Weight Of Evidence (WOE) approaches for Ecological Risk Assessment (ERA) in the marine environment

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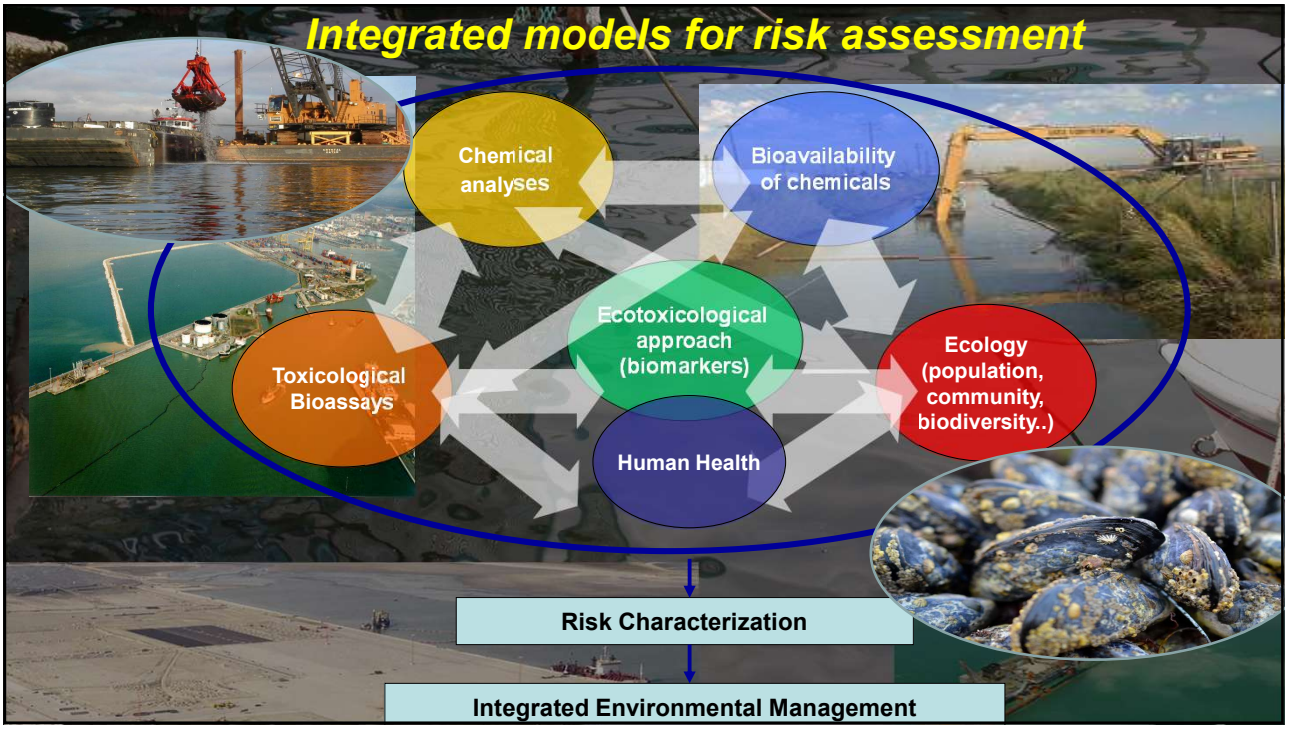

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Critical issues in risk assessment

