
Value equivalency methods

Financial security and insurance

Habitat banking

REMEDE

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Topics Covered

- Value Equivalency Methods for Restoration Scaling
- Financial Security and Insurance
- Habitat Banking

Scaling Remedial Actions Using Value Equivalency Analysis (VEA)

- What is value equivalency scaling (valuation)?
- When would you want to use it?
- What methods allow for value equivalency scaling?
- Applications and Case examples

HEA, REA v. VEA

- In many cases, the remediation actions provide the same resources or services as those lost and HEA or REA are appropriate scaling tools
- In other cases, we cannot remediate the same resources or services, but can remediate similar resources. VEA is appropriate to scaling remediation in these cases - focuses on human services

Critical Issues in Valuation Scaling

- When is it appropriate?
 - When remedial options provide different resources/services
 - When location of remedial option is different than damage site
 - When assumptions based in HEA/REA cannot be supported

- VEA and HEA/REA may not result in same amount of remediation
 - Metric for scaling is different
 - May have cost implications.

Annex II References

- Method Applicable to Scale Complementary and Compensatory Remediation Actions
 - § 1.2.2. Where it is not possible to provide services of the same type, quality and quantity as those damaged then alternative natural resources and/or services shall be provided. For example, a reduction in quality could be offset by an increase in the quantity of remedial measures.
(Annex II: Section 1.2.2)
 - § 1.3.3 Remedial Option Evaluation
 - When selecting Remedial Options, the competent authority should consider among other items.....
 - ... The extent to which each option takes account of relevant social, economic and cultural concerns and other relevant factors specific to the locality,
 - ... The geographical linkage to the damaged site.
- Method can help determine how much more of a resource is necessary to offset the reduction in quality.

What Do We Mean by “Value”

- This is the rate at which individuals are willing to trade off one resource or service for another
- The value of resources and services can be determined by:
 - How much money an individual is willing to give up to get a resource or service

OR

 - How much of other resources or services an individual is willing to give up
- VEA can help measure both types of value

VEA is similar to HEA or REA

- In HEA/REA, use common units of similar resources or services
 - Hectares of wetland lost = Hectares of wetland gained
- In VEA, allow for the use of dissimilar units of different resources or services.
 - Hectares of wetland lost = kilometers of forest paths

Examples

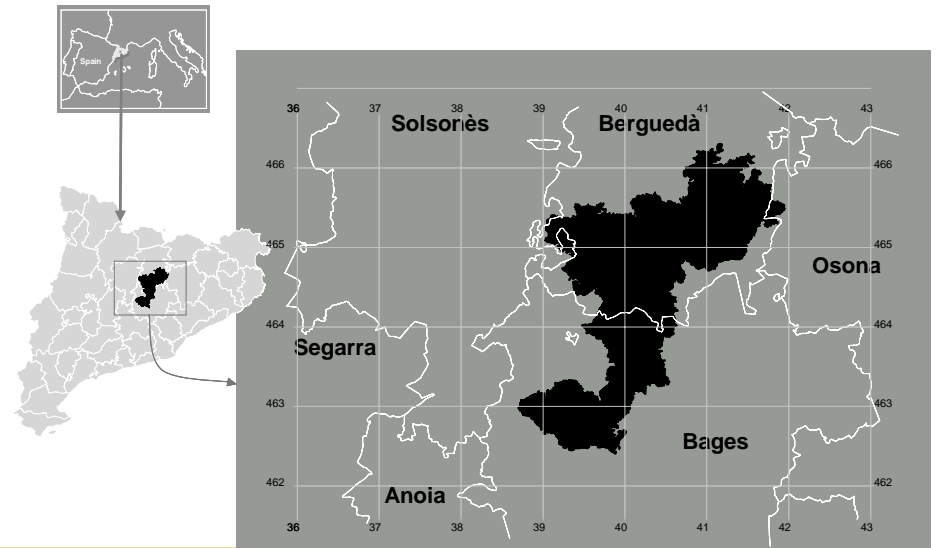
- BABE Forest - Spain
 - Similar resources, different location
- Green Bay - Wisconsin, USA
 - Different resources and services
- Groundwater - Colorado, USA
 - Same resources, different services

