

Environmental Impact Reports and Decision Analysis

Using value modeling to reinvent public policy

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What's an EIR? (*Value-neutral description*)

- Required under California Environmental Quality Act for a variety of public or private projects as part of the CEQA process
- Often the central document in public hearings and decision-making process for major land use decisions
- Typically provides fundamental decision frame for many major public or private policy decisions
- May be created by collaboration among engineering consultants and planners
- Looks at "environmental consequences" plus possible mitigation options in case these consequences are "significant"

Question: How well do EIRs work in framing land use and other major environmental decisions? What does a decision-analytic perspective add?



A land use project from Palo Alto, CA

- \$342 million projected project costs (privately financed)
- Four-lane roadway expansion in congested urban area also seeking to reduce auto dependency; considerable future development potential created via roadway improvements
- 1,000 housing units addressing local rental and senior housing shortages to be built on precious creekside open space
- Project crosses three municipal and two county jurisdictions with benefits and costs unequally distributed across all
- Major shopping center expansion planned as financing means for other improvements, also generating tax revenues for Palo Alto
- Other dollar mitigations planned for Palo Alto, but not neighbors (who didn't want the money anyway)

In other words: A classic high-profile, multiple-stakeholder, multiple-values environmental, transportation, and land use decision.

What's an EIR? (*Value-laden description*)

- Fundamentally alternative-driven by the "proposed project"
- Uses legalistic-administrative characterization of decision context
- Contains many, many value judgments with:
 - √ No clear underlying value structure, no meaningful tradeoffs or process for ordering or generating alternatives
 - √ Incomplete expression of rules for utilizing technical information in value judgments by decision-makers
 - √ Incomplete definitions of measurement criteria
 - √ No stakeholder inventory and mapping into values
- Traditional worst-case or nominal estimate approach with limited or no expression of uncertainty

Claim: The EIR process can create the antithesis of a values-focused, decision-analytic approach to multiple-value land use and environmental problems.

What's did the EIR lead to? (Political description)

- Over 200 speakers (x 5 mins.) at EIR City Council hearings based on the massive document
- Creation of local organization in opposition to proposed project as out of scale, out of synch with their urban design, open space, transportation preferences
- Sophisticated ad campaigns and mobilization against projects with parallel campaign in support by project applicant
- Threat of lawsuit from neighboring municipality over transportation or traffic analysis and impacts
- Resignations mid-course of City planning staff due to overwork
- Entire decision to a November City vote confounded by Council elections

Conjecture: The EIR process helped create and promote a predictable political controversy.

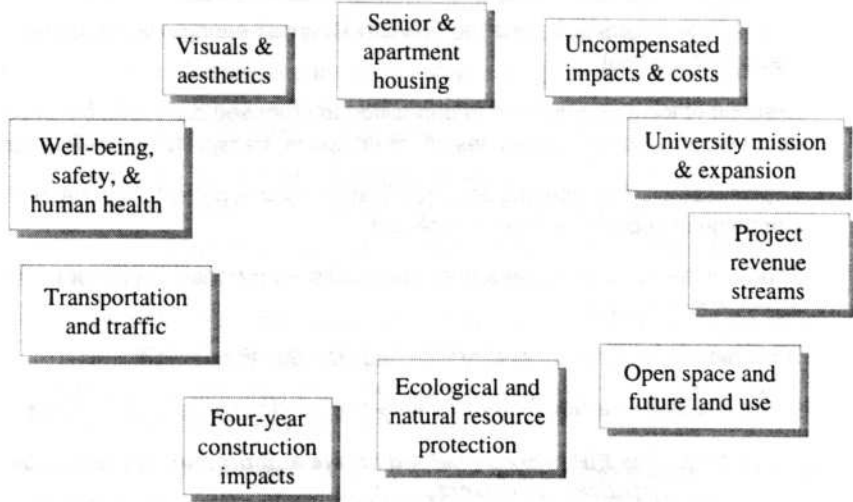
But it's not an easy fix...

- Public and city government process limits roles for explicit mathematical approaches, such as formal value weights, utility functions, quantified uncertainty, etc.
- Can have a very complex set of values with high stakes and uncertainty
 - ∨ Transportation, open space, city revenues, ecological impacts, housing
- Basic political and EIR process is slow and resistant to change

Therefore:

- ∨ Have problems of bounded rationality in spaces
- ∨ Need robust organizational conception of what values modeling is supposed to achieve in dynamic, complex public-political settings
- ∨ Need robust, "self-improving" approaches to values modeling

One solution: A traditional set of value categories developed by a local civic group...



...plus a semantics for value judgments

- "Benefit"
- "Benefit to other"
- "Cost"
- "Cost to other"
- "—" Lesser benefit or cost
- "?" (Uncertainty)
- "no net change"

	Senior housing and apartment housing
benefit	Number of units
benefit	Types of units (apt., senior), senior services
cost	Neighborhood design (transit access, shopping, etc.)
cost	? Affordability (BMR, non-BMR)

	Visuals & aesthetics
cost	Shopping center redesign & treescape changes
cost	Field landscape
cost	Creek bridge & Sand Hill Road treescape
cost	Ambient noise & light
benefit	New housing aesthetics

	Project revenue streams
benefit to other	Shopping center, housing, other revenues to Stanford
cost to other	Project costs for Stanford
benefit	Shopping center tax revenue to PA
benefit	Infrastructure mitigations to PA
benefit to other	New retail revenue at Shopping Center
no net change	? Competitive & business cycle impact on PA, MP

