



Ecological Restoration Site Selection Drivers, Principals, and Prioritization

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Agenda

- Drivers
- Policy and Regulations
- Developing Search Criteria
- Desktop Analysis
- Field Investigations
- Prioritizing and Selecting Sites



Drivers

The #1 driver is funding!

Follow the policy and regulations...

- **Mitigation**
 - PRM, Banking, In-Lieu Fee, and NRDA
- **Nutrient and Sediment Reduction**
 - TMDL and MS4
- **Environmental Stewardship**
 - Habitat Restoration
 - Conservation/Natural Capital Valuation
 - Climate Change Solutions/Resiliency



Policy and Regulations

- Directly connected to project drivers
- Can vary widely from state to state and jurisdiction to jurisdiction
- Significant philosophical differences
- The “rules” can change quickly

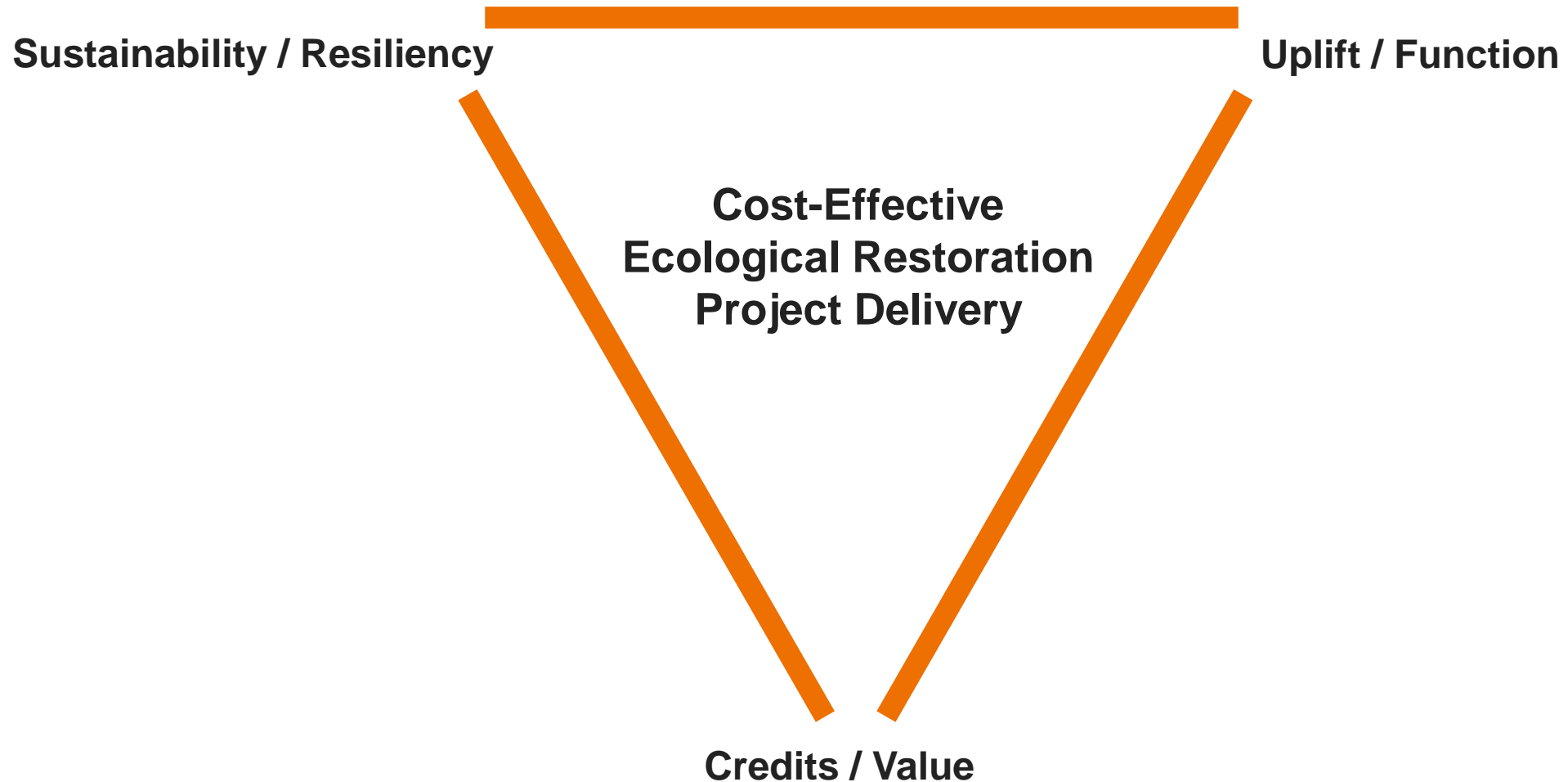
Examples

- **Function Based Mitigation can vary widely**
 - MD receive credit multiplier for DA >1 mi² (up to 10 mi²)
 - PA receive credit multiplier for DA <2 mi²
- **Evolution of MS4 Impervious Acres Treated in MD**
 - 100 LF = 1 AC → BANCS P1 Default Values
→ P2-P4 → Restoration Efficiency
→ Qualifying Conditions → Site Specific Data





Finding the Right Balance...





