Coastal adaptation to climate changes through an Integrated Coastal Zone Management approach: from theory to practice

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Coastal Zone : *the critical uncertainty*

- a field of controversy
- an area of high interests
- a sky-rocketed development asset
- terrestrial and marine resource efficiency
- a dynamic natural system

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Integrated Coastal Zone Management

▸ Is it implementable?

▸ Possible?

▸ A *prelude to conflict? (Goldberg, E. (1994))*

▸ A bureaucratic invention?

▸ A strategy?

▸ A policy?

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Integrate Coastal Zone Management

- ICZM is a **process**: continuous evolution
- Adaptation to climate changes IS a process
- ICZM and adaptation needs increased participation of stakeholders AND site specificity when implementing measures
- **Trust and commitment: we need tools for decision support!**

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ICZM process in decision taking : the DeCyDe-4 decision support method

- Important questions:
  - who are the decision makers?
  - What are their competences?

- Usual problems: Sophisticated and complicated decision support tools for decision makers who do not have the competences
- Or not enough data to evaluate the impacts from decisions

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Decision then, is based on:

- Decision makers' intuition

- Decision makers' judgment

- Interests

- Ignorance

- Lack of having the "entire picture"

- Piece-meal solutions

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DeCyDe-4 is a method incorporating intelligent management tools, that can be implemented to give a "number" to a problem or an issue, i.e. to have a measure, to understand the size or the scale of a state/condition, especially in cases where everything is subjective or difficult to quantify.

Why DeCyDe?
Decide, Cy for Cyprus!

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DeCyDe structure: four steps

- ▸ Step 1: The data base

- ▸ Step 2: The setting of of criteria/ parameters

- ▸ Step 3: weighting factors

- ▸ Step 4: input of data to the decision support tool

All the steps are self-contained because they can be used *per se*, each step giving specific results.

DeCyDe-4: the method

- Data Bank
- Structure the problem/ case: specific structure for each case
- Build the matrices
- "scoring through ranges"
- Self assessment tool
- Weighting: the sensitivity of the method

DeCyDe-4
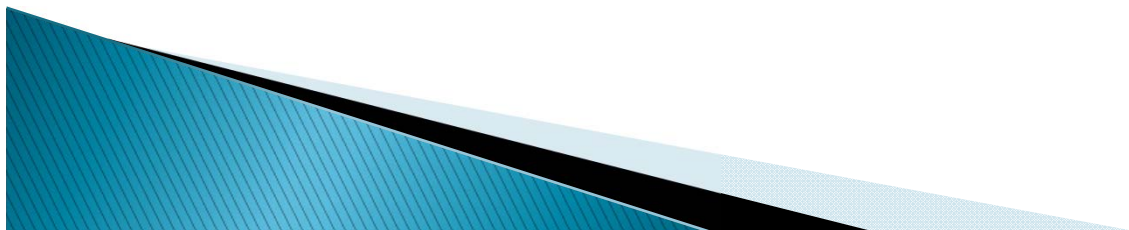
Innovation: The "Scoring" of the criteria/parameters

- ▸ **The "scoring through ranges" approach**
  - ◦ converts state-of parameters into indicators.
  - ◦ the score attributed immediately gives **a reference value and relevance** instead of just a snap-shot single figure which stands for nothing but itself.

