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Social impact

A comparison of a technical and a participatory application of social impact assessment

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Results of independent applications of a technical and a participatory approach to SIA are compared for an assessment of impacts of the proposed removal of hydroelectric dams to recover threatened and endangered salmon in the Pacific Northwest of the United States. The analysis focuses on empirical differences and similarities between the technical social analysis report (SAR) and the participatory interactive community forum (ICF) in terms of indicators used, projection of impacts, and types of social impacts identified in two communities. The SAR used a more homogeneous set of social structures and indicators to make expert-based projections. The ICF did not limit indicators to those aggregated across the region, but revealed residents' perceptions of impacts to their communities. A combination of the two approaches would provide robust findings of social impacts.

Keywords: SIA; technical; participatory; social indicators; impact projection; EIS

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SOCIAL IMPACT ASSESSMENT (SIA), or the measurement and projection of social impacts, is a methodology used to measure the social effects from proposed projects or policy actions. While the steps of the SIA process are well documented by the Interorganizational Committee on Principles and Guidelines for Social Impact Assessment (ICPG, 2003), there is less agreement on the methods for identifying impacts (Lockie, 2001).

Building from a dominant theoretical base in social indicator research, early applications often referred to as technical, focused on quantifiable impacts collected from readily available secondary data sources (Becker, 1997; Soderstrom, 1981). More recently, though recognized for some time, the identification of impacts has considered a wider range of social knowledge reflecting a participatory view; a view that those who are affected by proposed actions have a role in identifying the scope and magnitude of impacts (Chambers, 1997; Gismondi, 1997; Lane *et al*, 1997; Stolp *et al*, 2002).

In 1995, the US Army Corps of Engineers (Corps) commissioned an environmental impact study (EIS) to determine the impacts of recovering threatened and endangered species of salmon in the Pacific Northwest (US Army Corps of Engineers, 2002). Two distinct yet complementary SIAs, the social analysis report (SAR) and the interactive community forum (ICF), were carried out simultaneously to examine the social impacts originating from the potential removal of hydroelectric dams on the Snake River on communities in Idaho, southeastern Washington, and northeastern Oregon.

Corps planners employed the SAR, a technical

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approach, to obtain comparisons of impacts across communities. The goal was to acquire objective results based on readily available data that could be easily aggregated (Foster Wheeler Environmental Corporation, 1999). The purpose of the parallel ICF assessment, a participatory approach, was to supplement the findings of the SAR by providing insight into community-level impacts from the perspective of those most affected by proposed actions (Harris *et al*, 1999; see also Becker *et al*, 2003).

The purpose of this paper is to provide an empirical comparison of independent applications of a technical and a participatory approach in the United States, and to attend to what Lockie (2001) suggests is a fundamental theoretical contradiction concerning methods of impact assessment. We examine various claims made and concerns articulated in the technical–participatory debate by comparing the results of the SAR and ICF. The analysis focuses on similarities and differences in terms of the selection of social indicators, and the manner in which impacts were projected. Results are compared for two study communities to illustrate how technical and participatory approaches in general, and the SAR and ICF in particular, can be merged to provide robust findings of social impacts, and, where necessary, aggregating data for large-scale EISs.

Technical and participatory SIA

Technical and participatory approaches are often depicted as competing methods with distinct epistemologies and techniques for collecting data (Bryan, 1996; Carley, 1983). On the one hand, technical approaches are generally thought of as emphasizing a positivist way of thinking, where the scientist remains a neutral observer of social phenomena. The role of the scientist is to identify indicators, obtain objective measures relevant to the particular situation, and provide an expert assessment of how the system will change (Burdge, 1998). A key assumption is that, given sufficient data, accurate predictions can be made by those trained in the social science of impact assessment.

Technical approaches have not been without criticism (Carter and Willard, 1993; Geisler, 1993; Lane *et al*, 1997; Soderstrom, 1981). A common observation has been that they filter the identification of impacts through a model of inquiry that assumes individuals and communities respond and adapt to change in similar ways (Gismondi, 1997; Laird, 1993). Despite best attempts, pre-identified indicators may be speculative and rely on easily quantified data sources that may inaccurately measure social phenomena (Chambers, 1997; Blishen *et al*, 1979; Geisler, 1993).

Participatory approaches, on the other hand, use the knowledge and experiences of individuals most affected by proposed changes as the basis for projecting impacts (Craig, 1990; Dietz, 1987; Gismondi, 1997; Stolp *et al*, 2002). The role of the scientist is facilitator of knowledge sharing, interpretation, and reporting of impacts. Albrecht and Thompson (1988) argue that, when appropriately and effectively implemented, elicitation and consideration of individuals' perceptions, attitudes, and beliefs can be a key component of impact assessment. The difficulty lies in adequately controlling for individuals' biases and the influence of, say, their vested interests on personal interpretations of how their situation will change.

Even so, Lane and colleagues (Dale and Lane, 1994; Freudenburg and Keating, 1985; Lane *et al*, 1997) argue that SIAs in general, and participatory approaches in particular, are a value-laden and fundamentally political process in which peoples' biases cannot be entirely divorced from the projection of impacts. The comparisons that follow, while not representative of all technical and participatory applications, provide insight into the strengths and weaknesses of each and their potential to provide complementary information to the political process.

