



Composante 4

Sediment management plan for département of Hérault and the Golfe du Lion (south of France)



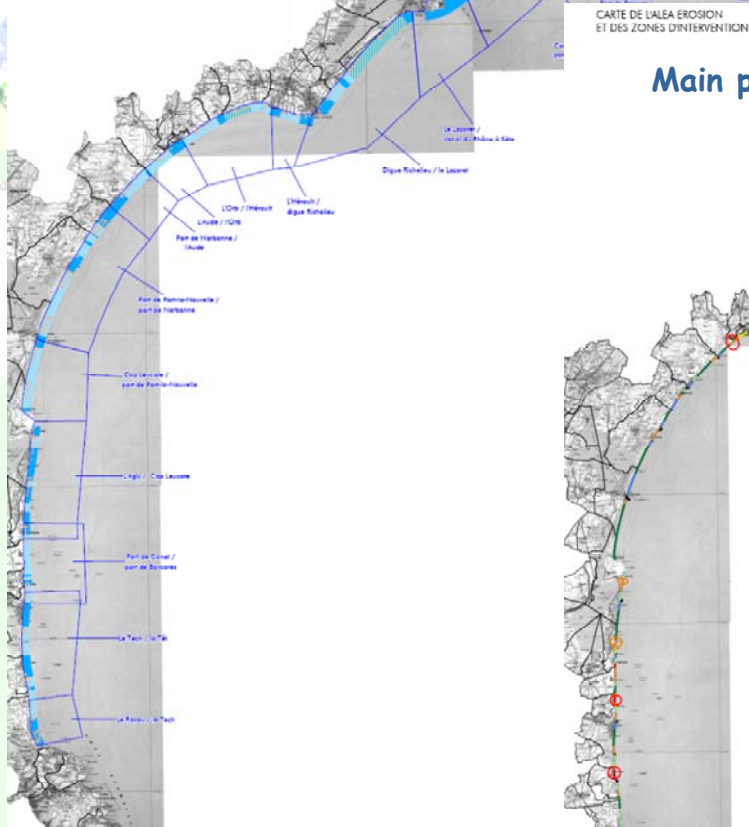
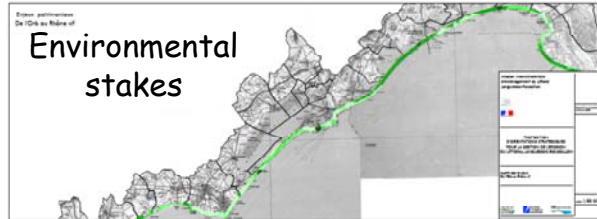
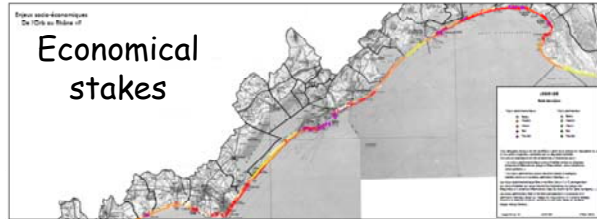


Sediment management background for South of France

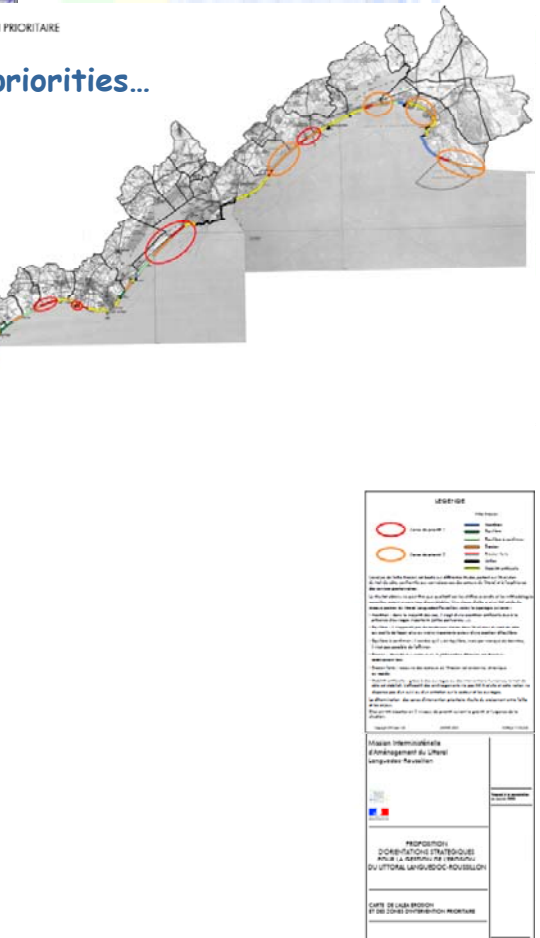


Thanks to French State initiative, we know since year 2005 :

Where and what general management to be applied (retreat / do nothing / restore natural functionment / resist...)



Main priorities...



Phase B : Definition of Sediment Management Plans elements



Sediment management plan definition : scale of action

Thanks to Coastance first steps we defined two main scales of institutional involvement:

Golfe du Lion : Need to have a structure to manage the global plan. It can be an existing structure whose competencies are to be increased or a specific one...

Sediment cell : local administration or association of administration are involved

The general structure proposed is :

Golfe du Lion Scale Coordination structure	Locales Scale Executive Structure
<p>Definition of the principal sediment management action plan (strategy, common principles, general organization) overall coordination</p> <p>Management and share of the common offshore sand resource</p> <p>Knowledge development, littoral and sand resources monitoring at the scale of Golfe du Lion, return of experiences linked with the littoral observatory</p> <p>Application of general communication and media action plan (including actions to make available the offshore sand resource)</p> <p>Monitoring of the management sediment action plan : reevaluation each 5 years</p>	<p>Contribution to the sediment management action plan</p> <p>Definition and execution of local actions with respect to common principles</p> <p>Local communication and dialogue</p> <p>Feed back on each action for the coordination structure and the littoral observatory, reporting</p>



Sediment management plan definition : scale of action



But 3 remaining major problems :

1/ It will take time and need energy to settle the Golfe de Lion sediment management plan and the coordination structure (3-5 years depending on general goodwill) ...

A transition phase is to be assumed by an existing institution :

- to enable the good conclusion of actual littoral works related to sediment management (offshore resource ecological studies - lobbying to change the juridic status of offshore sand resource)
- to enable the final coordination to be created and organise the dialogue between institutional actors

Conseil General de l'Hérault may be a good contributive actor for the next 3 to 5 years transition phase...





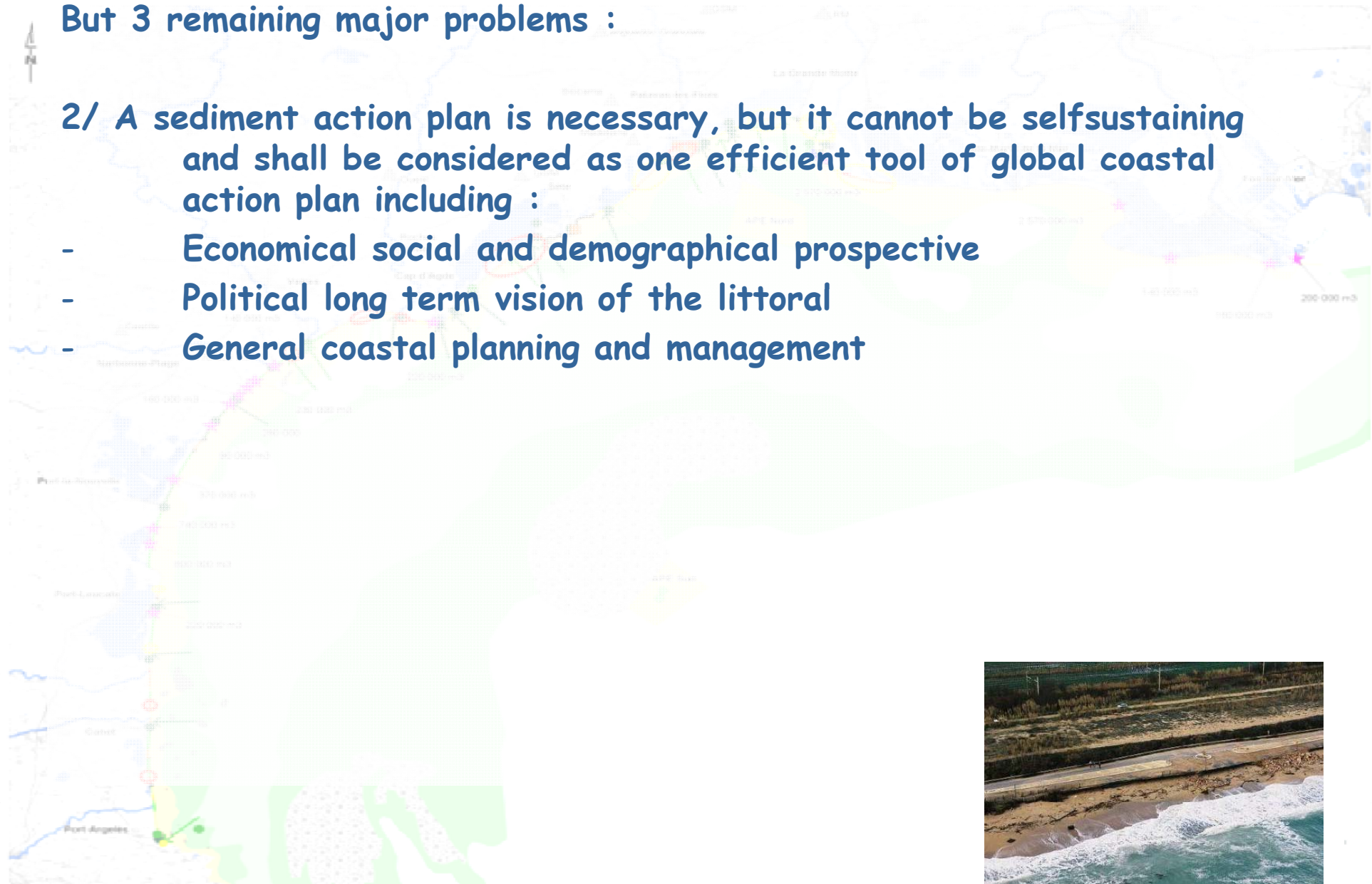
Sediment management plan definition : scale of action