- ▸ **Strong gamification character**

- ▸ **High sensitivity**

- ▸ **www.isotech.com.cy**

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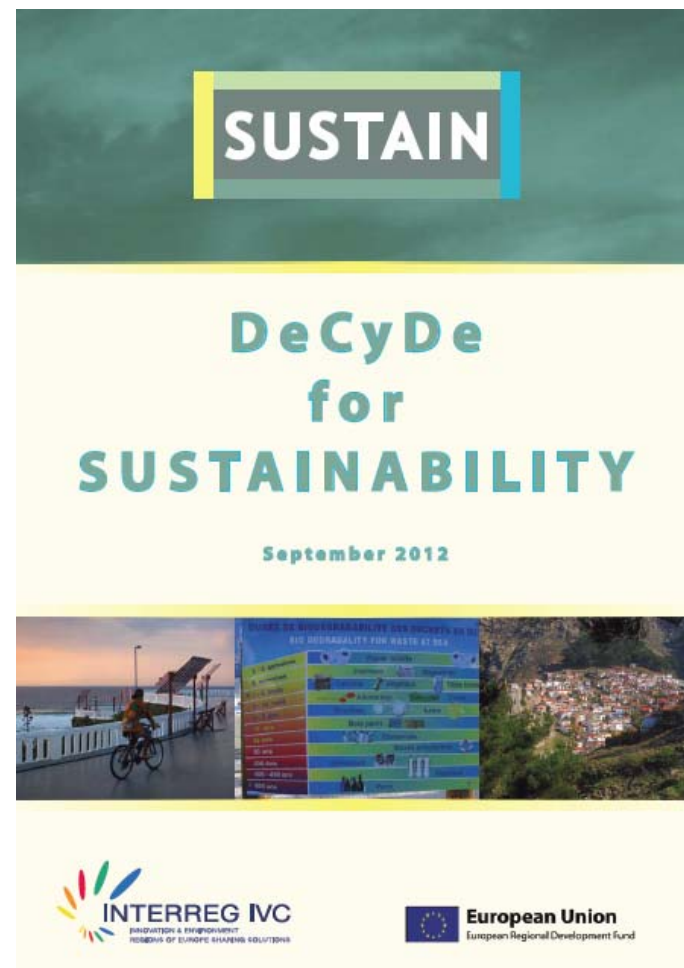environmental consultants

Valorisation/ evaluation of DeCyDe-4

North Ireland

▸ SUSTAIN: implemented in 12 countries

▸ Very positive evaluation results:

▸ Dr. Pickaver, ICZM EU Group of experts:

▸ Smart, innovative, intelligent

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Implementation in SUSTAIN PROJECT:
DeCyDe-for-sustainabiltiy

Step 1: The data base – the baseline study

▸ Major problem in decision making: the lack of consistent data or the low quality of existing data.

▸ The Data Base of DeCyDe is built specifically and dedicated for every case that the method is implemented: SITE AND CASE SPECIFICITY

▸ Structure of Data Base: is the product of the identification of the problem and the gap analysis of the needs and the parameters that are involved in the specific decision process.

Step 1: The data base – guarantee for unbiased process

- The Data Base provides the set of "core" data that are needed in order to **guarantee the unbiased** character of the results of the decision process.
- It is very usual that the decision makers believe something which is not the reality but rather their perception.
- "Picture" existing situation and understand the problem through numbers.

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Step 2: Criteria/ indicators

▸ Case specificity: each case under examination, is structured and modeled

▸ Part (a): **Addressing the multiple dimensions and/or perspectives of each case**

▸ Part (b): **The "Scoring" of the criteria/parameters**

2 (b):
The "Scoring" of the criteria/parameters
THE INNOVATION

▸ The "scoring through ranges" approach

◦ converts state-of indicators into sustainability indicators.

◦ the score attributed immediately gives **a reference value and relevance** instead of just a snap-shot single figure which stands for nothing but itself.

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SUSTAIN

DeCyDe for SUSTAINABILITY

ENVIRONMENTAL QUALITY

1	Air Pollution	Units	Scoring Ranges							Indicator Score
	1. Air Quality (according to 2008/50/EC, annex 2)	No. of days per year limit values are exceeded for PM$_{10}$ (times/year, limit: 70%, 35 µg/m^3)	>35 days	27-35 days	17-26	9-16	1-8 days	0 days	No Data	4.75
			1	2	4	6	8	10	0	
					4					
		No. of days per year limit values are exceeded for Nitrogen Dioxide (NO$_2$), 70%, 140 µg/m^3)	>18 days	17-12 days	11-6 days	5-3 days	2-1 days	0 days	No Data	
			1	2	4	6	8	10	0	
				2						
		No. of days per year limit values are exceeded for Ozone (O$_3$), 120 µg/m^3, 8 hours per day, 25 days/year	>25 days	18-24 days	11-17 days	5-10 days	1-4 days	0 days	No Data	
			1	2	4	6	8	10	0	
						6				
		No. of days per year limit values are exceeded for Sulphur Dioxide (SO$_2$), 60%, 75 µg/m^3	>3 days	2 days	1 day	0			No Data	
			1	4	7	10			0	
					7					