Interpretation and significance of complex datasets of heterogeneous results

Qualitative and quantitative evaluations: indices and scales development

Integration of different typologies of data

Synthetic risk characterization/communication

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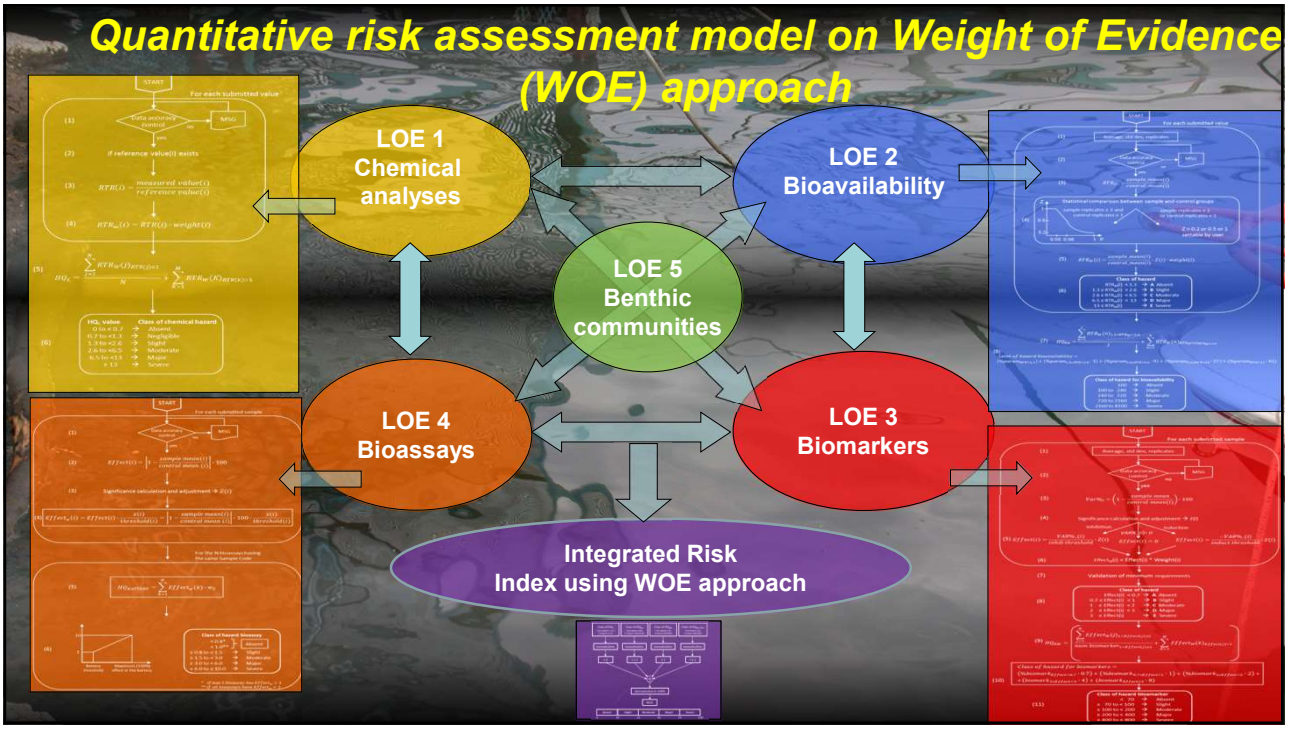
Quantitative risk assessment model on Weight of Evidence (WOE) approach



