Contextualizing multiple tools with a marsh conceptual diagram

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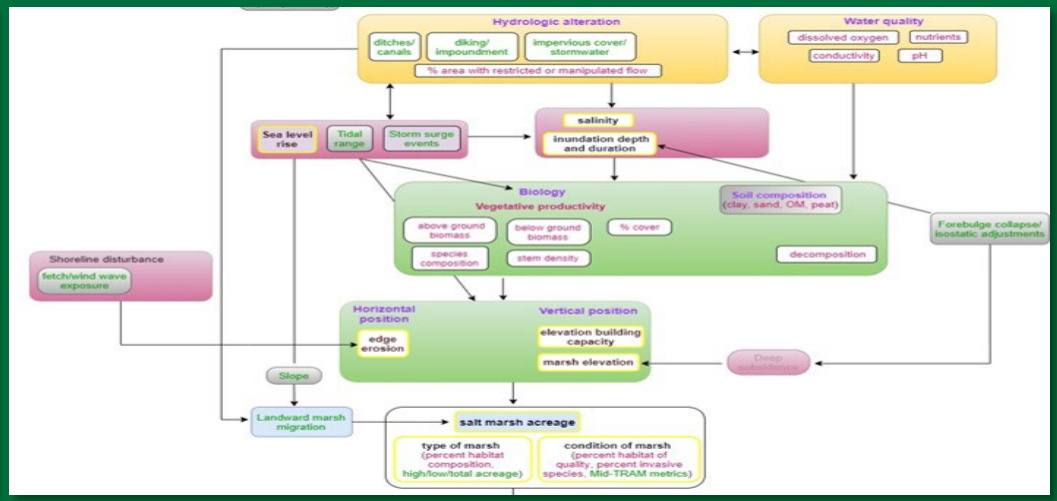
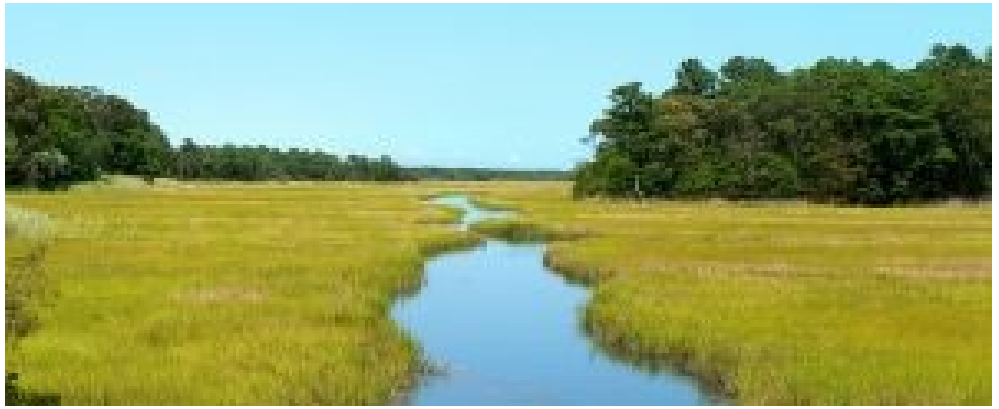


*The views expressed in this presentation are those of the authors and do not necessarily represent views or policies of the U.S. Environmental Protection Agency.

Premise

- There are many tools, approaches and datasets out there besides the tools we have been discussing so far
- How do we identify how they complement or align with each other?
- How do we decide which one(s) to use?



Conceptual diagram approach (salt marsh focus)

- Start by representing the system, then bring in the tools
  - ✓ PDE Wetlands Assessment Tool for Condition and Health (WATCH)
  - ✓ EPA Relative Wetland Vulnerabilities Framework (RWVF)
  - ✓ Other tools, e.g., the Adaptation Design Tool
- Where do the various tools plug into the diagram?

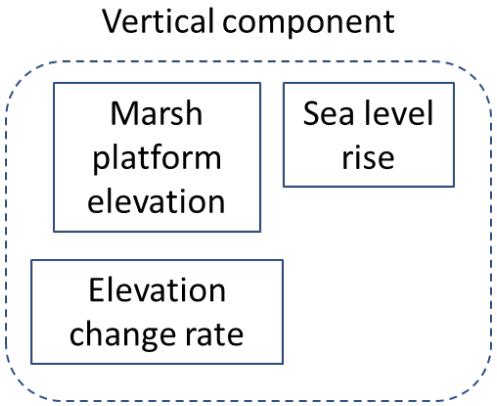
Objective: Further clarify how attributes in WATCH and principal factors in the RWVF are characterized and used, how they respond to climate change effects and other threats, and how they relate to each other and to other tools