Comparison of SIA applications

The SAR portion of the Corps' EIS was completed in June 1999 and presented findings of an assessment of eight focus communities in the Snake River impact region of Idaho, Washington, and Oregon. The purpose of the assessment was to identify social impacts that would occur from salmon recovery actions, specifically those from the removal of hydroelectric dams, and extrapolate those impacts to non-sampled communities in the impact region (Foster Wheeler Environmental Corporation, 1999).

In the context of local and regional biological, economic and physical changes to the environment, the SAR assessed short- and long-range impacts on a purposive sample of communities selected for differences in population size, economic diversity, and anticipated impacts from the removal of Snake River dams. Key issues addressed included: what the social impacts of salmon recovery would be and

The social analysis report assessed short- and long-range impacts on a purposive sample of communities; a key premise of the interactive community forum was that community residents were capable of projecting the range of social impacts based on informed judgments

when they would take place; who would be affected; how they would be affected; how much they would be affected; and how communities would respond to those effects. The SAR is regarded as having a technical orientation to SIA because of its reliance on secondary data sources and expert-driven projections of impacts.

Alternatively, a key premise of the ICF was that community residents were capable of projecting the range of social impacts to the extent they provide informed judgments based on a thoughtful consideration of project alternatives and their consequences. With pressure from tribal, state and federal officials, the Corps hired researchers at the University of Idaho to design and facilitate an assessment of these judgments to complement findings from the SAR.

In total, 27 communities in the impact region were selected based on their varying economic and social dependencies on different natural resources, their relationship to the Snake River, demographics, and anticipated impacts from the removal the Snake River dams. The eight focus communities assessed in the SAR were also included in the ICF. Judgments of impacts were collected from 705 residents in interactive forums conducted from January to June 1999 (Harris *et al*, 1999). The objectives were to:

- introduce residents to preliminary scientific information obtained from corresponding analyses conducted for the Corps' EIS;
- measure communities' baseline situations and how they had changed since 1960, prior to the construction of the Snake River dams;
- allow residents to assess how their community would be affected by proposed actions; and
- obtain their ideas for mitigating identified impacts.

The ICF is regarded as having a participatory orientation because of its reliance on community-identified indicators and a projection of impacts by residents.

Selection of social indicators

The conceptualization, selection, and measurement of social indicators are interrelated tasks used to understand the likely consequences of proposed actions. A number of authors have commented on, and suggested models for, identifying indicators based on an array of theoretical perspectives, including models of human ecology (Hawley, 1950, Machlis *et al*, 1997, Murdock, 1979), social conflict (Carter and Willard, 1993; Nowak *et al*, 1982), general systems theory (Knop, 1987; Palinkas *et al*, 1985), and social action and planning (Lane *et al*, 1997; Greider and Little, 1988; Taylor *et al*, 1995), as well as a variety of other approaches (Blishen *et al*, 1979; Rickson *et al*, 1990; Rossi and Gilmartin, 1980; Slootweg *et al*, 2001).

Yet, much of what passes for SIA is largely non-theoretical (Bryan, 1996; Dietz, 1987; Knop, 1987). The selection of indicators is often based on convenience in data availability, cost and time constraints, and the qualifications and experiences of the researchers (Freudenburg and Keating, 1985). Care must be taken so that selected indicators represent measurable project outcomes or delineate between project impacts and ongoing processes of social change (Vanclay, 2002). The following is a comparison of how indicators were selected for the SAR and ICF.

Social analysis report

The method of indicator selection used in the SAR generally reflects an orientation where pre-selected indicators were used to outline the realm of possible social impacts. Specifically, the human ecology structure put forth by Force and Machlis (1997), indicators recommended by Burdge (1998), and the US Water Resources Council's (1983) economic and environmental principles and guidelines for water and land resource studies were used as the basis for selecting indicators. A final list was chosen by agency planners, scientific experts, and stakeholder interest group representatives based on data availability and their ability to be aggregated across selected communities (Table 1) (Foster Wheeler Environmental Corporation, 1999).

Relevant community information was collected from corresponding environmental and economic analyses conducted for the Corps' EIS to pinpoint impacts. Corresponding studies included changes in hydro-system power generation, recreation demand, transportation corridors, agricultural irrigation, construction, and salmon recovery (Foster Wheeler Environmental Corporation, 1999).

Additional indicators were gleaned from the Corps' preceding and related system operation review EIS (US Army Corps of Engineers, 1995), public scoping meetings, and through formal and informal contacts with community informants. Indicators that were more difficult to quantify were deferred to the parallel ICF study. Data sources included census track information from the US Census, state and local government records, school districts, and socioeconomic data from past studies in the region.

