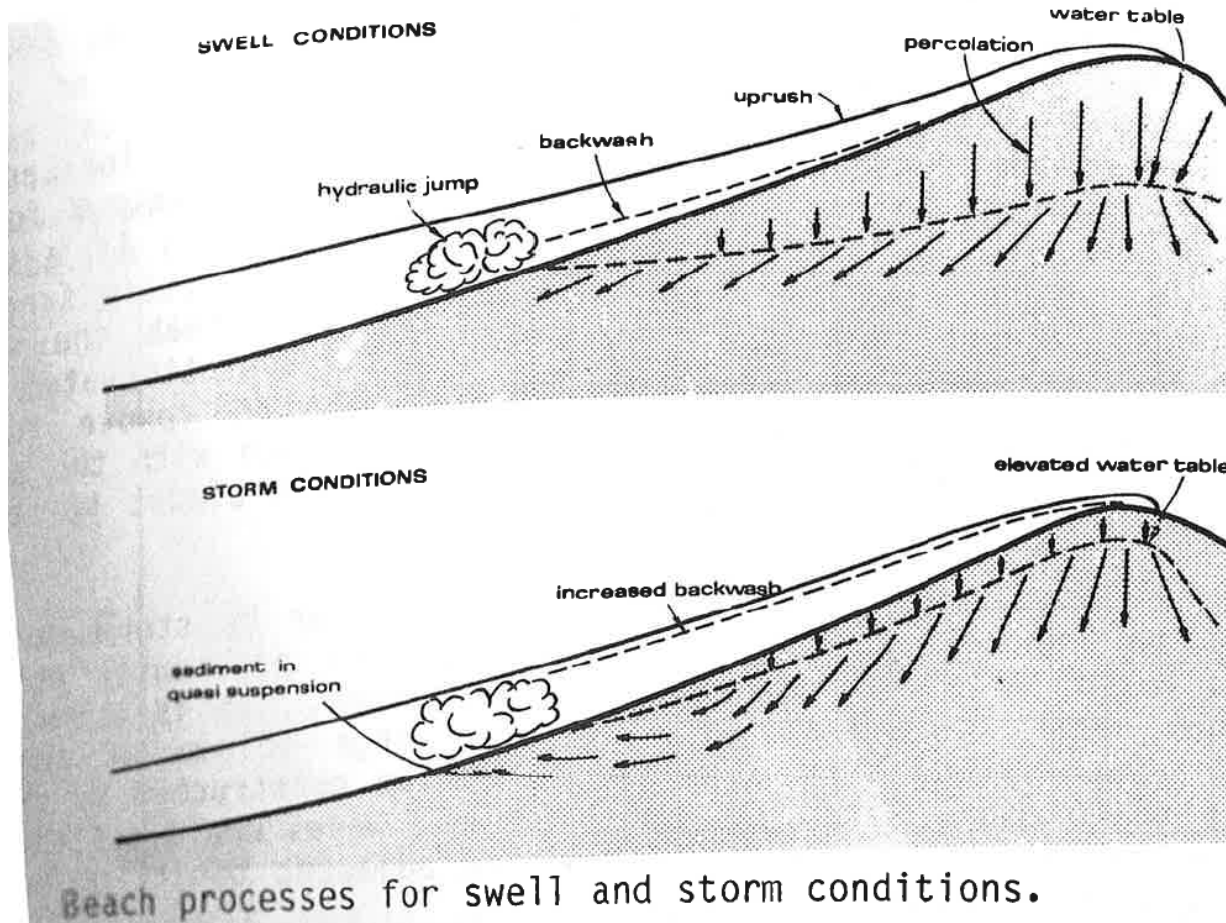
REASON 1	REASON 2	REASON 3	REASON 4	REASON 5
Much more Know how (thanks to Universities + Hydraulic Labs)	Much more European & International Exchanges Of Knowledge	All 4 big surviving Dredging companies are NOT dredging companies anymore	International Research and Internal Engineering THANKS TO LARGE PROJECTS in Holland and in Belgium	The growth Of the Coastal “needs” in general = growing population in coastal area’s

The 5 Triggers

The First Trigger:

UNIVERSAL KNOW HOW and better understanding of the behaviour of the coastal structure and beaches





-Better understanding of the influence of wave-passage on the pore-pressure «in the sand »

-EXAMPLE!