Developing Search Criteria



**Where do I search?
Defining the geographic
boundary....**

- Forecasting Impacts (Service Areas)
- Existing Land Holdings
- Public vs. Private Land
- Target Watershed (Scale)



**Back to project
drivers**

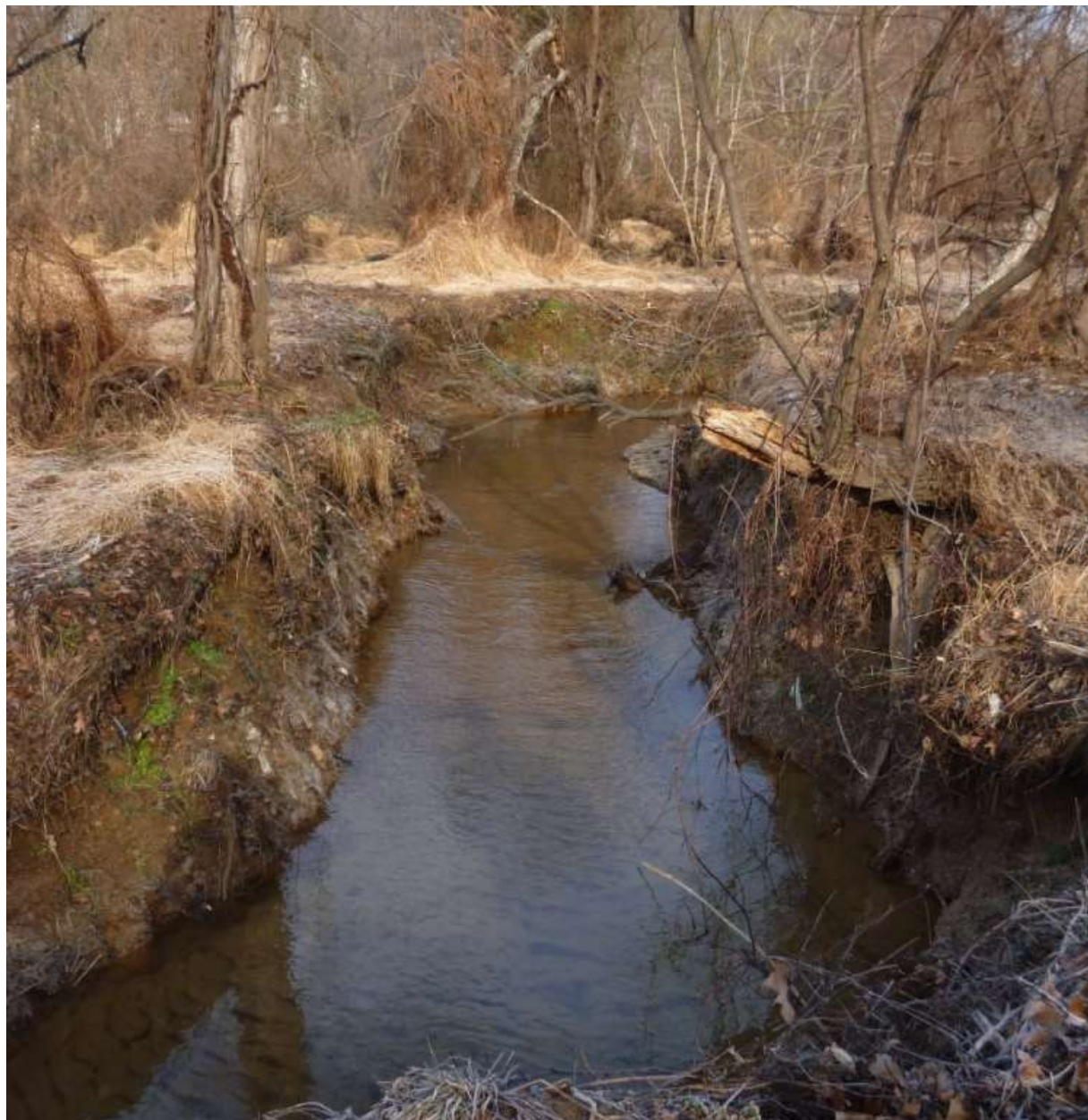
- Define Goals and Success Metrics
- What to Target and What to Avoid
- Project Size



Desktop Analysis Tools and Technologies

- GIS Query
 - Tier 1 - Watershed Boundaries, Parcel Data, Hydrology, Aerial Imagery
 - Tier 2 - Lidar (Topography), Wetlands, RTE, Protected Lands, Land Use/Land Cover
 - Sort number of records by channel length
 - **Watch out for channels that run along parcel boundaries**
- DEM Differencing
- Data Quality and Availability
 - Garbage in, garbage out...