Steps

1. Construct simple conceptual diagrams of interacting attributes, methods and metrics in WATCH
2. Review:
   - ✓ Models and variables used in the RWVF case study
   - ✓ Climate change projections for the Delaware Bay region
   - ✓ Literature and existing conceptual diagrams
3. Create a conceptual diagram that includes components from WATCH, the RWVF case study, climate change and the literature review
4. Assess applicability to contextualizing additional tools

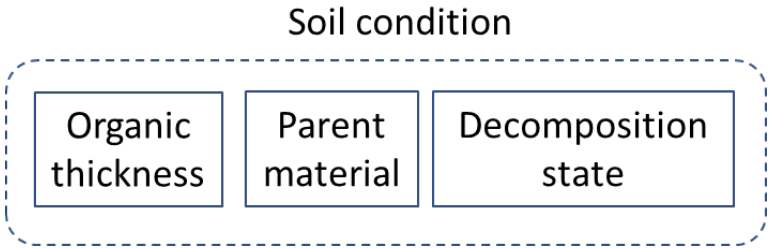
Used free interactive software: diagrams.net

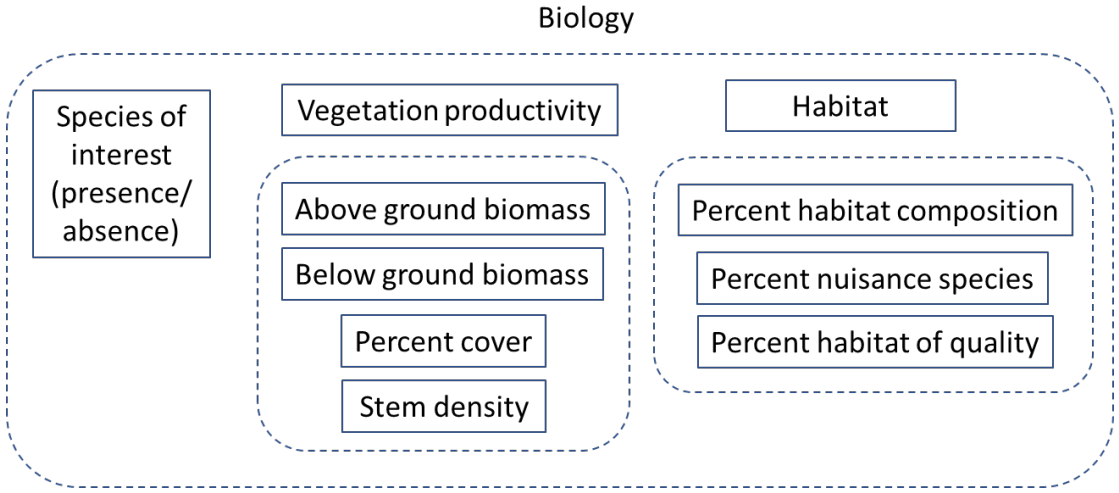
Step 1: simple diagrams of WATCH components

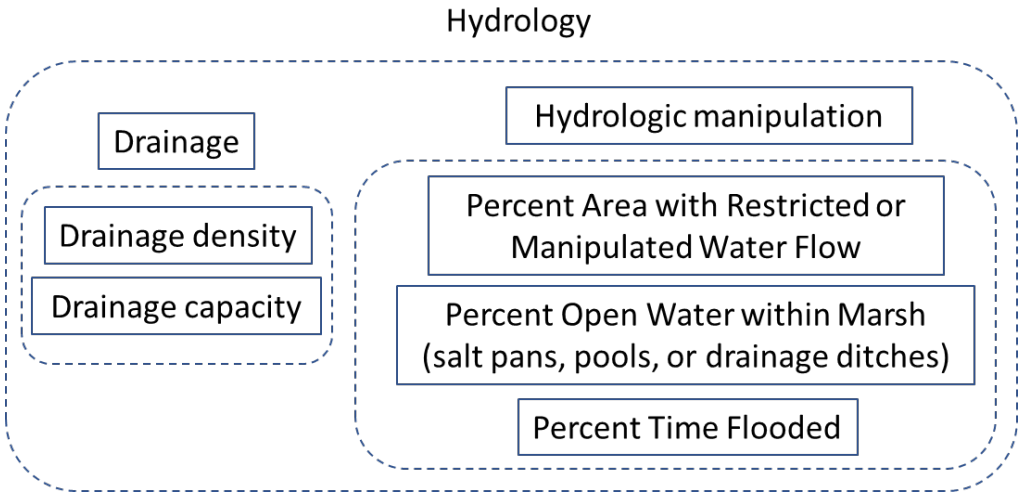


Attributes

- Horizontal position
- Vertical position
- Biology
- Hydrology
- Soil condition
- Water chemistry