2	Biodiversity and Natural Resources Management	Units	Scoring Ranges							Indicator Score
	2. Change of condition of coastal and marine habitats and species that have been identified as priorities for conservation	Number of important species lost since the aproval of Habitats and Birds Directives (the year of aproval of each directive will be the baseline year for those species listed (according to Annex II & IV of 92/43/EEC)	>3	2-3	1			0	No Data	4.50
			1	2	4			10	0	
				2						
		Number of important habitats lost since the aproval of Habitats and Birds Directives (the year of aproval of each directive will be the baseline year for those habitats listed (according to Annex II & IV of 92/43/EEC)	>2	1				0	No Data	
			1	2				10	0	
								10		
	3. Area of land and sea protected by statutory designations	Hectares as a percentage of the land area of the municipality	0%	1-20%	21-40%	41-60%	61-80%	81-100%	No Data	
			1	2	4	6	8	10	0	
				2						
		Hectares as a percentage of the marine area of the	< 2%	2-4%	4-6%	6-8%	8-10%	>10%	No Data	
			1	2	4	6	8	10	0	

ECONOMICS | **ENVIRONMENTAL QUALITY** | SOCIAL WELL-BEING | GOVERNANCE | FINAL-assess | WEIGHT_PILLA

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"scoring through ranges"

◦ a reference value and relevance

◦ Different kind of activities become comparative, instead of just a snap-shot single figure which stands for nothing but itself.

◦ Ranges according to Directives, national legislation, international standards
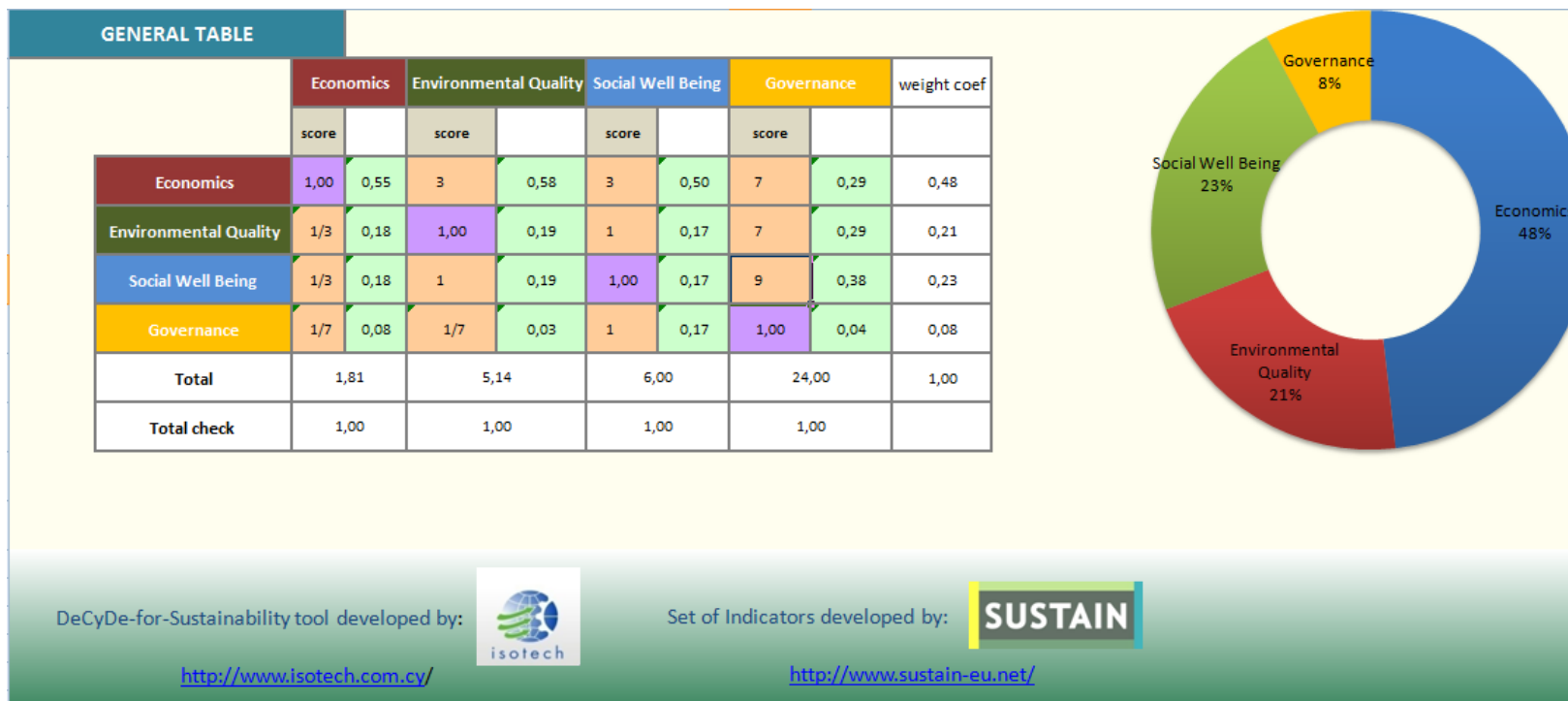
The self assessment tool