But 3 remaining major problems :

2/ A sediment action plan is necessary, but it cannot be selfsustaining and shall be considered as one efficient tool of global coastal action plan including :

- Economical social and demographical prospective
- Political long term vision of the littoral
- General coastal planning and management





POSITIONING OF THE SEDIMENTS MANAGEMENT PLAN



The doctrine for CG34 to be extended to Golfe du Lion (1/2)

In the long term, an approach which favours strategic withdrawal coupled with restoring the natural transport of sediments is the only durable solution that can be envisaged. As of now, this is the goal we need to strive for, even if it is true that it will not be achieved for several decades.

As a transitional initiative, until these approaches are put into action, it is necessary to ensure that the economic activity linked to beaches is maintained via the 'soft' management of sediments; beach nourishment and reinforcement and protection of dune systems.





POSITIONING OF THE SEDIMENTS MANAGEMENT PLAN



The doctrine (2/2)

The transitional phase concerning the management of erosion via soft methods can only be envisaged as part of a well thought-out and structured global process for the development of the coastline on the scale of the Gulf of Lion. The notion of sustainable financing of action taken is key to the success of the new coastal order.

During the transitional phase, the value of coastal socio-economic issues should not be increased. This would make strategic withdrawal even more difficult. Investments of this kind should therefore be stopped or completely depreciated when the plan for withdrawal is implemented.

Finally, the position and promotion of the environment and natural processes should be better integrated into the study and should be monetised in order to have a common interest with anthropogenic developments.



POSITIONING OF THE SEDIMENTS MANAGEMENT PLAN



Positioning of the sediment management plan

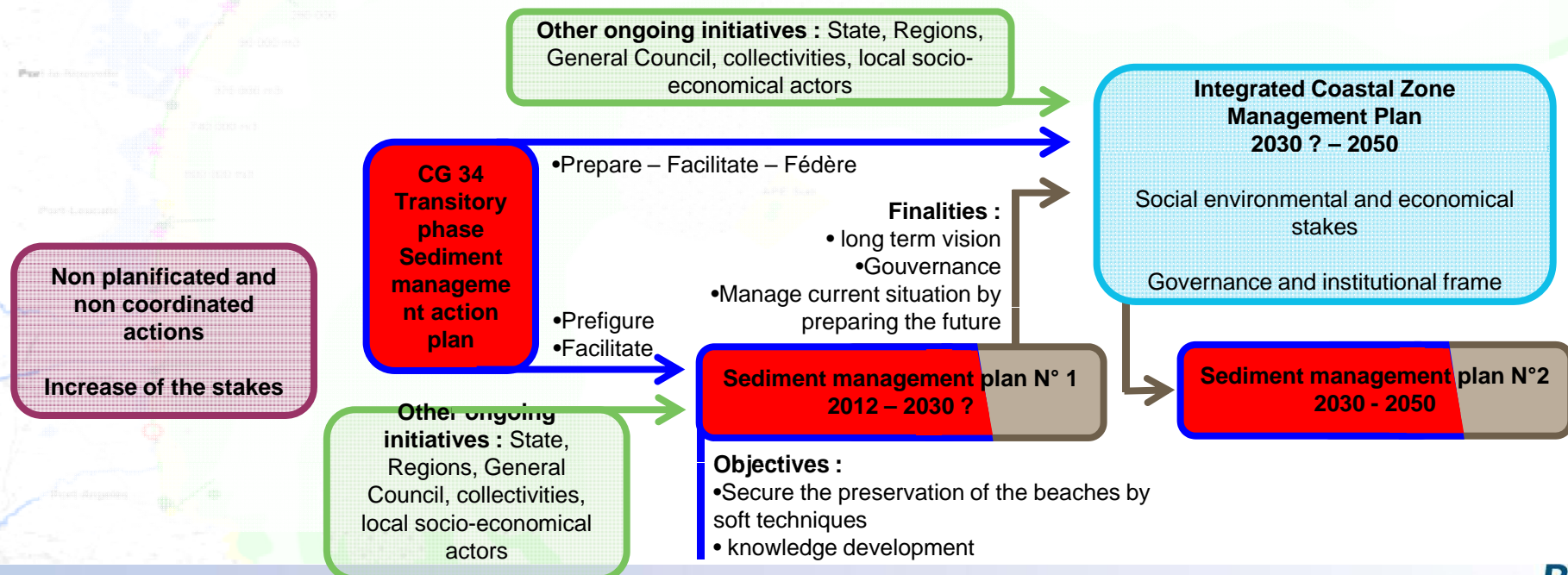
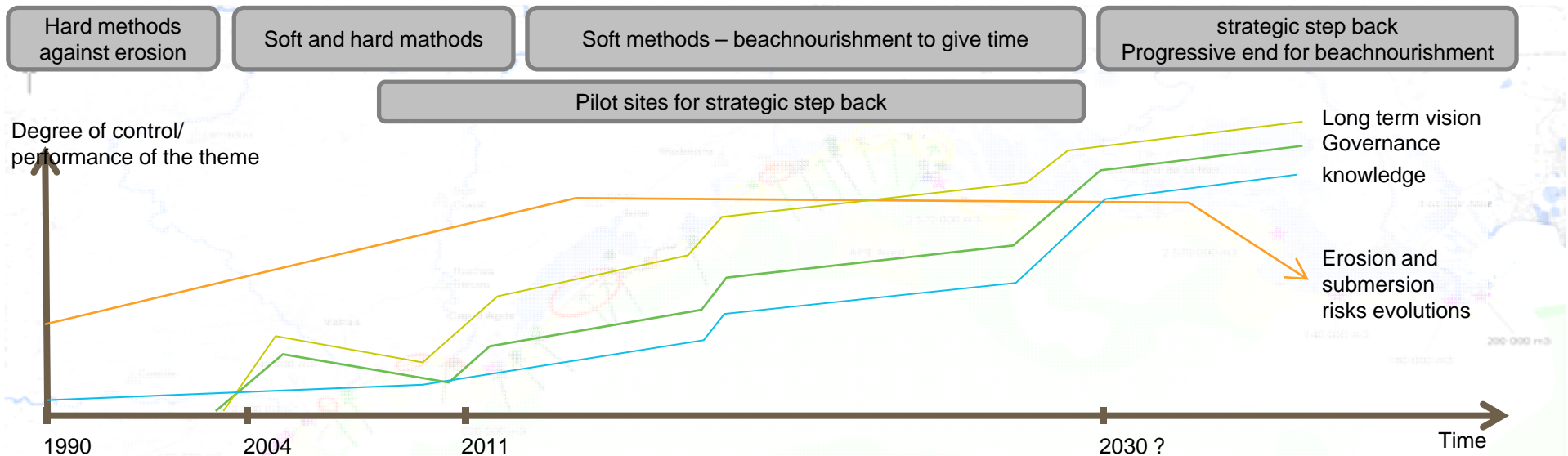
The sediments management plan should be viewed as a technical tool designed to aid coastal development.

Coastal development itself will only be able to feel the benefits of a global strategy after several years. This strategy should allow for the development of a complete diagnosis of the coast, should take into account a number of issues and constraints, like the rising sea level, and should carry out a complex prospective exercise that will lead to the creation of a plan of action with multiple phases. One of these will no doubt be a new sediments management plan.

Between now and then, it has been suggested that developments be made without waiting for an initial sediments management plan, in accordance with the methodology proposed in the Coastance phase 2 report.



POSITIONING OF THE SEDIMENTS MANAGEMENT PLAN



Phase B : Definition of Sediment Management Plans elements





Département de l'Herault Action plan for the development of the sediment management plan of the Golfe du Lion



Global objective

- x To launch the development of the sediments management plan in the Gulf of Lion in collaboration with all of the actors concerned, under the guidance of the State.

Specific objective

- x To facilitate the launch of the development of a joint management plan under the guidance of the State.