Interactive community forum

Methods of indicator selection used in the ICF represented a more inductive approach than that used in the SAR. Rather than measuring impacts from a standardized list used for all communities, residents determined the unique indicators most relevant to their situation. The assumption was that communities have a set of social values, relationships, histories and other attributes unique to their particular circumstance. Those unique traits were broadly captured in four areas of community life, or as they

Table 1. Comparison of social indicators and organization

Social analysis report (SAR)		Interactive community forum (ICF)	
Power generation - Residential rate increase - Rate employment impacts - Utility provider rate risk - Fixed income rate payers and poverty **Recreation** - Non-fishing river recreation employment - Displacement of non-fishing recreation - Change in salmon fishing employment - Short-term displacement of salmon fishing - Short-term crowding from salmon fishing - Availability of local fishing opportunities - Change in recreation site access - Change in recreation site services - Change in elderly recreationists **Water supply** - Employment from irrigation pump modifications - Costs for well irrigators and users **Implementation costs** - Employment effects from the implementation of alternatives - Influx of outside workers - Disruptions in transportation patterns	**Transportation** - Change in related employment - Farm spending related employment - Change in dryland farm income - Country property tax revenue - County sales tax revenue - Construction and maintenance - Change in grain transportation costs - Rate of farm consolidation - Transportation costs for other shippers - Uncertainty of commodity transportation - Highway congestion and safety **Salmon recovery** - Changes in community social cohesion - Risk and uncertainty of recovery to communities and business **Other social effects** - Change in community population - Long-term community employment - Short-term community employment - Total sub-regional net employment - Change in community aesthetics	**Social make-up** - Increasing or decreasing population - How rapidly population is changing - Aging of population - Number of older people - Retirees living in, or moving to, town - Ethnic diversity and its importance - Increasing or decreasing diversity - Trends in school enrollment - Extent of extended families living in community - Increasing or decreasing number of children staying in community - Home ownership - Trends in public assistance - Prevalent values of community - Customs and lifestyles - Family stability **Economy** - Job opportunities in community - Job wages and compensation - Extent of commuting for work - Proportion of workforce unemployed - Economic base of community - Economic diversity - Diversity of financial assets - Role of different public-sector jobs in the local economy - Reinvestment in the local economy and leakage of money - Trends in wealth and poverty levels - Cost of living - Relative utility prices - Property values	**Community character** - Business openings and closures - Extent of local shopping - Adequacy of social services including health, safety and education - Crime and community safety - Dominant transportation modes - Road and highway conditions in the community/region - Traffic congestion and safety - Changes in dominant land-use patterns - Land tenure and absentee ownership - Trends in family farming and farm size - Annexing of farmland - Parks and open space availability - Area scenic attractiveness - Level of air and water quality - Community appearance - Sense of place - Community attachment **Organization and leadership capacity** - Number of active civic organizations - Quality of political and civic leadership - Level of local government expenditure and budget - Success of bonds, levies and grants - Adequacy of fiscal resources and tax revenues - Community development planning - Extent of control over influential events and outside forces - Vision and preparedness for future - Level of social activities - Friendliness of the community - Ability to respond to change - Level of community cohesiveness and ability to work together

were referred to, 'dimensions' (Table 1) (Harris *et al*, 1999). These dimensions, which were influenced by the work of Harris *et al* (2000), included social make-up, economy, community character, and community organization and leadership capacity. The dimensions prompted residents to brainstorm indicators and debate impacts in diverse and interrelated spheres of community life.

Indicators, posed as questions to residents by forum facilitators, were presented within each dimension to highlight issues of possible relevance to a given community's situation. For instance, cohesiveness was presented as an indicator in the community organization and leadership capacity dimension to evoke thought on how a community's ability to work together might change from dam removal. Participants identified those indicators most relevant to their community's situation based on their personal experiences and local expertise. Social impacts were assessed by community participants based on these indicators.

Projection of social impacts

A commonly used technique for assessing future social impacts first describes the baseline condition and then attempts to project future conditions from that baseline, both with and without the proposed project (Barrow, 2000), while distinguishing between ongoing social change and social impacts deriving specifically from the proposed project (Vanclay, 2002). Geisler (1993) argues convincingly that *ex-ante* analysis, such as that used in SIA, is vulnerable to the complexities of project development and the unpredictability of human behavior. Other authors, such as Carley (1983), argue that social forecasting and modeling is an imperfect science

and that SIA methodologies should be designed to "enlighten" and "assist" political choices. More recent methodologies appear to have sidestepped the projection of impacts altogether, integrating proposed actions into ongoing planning and monitoring processes (see Chambers, 1997; Ende *et al*, 1998; Kruger and Shannon, 2000).

Most methods, however, fall into one or more of the following categories: trend projection, historical context, expert consultation, comparison communities, institutional analysis, computer modeling, or scenario construction (Burdge, 1998; ICPG, 2003). The projection of impacts is at the heart of the SIA process, and it is where the SAR and the ICF most clearly diverge.

Social analysis report

The scope and magnitude of social impacts were assessed using computer modeling, expert consultation, comparison communities, and scenario construction. Regional employment impacts were allocated to sub-regions based on economic input–output analysis of county-level regional economic impact study (REIS) data. From these data, employment estimates were disaggregated to the eight focus communities based on a 1995 economic analysis of individual communities in the impact region (Harris *et al*, 2000).

Scientific experts were then consulted to provide their judgments of the extent and range of community-level impacts as they related to the corresponding EISs on power generation, transportation, recreation, and other matters. Communities not assessed, but having similar socioeconomic conditions as those of the focus communities, were assumed to be similarly affected by the salmon recovery alternatives.

A review of the SIA literature was used to understand better the effects on communities in similar situations. In particular, literature was consulted on the realized social effects of, and community responses to, agriculture conservation programs, land tenure, changes in commodity transportation systems, and the loss of family farms. With this information, the social impacts on the eight focus communities were assessed by experts on a five-point scale ranging from very positive effects, to positive, no change, negative, and very negative effects.

Where community-level data could not be quantified or where none existed, impacts were determined based on the preponderance of evidence, economic modeling, and the historic context of each community. Historical data obtained from the parallel ICF assessment was used to aid in constructing scenarios of social impacts for each community.