-A lot of physical and mathematical modelling systems

-We understand what will happen.

➡ WHO DID A LOT OF RESEARCH ?

- U.S.A.
- NETHERLANDS: Delft + the « boost » by Delta-Plan and Maasvlakte (N° 1 & 2)
- BELGIUM : Borgerhout + the « boost » by Zeebrugge - project
- AUSTRALIA
- JAPAN

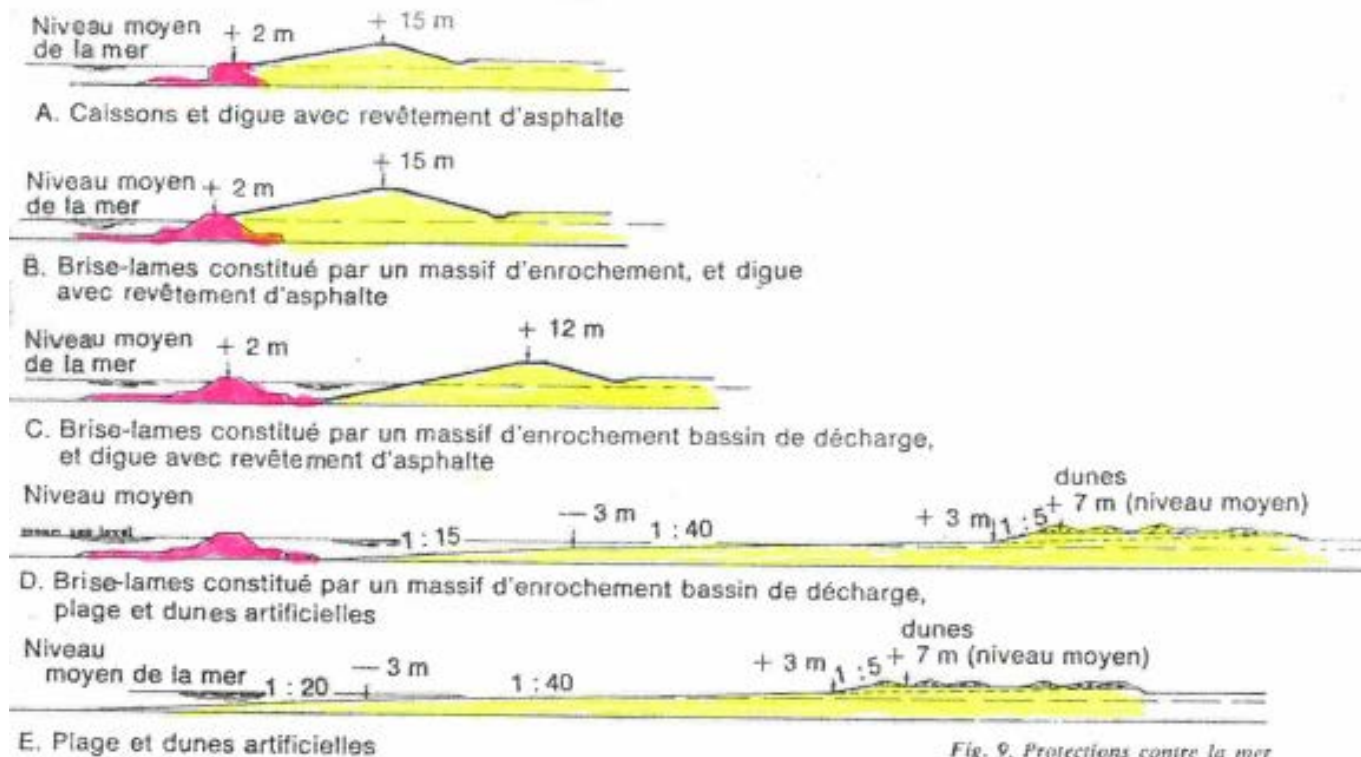
➡ A lot of studies along the Australian coast

➡ Some great names: Silvester, Svasek, Bijker

➡ Some « unfortunate » (unlucky) great names: Zwanborn and the sad Dolos-history.