Step 2: reviews

- Review the Sea Level Affecting Marshes Model (SLAMM) report (US EPA 2019) & two draft journal articles to ensure inclusion of:
  - ✓ All the variables and models deemed important during the RWVF case study.
  - ✓ Additional exposure-response relationships in the diagram

- Reference historic trends and future projections from the fourth National Climate Assessment for the Northeast and other relevant literature on:
  - ✓ Temperature
  - ✓ Precipitation patterns
  - ✓ Sea level rise
  - ✓ Storm surge events

- Consider literature on existing conceptual diagrams:
  - ✓ Wetland Productivity Graphic created by the Coastwide Reference Monitoring System in Louisiana
  - ✓ Diagrams from the EPA CADDIS website
  - ✓ Publications by: Cahoon et al. 2009; Fagherazzi et al. 2019; Gonneea et al. 2019; Haaf 2015; Kirwan et al. 2013; Krauss et al. 2014 (mangroves); Leonardi et al. 2018; USEPA 2012 (MassBays)

Step 3: create a conceptual diagram that includes components from WATCH, the RWVF case study, climate change and the literature review

Full conceptual diagram

Climate change components

Upper-level sources of stressors, directly affected by human activities

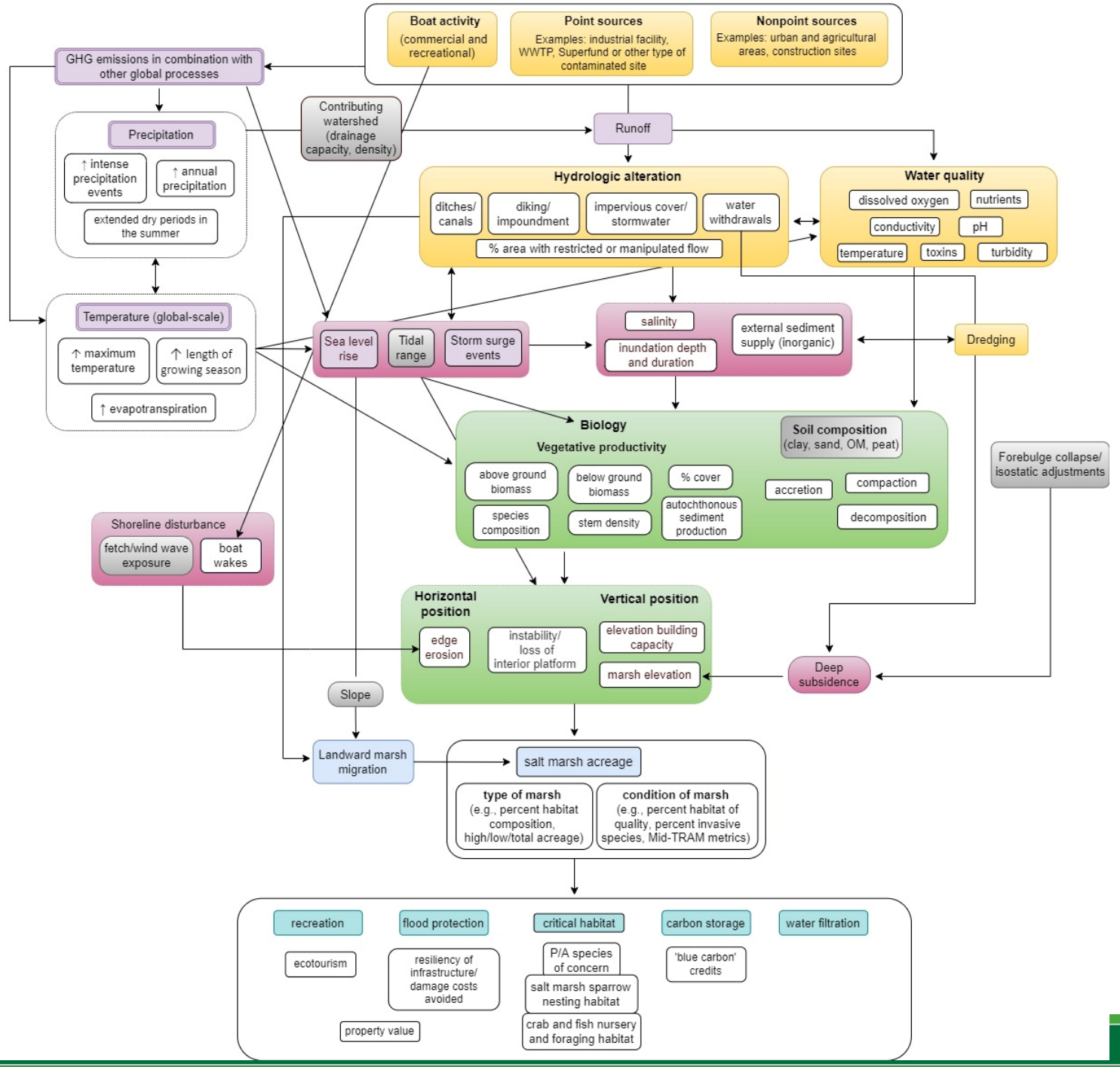
Natural factors not easily manipulated or altered