BABE Forest Fire

- Description of Damage
- Remedial Options
 - Not at the location of damage
 - Potentially far away, even in France
 - Different remedial actions
 - Preventing future forest fires
 - Planting trees
 - Different times

Bages-Berguedà (BABE) Forest Fire

- In 1994 25,000 ha of Black Pine (*Pinus nigra*) in Catalonia, NE Spain burned
 - Malfunctioning Power Line
 - Protected species - Annex I EU Habitats Directive

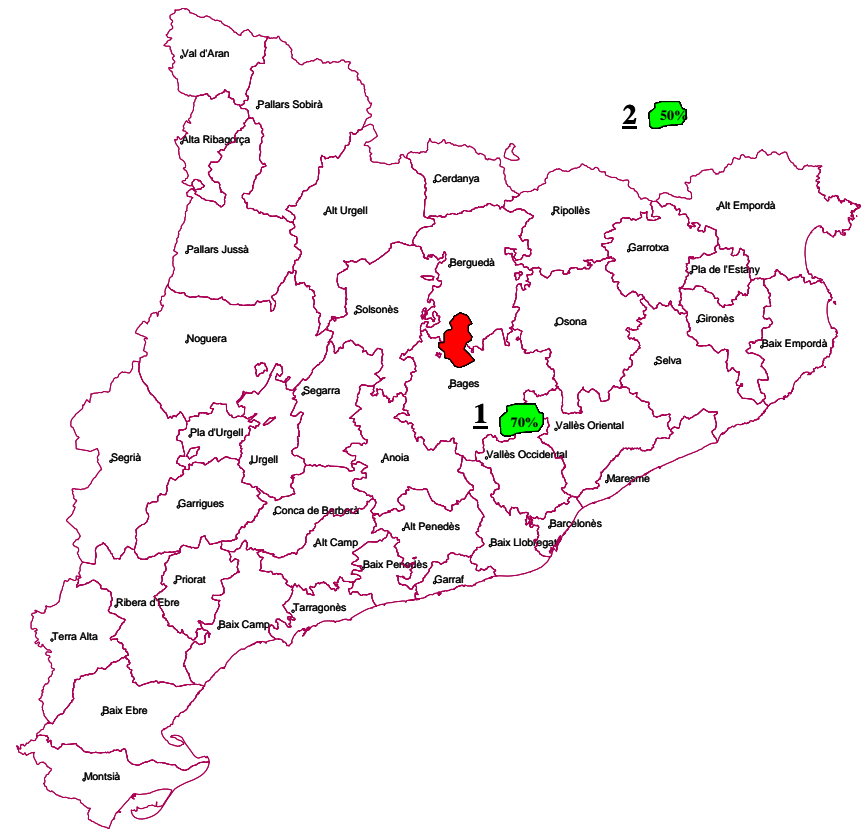


Remedial Options

- Only Compensatory
 - Primary remediation on-site returned resources to baseline
 - off-site remediation plan consisting of the forestation of other available areas in Catalonia with Black pine trees
 - Location of projects matter to people
 - a large-scale fire-prevention plan involving splitting large forests up into smaller forested areas separated by firebreaks
 - Fragmented areas have lower ecological value

Location of Remedial Actions

- Location of remedial actions affect the amount of remediation necessary
 - Within region - for every km further away need and additional 1 % remediation
 - Outside of region - an additional 5% of remediation necessary for every km
 - Outside of Spain - remediation not seen as equivalent/appropriate



Green Bay, Michigan/Wisconsin



PCB / Dioxin Contamination

Aquatic Resources/Sediments
Fish

Birds - bald eagles

Recreational Fishing

Fish Consumption Advisories

Green Bay NRDA - Restoration Scaling

■ Injured Resources:

- Sediments
- Water Column
- Birds
- Fish

■ Injured Services:

- Recreational Fishing
- Aesthetics

■ Remedial Options

- Primary
 - Partial Sediment clean up
- Complementary/Compensatory
 - Wetland Creation / Preservation
 - Agricultural lands runoff control
 - Improved recreation opportunities

- Remedial Options were of a different type and quality
- VEA used to determine the quantity necessary

Scaling Restoration

- Authorities used an survey of public values and attitudes (“total value equivalency analysis”)
- The value to the public of the increase in environmental quality that will be achieved through restoration is balanced against the value that will be lost because of continuing PCB injuries
- This determines “how much is enough,” with the flexibility to consider different project mixes

Results - Restoration Scaling

PCB Cleanup Scenario	Wetlands		Increase in bay water clarity from runoff control	Improvement in existing parks
	Acres preserved	Acres restored		
Intensive (injuries gone in 20 years)	8,700	2,900	+2"	10%
	6,900	2,300	+6"	5%
Intermediate (injuries gone in 40 years)	9,900	3,300	+4"	10%
	8,700	2,900	+8"	10%

Groundwater

- Contamination of groundwater resources
 - Water not usable for drinking
- Remedial Options
 - Household conservation
 - Public area conservation
 - Industrial conservation
 - Protection of future contamination at different sites
 - Increased storage capacity

Groundwater

- Survey of the public to determine their trade-off rates between the types of remedial options and damage
- Use this information to adjust a resource to resource scaling effort
 - The trade-off rates are used to adjust the scaling metrics
- Remedial Options
 - Household conservation
 - Public park/golf course conservation
 - Industrial conservation
 - Protection of future contamination at different sites
 - Clean up of contaminated sites
 - Removal of invasive plants that use a lot of water
 - Increased storage capacity

Groundwater Remediation Options

	Option A	Option B
Save water at the household level	None Save 150 AF per year for 20 years, for a total of 3,000 AF of water saved	None
Save water at parks, golf courses, power plants, and factories.	Save 125 AF per year for 20 years, for a total of 2,500 AF of water saved	Save 50 AF per year for 20 years, for a total of 1,000 AF of water saved
Replace tamarisk along canals and rivers with native plants that use less water.	Save 125 AF per year for 20 years, for a total of 2,500 AF of water saved	Save 75 AF per year for 20 years, for a total of 1,500 AF of water saved
Clean-up contaminated groundwater	None	Clean up 125 AF per year for 20 years, for a total of 2,500 AF cleaned and stored
Store extra spring runoff in wet years for later use.	Store 100 AF per year, on average, for 20 years for a total of 2,000 AF	Store 100 AF per year, on average, for 20 years for a total of 2,000 AF
Install porous pavement in parking lots.	Store 75 AF per year, on average, for 20 year for a total of 1,500 AF	None.
Which plan would you prefer? (Mark with X)		

Relative Preferences (Values) of Remedial Options

- 1st - Groundwater Protection
- 2nd - Water Storage
- 3rd - Groundwater clean up
- 4rd - Industrial Conservation
- 5th - Public Park Conservation
- 6th - Home Conservation
- 7th - Removal of exotic phreatophytes

End of Value Equivalency Analysis

Financial Security and Insurance

- **§ 27** “Member States should take measures to encourage the use by operators of any appropriate insurance or other forms of financial security and the development of financial security instruments and markets in order to provide effective cover for financial obligations under this Directive.”

- **Article 14.2** “...shall also consider in relation to financial security the following aspects: a gradual approach, a ceiling for the financial guarantee and the exclusion of low-risk activities.”