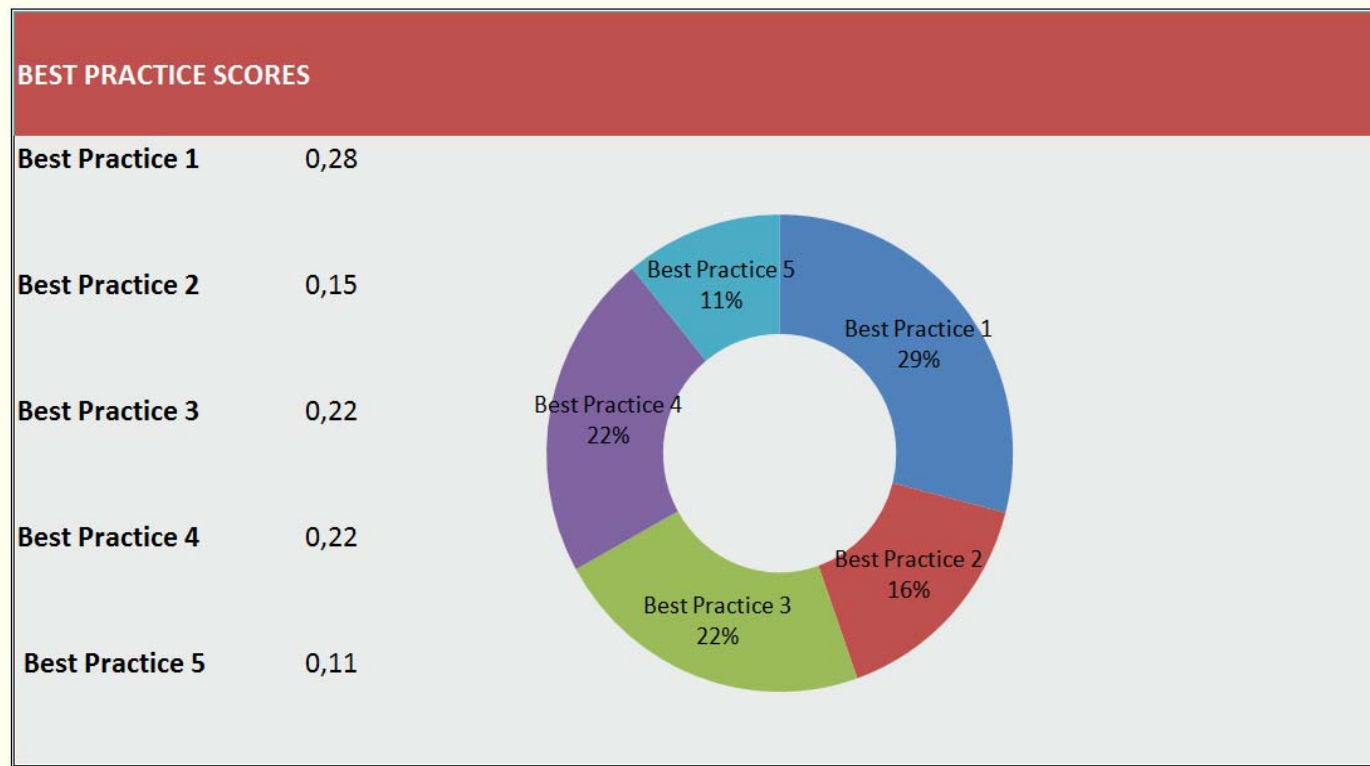| PILLARS	INDICATORS	Indicators Score
ECONOMICS	Economic Opportunity	3.00
	Land Use	10.00
	Tourism	4.00
	Transportation	1.00
		18.00
ENVIRONMENTAL QUALITY	Air Pollution	10.00
	Biodiversity and Natural Resources Management	7.75
	Change at the coast	5.50
	Energy & Climate Change	7.33
	Land use	10.00
	Public Health and safety	10.00
	Waste Management	4.67
	Water resources and Pollution	8.20
		63.45
SOCIAL WELL-BEING	Demography	4.00
	Equity	8.00
	Education and Training	10.00
	Local and cultural identity	0.00
	Public Health and Safety	7.00
		29.00
GOVERNANCE	Policies/ strategies for sustainability	4.86
	Monitoring tools for sustainability	0.83
	Human resources capacity building	1.00
	Implementation of good management practices	1.00
	Stakeholder involvement/ public participation	7.00
		14.69
TOTAL	125.14	