SVASEK's BABY in the Eighties

The so-called « equivalent » systems of coastal protection



One of the most famous sketches by Mr. Svasek, when he was still working for the Rijkswaterstaat in Rotterdam

A famous Australian example of a phenomenon that has been predicted: AUSTRALIA

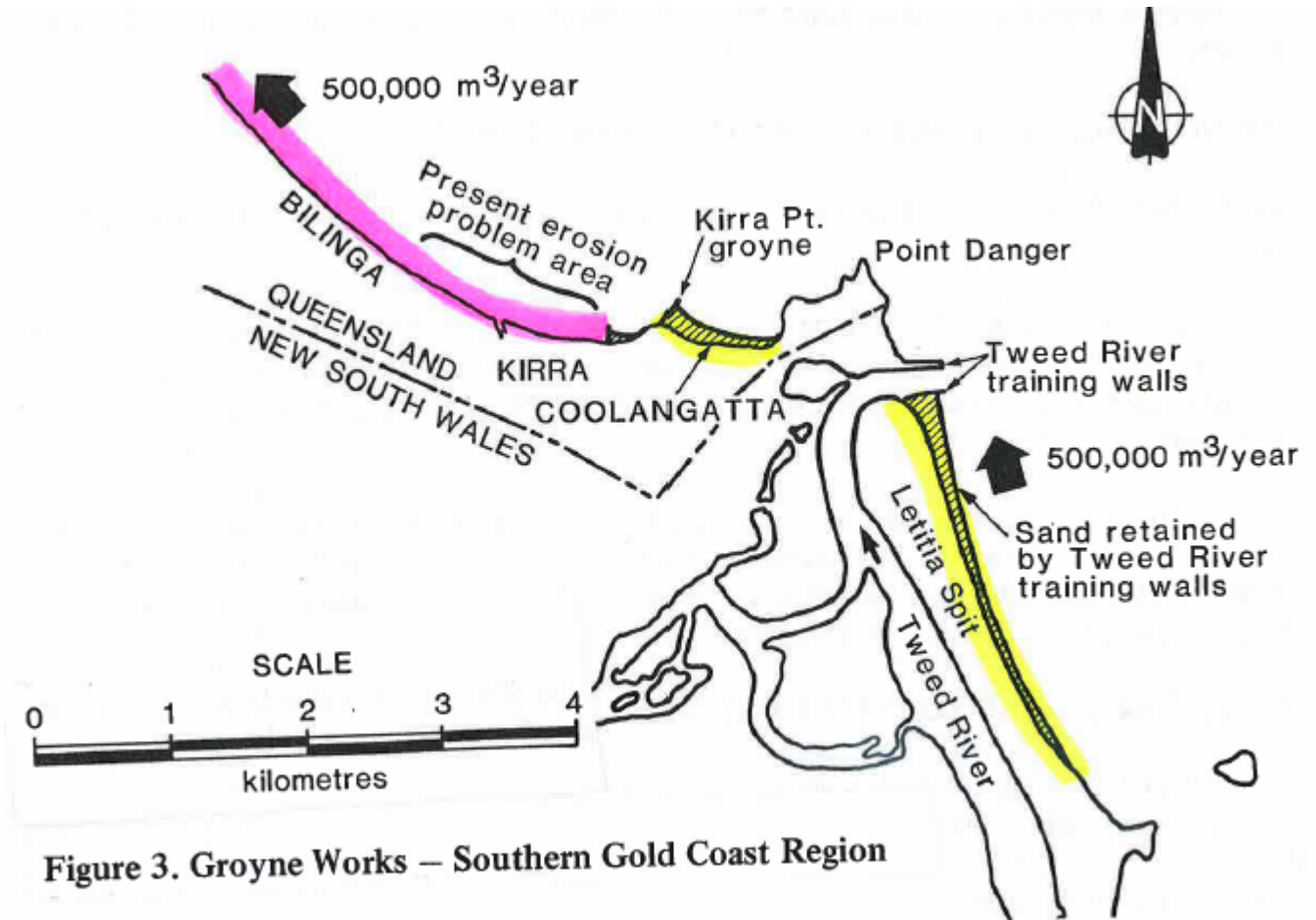
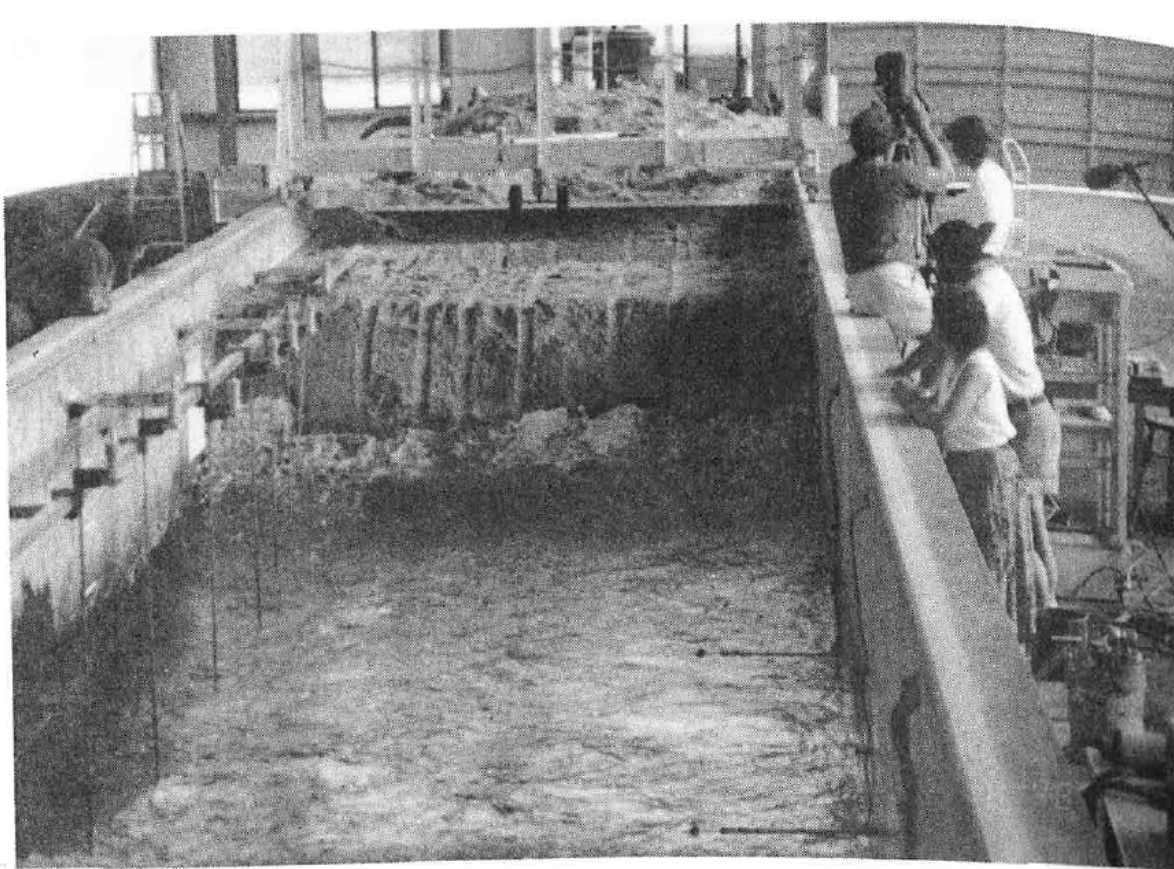