Interactive community forum

As previously stated, the projection of impacts for the ICF process was based solely on residents' reporting of their personal judgments. It was recognized that they might provide biased responses, seek to achieve desired outcomes, or simply not have enough information, which could lead to inaccurate and less credible projections. For instance, wheat farmers that utilize the Snake River for barge transportation might overstate the negative impacts of transportation costs if they felt it would influence the selection of alternatives or mitigation plans. It is also known that individual's perceptions can be highly volatile, depending on how personally involved they perceive themselves to be in an issue, how knowledgeable they are about an issue, or the extent to which they have "worked through" their own ambivalence about an issue (Yankelovich, 1991).

To offset the deleterious effects of personal biases, two kinds of individual were encouraged to participate in the ICF process: invited residents, and self-selected residents. Invited residents were selected using a snowball sampling technique of 14 *a priori* roles representing diverse spheres of community life ranging from residents actively involved in business, education, and civic organizations to those in healthcare, resource production, and public office (Becker *et al*, 2003). The intent was that these individuals, identified by fellow residents as being highly active and involved in effecting community change, would share and debate their unique perspectives with one another, which would lead to informed judgments of social impacts. Invited residents interacted with one other within one workgroup.

On the other hand, self-selected residents who were sufficiently interested to attend a forum by their own choice were assigned to separate workgroups based on their self-identified spheres of community involvement across the same 14 community roles. The goal was to replicate in the self-selected workgroups the diversity of community interests present within the invited workgroup, and thus to ensure that a maximum variation of perspectives and knowledge would be present in any given group. The assumption was that group members' biases would be challenged and a greater range of community-level impacts could then be identified than would have been possible in a homogeneous setting or traditional public meeting.

Within each workgroup, invited and self-selected residents engaged in a four-step, mutual-learning process to arrive at informed judgments. First, residents were presented with the latest scientific information from the corresponding EIS studies on the projected biophysical, engineering, power generation, recreation, transportation, project implementation, and water supply impacts. This information was intended to increase awareness of the recovery alternatives, clear up misconceptions, and give residents an opportunity to ask questions relating to how their community might be affected.

Step two involved participants providing ini tial numeric ratings of impacts for each of the

community dimensions using interval-level scales that ranged from –5 (adversely affected by the alternative) to +5 (beneficially affected), with the mid-point of 0 depicting residents' baseline ratings.

Step three involved a facilitated dialogue among participants within each workgroup. Participants shared their perspectives of impacts based on the presented scientific information, fellow residents' knowledge, and their personal understanding of their community's situation. The intention was to achieve a more thoughtful consideration of others' perspectives.

In step four, residents reassessed the information, assigned final numeric ratings to the four community dimensions, and listed qualitative justifications for why they rated the dimensions as they did. At the conclusion of this process, participants brainstormed measures by which identified impacts could be mitigated.

Those communities where interactive forums were not held were assessed by classifying them by community type. Communities having a similar relationship to the Snake River and comparable social characteristics were assumed to experience similar impacts but that the magnitude of impacts and their responses would be unique.

Comparing social impacts in two communities

Results of the projection of social impacts are compared for two communities assessed in the Corp's EIS: an outdoor recreation and tourism one and an agriculture one. The outdoor recreation and tourism community was characterized by a mix of natural and rural landscapes. The economic dependency and way of life for this community was traditionally dominated by a mixture of forestry, fisheries, mining, farming and ranching, and most recently by outdoor recreation and tourism. Residents use the Snake River for its port facilities and transportation of commodities, but most importantly, are dependent on its fisheries for recreation and tourism. Removal of Snake River dams was presented in the EIS as the most viable way to recover populations of threatened and endangered salmon and to do so would greatly benefit this community, both socially and economically (US Army Corps of Engineers, 2002).

The workgroups engaged in a four-step process: they were presented with the latest scientific information; they gave initial numeric ratings of impacts; there was a facilitated dialogue; and they reassessed the information and gave final numeric ratings

The agriculture community was characterized by less intensive rural development with a predominance of agriculture-oriented industrial, commercial and service establishments, as well as state and local government jobs. Farmers in this community use the Snake River for port facilities and barge transportation of commodities. Residents have also long used the river for reservoir-based water recreation. The impacts of removing Snake River dams were projected to affect this community negatively in most all aspects (US Army Corps of Engineers, 2002).

Social impacts identified in both communities were derived from the Corps' EIS and are organized in Tables 2 and 3 according to categories of similar types of impact.

Outdoor recreation and tourism community

The impacts identified in the SAR and ICF for the outdoor recreation and tourism community differ most prominently in the categories of business, community services, community character, and planning (Table 2). Differences between the two assessments can also be found in the other categories for impacts related to risk and uncertainty. In the ICF, participants either did not perceive that they would be affected by risk and uncertainty or they overlooked the implications of that presented in the SAR. Examples of other impacts identified in the SAR but not in the ICF include decreased employment related to increased utility rates and job losses from reduced farm spending. In the SAR, it was also determined that family poverty rates would increase from utility rate increases.