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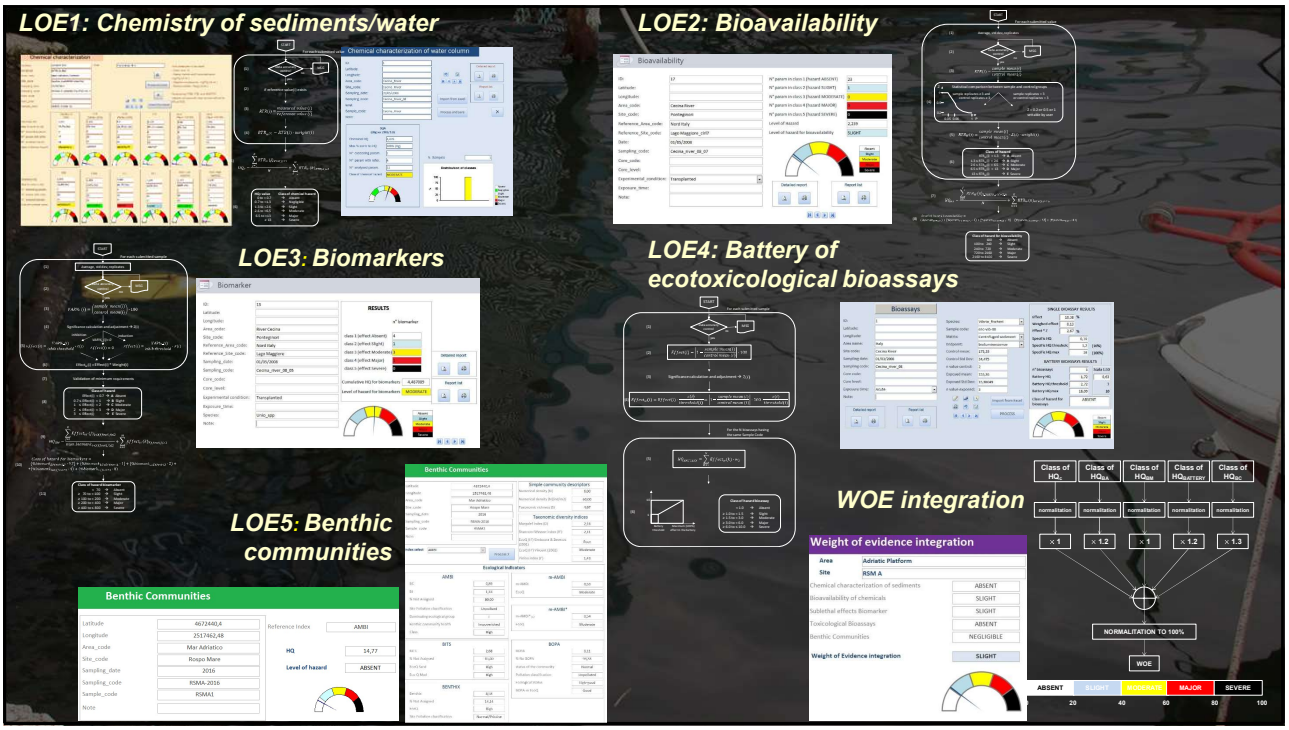

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Main advantages of WOE approaches

- Multidisciplinary approach for characterizing environmental quality and risk assessment
- WOE models represent a fundamental tool for summarizing and interpreting large datasets of heterogeneous data, singularly or in an integrative approach
- They do not use “pass-to-fail” approach, enhancing the capability to discriminate different environmental conditions
- The developed model is versatile, easy to update or adapt to local or national specificities

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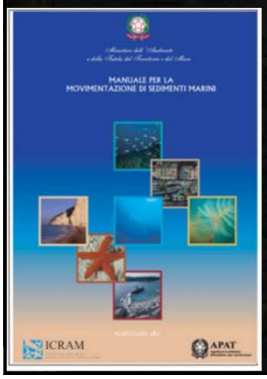
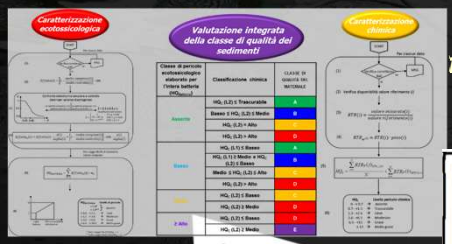
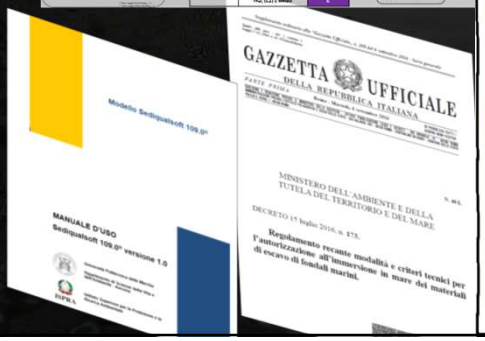
Weighted criteria are included in the new Italian Law on classification of dredged marine sediments

Manual ICRAM-APAT 2007

Classificazione chimica	Classificazione ecotossicologica – Colonna	Classificazione ecotossicologica – Tossicità elu/elu	CLASSE QUALITA'
≤ LCB	A	n.c.	A1
	A	n.c.	A2
	B	n.c.	
	C	assente	B1
	C	≥ Colonna C	B2
	D	assente	
	D	= Colonna D	C1
compresa tra LCB e LCL	A	n.c.	A2
	B	assente	B1
	B	= Colonna B	B2
	C	n.c.	
	D	assente	
	D	= Colonna D	C1
≥ LCL	A o B	n.c.	B2
	C	assente	C1
	C	= Colonna C	C2
	D	n.c.	