Figure 3. Groyne Works – Southern Gold Coast Region

Some other example of a growing understanding and capacity to predict the behaviour of coasts: « THE SUPERTANK » OF OREGON



106 meter Long

4,6 meter Deep

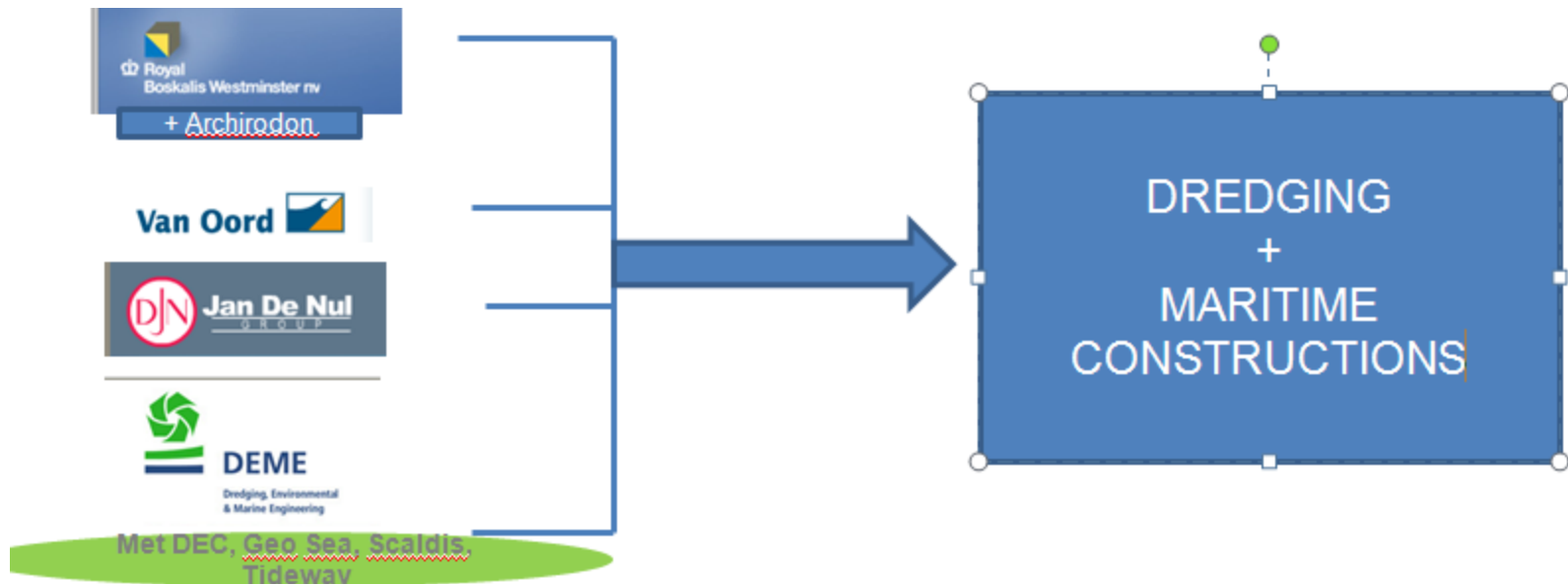
Capacitance bed surface and water surface gages on the foreshore

The SECOND TRIGGER

- ALL EUROPEAN and INTERNATIONAL exchanges of know how, mainly thanks to the
- COASTAL ENGINEERING CONFERENCES every 4 years (organised jointly by the American Society of Civil Engineers and the International Association for Hydraulic Research.
- European programmes, mentioned by all the previous speakers
- Corporation EUDA with the European Commission (ref. brochure EUDA at the entrance)

The THIRD TRIGGER

THERE IS NO LARGE « PURE » DREDGING COMPANY ANYMORE



AND, 13 other companies have disappeared
(The « mono -culture » has almost disappeared)

From Dredgers to Maritime Builders

PARADOX is as follows:

A succesfull big dredging company has a double focus

=

FOCUS on Technology of the dredgers

+ (“DREDGING PLUS”) : focus on other sciences !

FOCUS + GEEN FOCUS

combination of 2 kind of people inside the same company:

From Dredgers to Maritime Builders

Why did the large « mono-cultural » dredging companies disappear in the 80's and the 90's?

Why no more Blankevoort, Ballast Nedam, Berger Bilfinger Dredging, Zanen Verstoep, U.M.D. ?

WHY ?

- May be too much focused on mechanic (In Flemish we say « *vakidioten* » .) and not on hydraulic, geotechnic, environmental knowledge !
- May be too much dependant on the lack of balance between offer and demand?
- Not aware of the « reason or motivation » of a certain project: is it stable? Is it sensible? Is it ecological?

From Dredgers to Maritime Builders

“DREDGING PLUS” makes a company less dependant on the cyclus of “offer on demand”

- Ex. Van Oord-Groep survived in the eighties thanks to the merger with ACZ (stone dumping and maritime construction)
- Ex. U.M.D. had only one discipline and disappeared in the eighties, although it was, by far, the largest in France.
- Ex. S.G.D. was too monodisciplinair and could hardly export.
Moreover S.G.D. ‘s mother, CFE, urged them to do nothing else but dredging, and hydraulic engineering was not allowed by the “old CFE”
- Ex. De Nul was from the start of the company a building contractor and was not dependant on dredging alone. This shows a great vision by the family De Nul, as from the early fifties.