On the other hand, farm income and job losses did not resonate with the ICF participants in this outdoor recreation and tourism dominated community. Residents within the invited and self-selected workgroups agreed that fewer people would be on public assistance and that more fish would mean more tourists and subsequent jobs. In other categories, ICF participants discussed impacts on property values, increased school enrollment, and the change in social services and community activities, which were absent in the SAR. Other unique ICF impacts included improved family and community stability, community character, and the ability to plan in light of government costs, civic involvement, and preparedness.

While there was internal disagreement among ICF participants over changes to air and water quality and economic diversification, externally the ICF and SAR identified many of the same impacts. Both identified net increases in overall employment and population, not to mention improved salmon fisheries. An increase in transportation costs and utility rate increases were similar, as were concerns for increasing traffic volumes. More difficult to determine was the level of agreement over social cohesion and

Table 2. Comparison of projected social impacts for an outdoor recreation and tourism community

Impact type	Social analysis report			Interactive community forum
	Projected social impact	Short[a]	Long[a]	Projected social impact
Demographics	Net change in population	+		People drawn in from outside area (R)
				Population will stay the same (R)
				Retirees will stay about the same
Employment	Long-term employment losses	na	na	More jobs but still low paying (R)
	Short-term employment gains	na	na	More fish would mean more jobs (R)
	Net change in employment	++	++	No increase in job types
	Net change in sub-regional employment	++	++	Jobs will be satisfying
	Decrease in employment related to increased utility rates	–	–	Jobs would become more diversified
				Higher-paying jobs
	Change in dam operations employment from dam deconstruction	na	na	Jobs available for youth to stay
				Unemployment decreases
	Increased employment related to dam deconstruction	na	na	
	Increased employment related to well pump modifications	na	na	
	Decrease in employment from reduced farm spending	–	–	
	Increased employment from road, rail and infrastructure construction	na	na	
	Increased employment from road, rail and infrastructure maintenance	na	na	
	Increased non-fishing river recreation jobs		++	
	Increased employment from salmon fishing recreation			
	Increase in transportation related jobs	na	na	
Businesses	Lower economic uncertainty	+	+	Increased flow of tourism dollars (R)
	Higher economic uncertainty	–	–	Positively affect the economy (R)
	Increase in grain transportation costs	– –	– –	Increased income for businesses (R)
	Increased transportation costs (others)	–	–	Increase in transportation cost
	Decrease in total dryland farm income	– –	– –	Stable economy
	Increased cost for well irrigators/users	na	na	
	Increased rate of farm consolidation	na	na	
Transportation infrastructure	Increase in transportation capacity uncertainty	–		Traffic congestion worse (R)
	Traffic volume and congestion			
	Highway safety	–/+	–/+	
	Loss of bridges within 50 miles with dam deconstruction	+	+	
		na	na	
Cost of living	Residential utility rate increase	– –	– –	Power costs will increase
	Risk of utility rate increase	– –	– –	Less money for living expenses
	Decrease in county property tax revenues	– –	– –	Taxes will increase
	Increase in county sales tax revenue	–/+	–/+	Increased property values
Income and poverty	Increased family poverty rate from increased utility rates	– –	– –	Fewer people on public assistance (R)
Education and community services	Decreased recreation site access	na	na	Negative impact to boat ramps and recreation
	Decreased recreation site services	na	na	School enrollment will increase
				Increased number of services
				Increased social activities for the community
Community character	Increased social cohesion	+	+	Some overall improvement because recreation is maintained (R)
	Non-fishing river recreation short-term displacement	na	na	Families will be stable (R)
	Short-term displacement of salmon fishing recreation	na	na	Remain a land-based community (R)
				Same friendly and interesting community (R)
	Short-term crowding for salmon fishing recreation	na	na	Town will still have character
				Social make-up will not change
	Local fishing opportunities for salmon fishing recreation		+	Increase in steelhead fishing numbers
				Recreation capital
	Effect on elderly recreationists	na	na	Community should stabilize
	Increase in outside workers from dam deconstruction	na	na	Become more of a family oriented community
				Increased growth
				Improved quality of life
				Existence of the fish is a benefit to people
Appearance	Aesthetics — exposed shoreline	na	na	Benefits to community appearance
				Air quality and water quality will improve
				No change in air or water quality

(*continued*)

Table 2 (*continued*)

Impact type	Social analysis report			Interactive community forum
	Projected social impact	Short[a]	Long[a]	Projected social impact
Civic organizations and leadership				Will not change vision or vitality Increased inspiration and vitality
Planning	Lower uncertainty of salmon recovery	+	+	More people to involve in community affairs (R)
	Higher uncertainty of salmon recovery	–	–	More money for enhancement of place
	Decrease in county property tax revenues	– –	– –	Government costs will increase
	Increase in county sales tax revenue	–/+	–/+	Preparedness for the future will not change More focus on community

Notes: [a] Short-term impacts are those taking place between 2006 and 2012; long-term impacts are those taking place after 2020

+ + = very positive effect
– = negative effect
+ = positive effect
– – = very negative effect
Blank = no effect
na = not applicable to this situation

(R) denotes interactive community forum participant justifications that were replicated among workgroups within the community

related quality of life impacts. Even so, there was a triangulation (duplication), between the two studies, of impacts that represent likely changes to the community as a result of removing Snake River dams.

Agriculture community

Differences of social impacts between the SAR and ICF for the agriculture community are abundant, but there are also several that are replicated between the two studies (Table 3). Impacts unique to the SAR are most distinct in two respects. The first, not unlike the outdoor recreation and tourism community, is the assessment of risk and uncertainty. Some impacts identified in the ICF could be interpreted to be a result of increased or decreased risk and uncertainty, but it was not explicit.