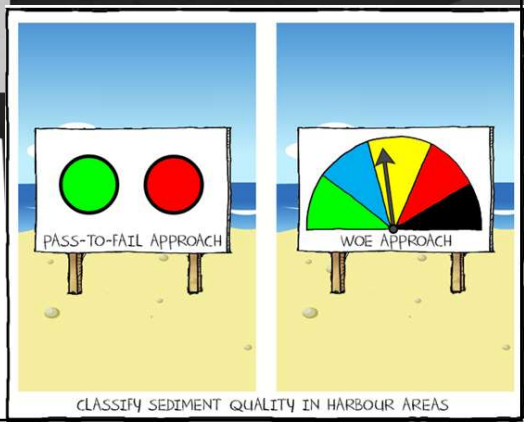






from «pass-fail» to weighted criteria

DM 173/2016



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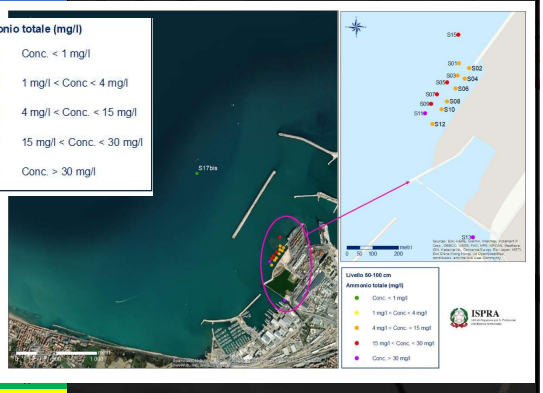
Ecotoxicology and Chemistry: identification of unknown factors in harbor sediments: the Ancona case-study

Campione	PROFONDITA'		Classe di qualità del materiale	
S01	0-50	10,68	D	C
S01	50-100	14,04	D	A
S01	100-200	6,19	C	A
S01	200-400	4,84	A	A
S01	400-600	1,16	A	A
S01	600-700	1,28	A	A
S02	0-50	8,81	D	C
S02	50-100	13,65	D	D
S02	100-200	8,99	C	C
S02	200-400	2,22	A	A
S02	400-600	0,887	A	A
S02	600-800	1,42	A	A
S02	800-1000	1,62	A	A
S02	1000-1150	1,12	A	A
S03	0-50	7,87	D	C
S03	50-100	12,34	D	D
S03	100-200	2,03	A	A
S03	200-400	1,04	A	A
S03	400-600	1,08	A	A
S03	600-700	0,84	A	A
S04	0-50	6,01	D	D
S04	50-100	7,03	C	C
S04	100-200	6,22	D	A
S04	200-400	3,97	A	A
S04	400-600	4,38	A	A
S04	600-800	0,771	A	A
S04	800-1000	0,742	A	A
S04	1000-1150	0,853	A	A
S04	1300-1500	2,24	A	A

	ONDITA'		Classe di qualità del materiale	
	-50	14,04	D	D
	-100	20,61	D	D
	0-200	6,8	C	A
	0-400	1,94	A	A
	0-600	1,03	A	A
	0-700	0,842	A	A
	-50	5,15	C	A
	-100	4,92	A	A
	0-200	3,7	A	A
	0-400	0,94	A	A
	0-600	0,626	A	A
	0-800	0,42	A	A
	-1000	0,424	C	C
	0-1150	0,595	A	A
	0-1200	2,23	B	B
	-50	14,94	D	C
	-100	23,70	D	B
	0-200	12,8	C	C
	0-400	1,1	A	A
	0-600	0,977	A	A
	0-650	1,46	A	A
	-50	10,3	C	A
	-100	8,13	C	A
	0-200	4,89	C	A
	0-400	1,14	A	A
	0-600	0,433	A	A
	0-800	0,341	A	A
	-1000	0,404	A	A
S08	1000-1150	3,14	A	A