From Dredgers towards Maritime Builders

EVOLUTION of the turnover of dredging and maritime works in the world. (in million euro)

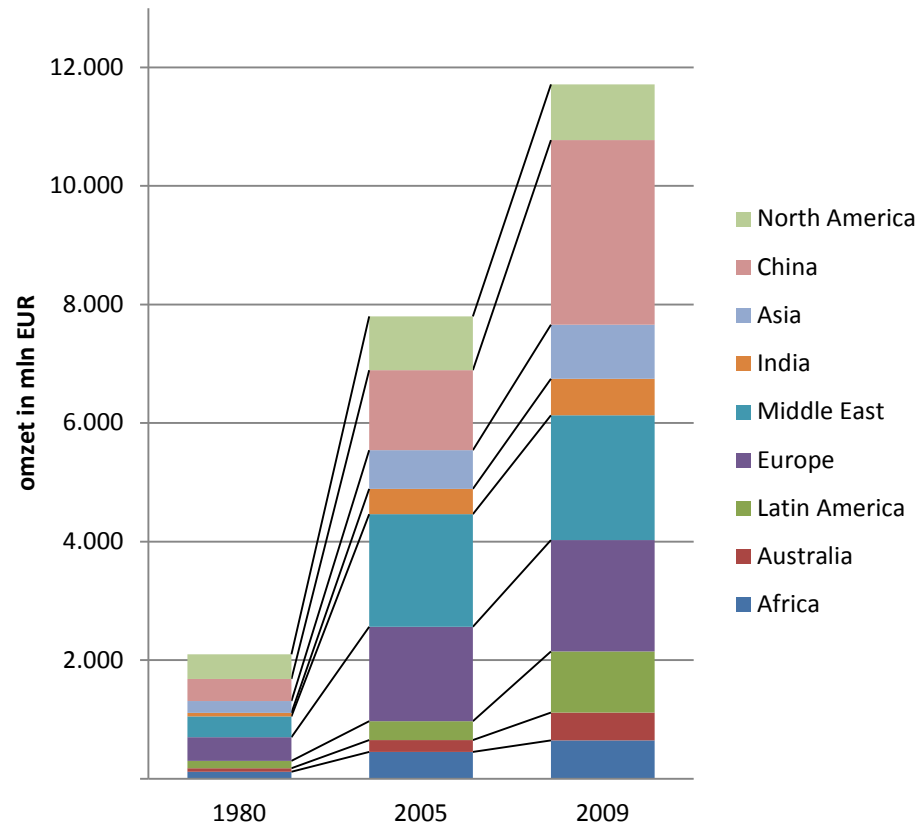
	1980	2005	2009
Africa	119	450	649
Australia	60	200	468
Latin America	121	320	1.030
Europe	401	1.595	1.881
Middle East	350	1.900	2.105
India	61	425	614
Asia	201	650	912
China	370	1.350	3.117
North America	417	910	934
total	2.100	7.800	11.710



11,7 Billion Euro

From Dredgers towards Maritime Builders

EVOLUTION of the turnover of dredging works in the world:



WHY are the European companies of dredging and maritime works so dominant in the world?

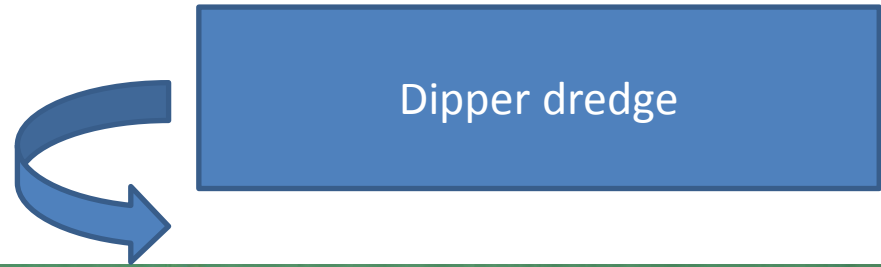
WHY 85% of the world market for Europeans ?

WHY not only « dredging » ?? 5 reasons:

- Complicated technology
- « too small » to excite and to motivate Koreans and Japanese
- USAventure capitalists! (Leadership by bean-counters)
..... closed, protected market
- Financial guidelines ruling the balance sheets of some large European civil groups: they have scrapped their port construction equipment in the nineties !
- Koreans and Japanese civil « sisters » too dominant towards their « in house » dredging departments.

WHAT IS DREDGING ? WHAT IS DREDGING PLUS ?