Expected results (operational objectives)

- x A network of actors, including the State, is created, working on a project which aims to form a sediments management plan in the Gulf of Lion;
- x The main sediment sites identified are made accessible; global systems for the conservation of sediments are implemented;
- x Those actions which can be carried out without deadlines will be, foreshadowing the future management plan;
- x The value of the assets subject to risks of erosion will not have increased (risk therefore not increased)



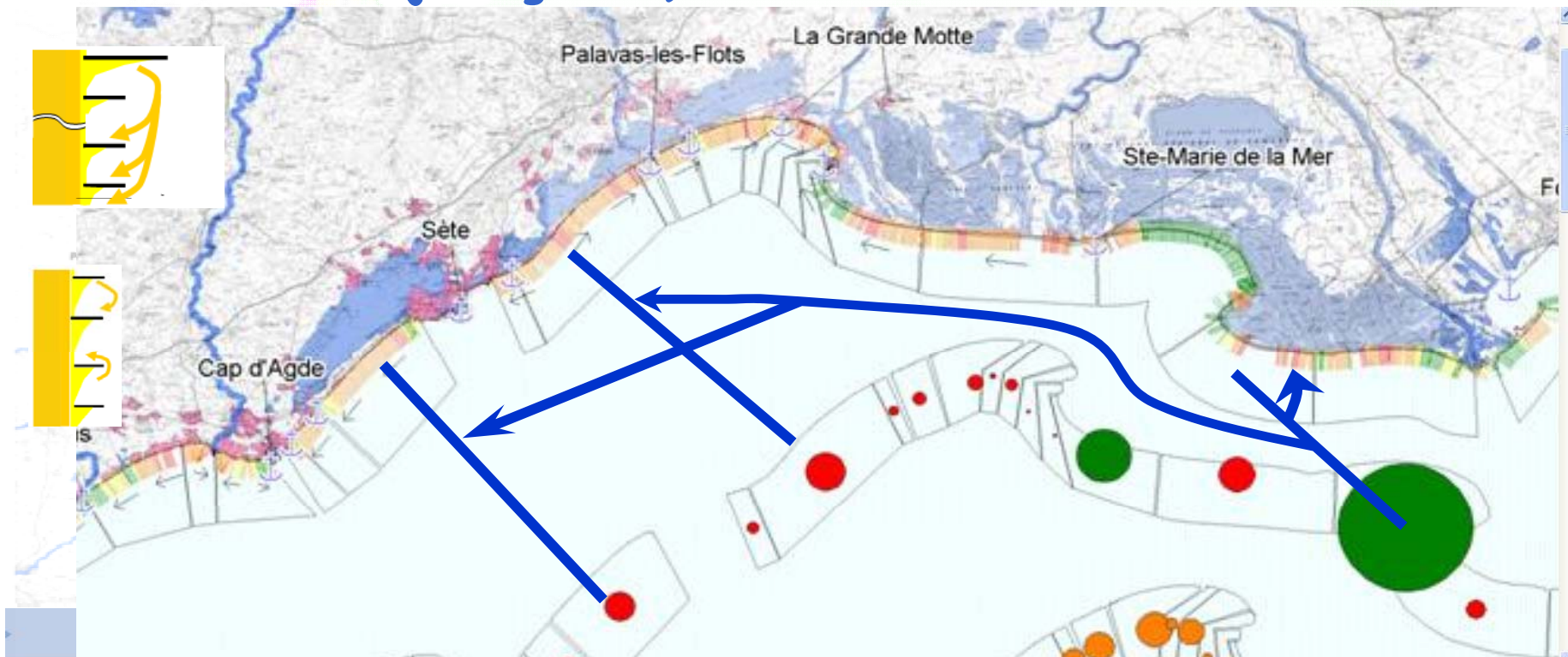


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1) Action carried out in the field foreshadowing the management plan:

- Completion and evaluation of current operations and achievement of overall capitalisation on these;
- Carrying out local action which can be undertaken in the short term with no major legal constraints or availability problems in terms of sediments (intracellular and intercellular transfers between adjoining cells);





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2) Communication:

- o Raising awareness among contracting authorities concerning the grouping of orders;
- o Communication associated with the work to be carried out (targets: local elected representatives, the general public, socio-professionals);



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o Political communication :

- # Contributing to preparing the creation of a structure which would be in charge of developing the management plan and then coordinating its implementation and requesting collectively the involvement of the State;
- # Lobbying in favour of the legal accessibility of the sediment resources identified: Beachmed Sud and the intercellular transfer of sediments between non-adjoining cells;
- # Lobbying in favour of an integrated study into long-term investments in coastal zones that lead to an increase in the value of socio-economic issues and could therefore potentially have negative effects on strategic withdrawal.



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3) Further action to be taken in preparation for the sediments management plan:

- Creation of a network of actors ;
- Research of durable financial solutions for operations in the field;
- Acting in advance in order to encourage the conservation of backfill and carries resources:
- By setting up a regional aggregate market (sale of excavated material and backfill) and by putting in place constraints regarding re-use by construction companies ;
- By reserving land for storing backfill and by putting in place a suitable legal framework.
- By reserving nearshore zones for future offshore dredged material along coastal zone. These nearby new sand resources could be used with small to medium dredges at low price
- By Implementing of analytical cost accounting of the economy linked to beaches
- By financing studies to evaluate le price of environment



Initial state of data

Budget / Planning: Under construction...

Phase B : Definition of Sediment Management Plans elements



PROPOSITIONS FOR THE SEDIMENTS MANAGEMENT PLAN OF THE GULF OF LION



Global objectives

- x To contribute to maintaining coastal socio-economic activity;
- x To contribute to developing a long-term coastal vision;
- x To contribute to preparing in the field the future strategic withdrawal on a large scale and the revival of the natural transportation of sediments (or, at least, not to complicate it by contributing to increasing the risks of erosion/flooding by increasing the value of the threatened assets);
- x To contribute to preparing the global coastal management plan on an institutional level (governance structure and Coastal observatory).

Specific objective

- x While awaiting strategic withdrawal and the revival of the natural transportation of sediments, to ensure that the coast's beaches are maintained using soft techniques (without increasing risks) and to contribute to raising awareness.





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Expected results (operational objectives)

- x The condition of the beaches is maintained via soft techniques
- x The existing work underway in terms of coastal protection is maintained and the threats are decreased
- x Awareness is raised and knowledge is made more accessible and is used in a better manner

Plan of action

- x Soft protective measures as of Beachmed Sud; beach nourishment and protection of dune belts;
- x Hard protective measures limited to a strict minimum; protective actions maintained when involving significant socio-economic risks.
- x Strategic withdrawal from the most easily-changeable issues;
- x Research and implementation of durable financial solutions for operations in the field;
- x Make easy cost benefits estimates (monetarisation of environment / analytic indicators for all regarding coastal activity)
- x Communication plan to accompany actions in the field and in favour of the future plan for the integrated management of the coast;
- x Set-up and management of a Coastal observatory.



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Evaluation of sediment resources and needs along poorly documented sandy coasts : the « COASTANCE coastal sand resources and needs evaluation method »

Methodology used for rough evaluation of coastal sand resources and needs with simple GIS tool

Shore line characteristics are generally being deduced from :

- Aerial photographs analysis for shore line or dune positioning ;
- In situ direct measurement of geomorphological indicators (GPS, LIDAR,...) ;

It is then possible to digitaly localize :

- Shore line,
- Limit of active beach (position of 1st vegetation,...)
- Dune foot
- First vulnerable elements (road, house,...)
- ...

For many historical positions





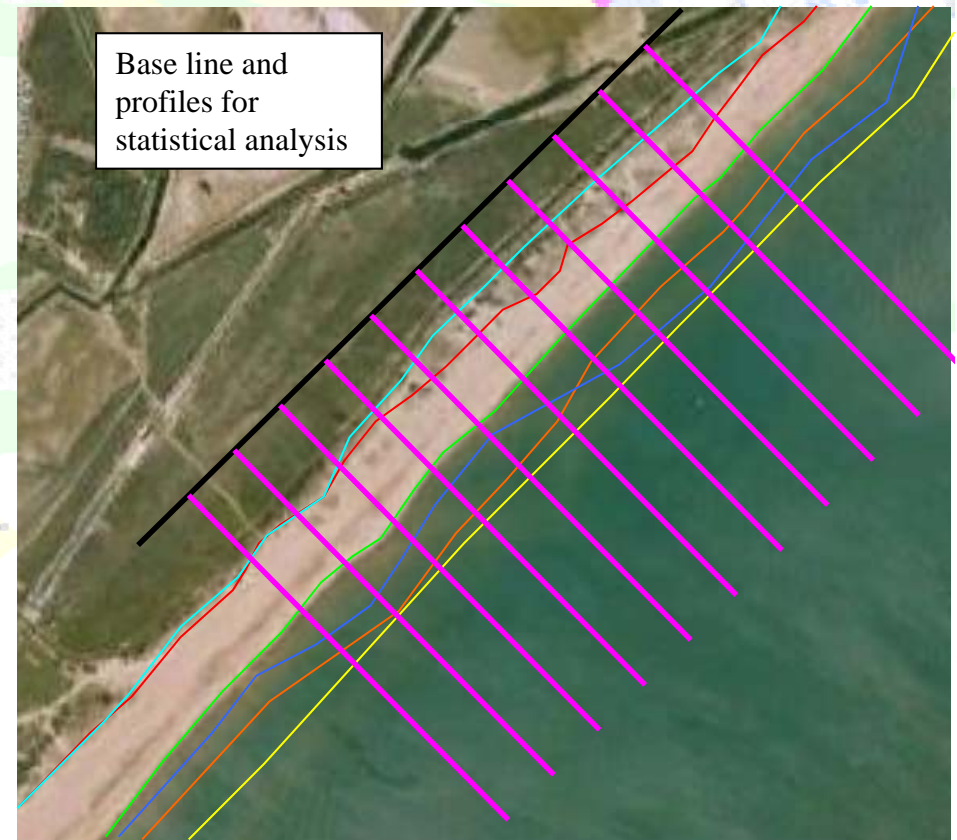
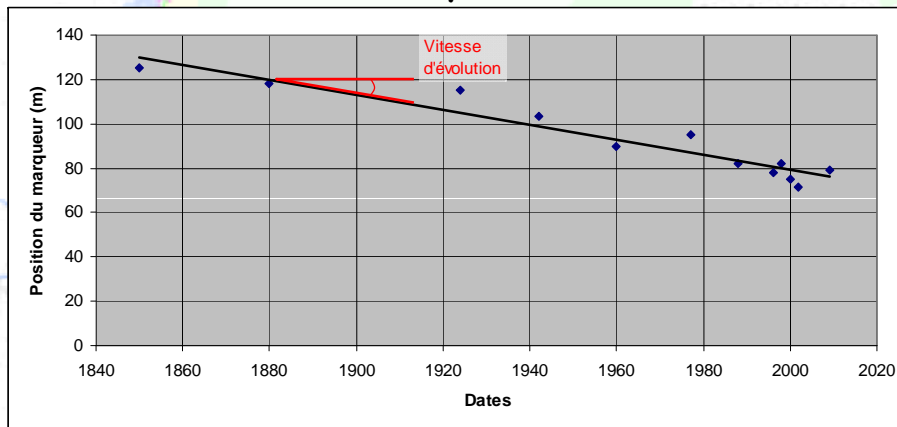
« COASTANCE coastal sand resources and needs evaluation method »