		Classe di qualità del materiale	
		D	C
		D	A
		C	A
		A	A
		A	A
		A	A
18,03		D	C
23,95		D	D
14,04		D	A
1,38		A	A
1,84		C	A
8,18		A	A
17,64		D	A
7,07		C	A
< 0.2		C	C
0,764		A	A
0,990		C	B
1,17		A	C
0,722		C	B
2,318		C	C
22,410		D	A
31,040		D	A
15,71		C	A
0,968		A	A
0,847		A	A
18,16		C	A
5,24		D	A
10,78		C	A
1,75		A	A
1,06		A	A
0,939		A	A
0,813	S12	C	C
8,9	800-900		



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Porti di Pesaro, Falconara Marittima, Ancona, S. Benedetto, Pescara, Ortona

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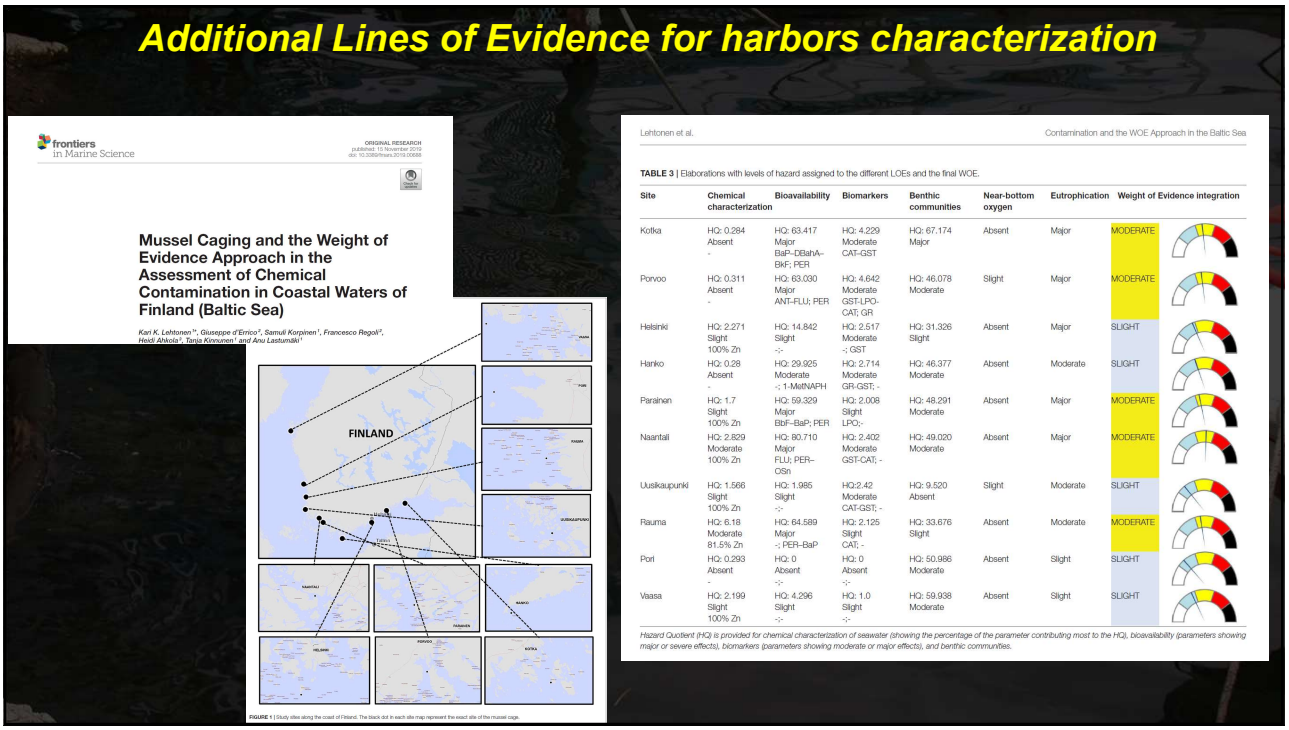
Additional Lines of Evidence for harbors characterization