External factors that most directly affect internal marsh processes and marsh condition

Internal marsh processes

Response

Ecosystem services, beneficial outputs



WATCH only

Climate change components

Upper-level sources of stressors, directly affected by human activities

Natural factors not easily manipulated or altered

External factors that most directly affect internal marsh processes and marsh condition

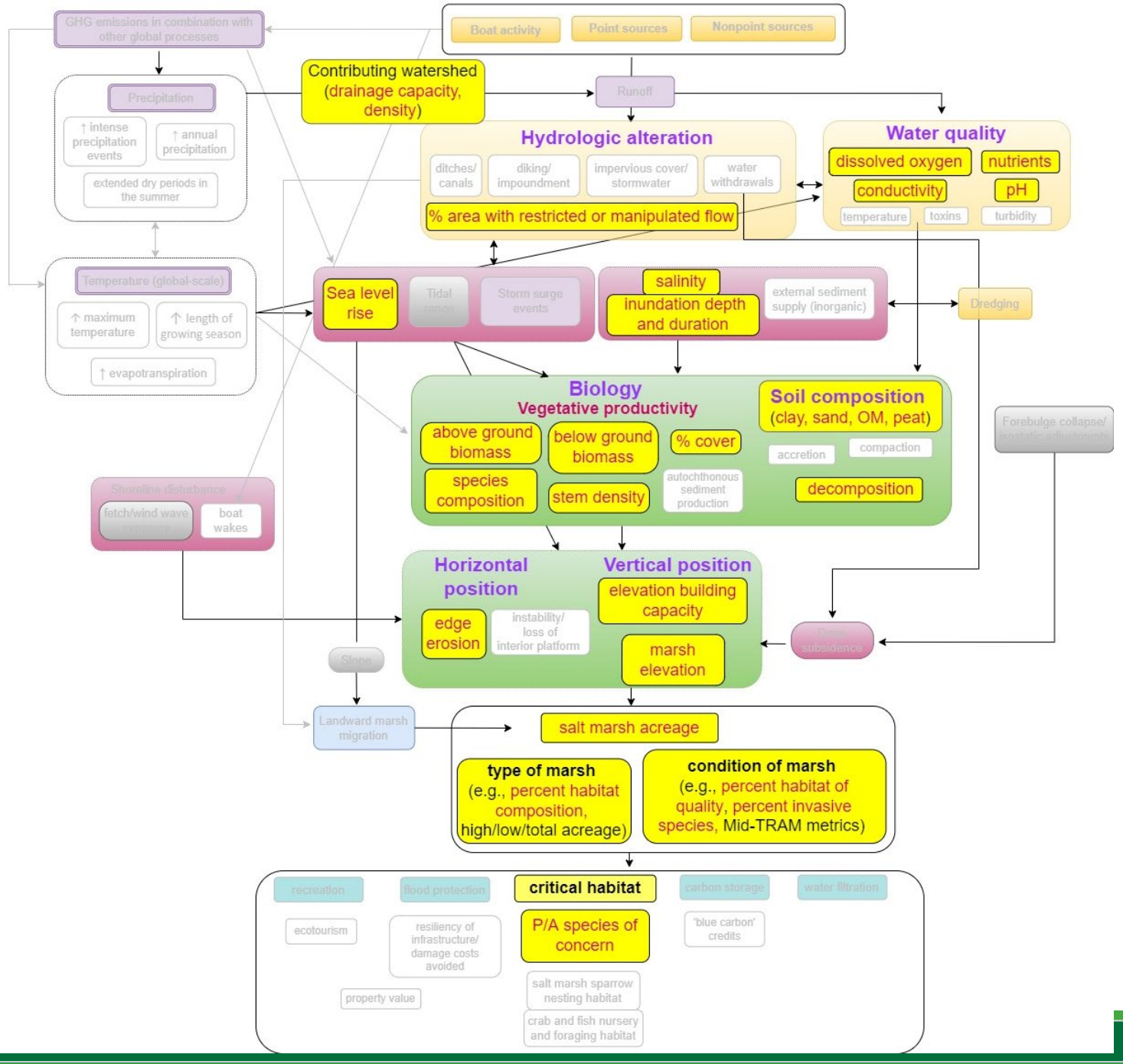
Internal marsh processes