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Step 3: Weighting

▸ Concept of "Compare couples"

▸ the decision makers can evaluate and assess a large range of concepts, of actions, of policies

▸ A strong participatory part of DeCyDe-4 method. Work carried on in dedicated, structured workshops

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ECONOMICS											Weight Coef
	Economic Opportunity		Fisheries & Aquaculture		Land Use		Tourism		Transportation		
	score		score		score		score		score		
Economic Opportunity	1	0.4	9	0.3	7	0.4	1	0.3	9	0.3	0.35
Fisheries & Aquaculture	1/9	0.0	1	0.0	1/7	0.0	1/9	0.0	1/3	0.0	0.03
Land Use	1/7	0.1	7	0.2	1	0.1	1	0.3	9	0.3	0.17
Tourism	1	0.4	9	0.3	9	0.5	1	0.3	9	0.3	0.39
Transportation	1/9	0.0	3	0.1	1/9	0.0	1/9	0.0	1	0.0	0.05
Total	2.37		29.00		17.25		3.22		28.33		0.99
Total check	1.00		1.00		1.00		1.00		1.00		

GENERAL TABLE

	Economics		Environmental Quality		Social Well Being		Governance		weight coef
	score		score		score		score		
Economics	1,00	0,55	3	0,58	3	0,50	7	0,29	0,48
Environmental Quality	1/3	0,18	1,00	0,19	1	0,17	7	0,29	0,21
Social Well Being	1/3	0,18	1	0,19	1,00	0,17	9	0,38	0,23
Governance	1/7	0,08	1/7	0,03	1	0,17	1,00	0,04	0,08
Total	1,81		5,14		6,00		24,00		1,00
Total check	1,00		1,00		1,00		1,00		