Examples of « pure » dredging



Some other examples of « pure dredging » activities »



Self propelled
Cutter Dredge



Trailing Suction Dredge



Bucket Dredge

Some Examples of DREDGING PLUS

- 1) The growth and the importance of the Internal Engineering Departments and Internal Research
- 2) Soil Cleaning business as a new business, with attention for contaminated silt and sludges
- 3) Environmental dredging : « SCOOP » dredger and others

From Dredgers towards Maritime Builders



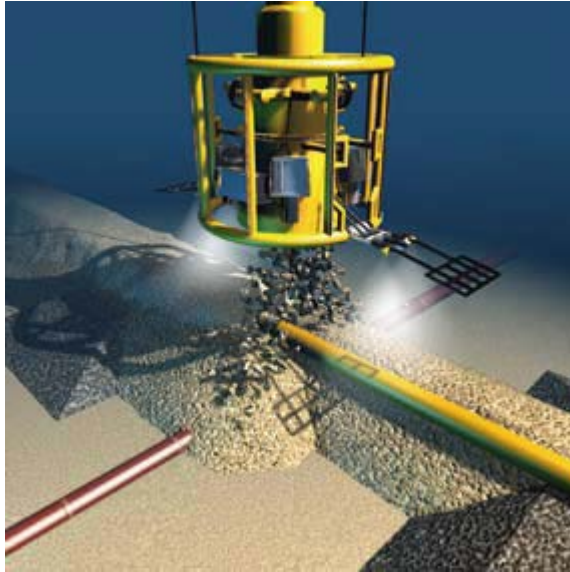
Examples of “Dredging Plus”

Geotechnical investigations from the many jack-up’s of (and prior to Geo Sea = Hydro Soil Services)



Wreckclearance is bundled in Belgium with the NV SCALDIS together with DEME, DE NUL and Herbosh Kiere

From Dredgers towards Maritime Builders



Examples of “Dredging Plus”



Fall-pipe techniques for the protection of pipelines up to 2000 meter deep.

From Dredgers towards Maritime Builders

Examples of "Dredging Plus"

Rockdumping with side unloaders
The N.V. POMPEI with DEME, De Nul,
Herbosch Kiere



From Dredgers towards Maritime Builders



Examples of "Dredging Plus"



Erection of windturbines on sea on top of foundations (Geo Sea)

From Dredgers towards Maritime Builders



Examples of “Dredging Plus”

Dikes, breakwaters, jetties
in rock



Building materials in the sea
(gravel and sand)

THE FOURTH TRIGGER

WHERE DID THE INTERNAL MULTI-DISCIPLINARY ENGINEERING DEPARTMENTS « **START** » ??

WHERE AND WHY ?

Thanks to the « cradle » of the large DUTCH and BELGIAN COASTAL PROJECTS:

- Delta works in the Netherlands
- Maasvlakte 1 and 2 in the Netherlands
- Port of Zeebrugge in Belgium

In Belgium, the new Port of Zeebrugge became the « BOOST » of the new multi-disciplinary wave of DEME and De Nul

NEW PORT of ZEEBRUGGE



Picture of the Maasvlakte 2

Compare the outerdike with Maasvlakte 1 !
Influence of the SVASEK – theory and modelling



THE FOURTH TRIGGER (continued)

INTERNAL ENGINEERING WITHIN THE MARITIME BUILDERS:

ZEEBRUGGE = THE BOOSTER

The Zeebrugge project was an « eye-opener », a revelation for the Belgian contractors. It brought a deep knowledge about coastal morphology and a boost to the development of internal engineering departments of the contractors who were involved since 1978.

« Employer (Ministry) + Consultant (HAECON) + CONTRACTORS » were working closely together !

THEY LEARNED A LOT FROM EACH OTHER !!

Why was this a learning curve for the dredging contractors ?

- The contractor learned about the requirements of the harbour exploitation and harbour concept
- The contractor learned about pilotage, nautical requirements, mooring etc
- The contractor was involved in the modelling in hydraulic labs (with regard to the influence of Waves, Tide, Wind)
- The Government learned about the modern building methods and feasibility of new maritime execution methods.
- The Consultant was not allowed to « dream ». The design must be realistic.