A simple USACE freeware ArcGis extension is used for distance analysis between coastal markers (Digital Shoreline Analysis System)

Calculation of distances between typical shore geomorphological markers :

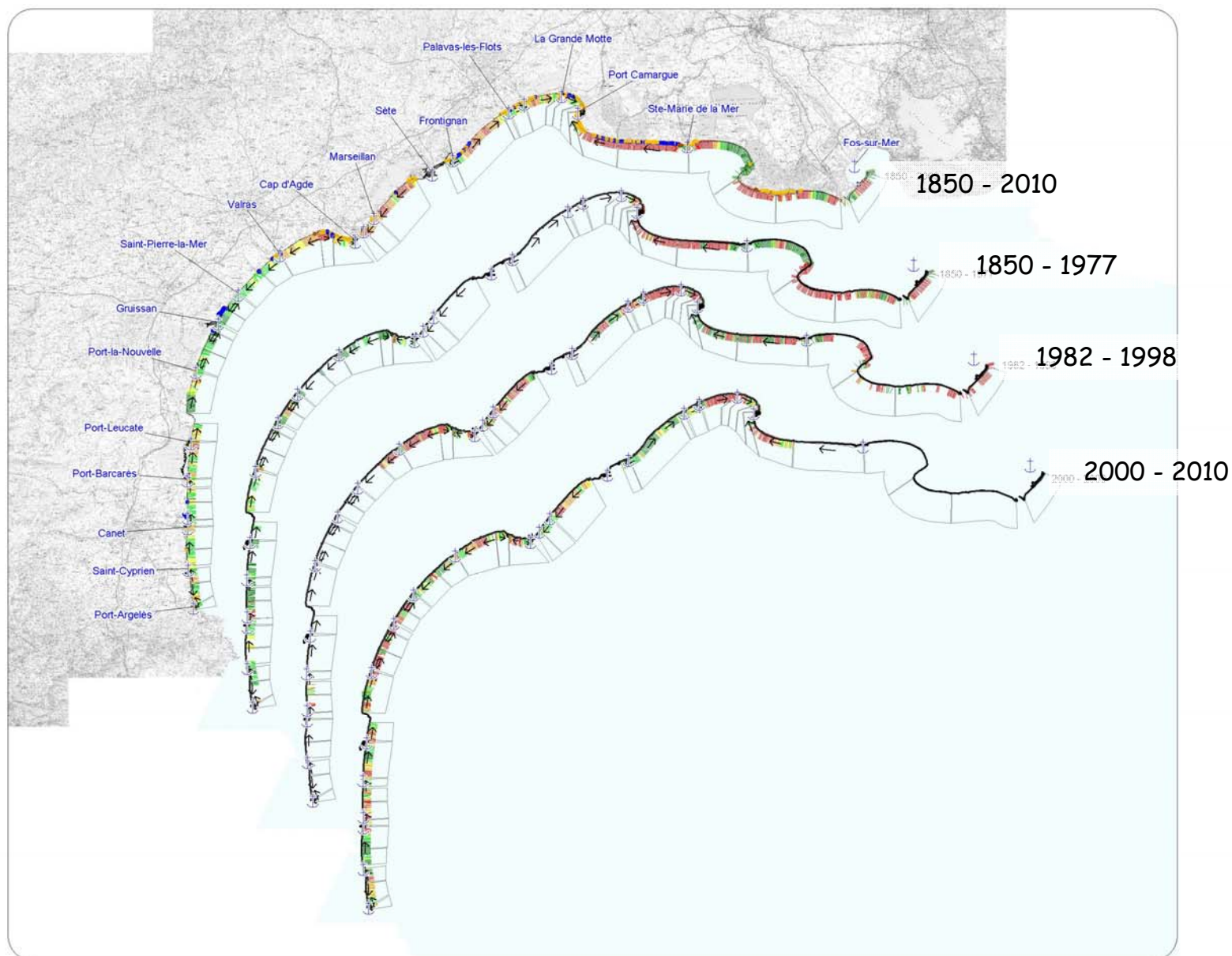
- Shore line / dune location / active beach limit / first vulnerable element / ...

Automatic calculation of historical évolution of a marker with linear regression (for exemple shore line retreat caused by erosion)





Evolution des littoraux du Golfe du Lion depuis 1850



Source : Beachmed
DREAL LR
BRL





« COASTANCE coastal sand resources and needs evaluation method »

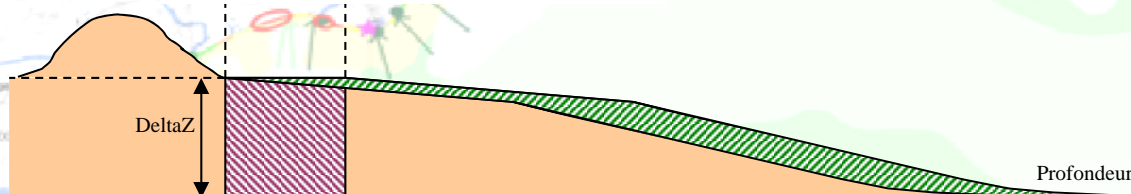
A problem : to transform shoreline marker analysis into sand volume estimation

A simple solution : the shifting equivalence principle

Shore line position evolution

Méthode de calcul n°1 : V1

Méthode de calcul n°2 : V2



Profondeur c

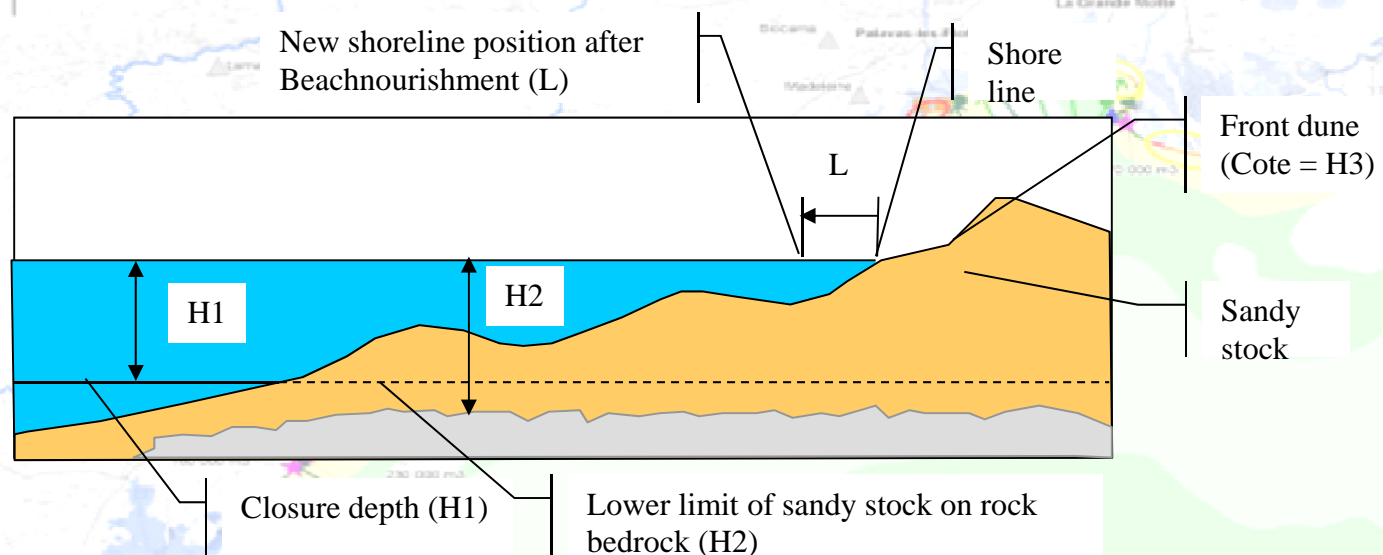
Closure depth

Volume V1 and V2 are equals...