Response

Ecosystem services, beneficial outputs

WATCH attribute

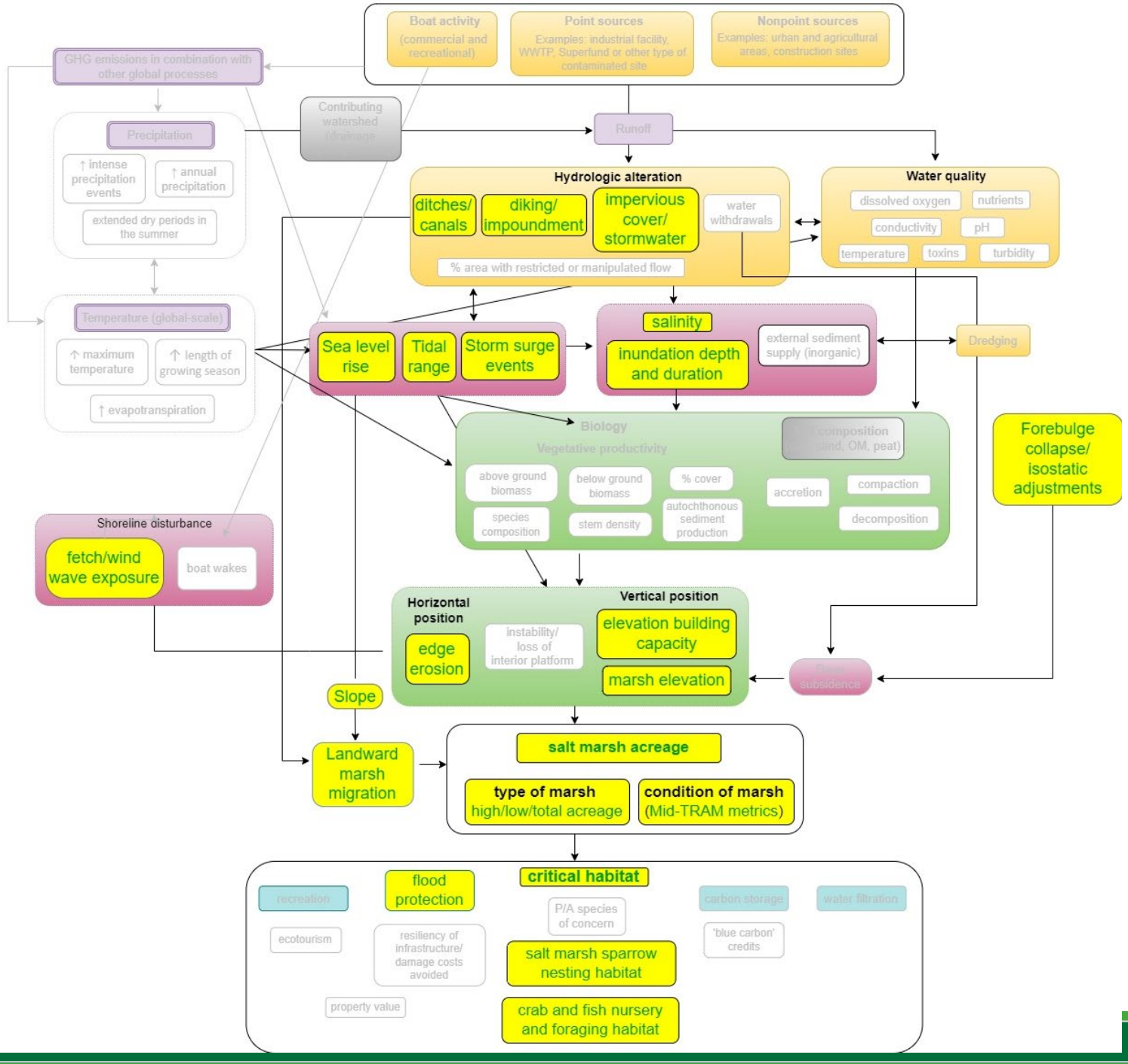
WATCH worksheet entry



RWVF case study only

- Climate change components
- Upper-level sources of stressors, directly affected by human activities
- Natural factors not easily manipulated or altered
- External factors that most directly affect internal marsh processes and marsh condition
- Internal marsh processes
- Response
- Ecosystem services, beneficial outputs