From a 3,000 page EIR to a single-page "Values Map"

benefit to other	Stanford mission & other Sand Hill expansion		
benefit	Medical center capabilities		
benefit to other	Stanford academic/research capabilities		
benefit to other	Other Sand Hill Road expansion		
cost	Transportation & traffic	cost	Open space & future land use
no net change	Traffic congestion changes & redistribution (short-term)	cost	Cumulative change to urban open space
cost	Traffic capacity & volumes changes (long-term)	cost	Future development of Stanford vacant lands
cost	Potential for unplanned future road changes	cost	Ohlone Field cultural & historical value
benefit	Facilitation of pedestrian, public, bicycle modes in project area	benefit	Recreational use and access
benefit	Senior housing and apartment housing	benefit	Project revenue streams
benefit	Number of units	benefit to other	Shopping center, housing, other revenues to Stanford
benefit	Types of units (apt., senior), senior services	cost to other	Project costs for Stanford
benefit	Neighborhood design (transit access, shopping, etc.)	benefit	Shopping center tax revenue to PA
cost	Affordability (BMR, non-BMR)	benefit	Infrastructure mitigations to PA
cost	Visuals & aesthetics	benefit to other	New retail revenue at Shopping Center
cost	Shopping center redesign & treescape changes	no net change	Competitive & business cycle impact on PA, MP
cost	Stanford West/Ohlone Field landscape	cost	Four-year construction impacts
cost	Creek bridge & Sand Hill Road treescape	cost	Traffic congestion & detours
cost	Ambient noise & light	cost	Noise, dust, & visuals
benefit	New housing aesthetics	cost	Unplanned project extensions
cost	Ecological & natural resource protection	cost	Well-being, safety, & human health
cost	Creek and meadow habitat, flora, wildlife	cost	Development contribution to urban congestion
cost	Creek erosion & channelization potential	cost	Bicycle, pedestrian, and automobile safety
no net change	Groundwater & soils impact	cost	Air quality
		cost	Uncompensated impacts & costs
		cost	Unplanned transportation/roadway costs
		cost	Creek flooding or erosion costs
		cost	Schools, utilities, or child care impact
		cost	Property values (roadway areas)
		cost	Local shopping congestion, parking



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Spelling out the Values Map...

cost	Ecological & natural resource protection
cost	Creek and meadow habitat, flora, wildlife
cost	Creek erosion & channelization potential
no net change	Groundwater & soils impact

DEFINITION OF CATEGORY: Ecological resources refers to wildlife, fish, flora, and habitat, considered as an whole ecological system. The perspective taken here is not to separate creek and the riparian edge from meadow and trees, but to consider the totality of changes proposed: as one functioning ecological system being traded for another. The current ecological system consists of large meadow contiguous with San Francisco creek, current flora, riparian edge area, and assoc. habitat. The alternative is a reconstructed ecological system, developed by removal of approximated 1200 trees (over 500 of little ecological value in the shopping center, but mature nonetheless), loss of about half the meadow area with planting of native grasses on what remains, about thirty feet of cre paving added to the bridge creek area, increased impervious surfaces allowing for greater non-point pollution runoff but designed to be controlled via filtration mechanisms and flood control techniques and hedgework to limit creek access for the approximately 2000 new residents close by. Consideration should be given to the role of time, in that new plantings do not mature immediately, and monitoring continued care will be required to assure success of the native grasses replantings. Creek channelization refers to the use of concrete or other hardening materials to halt erosion which threatens near-creek buildings or creates a flood hazard. Relevant here is the near-creek Senior housing and the planned paving (about 30 feet) needed to expand the bridge at San Francisco creek from two to four lanes. The last subcategory refers to water and soil in terms of their use value.

CIVIC LEAGUE EVALUATION: If this large environmental restoration project were proposed for an area of significantly lower ecological value than the creek-meadow system, with mature trees, it would be laudatory. The difficulty is that this multi-year environmental restoration (which implies at least a decade for the trees to mature, plus several years monitoring of the grasses replanting to ensure success, where a great number of new trees are to be planted is also unclear) is proposed to replace an existing ecological system of considerable local environmental value. This local value is due principally to the meadow area's uniqueness in the lower creek watershed (thereby contributing to ecological diversity) in addition to San Francisco creek itself being one of the last free-flowing, unpaved creeks on the Peninsula. "Downsizing" the meadow area is not considered to be "compensated" by the replanting adjacent to the new apartment housing, with the added population, taking up about half the meadow. Given also the impacted area is contained within a larger urban setting, the EIR neglects

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- The Values Map structure and semantics provided a natural organization for a values-focused policy statement
- Makes essential uses of EIR findings, largely uncontested
- Unlike EIR, include an open and intelligible values framework for considering the inevitable project alternatives

Values Map "algebra"

- Value hierarchy organizes 40 categories and promotes more realistic decision frames
- Allows ordinal 5-point scale when comparing one alternative to "do nothing" (benefit, benefit-, no net change, cost-, cost)
- Allows for ordinal value weight comparisons, and zero values representative of "other" stakeholder benefit or cost
- Uncertainty defined contextually, allowing for simple expressions of risk and quality of information

- "Benefit"
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Conclusions

- EIRs can be predictably dysfunctional by promoting known problems of alternative-focused decision-making
- Process constraints and bounded rationality limit success of overly formal efforts
- Can improve EIR process by using value-focused approaches to drive decision semantics without a full-blown formal model
- A Values Map or similar structure is sufficient to achieve this modest but important goal

