

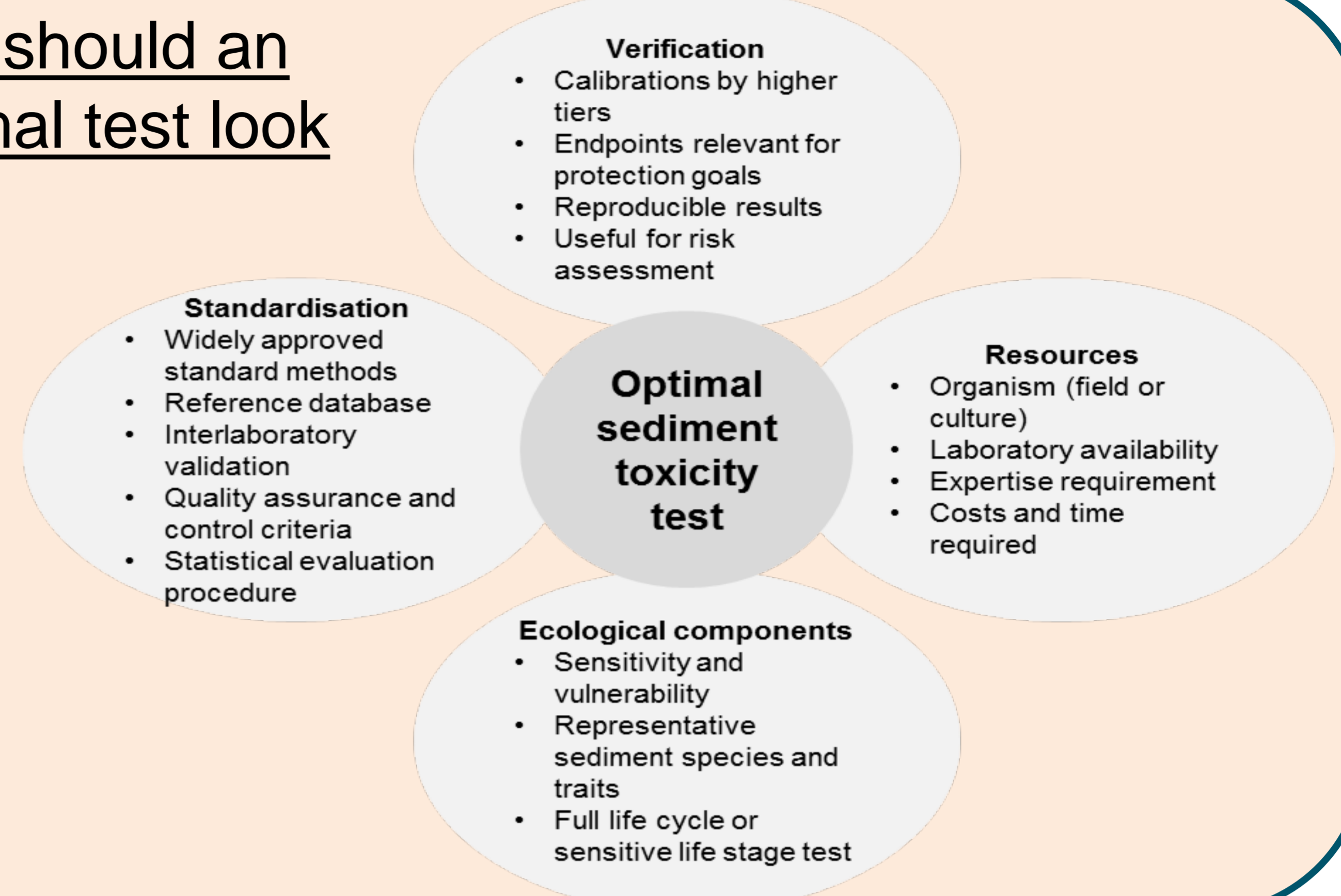
Sediment toxicity testing of organic chemicals in the context of prospective risk assessment

