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Research

The promise and reality of social and cultural metrics

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ABSTRACT. In addition to evaluating the economic, ecological, and health impacts of major public policy initiatives, impact assessments typically also need to identify and evaluate an action's social and cultural (S/C) impacts. A wide range of S/C metrics have been suggested, and guidelines exist to help ensure their thoughtful and comprehensive development. Nevertheless, many of the S/C concerns identified as part of impact assessments remain vague, are difficult to measure or understand, and are more closely attuned to existing data than to concerns expressed by stakeholders or residents of Indigenous communities. Furthermore, S/C impacts are often deemphasized or, in some cases, outright ignored during project generation and as part of final decisions made by elected officials. Here, we examine the promise of well-designed S/C metrics and contrast it with the reality of how they are commonly deployed, with specific reference to four case studies in North America: municipal planning decisions in Oregon, wildlife decisions in Ohio, renewable energy decisions in Michigan, and pipeline decisions in the western United States and Canada. We argue the importance of moving beyond assessment to decision making, pointing out five reasons why critical S/C impacts are often neglected, and presenting recommendations for the design of clearer, more comprehensive metrics that will contribute to more socially responsive policy choices.

Key Words: *cultural; impact assessment; Indigenous; metrics; public policy; social*

INTRODUCTION

Comprehensive evaluations of the economic, ecological, and health impacts of public policy decisions have long been recognized as crucial. In 1981, United States Executive Order 12291 (46 FR 13193), with oversight through the Office of Information and Regulatory Affairs, emphasized a more systematic assessment of the benefits and costs of policy initiatives. In recent years, input from Indigenous populations, academic researchers, and legal scholars has pushed impact assessments to identify more carefully the social and cultural (S/C) impacts of major public policy decisions such as energy infrastructure development (e.g., pipelines), resource extraction (e.g., forestry and mining), management of ecosystem assets (e.g., whales and polar bears), and transportation initiatives (e.g., bridges, electric-vehicle adoption, charging stations, and ports) (Partal and Dunphy 2016, Phelan et al. 2017). This shift has been accompanied by a parallel rise of interest in measures of human well-being, which typically incorporate S/C concerns as well as a range of nonphysical health values concerned with mental, spiritual, and community impacts (Gilani et al. 2018, Graham et al. 2018). As a result, public citizens, decision makers (whether elected representatives, regulatory officials, or judges), and media representatives now have important new information to consider regarding potentially affected values and practices as part of public policy choices.

A wide range of S/C metrics and indices have been employed in studies of potential project impacts, both published and in the vast grey literature of municipal backgrounders and consultants' reports, and in the past decade, helpful guidelines have been published to assist in the identification and evaluation of S/C impacts (e.g., Esteves et al. 2012, Vanclay et al. 2015). Unfortunately, existing guidelines are not always able to cover the myriad considerations that arise as part of conducting S/C assessments. This lack of guidance can result in ad hoc decisions being made with regard to key issues such as whom to identify as legitimate participants, how to generate and compare alternatives, how best to depict consequences in the face of data gaps, and what to do when budget or time constraints impose difficult trade-offs. The selected S/C metrics may also be hard to measure and difficult to understand, resulting in measures that are vague or overly technical and that, at times, appear designed more to fit the existing data than to address the concerns expressed by potentially affected stakeholders. As we discuss in more detail, this situation can result in many of the identified S/C concerns having limited relevance to the people whose lives may be altered (Brueckner and Eabrasu 2018).

The end result is that despite decision makers' proclaimed enthusiasm for including S/C effects, there is concern, and evidence in the case studies reported here, that many S/C impacts are deemphasized as part of project generation, selection, and summary analysis. This gap between decision makers' stated intentions and the actual content of formal assessments is often large. At times, it has resulted in anger on the part of potentially affected individuals or communities, frustration on the part of industry or government proponents hamstrung by regulatory or bureaucratic constraints or facing stakeholders who feel that no one is listening to their concerns, and mistrust in the ability of elected leaders to gauge the public interest with either accuracy or sincerity (Slovic 1999, Vanclay and Hanna 2019). Such responses have arisen across contexts: from local projects such as municipal parks and renewable energy infrastructure, and national initiatives such as fossil-fuel mines, pipelines, and railways (Brueckner and Eabrasu 2018), to international efforts such as nanotechnology development or geoengineering trials. One result is that processes for the design and selection of large projects have come into question, with lowered public trust in government officials and in the credibility of supporting factual information and expertise (Pidgeon et al. 2014). A related result is that debates regarding the social license to operate too often take place in the courts as part of an adversarial process rather than with stakeholders, analysts, and officials as part of a

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deliberative process designed to inform citizens and decision makers (Franks and Cohen 2012, Gregory 2017).