Financial Security and Insurance

- What activities require financial security/insurance?
 - ELD references Annex III activities (Article 14.2)
 - Other activities may require coverage
 - Determined by member states

- What are Financial Obligations under the ELD?
 - Cost of Primary, Complementary and Compensatory Remediation
 - Competent authority oversight
 - Monitoring and reporting
 - Cost of conducting assessments

Cost of Remediation

- Primary
 - Removal of source of damage (e.g., contaminants, physical disturbance)
 - Remedial actions to recover to baseline
 - Planning, engineering, implementing
- Complementary and Compensatory
 - Planning, engineering, implementing
- In many cases, source removal is the most expensive activity

Example Approach to Financial Security or Insurance

- Allow for multiple guarantee levels
 - Based on evaluation of Expected Liability
 - Probability of event x Remediation costs
 - Level 1 - no guarantee necessary
 - Level 2 - €250,000
 - Level 3 - €500,000
 - Level 4 - €1,000,000
 - Level 5 - €5,000,000
 - Level 6 - €10,000,000
 - Level 7 - > €20,000,000 - requires site specific evaluation
- Multiple methods of guarantee
 - Insurance
 - Bonding
 - Assets/collateral

Methods to Determine Guarantee Level

- ❑ Use ex-ante evaluation of risk via hazard scenarios (representative case studies)
 - Key Factors:
 - ❑ Industry sector
 - ❑ Size of operations
 - ❑ Special characteristics
 - toxicity of the wastes handled
 - local receiving environment (e.g., proximity to Natura 2000 sites, surface water)
- ❑ Allow individual operators to opt out of Guarantee Levels and do site specific evaluation
 - Third party evaluation of results

Simplified Example

	Primary Remediation	Complementary / Compensatory	Probability of Scenario	Expected Liability
Scenario 1	€ 250.000	€ 100.000	0.5	€ 175.000
Scenario 2	€ 500.000	€ 250.000	0.2	€ 150.000
Scenario 3	€1.000.000	€ 500.000	0.2	€ 300.000
Scenario 4	€2.000.000	€1.000.000	0.1	€ 300.000
			Sum Expected Liability	€ 925.000
			Precautionary	€ 3.000.000

End of Financial Security

Habitat Banking

- What is a Habitat Bank?
- Role of Banks in ELD ?
- How do you determine credits in the bank?

What is a Habitat Bank?

- Functioning habitat that has been developed to address future environmental liabilities
 - *“an entity that restores, creates, enhances or preserves a habitat. It sells tangible units of habitat (or facilitates land purchase and creation of habitat), termed credits, to a developer to use as compensation for equivalent units that a development would impact upon, termed debits.” (Gillespie, R. & Hill, D. (2007))*
- Allows for the offset of environmental remediation through the purchase of “credits” in the bank
- Initially developed to offset development impacts (roads, buildings, etc)

When might habitat banks be used under ELD?

- Should only be considered an option to resolve liability for (complementary?) compensatory remediation.
 - Should not offset primary remediation needs
- For similar resources in similar locations
- Habitat banks may have limited application to Natura 2000 sites.
 - Article 6(4) of the 'Habitats Directive' 92/43/EEC, Jan. 2007) "The option of habitat banking as compensatory measure under Article 6(4) is of very limited value due to the tight criteria mentioned in relation to the need for compensation to ensure the protection of the coherence of the network.

Determining Credits

- Some banks are based on the number of animals/plants within the bank.
 - Bank can sell credits for each animal/plant
 - One to one relationship between debit and credit
- Other banks use Eco-scores
 - indicators for complex ecosystem situations
 - Allows for the trade-off of one resource for another

Habitat Banks - Some Concerns

- Centralization of credits within specific habitat types (rather than the damaged resources); incentive to claim that bank is properly compensatory
- Environmental justice: credits not located at site of damage
- Is habitat actually being improved?
- Marginal benefit of environmental credit at location of bank?
- Consideration of spatial heterogeneity, migratory corridors, other ecological functions?
- Verification of credits: Who? How? When?
- Transferability of "eco-scores"?