The FIFTH TRIGGER

THE GROWTH OF THE COASTAL NEEDS IN THE WORLD:

Port cities and other coastal areas are motors for economic activity and national prosperity. They are magnets for people to surrounding, often rural, regions who are seeking jobs and financial security. This puts pressure on these urban hubs for additional land – for housing, industry and recreation. If cities can't grow outward, they grow upwards resulting in more congestion in terms of industry, roads and demand for services.

This becomes a vicious circle. The more people these cities attract, the more economic growth. That again attracts more people. For governing authorities this self-perpetuating process is a challenge. Often natural geographic limitations – such as mountains, rivers, preserved tropical forests, deserts – prevent expansion into the hinterland. How to meet this challenge? How to create space to accommodate growing populations? Land reclamation – making new land in water – is one of the answers.

Addressing Population Growth

In 2005 the global population was 6 billion. The United Nations predicts that by 2050 it will grow to 10 billion ! A lot of people, indeed!

While vast areas of land are available in the interiors of many countries, they are under-utilised. Instead, the age-old rule applies. Land near water attracts people.

Even taking into account additional costs for elements like shore protection, soil improvement and site preparation, the all-inclusive costs of the majority of reclamation projects have remained below € 500 per square meter. Based on this, land reclamation is on average less expensive than using existing land.

SEAFRONT LAND PRICES PER SQUARE METER

Place	Range of land prices in €/m ² in
Monaco	25.000 – 35.000
Hong Kong	19.500 – 31.400
Singapore	4.600 – 6.200
Dubai	1.785 – 4.150
Tokyo	1.250 (average)
Rotterdam	485 - 625
Knokke Het Zoute (far from the beach)	6000
Knokke Het Zoute (top locations close to the beach)	9000
Reclaimed land	500

- Example :
- 1) Hong Kong: new airport (picture)
 - 2) Amsterdam : Yburg (Residential)
 - 3) SINGAPORE : how tropical forrest and woodland was saved by providing the extension on the sea

Hong Kong – New airport on the Sea



Yburg (Amsterdam) = New Residential area



Singapore

(Note how the tropical forest has been kept and « saved »).

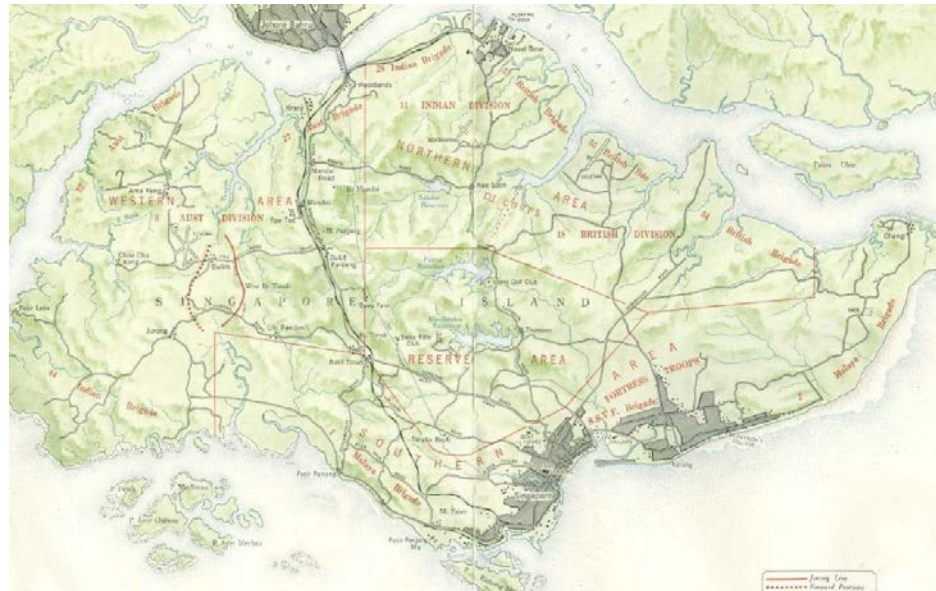
And how the expansion of the city did happen on the sea, rather than sacrificing the forest and the woodlands !)

A hand is shown from the bottom, holding a translucent green globe. The globe features a white grid of latitude and longitude lines and a faint world map. The background is a soft, light green gradient.

**Creating land for the future
without destroying our
natural habitats**

The Singapore Experience

SINGAPORE 1950



SINGAPORE 2012



New Land