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Introduction

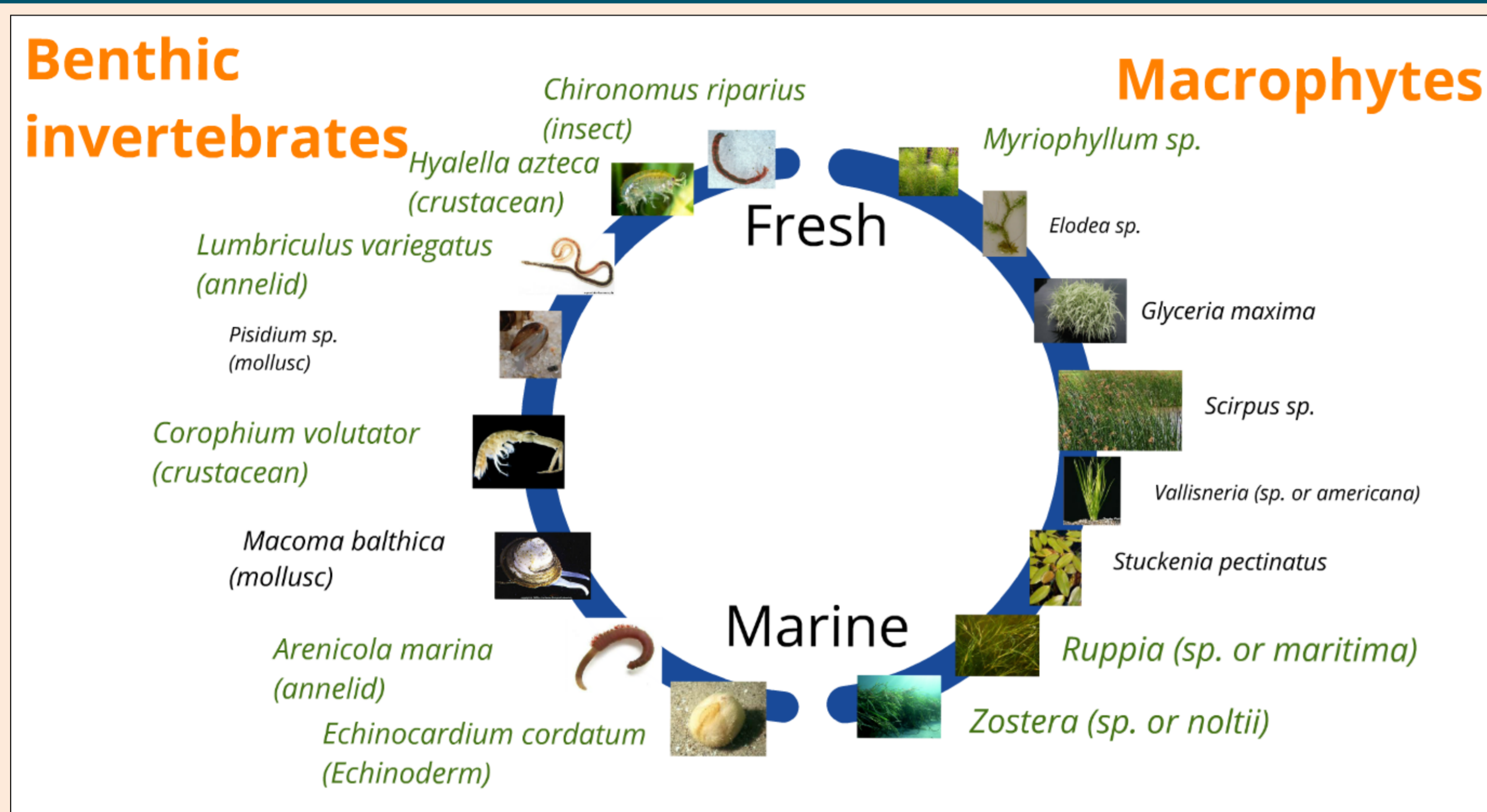
At present, prospective tests to assess the toxicity of sediment-bound chemicals to sediment-dwelling organisms are relatively well established for a few test species. However, there is a lack of cost-effective and widely accepted methods to assess potential effects on microorganisms, macrophytes and animals across taxonomic groups, as well as methods to translate results of such tests between freshwater and marine ecosystems and to the population and community levels. Therefore, improved standard methods are crucial within the current context of criteria setting and prospective risk assessment.

How should an optimal test look like?