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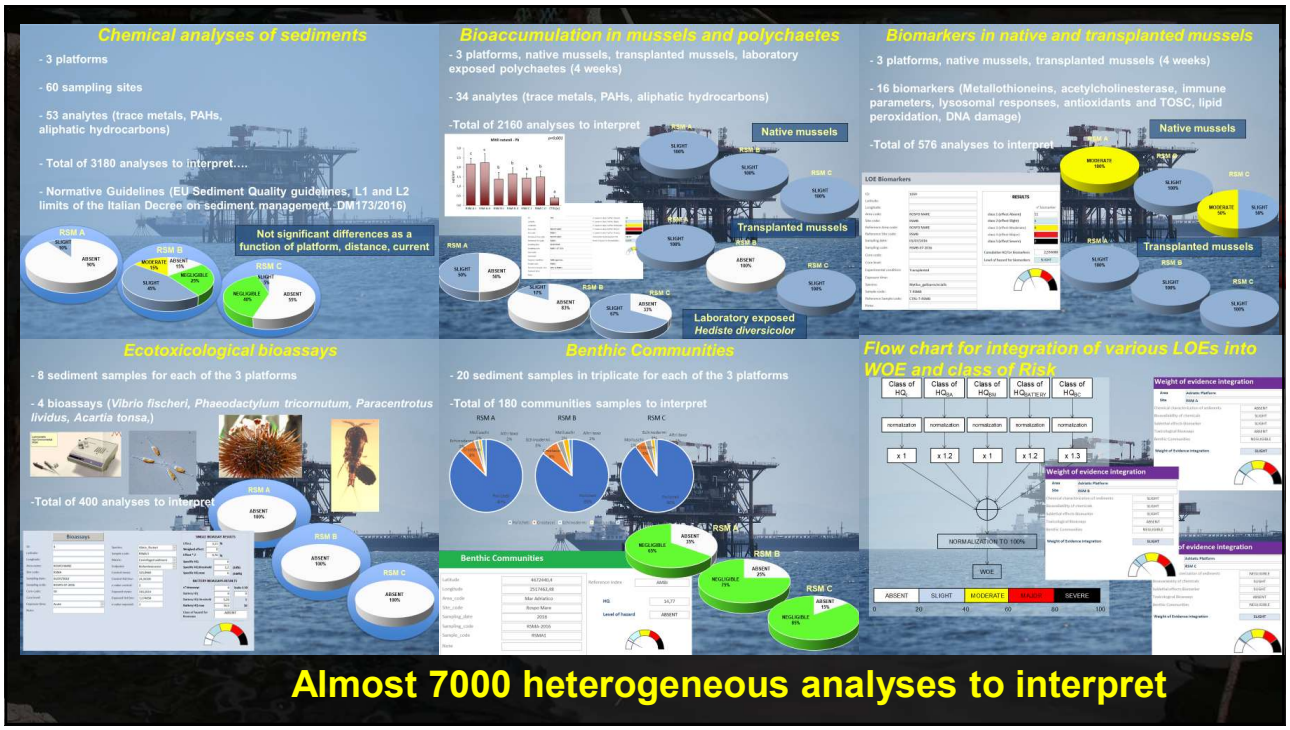

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Conclusions

- Future development of WOE approach in harbor areas can be based on the evaluation/integration of additional Lines Of Evidence
- Already validated flow-charts elaborate hazard indices for bioaccumulation, biomarkers, benthic communities
- New LOEs for water circulation in harbor areas
- The developed model is versatile, easy to update or adapt to local or national specificities
- Scientifically sound but user-friendly format, to support a more comprehensive process of risk assessment and “site-oriented” management decisions

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Thanks for the attention
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