Even with geomorphological complex sandy littoral, without needs for modelisation

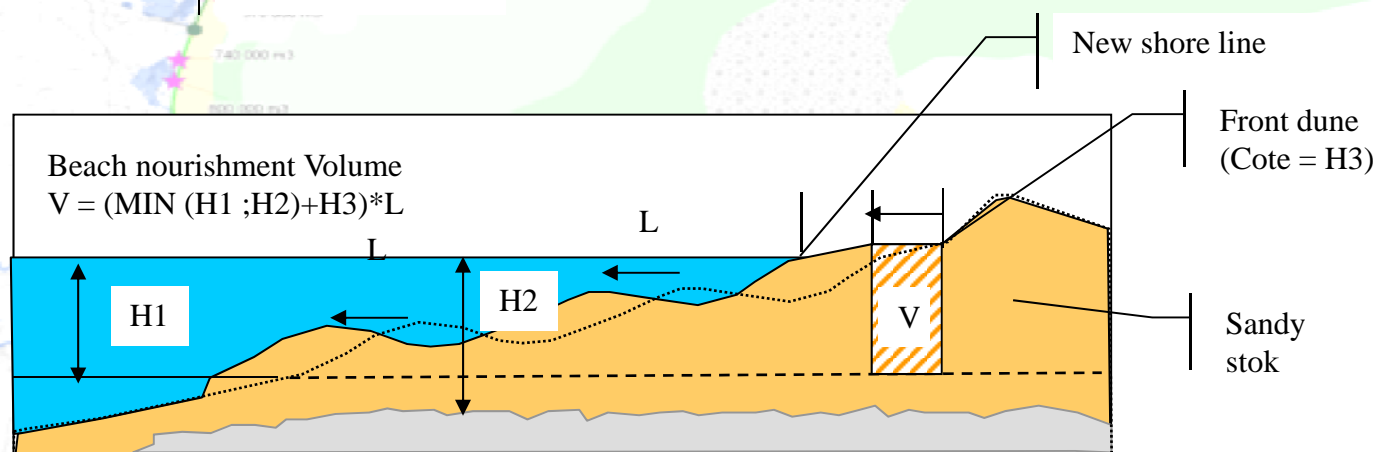


« COASTANCE coastal sand resources and needs evaluation method »



Potential errors of the method :
Uncertainty on real closure depth value or position of beach rock

Strong interest for the analysis to be confronted to LIDAR survey...





« COASTANCE coastal sand resources and needs evaluation method »

The problem : to define an « stable / non perturbed / natural » length of ideal beach to compare it with existing beach...

This « stable » beach is normally conditioned by :

1. Local hydrodynamics action ;
2. Local wind action ;
3. Beach characteristics (granulometry / slope,...) ;

So in order to define the sediment needs, it is necessary to fix for each sediment cell the minimum stable beach length to recover a « natural behaviour of the sandy system.

For each sediment cell of Golfe du Lion, a rough estimation was done with the following assumption :

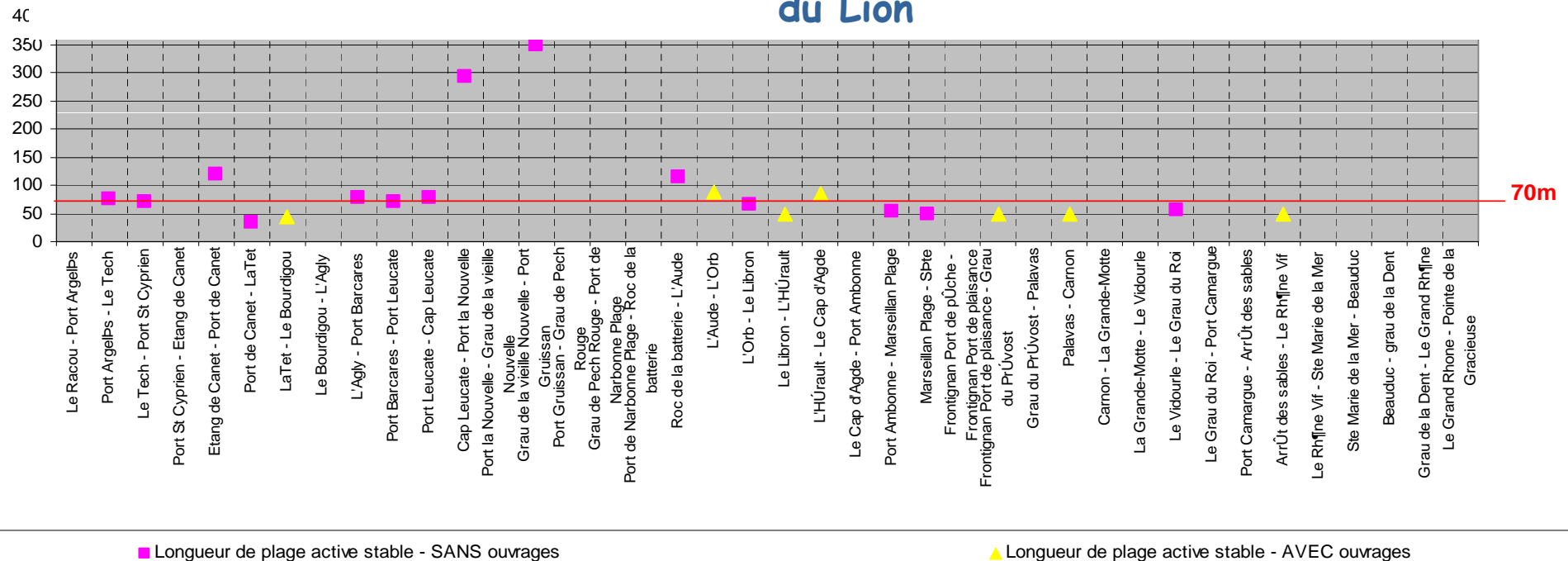
A beach profile was supposed stable if :

1. The erosion during 2000-2010 period was comprised :-
0,5 m/year et +0,5 m/year.
2. If these profiles are not protected by hard defences



« COASTANCE coastal sand ressources and needs evaluation method »

Natural stable beach length definition for each sedimentary cell of the Golfe du Lion



- x Mean stable beach length is 60 m if not protected by hard defense
- x Mean stable beach length is 60 m if protected by hard defense
- x Calculations for 60 m / 70 m / 80 m to determine beach nourishment necessary volumes to restaure natural behaviour for each sedimentary cell along all littoral

Phase B : Definition of Sediment Management Plans elements



« COASTANCE coastal sand resources and needs evaluation method »

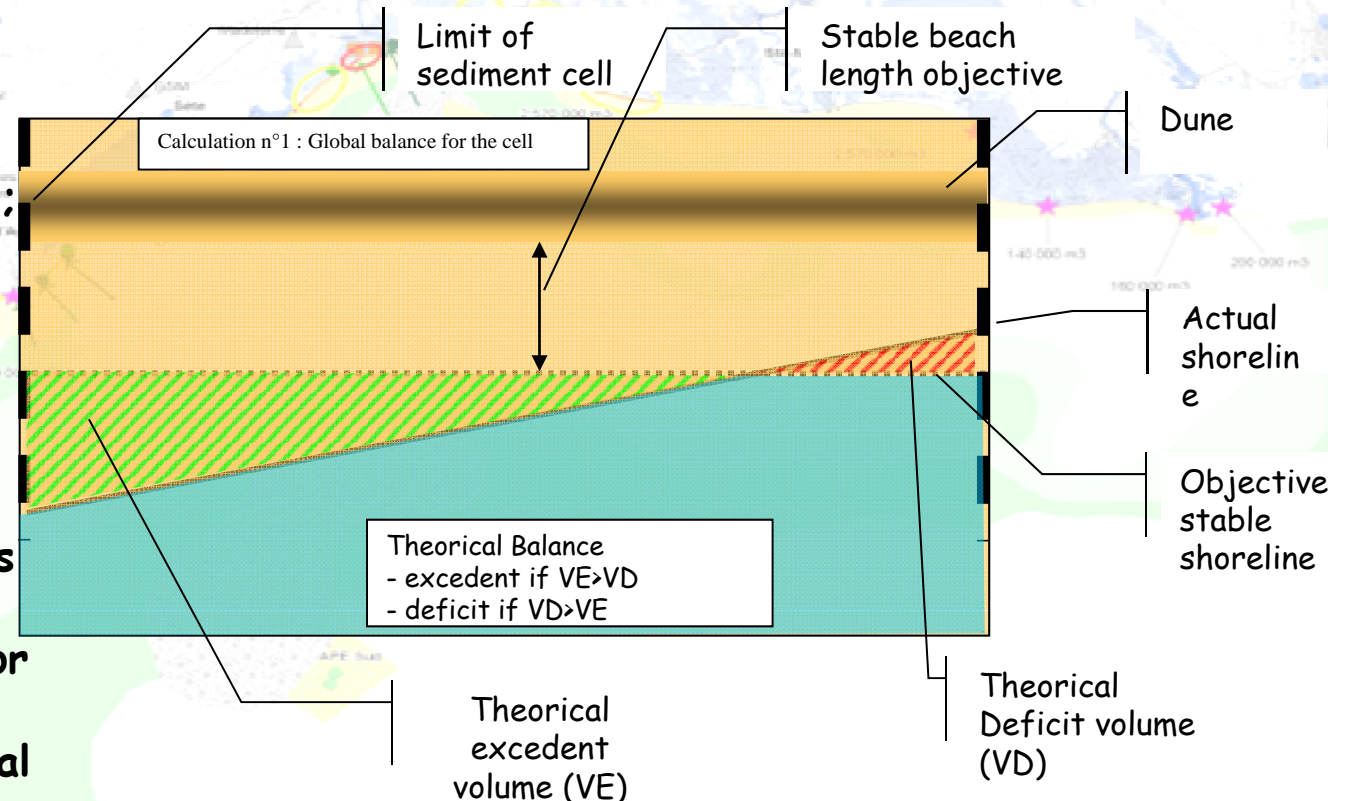
Calculation n°1 : Global balance of the sedimentary cell...