The second unique attribute of the SAR is in the level of detail pertaining to job impacts. Job losses and gains are identified in the ICF but with less discussion of the types of job. In the SAR, employment changes are attributed to a variety of causes including utility rates, dam operations and deconstruction, irrigation well pump modifications, recreation, transportation, infrastructure maintenance, and changes in farm spending.

Unique social impacts identified by ICF participants are many, but they too are distinct in two ways. The first is that many ICF impacts truly represent second- or higher-order impacts. For instance, in the jobs and employment category it was identified that a loss of farmers will result in reduced retail and government jobs. Residents will also have to commute to find work. Similarly, a reduction in local spending will lead to fewer businesses. There will also be an assortment of impacts on the schools, healthcare, and other local services because of decreased tax revenues. The quality of the air and water will decline because of more trucks on the highway, which will lead to more health problems.

The second distinction is a stronger focus on normative impacts such as family stability, community identity and lifestyles, leadership capacity, and community vision. These impacts are largely nonexistent in the SAR.

Internally, there was disagreement among ICF participants over the impact of removing dams on population levels and property values. Between the two studies, disagreement was limited to a change in social cohesion and quality of life. From the perspective of triangulating impacts, the SAR and ICF support the results of the other for several categories. Both studies assessed net changes in employment, and to a lesser degree, the types of employment. Increased transportation costs were identified as important impacts in both, as was farm consolidation, residential utility rates, poverty, traffic congestion and highway safety, and aesthetics. An increase in outside workers from dam deconstruction was also identified by both studies, but, in the ICF, related second-order impacts were further enumerated.

Discussion

A key purpose of this paper was to compare the methods of indicator selection and subsequent projection of impacts as illustrated in the two SIA applications. Because the proposed salmon recovery alternatives have yet to be implemented, it is premature to verify which application, the SAR or ICF, provides the most accurate projections. Yet a comparison of these data suggests that technical and participatory assessments can be combined much in the way they were for the Corps' EIS to identify a greater range of community-specific impacts. They can be combined to verify key findings and to prioritize mitigation strategies based on those findings. Separately, they provide a more limited view of social impacts than is achieved using both.

Observations of impacts reveal that those identified in the ICF are more tailored to the individual communities. Yet the interpretation and presentation of the data is sometimes difficult. For instance, in the outdoor recreation and tourism community, it was stated that there would be increased growth but

no indication of what type of growth. This is also the case for community stabilization. Were respondents referring to stabilization of community character or to jobs and income? This level of detail makes it difficult to delineate between ongoing changes and those from proposed actions. Whereas, scientists are likely to have more precise information of particular kinds of impacts, such as jobs, allowing them to make predictions of long-term, indirect impacts.

A related issue is in identifying second-order, indirect, or higher-order change processes. Many impacts identified in the SAR and ICF represent first-order

Table 3. Comparison of projected social impacts for an agriculture community

Impact type	Social analysis report			Interactive community forum
	Projected social impact	Short[a]	Long[a]	Projected social impact
Demographics	Net change in population	–		Decreased population with fewer farms (R)
				Population will be more transient (R)
				Population will remain the same
				Some move but others will come with new jobs
				Retired people will remain
Employment	Long-term employment losses	–	–	Loss of agriculture jobs (R)
	Short-term employment gains	++		Increase in transportation costs will cause a decline in
	Net change in employment	–	–	farmers (R)
	Net change in sub-regional employment	– –	– –	Corporate farming with fewer jobs (R)
	Decrease in employment related to increased utility rates	–	–	Temporary construction jobs (R)
				Any new jobs will be low paying (R)
	Change in dam operations employment from dam deconstruction	– –/ +	– –/ +	Fewer opportunities for quality jobs
				Family farming will be replaced by lower paying
	Increased employment related to dam deconstruction	++		trucking jobs
				More jobs for trucking and railroad
	Increased employment related to well pump modifications	+		Trickle effect of lost farmers felt in government and retail employment
	Decrease in employment from reduced farm spending	–	–	Fewer public-sector jobs
				Fewer summer jobs for kids
	Increased employment from road, rail and infrastructure construction	++		High unemployment
				Increased commuting for employment
	Increased employment from road, rail and infrastructure maintenance	++	++	Shift in economic development will change job opportunities
	Increased non-fishing river recreation jobs	++	++	Increased recreation employment
	Increased employment from salmon fishing recreation	na	na	
	Increase in transportation-related jobs	+	+	
Businesses	Lower economic uncertainty	+	+	Increase in grain transportation costs (R)
	Higher economic uncertainty	–	–	Increased corporate/absentee farming (R)
	Increase in grain transportation costs	–	–	Fewer farms, increase in farm size (R)
	Increased transportation costs	–	–	Money leaving with out-of-town purchases (R)
	Increased cost for well irrigators/users	–		Decline in business owners (R)
	Increased rate of farm consolidation	–	–	Decline in downtown retail core
				Decrease in government investment
				Smaller economic base
				Increased cost to relocate grain facilities
				Economically diversify with mitigated jobs
				Decreased dependence on farm income
				Increased need for restaurants and fueling
				Increase income for downtown businesses to improve storefronts
Transportation infrastructure	Increase in transportation capacity uncertainty	–		Highways will be more congested and less safe (R)
	Traffic volume and congestion			Increased roads and highways deterioration (R)
	Highway safety	– –/++	– –/++	Highways will be more expensive to build and maintain
	Loss of bridges within 50 miles with dam deconstruction	–	–	(R)
		–	–	Roads will not be able to carry the load
Cost of living	Residential utility rate increase	–	–	Residential utility costs will increase (R)
	Risk of utility rate increase	–	–	Decline in agriculture will lower county tax base (R)
	Decrease in county property tax revenues	– –	– –	Property values will decrease (R)
	Increase in county sales tax revenue	–/+	–/+	Property values will increase
				Cost of living will increase
Income and poverty	Increased family poverty rate from increased utility rates	–	–	Increase in public assistance (R)
				Stress on farm income
	Decrease in total dryland farm income	–	–	More power struggles resulting from concentrated wealth
				Less income from higher transportation and maintenance costs