RWVF case study



WATCH and RWVF diagram

Climate change components

Upper-level sources of stressors, directly affected by human activities

Natural factors not easily manipulated or altered

External factors that most directly affect internal marsh processes and marsh condition

Internal marsh processes

Response

Ecosystem services, beneficial outputs

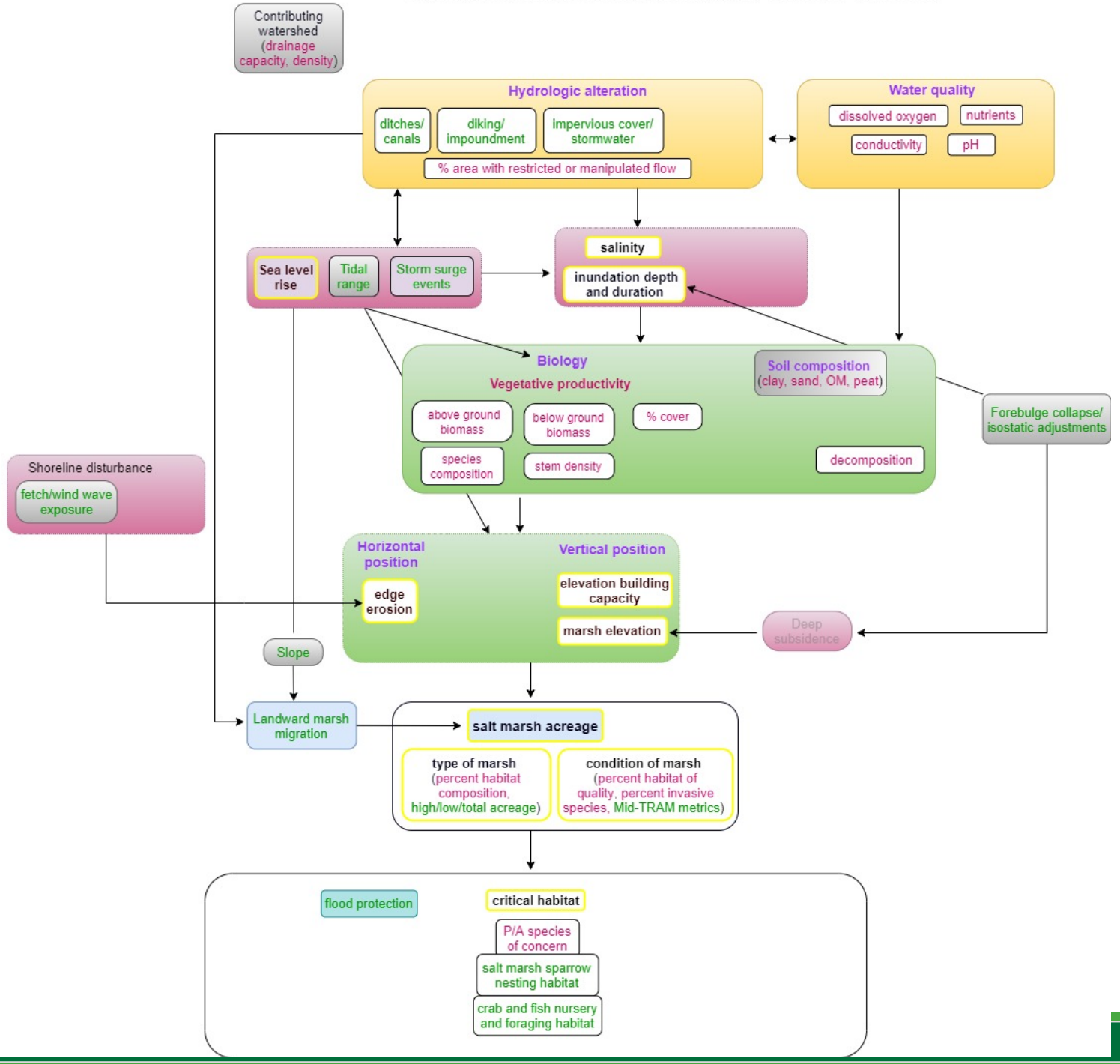
WATCH attribute

WATCH worksheet entry

RWVF case study

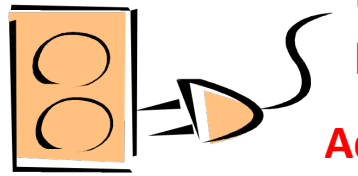
In both WATCH and the RWVF case study

Our biggest focus (internal marsh processes, response)



We could do more on stressor identification

What is causing the problem? Can something be done to fix it?
If so, can climate-smart tactics be used to improve resiliency?