Needs for analysis :

- Actual shore line position (here 2010)
- Stable beach length definition (here 70 m) ;
- Active beach length for year 2010

On volumic approach, it is estimated for each sedimentary cell :

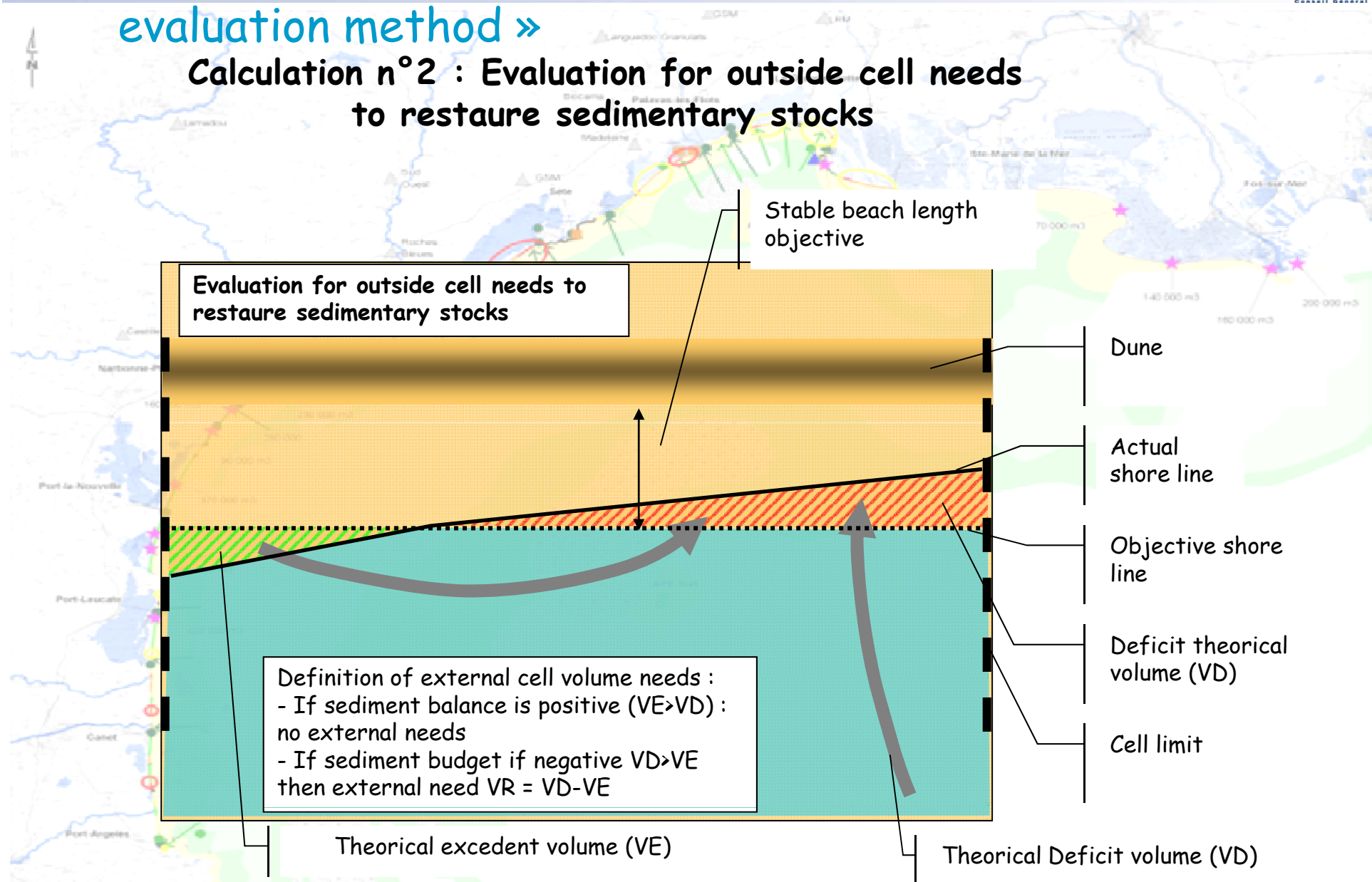
- If global sandy stock is large enough to reach stable beach length (for exemple 70 m).
- It is defined a theoretical excedent or theoretical need for the global cell.





« COASTANCE coastal sand ressources and needs evaluation method »

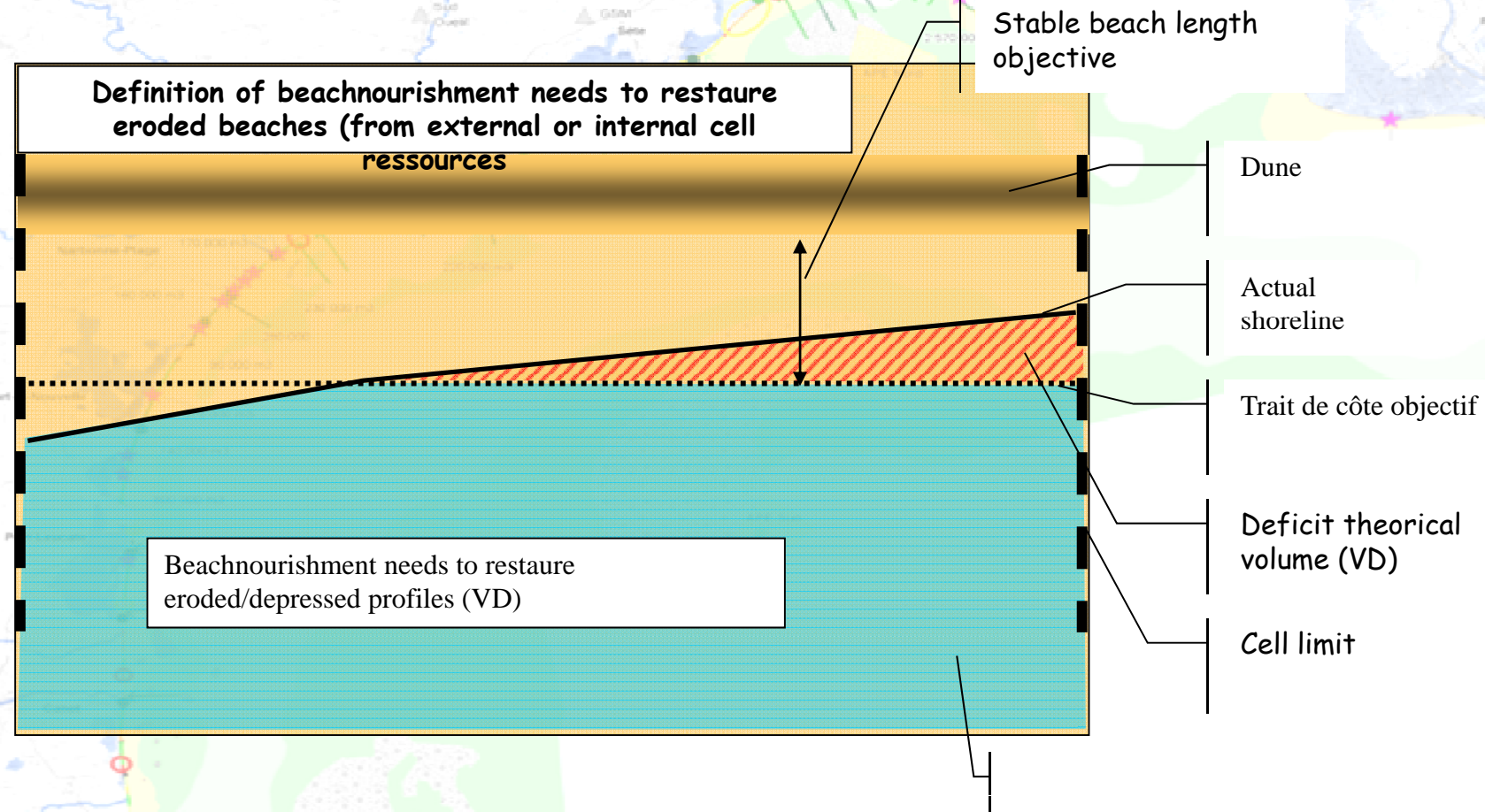
Calculation n°2 : Evaluation for outside cell needs to restaure sedimentary stocks





« COASTANCE coastal sand resources and needs evaluation method »

Calculation n°3 : Definition of beachnourishment needs to restaure eroded beaches (from external or internal cell ressources)