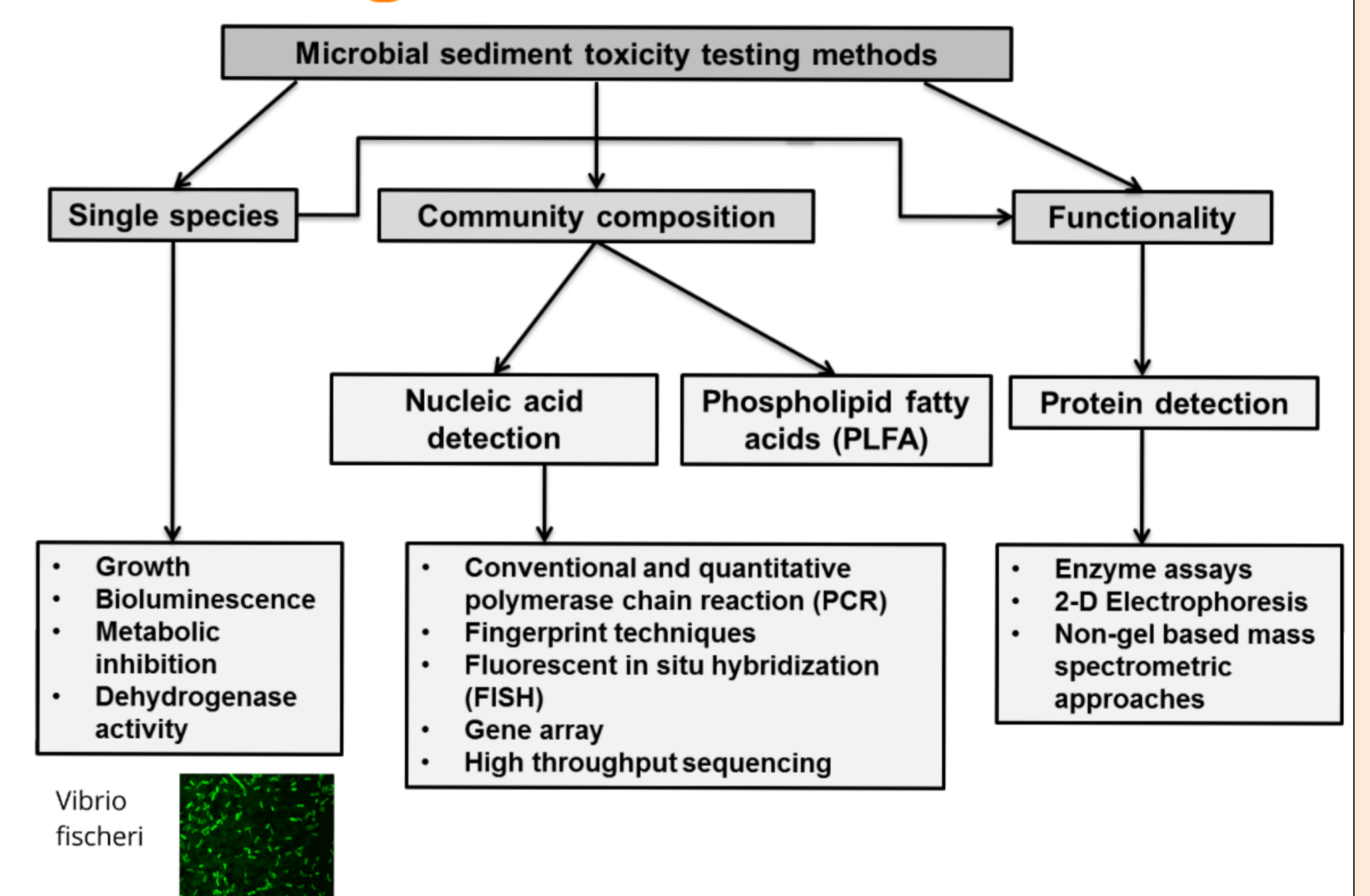


Which test species?

The green coloured names indicates possible suitable species for the first tier assessment



Microorganisms



Which standard invertebrate tests exist?

Standard benthic invertebrates protocols

Taxonomic group	Species	F/E/M	OECD	EPA	ASTM	Guideline
Insecta (ephemeroptera)	<i>Hexagenia</i> spp.	F			x	ASTM E1706
Insecta (diptera)	<i>Chironomus riparius</i>	F	x		x	OECD 218, 233, ASTM E1706
	<i>Chironomus dilutus</i>	F	x	x	x	OECD 218, 233, EPA 2000, ASTM E1706
	<i>Chironomus yoshimatsui</i>	F	x			OECD 218, 233
Annelida (oligochaeta)	<i>Lumbriculus variegatus</i>	F	x	x	x	OECD 225, EPA 2000, ASTM E1688
	<i>Tubifex tubifex</i>	F			x	ASTM E1706
Crustacean (amphipoda)	<i>Diporeia</i> spp.	F		x	x	ASTM E1706
	<i>Hyalella azteca</i>	F/E		x	x	EPA 2000, ASTM E1706
	<i>Eohaustorius estuarius</i>	E		x	x	EPA 1996, ASTM E1367
	<i>Leptocheirus plumulosus</i>	E		x	x	EPA 1996, 2001, ASTM E1367
	<i>Ampelisca abdita</i>	M		x	x	EPA 1996, ASTM E1367
	<i>Rhepoxynius abronius</i>	M		x	x	EPA 1996, ASTM E1367
	<i>Neanthes arenaceodentata</i>	E/M			x	ASTM E1611
Annelida (polychaeta)	<i>Neanthes virens</i>	E/M			x	ASTM E1611