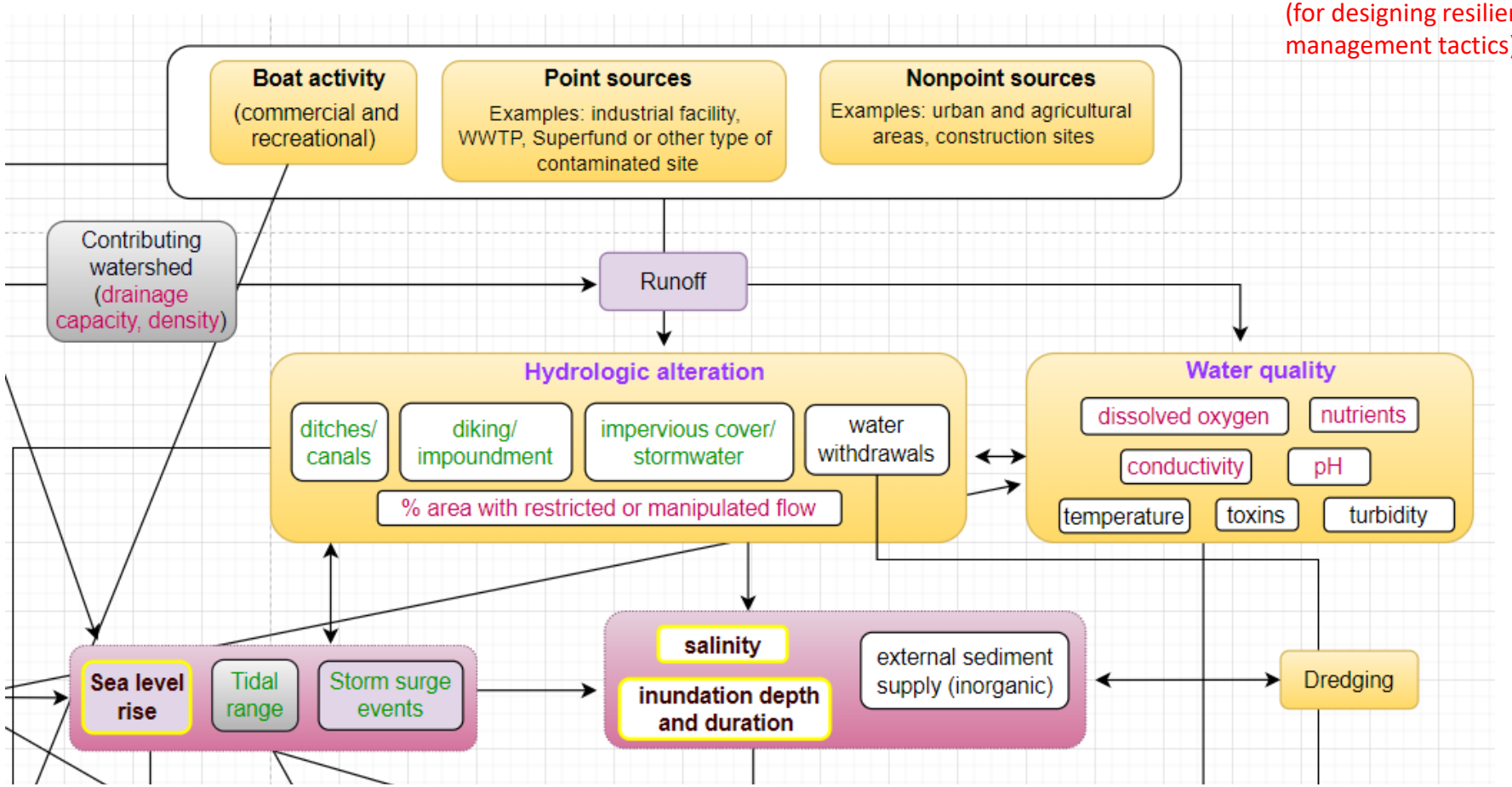
Potential plug-in

Adaptation Design Tool
(for designing resilient management tactics)