Sediment management plan definition : scale of action

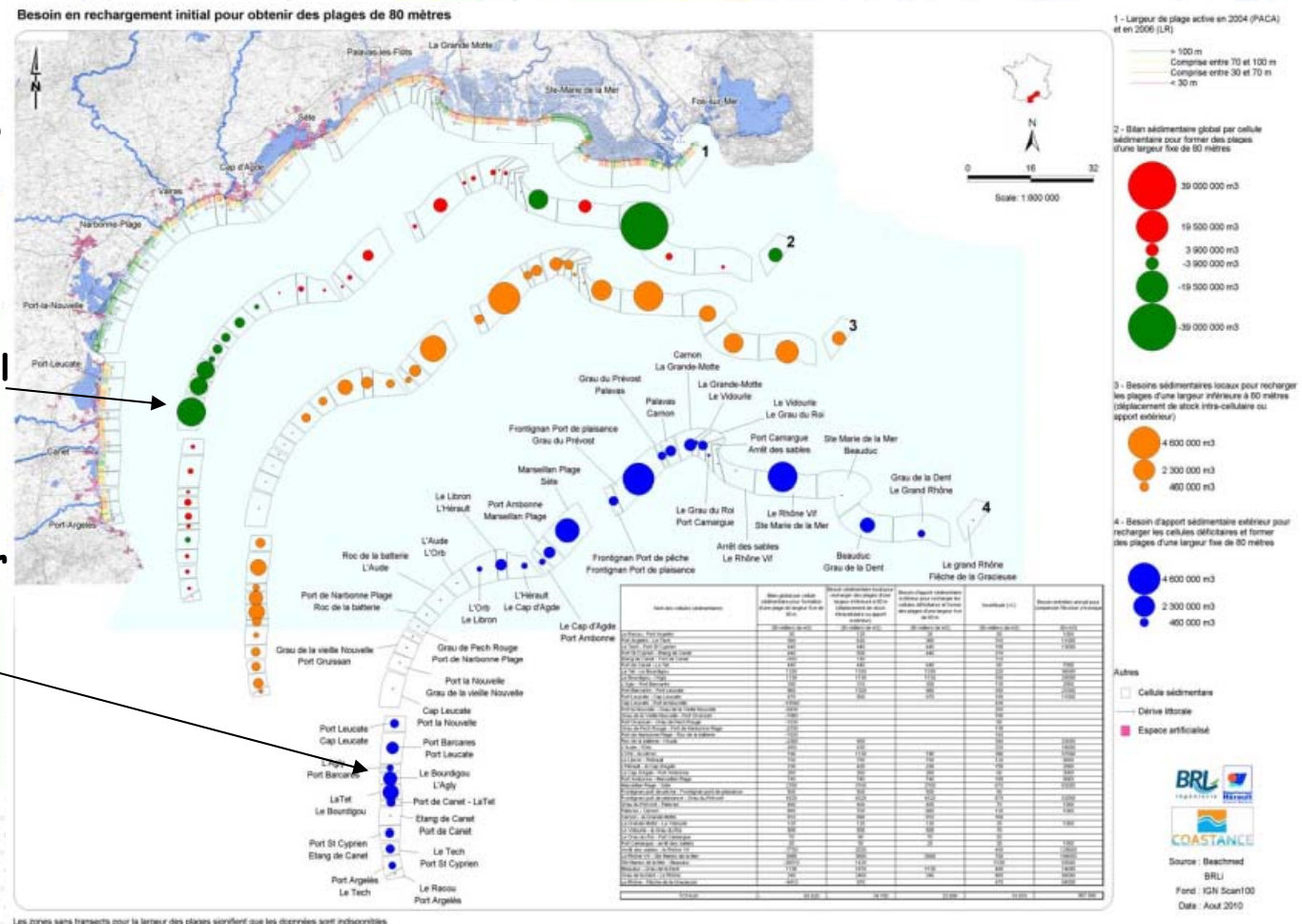
First of all : define the right scale of action based on a scientific quantitative approach :

- Sediment cell ----→ Coastance quick approach
- Global scale ----→ Coastance quick approach

A Coastance result for south of France : sediment budget for each sediment cell :

Each green point represent sediment cell with an extra sand resource

Each blue point represent the need for sand resources from outside the sediment cell





Sediment management plan definition : scale of action



Quantification of annual loss of sediment due to erosion for prospective vision

Besoins théoriques en rechargement annuel d'entretien pour compenser l'érosion

Length of active beach :

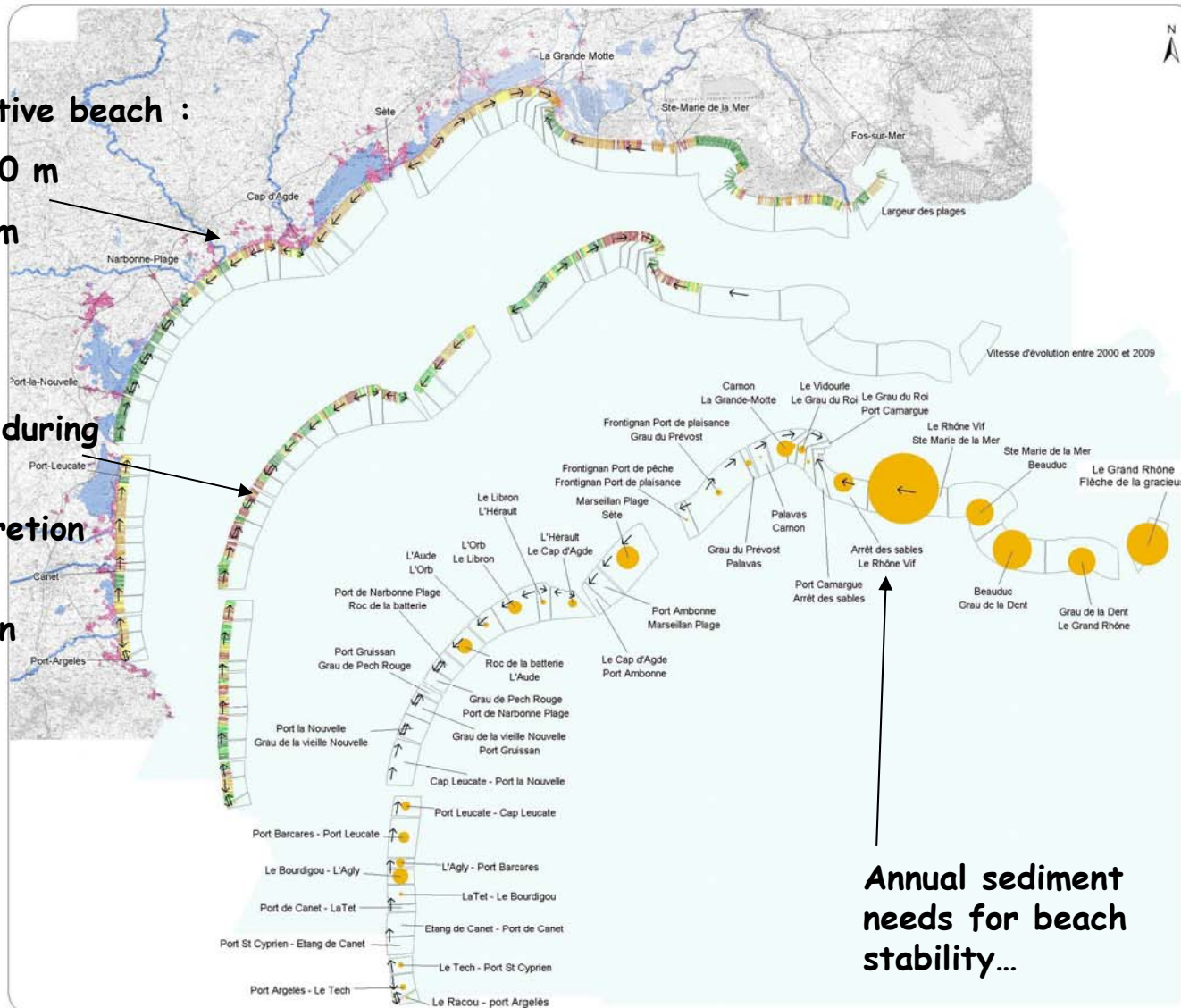
Green if >100 m

Red if < 30 m

Erosion rate during last decade :