Governance 8%
Social Well Being 23%
Economics 48%
Environmental Quality 21%

DeCyDe-for-Sustainability tool developed by: isotech

Set of Indicators developed by: SUSTAIN

http://www.isotech.com.cy/

http://www.sustain-eu.net/

DeCyDe-4-MARLSICO:
18 countries, FP7

BEST PRACTICE SCORES	
Best Practice 1	0,28
Best Practice 2	0,15
Best Practice 3	0,22
Best Practice 4	0,22
Best Practice 5	0,11

Best Practice 5 11%

Best Practice 1 29%

Best Practice 4 22%

Best Practice 2 16%

Best Practice 3 22%

DeCyDe-4-IRIS: Marine Strategy Descriptors, DG Environment

DeCyDe-4-IRIS

IRIS-SES

D8/D9 CONTAMINANTS

1	Water	Units	Scoring Ranges					Indicator
	1.Total PAHs	µg/l	>5	$3.3 < x \le 5$	$1.7 < x \le 3.3$	$0.1 < x \le 1.7$	≤ 0.1	
			1	3	5	7	10	
	2.Total PCBs	µg/l	>0.1	$0.06 < x \le 0.1$	$0.03 < x \le 0.06$	$0 < x \le 0.03$	0	
			1	3	5	7	10	
	3.Total Pesticides	µg/l	>0.1	$0.06 < x \le 0.1$	$0.03 < x \le 0.06$	$0 < x \le 0.03$	0	
			1	3	5	7	10	
	4.Copper (Cu)	µg/l	>10	$6.9 < x \le 10$	$3.7 < x \le 6.9$	$0.5 < x \le 3.7$	≤ 0.5	
			1	3	5	7	10	0.00
	5. Zinc (Zn)	µg/l	>100	$67 < x \le 100$	$34 < x \le 67$	$1 < x \le 34$	≤ 1	
			1	3	5	7	10	
	6. Cadmium (Cd)	µg/l	>1	$0.7 < x \le 1$	$0.4 < x \le 0.7$	$0.1 < x \le 0.4$	≤ 0.1	
			1	3	5	7	10	