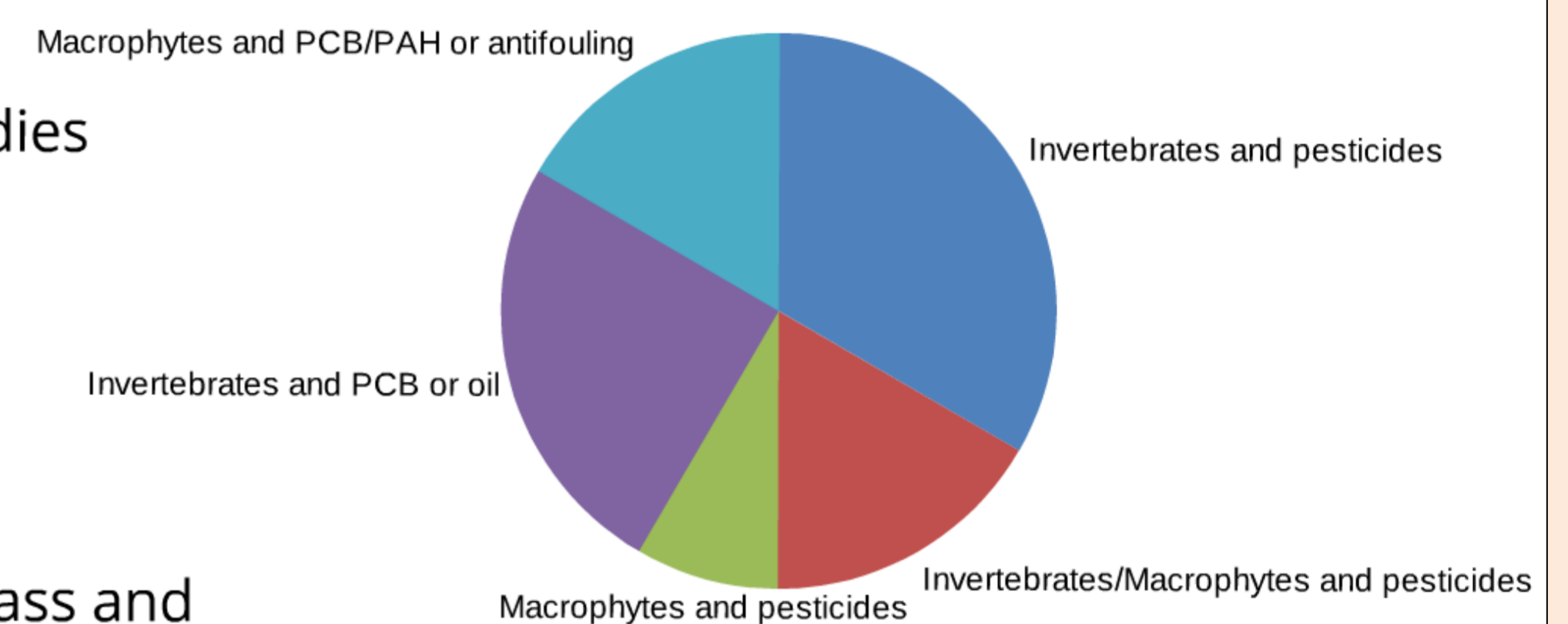
Micro- and mesocosms

No standard protocols

12 micro and mesocosm studies

Fresh: 66%
Estuarine: 17%
Marine: 17%

Endpoints: abundance, biomass and bioaccumulation



Use in risk assessment

- Protection goals in legislation for setting Sediment Quality Standards
- Harmonise the lower tier effect assessment procedure between different Acts/Regulations
- Select a set of candidate standard sediment test species that represent different taxonomic/trophic groups

Conclusion

Sediment toxicity testing, test species and exposure assessment methodologies approaches are currently still too heterogeneous to allow unification in risk assessment frameworks

Look out

- The formal selection and approval of species and tests in regulatory contexts
- The development of guidelines for estuarine and marine standard tests, microorganism, macrophyte and micro- and mesocosm tests
- Use micro- and mesocosm tests for the calibration of tests in lower tiers of the risk assessment
- Translation between different ecosystems and scales of biological organisation
- Combine results in risk assessment framework

More information: Diepens NJ, GHP Arts, TCM Brock, H Smidt, PJ Van den Brink, MJ Van den Heuvel-Greve, AA Koelmans. Online. *Sediment toxicity testing of organic chemicals in the context of prospective risk assessment: A review* (ID: 718945, DOI:10.1080/01496395.2012.718945)

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