Green if accretion >1m/year

Red if erosion >1m/year





Sediment management plan definition : scale of action



30 years cost estimate

Nom des cellules sédimentaires	Priorité selon MIAL 2005	Besoin sédimentaire local pour recharger des plages d'une largeur inférieure à 80 m (déplacement de stock intracellulaire ou apport extérieur)	Besoin d'apport sédimentaire extérieur pour recharger les cellules déficitaires et former des plages d'une largeur fixe de 80 m	Incertitude (+/-)	Besoin entretien annuel pour compenser l'érosion chronique	Estimation financière du montant de l'opération, y compris rechargements d'entretien, pour 30 ans (base 7€HT/m3)
		(En milliers de m3)	(En milliers de m3)	(En milliers)	(En m3)	(En k€HT)
Le Racou - Port Argelès	2	120	30	50	1000	1 050
Port St Cyprien - Etang de Canet	1	500	440	210	0	3 500
La Tet - Le Bourdigou	1	1330	1330	220	36000	16 870
Port Barcarès - Port Leucate	2	1320	860	350	21000	13 650
Port Leucate - Cap Leucate	2	560	470	180	11000	6 230
L'Aude - l'Orb	1	430		320	16000	6 370
L'Orb - le Libron	1	1130	190	390	57000	19 880
Le Libron - l'Hérault	1	750	750	120	9000	7 140
L'Hérault - le Cap d'Agde	1	420	230	150	2000	3 360
Marseillan Plage - Sète	1	3160	2760	670	63000	35 350
Frontignan port de plaisance - Grau du Prévost	1	4520	4520	670	52000	42 560
Carnon - la Grande Motte	2	890	810	180	0	6 230
Le Vidourle - le Grau du Roi	2	500	500	70	0	3 500
Arrêt des sables - le Rhône Vif	2	2020		450	129000	41 230
Le Rhône Vif - Ste Maries de la Mer	1	3890	3890	700	194000	67 970
TOTAL Besoins priorité 2	2	5 410	2 670	1 280	162 000	71 890
TOTAL besoins priorité 1	1	18 260	16 050	4 140	448 000	221 900
TOTAL priorités 1 & 2	1&2	23 670	18 720	5 420	610 000	293 790





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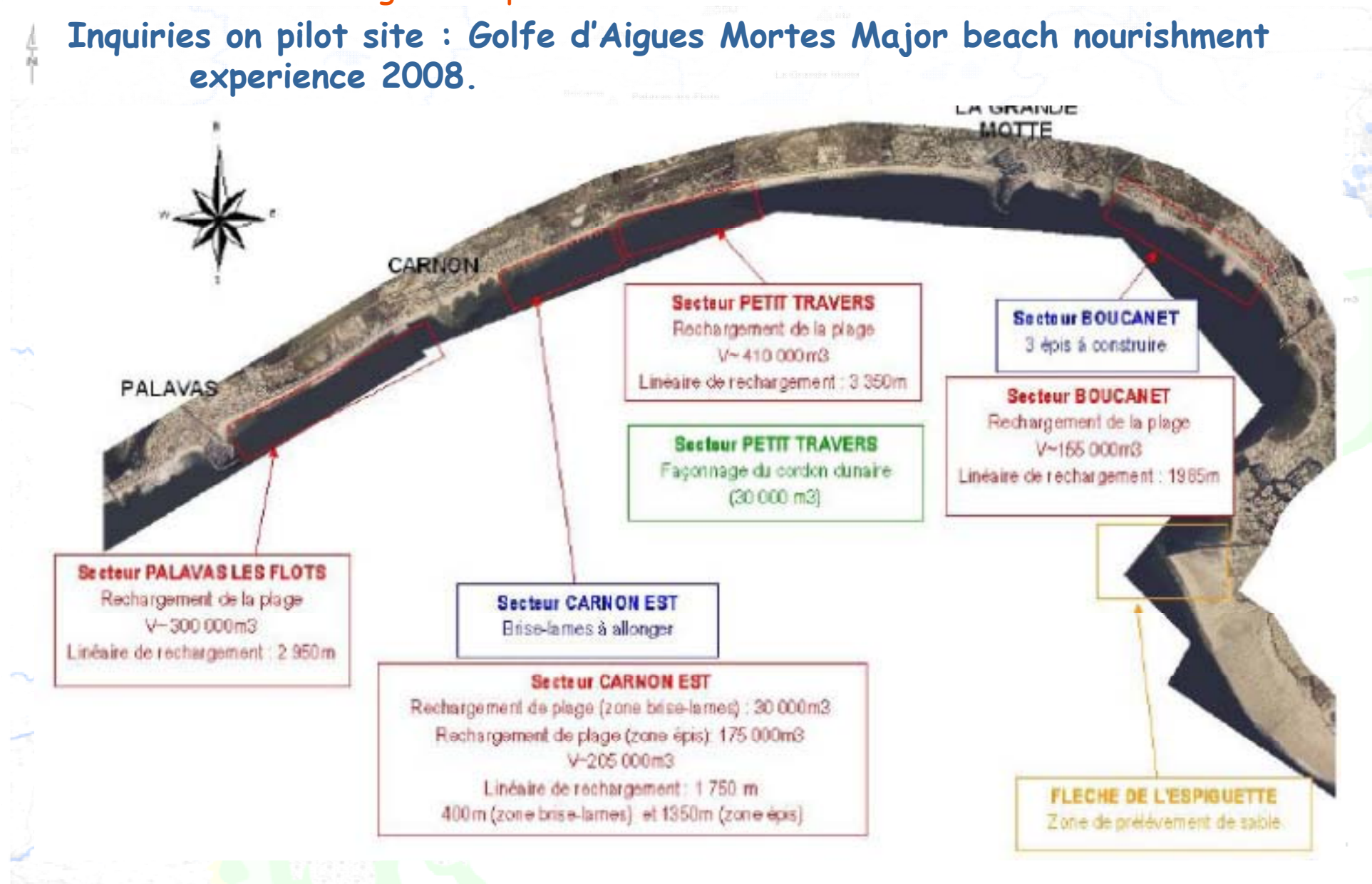




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Inquiries on pilot site : Golfe d'Aigues Mortes Major beach nourishment experience 2008.





Département de l'Herault Action plan for the development of the sediment management plan of the Golfe du Lion



Inquiries on pilot site : Golfe d'Aigues Mortes Major beach nourishment experience 2008.

350 people interrogated...

Perceptions(Collections) of the methods of management of the erosion

Concerning the importance to fight against the erosion, most of the users think that these policies are justified only if their cost is reasonable. It is advisable to underline that 17 % of the users think that you should not fight against the erosion, mostly because it is about an inevitable phenomenon (14 %) or, less often, because the cost is too expensive (3 %)

Concerning the methods preferred by the investigated, they are the hard methods based on rocks which are evoked in the first one by near a quarter of the investigated. We can underline that the withdrawal of the constructions, chosen also by near a quarter of the investigated, arrives in 2^o position before the policies of beachnourishment which are in 3^o place selected by 18 % of the investigated.



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With regard to the previous inquiries, we observe a strong decline of the methods of recharging or submarine bars in sand which are selected only by 31 % of the investigated and 29 % during the inquiries of the project Miseeva in 2009 against 51 % during inquiries Beachmed in 2007 before the recharging.

It seems that the operation of recharging, considered by many (cf. infra) as ineffective because of the dispersal of the sand by storms rather led the users to slander this method. You should not either minimize the role of the communication for the survey. Beachmed realized for a period when these methods were often evoked as the best while the accent is put since a few years rather on the importance of the strategic retreat the weight of which in the preferences of the users strongly progressed, passing from 15 % to 28 % or 23 %.



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More than half (59 %) investigated users had not heard about the operation of beachnourishment, whereas a little more than a third had an information by newspapers or television (9 %), by their networks of knowledge (13 %), or went to see the works (14 %).

Perception of the operation of beachnourishment : We observe a score relatively balanced between the users having a positive opinion of these operations (39 %) and those, slightly less numerous (31 %) who think on the contrary that it is useless or that there are the other more effective methods. Let us underline that near a third of the investigated (29 %) do not know and do not have no marked opinion.

Near half (the 48 %) users envisage a frequent renewal of the beachnourishments with a frequency which would be every five years, even more frequently even



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The fifth only questioned users declared to agree to participate in the financing of these operations of recharging whereas they are to be so much indecisive with regard to their participation. We stay in the same proportions as during the survey Beachmed where for 67 % of the investigated the financing had to remain public. On the other hand we can notice with the survey Miseeva that when it is about the marine flood, the part of the users who are ready to participate in the financing amounts to 56 %

Concerning the opinion of the users as for the positive effects of the beachnourishment the first three reserved items are relative to the physical enlargement of beaches and represent 44 % of the investigated. Other aspects bound (connected) to an improvement of the landscape, the tranquillity are relatively unimportant and concern only 27 % of the answers

More than half investigated (60 %) think that no negative effect can result from rechargings.. When negative effects are evoked, it is the fact that the contribution of sand constitutes a source of pollution which is the most quoted (13 %); of numerous investigated having underlined the dark color of sand during the works.



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Other more synthetic questions aimed at estimating the perception of the negative potential effects on the environment and the positive effects on the economy and the tourism. We observe that only a third of the investigated think that he can have a negative effect on the environment there. They are on the contrary widely majority (82 %) to think that these operations of recharging are beneficial for the economy. To note concerning the effects on the environment the balance between yes and no.

The properties to which the investigated are sensitive concerning the brought sand are mainly its cleanliness and the absence of effect on the environment. Near the two thirds of the investigated wish to know the origin of the sand which is brought during the operations of recharging.

Only a quarter of the investigated think that these operations of recharging can have an effect of sensitive on the erosion and two thirds (63 %) do not know the link between the fight against the erosion and the strategic retreat of the road



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Finally the last two questions aimed at knowing the proportion of the persons declaring itself ready of changing their habits to participate in the fight against the erosion, either by parking farther or by taking a shuttle. Whereas only a quarter of the investigated (24 %) declare to agree to park farther, they are on the contrary two thirds (66 %) to declare to agree to take a shuttle.

Main results :

- x Loss of general knowledge aquired during Beachmed major operation
 - x Beach nourishment fame is not as high than it was during the beachmed program. It is not any more considered as really durable solution to manage erosion
- Major lack of communication after beach nourishment...