D5 - Eutrophication | **D8 D9 - Contaminants** | REFERENCES

DeCyDe-4-Biodiversity
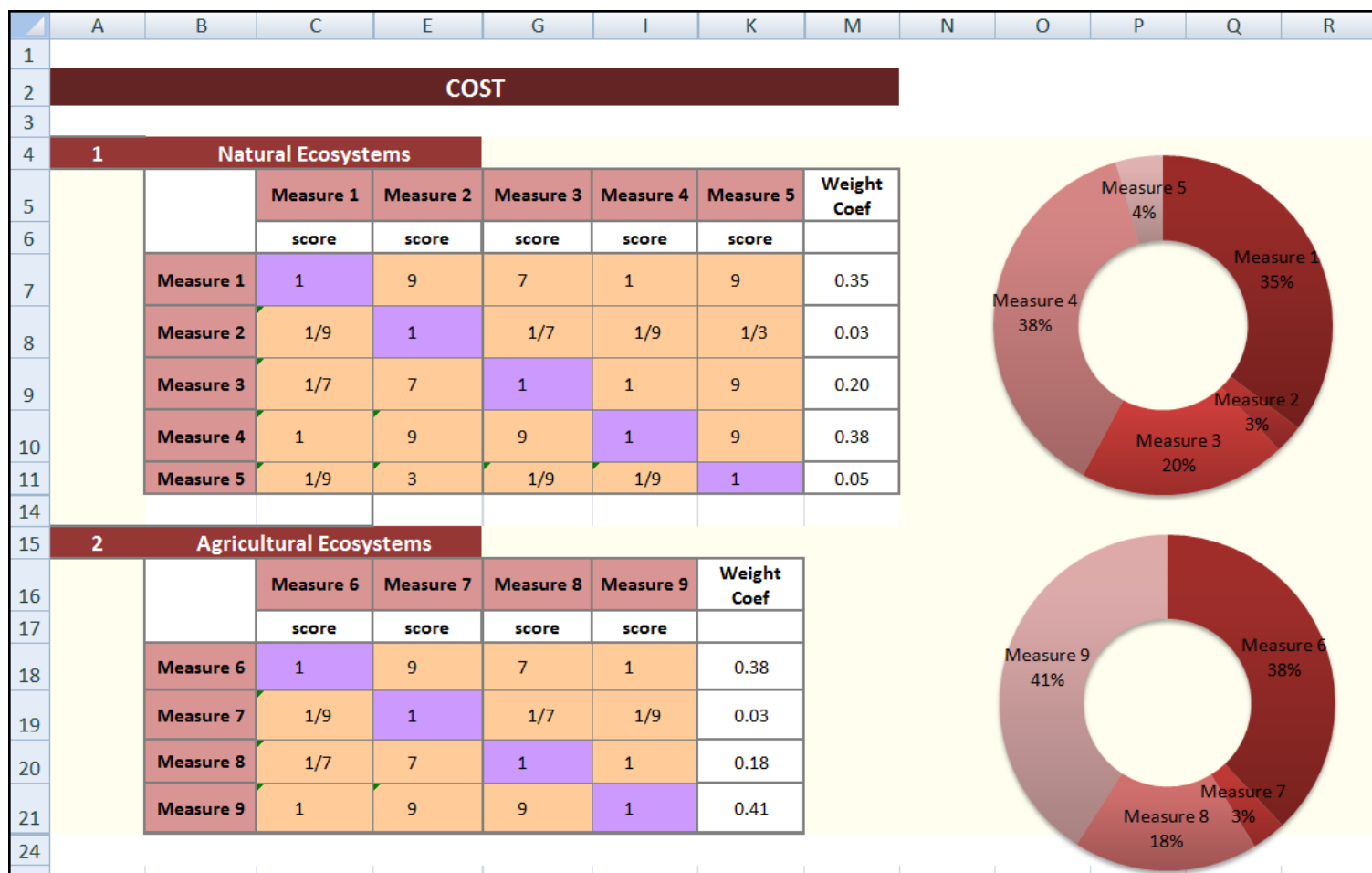
Capacity building through DeCyDe implementation

Pilot case: Pafos

LitusGo capacity building Manual (www.litusgo.eu)

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▸ DeCyDe-4 is a method that aims to facilitate decision makers and decision actors in the decision process

▸ at the same time sets their actual participation as a prerequisite for the success of the method.

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- ICZM and climate change adaptation process is better implemented when a "number" guides the decision makers

- Very specific "scoring" of impacts

- Possibility to easily "check" how a decision will affect the "whole picture"

1. **Site specificity/ Case specificity**

2. Very **good knowledge and understanding** of the **local coastal** system. Do not transfer "recipes" from other countries or other areas. Adapt to local system.

3. Early involvement of **local stakeholders/ key actors.**
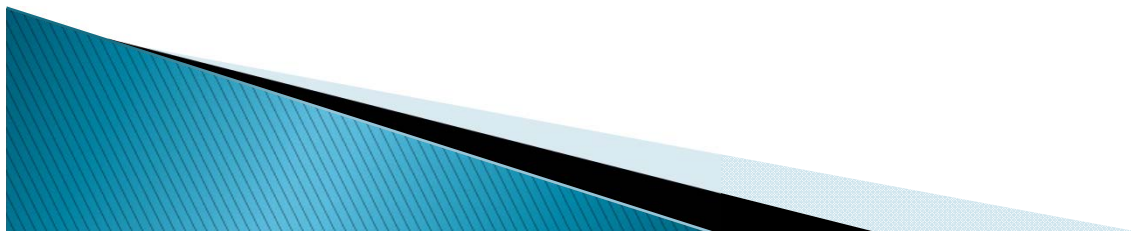
4. Incorporate structured decision support process

5. Intelligent and participatory tools

6. Not "smiling faces" and lists of hundreds of not-possible to estimate-"criteria"

7. prognosis of decision impacts in the overall coastal system: from "state-of-coast" to "state-of-coast-to-be".

DeCyDe-4

Thank you

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