(continued)

Table 3 (*continued*)

Impact type	Social analysis report			Interactive community forum
	Projected social impact	Short[a]	Long[a]	Projected social impact
Education and community services	Decreased recreation site access	na	na	Negative change in recreation (R)
	Decreased recreation site services	na	na	Loss of hospital (R)
				Decreased school enrollment as people move (R)
				Fewer school workers
				Declining school quality
				Less financial support for schools and hospital because they rely on agriculture tax base
				Less people to carry the tax load for services
				Loss of local services
				Decrease in community events and activities
				River recreation will disappear due to mudflats
Community character	Increased social cohesion	+		Community stays about the same (R)
	Non-fishing river recreation short-term displacement	–		Overall quality of life will decline (R)
				Loss of community cohesion and friendly nature (R)
	Short-term displacement of salmon fishing recreation	na	na	Families less stable from trucking fathers on the road more (R)
	Short-term crowding for salmon fishing recreation	na	na	Family stability and customs and lifestyles will change for worse (R)
	Local fishing opportunities for salmon fishing recreation		+	Loss of family farm image
				Community character devastated from economics
	Effect on elderly recreationists	na	na	Less desirable truckers and construction workers replace farm families
	Increase in outside workers from dam deconstruction	– –		Impact to farm families weakens extended family
				Decreased pride in community with increased transient population
				More crime with more truckers
				Town returns to a more active transportation hub
				Increased noise pollution and truck traffic through town is negative
				Poor living conditions
				Loss of water sports will be a negative
				Increased accidents on the river
				Benefit to retirees
Appearance	Aesthetics — exposed shoreline	–	+	Rundown appearance of main street (R)
				Poor air quality with more trucks on the road (R)
				Declining air and water quality will affect health
				Community appearance will deteriorate with less money to invest
				Parks and rivers will change
				Dead fish polluting the mudflats for years to come
Civic organizations and leadership				Less optimism (R
				Less involvement in activities and civic affairs (R)
				Fewer people will affect local elections
				Fewer organizations because less people
				Less effective civic organizations with less taxes
				Lose leaders with population decline
				Leadership capacity stays the same
Planning	Lower uncertainty of salmon recovery	+	+	Devastate the community budget (R)
	Higher uncertainty of salmon recovery	–	–	Difficult for bonds and levies to pass (R)
				More reliance on subsidies for community needs
				Will become more dependent on grants
				Less concern with the future and more about day-to-day survival
				Decreased vision with more obstacles to overcome
				Vision and planning based on current river transportation system
				More opportunity to improve the area with more people and activity

Notes: [a] Short-term impacts are those taking place between 2006 and 2012; long-term impacts are those taking place after 2020

+ + = very positive effect
\+ = *positive effect*
Blank = no effect
– = negative effect
– – = *very negative effect*
na = not applicable to this situation

(R) denotes interactive community forum participant justifications that were replicated among workgroups within the community

social changes that are merely intervening variables that could lead to social impacts, but are not im pacts in and of themselves. Population change is one example. It was concluded in both assessments that these communities would experience a change in population, but neither provides detail on the implications of this change. Will it be easier to retain businesses and increase local reinvestment? What

will happen to the quality of education or the ability to provide emergency services? Will taxes be increased, further burdening low-income families? As with any SIA, these impacts are difficult to spe cify but necessary for the purpose of decisions and mitigation.

The ability to verify impacts using different methods of impact assessment is an important finding of this study. However, care must be taken when combining approaches because some impacts could be invalidated simply because they were not identified in both instances. Inherent differences in indicator selection and methodology can lead to differences in assessed impacts, but do not reduce the validity of those projected impacts. In fact, for the two study communities, combining the SAR and ICF led to a greater range of impacts identified than would have been accomplished in isolation.

Not surprisingly, there was disagreement among participants within the individual ICFs. The diversity of perspectives, varying degrees of knowledge, and different interpretations of information are likely to lead to conflicting conclusions. Who is correct? Disagreement also existed between the two assessments. Is the SAR more valid because of its less subjective nature? Lacking a follow-up assessment of impacts or a longitudinal evaluation looking back, these questions are difficult to answer, not to mention beyond the scope of this study. Nevertheless, they are indicative of the tensions between technical and participatory approaches.

Several attributes unique to the SAR and ICF have been identified over the course of this study. Distinctions of approach, procedure, and discourse have been discussed, as have scale, selection of indicators, sources of data, and the projection of impacts. They are presented again in Table 4 to highlight methodological differences and advantages, but also to suggest when and how they could be combined to increase trustworthiness and utility to decision-makers and communities.