Field Investigations

- The next step is to ground truth the candidate sites and ranking them. But how?
- Critical to identify project non-starters that could not be identified during the desktop analysis.
- Everything is not always as it seems
 - Access/Topography
 - Utilities/Infrastructure
 - Boundary Conditions
 - Vertical and Lateral Constraints
 - Bank Height
 - Bank Erosion, Mass Wasting, or Bank Failure
 - Restoration Potential



Developing Scoring Criteria Example (Part 1)

	Optimal (8 – 7)	Suboptimal (6 – 5)	Marginal (4 – 3)	Poor (2 – 1)
Channel Length (LF)	> 6,000	6,000 - 4,000	4,000 - 2,000	< 2,000
Drainage Area	< 1 sq. mi.	1-2 sq. mi.	2-4 sq. mi.	> 4 sq. mi.
% Impervious	>50%	30-50%	10-29%	<10%
Property Owners	1 or More Public Landowner(s)	1- 2 Private Landowners	3- 4 Private Landowners	5 or more Private Landowners
Access/Topography	Unrestricted: Access is relatively flat, open, dry, within 100 ft of a public road.	Minor Constraints: Access is relatively flat, open, dry, within 100-500 ft of a public road, may require special construction road treatments.	Moderate Constraints: Some steep slopes, some vegetation clearing, some wet areas, between 500-1,000 ft of a public road, may require special construction road treatments.	Significant Constraints: Access location has steep slopes, is heavily vegetated, has wet areas, is over 1,000 feet from a public road and may require special construction road treatments.
Forest Cover	Sparse (0-10%): Treeline extends to a width of <30ft	Limited (11-30%): Treeline extends to a width of 30 - 60 ft	Moderate (31-50%): Treeline extends to a width of 60 - 100 ft	Dense (51-100%): Treeline extends to a width of >100ft
Wetlands	Occupies less than 10% of corridor	Occupies 10-30% of the corridor	Occupies 30-50% of the corridor	Occupies greater than 50% of the corridor
Utilities/Infrastructure	None: No obvious underground and/or overhead utilities present within the site.	Minor: Presence of underground and/or overhead utilities observed within the site.	Moderate: Presence of underground and/or overhead utilities. Anticipate incorporating protection measures but not relocation of utilities.	Significant: Presence of underground and/or overhead utilities with the restoration site. It is anticipated that the restoration site. It is anticipated that the restoration design will need to incorporate utility relocations (s).
Boundary Conditions	Good: no sediment supply, ability to easily achieve floodplain re-connection	Moderate: low sediment supply, ability to achieve partial floodplain connectivity	Poor: moderate sediment supply, ability for floodplain benching only	Very Poor: High sediment supply, no potential for floodplain re-connection



Developing Scoring Criteria Example (Part 2)

	Optimal (8 – 7)	Suboptimal (6 – 5)	Marginal (4 – 3)	Poor (2 – 1)
Vertical and Lateral Constraints	0 Constraints: Lateral encroachments and vertical controls that would limit the ability to perform restoration or increase cost to perform work.	1 to 2 Constraints: Lateral encroachments and vertical controls that would limit the ability to perform restoration or increase cost to perform work.	3 to 4 Constraints: Lateral encroachments and vertical controls that would limit the ability to perform restoration or increase cost to perform work.	>5 Constraints: Lateral encroachments and vertical controls that would limit the ability to perform restoration or increases cost to perform work.
Bank Height	> 6'	4-6'	2-4'	< 2'
Bank Erosion	75-100% eroded banks	50-74% eroded banks	25-49% eroded banks	0-24% eroded banks
Erodibility Description	Extreme: Active headcuts and/or significant potential for new headcuts. Streambed is expected to vertically degrade followed by a period of channel widening.	High: Highly incised, top-of-bank width to depth ratio is low, in-channel deposition features are limited.	Medium: Highly incised, top-of-bank width to depth ratio is low, in-channel deposition features are prevalent.	Low: Channel incision is low, vertical degradation potential is limited. Floodplain vegetation rooting depth extends to base level of streambed.
Mass Wasting or Bank Failure	Extreme: Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercutting, and bank slumping, is considerable. Channel width is highly irregular, and banks are scalloped	High: Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Medium: Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Low: No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach
Restoration Potential	Priority 1: Convert F or G stream types to E or C stream types at the previous elevation with floodplain	Priority 2: Convert F or G stream types to E or C by re-establishing the floodplain at the existing level or higher, but not at original level	Priority 3: Convert G stream types to B, or F stream types to Bc that contain a flood-prone area but not an active floodplain	Priority 4: Stabilize channel in place
Adjustment Factor	Add or subtract up to a total of +/- 12 points for site characteristics not captured above. i.e., Bedrock, Onsite Spoil, RTE Species, Historical or Cultural Resources, etc.			



Prioritizing and Selecting Sites

- Prioritizing and selecting sites starts with understanding what is important to you and your organization or clients
- Clearly define your goals and objectives
- Don't be afraid to create separate categories or buckets for different types of sites especially those with different drivers
- Reflect on the cost-effective Ecological Restoration Project Delivery Triangle





Questions?

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