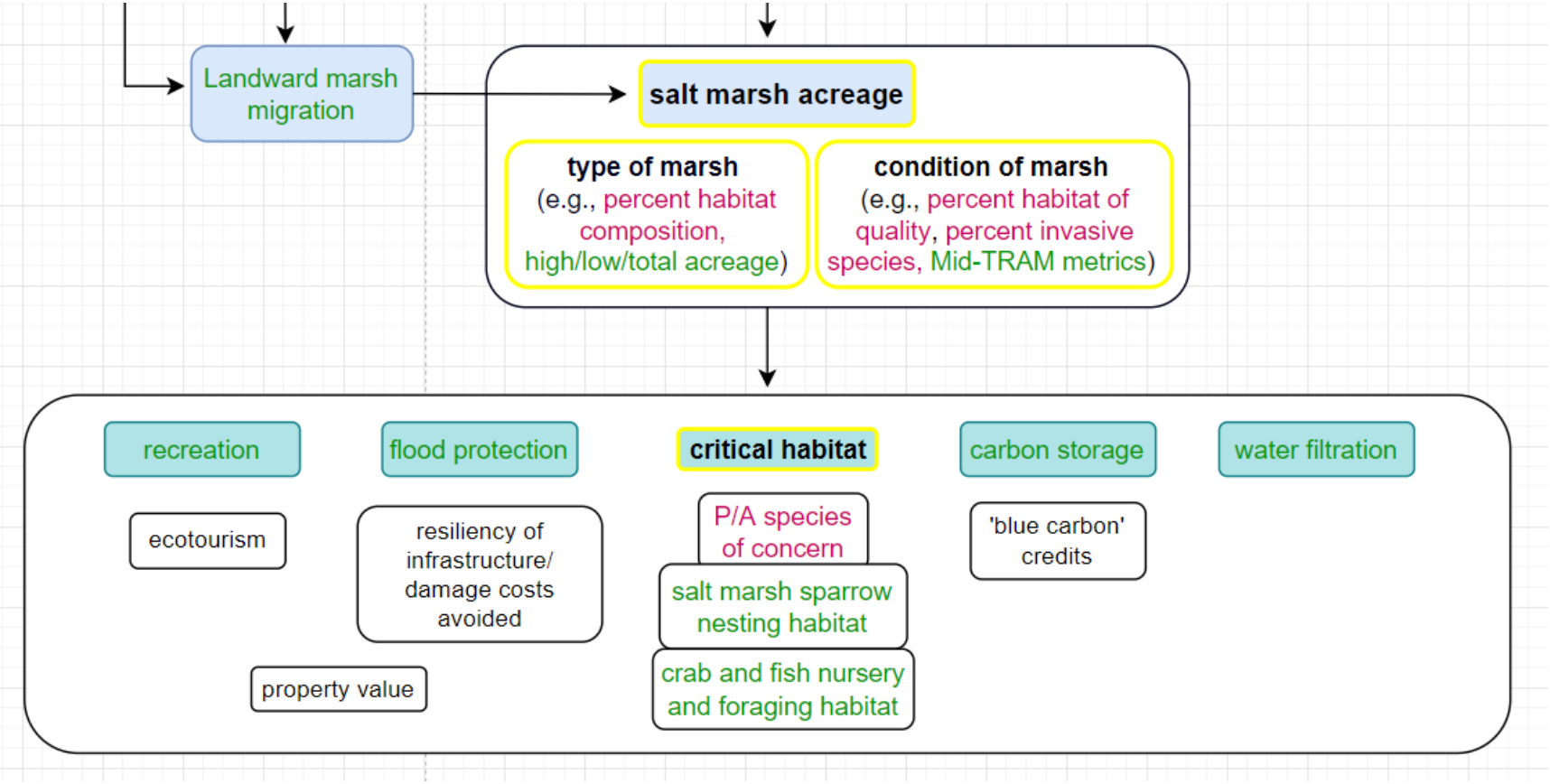
Upper-level sources of stressors, directly affected by human activities

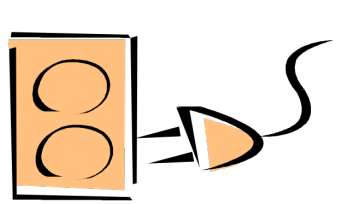
Examples of potential national-scale, standardized data sources:

- EPA Envirofacts
- NLCD Land Cover



We could also do more on ecosystem services/beneficial outputs





Potential plug-in

Coastal Resiliency Decision Support System

Contact: Anne Kuhn, Kuhn.Anne@epa.gov

- Web-based system, embedded in a story map, to inform sustainable decision making with a watershed perspective
- Informs science-based decision making for *modifiable factors* that increase coastal resiliency with focus on natural infrastructure
- Integrates measures of Ecosystem Services (ES) and ecological condition to inform decision making
- ES scoring metrics calculated based on direct spatial relationships using GIS methods

Other tie-ins:

- Final Ecosystem Goods and Services (FEGS) Scoping Tool
- Rapid Benefits Indicators (RBI) Approach

Discussion

Objective: Further clarify how attributes in WATCH and principal factors in the RWVF are characterized and used, how they respond to climate change effects and other threats, and how they relate to each other and to other tools

- Does the conceptual diagram help meet the objective?
- In what ways could this conceptual diagram be put to practical use?
- What creative elements could be added that would increase its utility?