The task for decision-makers is to understand the scope and magnitude of proposed actions based on the preponderance of information collected, select the most appropriate alternative, and develop effective mitigation plans. The SAR provides a standardized list of impacts that decision-makers can easily synthesize, compare across communities, and develop informed decisions from. The problem is that, by virtue of standardization, it also lacks in the scope of unique impacts considered, making it more difficult to make decisions where there is no clear choice of preferred policy action. The ICF provides this level of detail. However, the vast array of residents' justifications makes it difficult to aggregate findings at a level useful for decision-makers. In fact, results of the ICF were cited less often in the final EIS than the SAR findings to

Table 4. Comparison of select SIA attributes for the social analysis report and the interactive community forum

SIA attributes	Social analysis report (SAR)	Interactive community forum (ICF)
SIA approach	Technical	Participatory
Analytic procedure	Deductive, nomothetic	Inductive, ideographic
Dominant discourse	Scientists interacting with one another with legally mandated public input	Community residents interacting with one another, facilitated by scientists
Scale	Regional, sub-regional, county, community	Community type, community, individual
Selection of indicators	*A priori* set of indicators chosen from available secondary sources, issues and concerns identified by community informants and scientific expertise	*A priori* selected set of community dimensions with possible indicators of social change Residents selected indicators based on localized expertise
Sources of data	History — ICFs Baseline condition — census, state and local government records, economic impact modeling, ICFs Projected impacts — economic impact modeling, EISs, literature, ICFs	History — literature, state and local government records, community residents Baseline condition — state and local government records, community residents Projected impacts — community residents
Projection of social impacts	Allocation of regional employment impacts, scientific experts, historic context, literature review of similar communities, impact scenarios Short-term impacts (between 2006 and 2012), long-term impacts (after 2020)	Historic context, community consultation, replication of resident-identified impacts Long-term impacts (after 2020)
Trustworthiness of results	Based on objective data: extent to which data reflect relevant community impacts is unknown	Data is subject to community residents' biases and their vested interests replicated within and among workgroups
Utility to decision-makers	Provides a list of impacts for easy organization, synthesis, and development of decisions Lacks in the breadth of impacts considered	Complex accounting of impacts that provides in-depth information Can be difficult to synthesize and understand because of its level of detail
Utility to community residents	Provides an opportunity to gauge change across a region and to compare to other communities Does not provide opportunity to identify unique community impacts	Provides a forum to bring diverse ideas together that can be used for planning endeavors Legitimizes residents' perceptions of unique community impacts

justify decisions (US Army Corps of Engineers, 2002).

In terms of utility to the community, the ICF provides a forum for residents to express their concerns, debate impacts, and generally have a legitimate role in projecting impacts. It was discussed here that individuals' views could be biased, but that facilitated techniques and group dialogue were employed to confront participants with alternative perspectives. The result of the ICF was a rare opportunity in United States natural resource planning where citizens were given such a responsibility. The SAR, on the other hand, did not provide residents with such an opportunity to inform actions or provide input outside the normal, legally-mandated course of scoping meetings and public comment periods.

Together, the ICF and SAR provide an holistic view whereby the strengths of one approach is used to address deficiencies of the other. They allow for the assessment of social impacts from the vantage point of local residents, as well as the analysis of quantitative indicators and observation of individuals' behavior by experienced social scientists. Equally important, their combination provides multiple sources of data, converging methods of indicator selection and impact projection, and ultimately serves to increase trustworthiness of projected impacts. In the spirit of informed SIA, the combination of the SAR and ICF provides a more robust assessment of impacts than could have been achieved individually.

Conclusion

There are important conclusions to be found by aggregating data across a region but also by identifying individualized community impacts within a large-scale assessment such as the Corps' salmon recovery study. The SAR allowed for a comparison of the magnitude of similar impacts across the region; the results of which could be tailored to region-wide mitigation actions. The ICF provided the details of how different communities would respond to impacts and what they identify as their greatest concerns. This allows for individualized mitigation plans as well as better understanding of the objections to preferred actions.

We began by stating that this study is an empirical comparison of a technical and a participatory SIA application. These applications, however, are just two among many and are not representative of all approaches. That said, where both are used in an SIA, technical and participatory approaches may provide a more complete picture of social impacts with the added benefit of data triangulation, an increased range of impacts considered, and greater utility to a broader audience.

An even more exhaustive technical approach involving social surveys such as polls and focus groups, then combined with participatory applications, would provide an even more holistic view of impacts. A caveat here is that one approach cannot be used as a measure of effectiveness of the other. Technical and participatory approaches use inherently different methods for collecting data and projecting impacts, and thus each has its own set of strengths and weaknesses.

Practically speaking, the application of SIA is such that budget constraints, expertise, and preferences for different types of information drive the techniques used. Theoretically, certain advantages relating to the quality of data used to project impacts can be realized using either approach. When looking across the spectrum of issues in which SIA is used, researchers are faced with choosing a methodology that best reflects the circumstances surrounding a particular issue. As participatory approaches become more cost-effective and build on methodological developments in the social sciences, SIA researchers may increasingly use them to augment traditional, technical SIA, but not to take their place. The goal of this study is to provide evidence of the complementary nature of using both.

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