Interviews, workshops, and analyses conducted as part of four case studies in which we provided decision support to local, state, or provincial and national policy makers in the United States and Canada highlighted five issues that often limit the standing of S/C measures: (1) omission of important social and cultural impacts; (2) difficulty in identifying clear, evaluable metrics; (3) selection of metrics that ignore regulatory, legal, or cultural criteria; (4) measurement processes that are overtly technical; and (5) reliance on measures considered unimportant by decision makers or stakeholders. Explanations for these issues include government staff and private-sector consultants lacking the requisite knowledge of methods for identifying, expressing, and evaluating S/C measures, and elected officials or other decision makers lacking the will to incorporate S/C values in a transparent manner alongside more conventional measures. We next present critiques of current practices and metrics, followed by recommendations for developing and implementing meaningful S/C measures. Our goal is to assist efforts to incorporate such measures more fully into decision makers' standard impact assessment practices.

The promise of social and cultural metrics

The promise of more comprehensive, responsive project assessments that include S/C measures originates in the attention given to social and cultural values in recent guidelines for evaluating the impacts of large public projects (USEPA 2009, Gould et al. 2015, Vanclay et al. 2015). Although there remains debate as to whether the identification and definition of S/C values is context specific or can be generalizable (Magee et al. 2013), common examples include the following (e.g., Costanza et al. 2007, Partal and Donphy 2016).

- Social effects:· Shifts in community identity and traditional practices;
- Special impacts on youth or elders;
- Sharing and participation among community members at the level of individual, family, or community;
- Heightened conflict due to members' differing perspectives;
- Changes in self-definition associated with employment opportunities;
- Effects on governance and local control; and
- Creation of widespread feelings of shame, lack of agency, or frustration.· Cultural effects:
- Nonphysical health effects, including worry and anxiety;
- Effects on sharing of knowledge among family or community members;
- Access to traditional sources of food and recreation;
- Threats to cultural identity and well-being;
- Effects on ancestral sites, ceremonial practices, and place histories; and
- Effects on stewardship, naming, and language.

Most impact assessments remain strongly rooted in a cost-benefit paradigm, reflecting the preeminence of economic measures of value. However, many of the concerns reflected in S/C impact assessments are not exchanged in markets and instead relate to shared experiences, often based in conceptions of place and collective practices (Hechter 1992). This recognition of collective values is particularly important in Indigenous communities (Donatuto et al. 2011), but also pertains to non-Indigenous populations where family, ethnic, or neighborhood ties are important. Sen (2000), for example, argues that a collective decision is required to allocate collective resources rationally, and others have noted, "it is often impossible to arrive at a meaningful social valuation by adding up the willingness to pay expressed by individuals" (Ackerman and Heinzerling 2002:1567). Simply being assigned the role of representative citizen or consumer can affect people's behavior (Sagoff 2004). The issue looms largest when evaluating impacts on S/C values within an Indigenous community. As Litchfield (1999:256) and others have argued, when evaluating losses within Indigenous populations, "an over-emphasis on the imperatives of commerce may ultimately provide an unfair basis for determining a compensation amount."

We recognize that metrics for appropriately evaluating social and cultural values will vary based on the specific nature of the concern and the legal or institutional setting (Magee et al. 2013, Vanclay et al. 2015). However, general approaches for developing measures include the following (Keeney and Gregory 2005).

- Natural metrics, which are familiar to everyone, e.g., days of improved health or numbers of visits.
- Proxy metrics, which are introduced to help overcome measurement difficulties or a lack of data, e.g., distance as a proxy for protection of sites, salmon returns as a proxy for Indigenous place-based stewardship.
- Constructed metrics, which rely on quantitative or qualitative indices, e.g., scales from −3 to +3 or 1–5 that reflect different levels of a specific value. For example, a constructed scale was developed to compare public support for different energy facility siting options (Keeney and Sicherman 1983), and a 5-point "stewardship" scale was developed by a Tribal community to assist government regulators in evaluating flow changes to a managed river (Failing et al. 2013).

Both proxy and constructed scales provide theoretically supported approaches for including important qualitative concerns that might otherwise be omitted from quantitative analyses. They have been simultaneously praised and criticized for reflecting subjective judgments (to the extent that individual differences are supported), although decision science research clearly highlights the limits of so-called "objective" judgments because they typically rest on values-based assumptions (Slovic 1999). Including clear measures of concerns that may be considered intangible, and therefore omitted from assessments (despite their importance to stakeholders), demonstrates a commitment to including what matters to stakeholders and encourages clarity about what is meant by a concept (e.g., exactly what does "emotional health" mean in the context of improving access to a park?). It also aids in the generation of new, more responsive project alternatives (Magee et al. 2013). The inclusion

of such project-specific measures can also benefit stakeholder trust by facilitating inter-interest deliberations, creating a transparent record of public input and establishing a precedent for community support that is politically difficult to overturn (Satterfield et al. 2013). Moving from the specific conduct of S/C assessments to the broader decision-making process helps to ensure that the insights of a well-done S/C assessment will not purposely be buried within a consultant's report but will reach those ultimately responsible for making a decision.

One of the areas of S/C impact assessment that has gained broader acceptance among decision makers in recent years concerns metrics aimed at identifying potential changes to subjective well-being (SWB; Costanza et al. 2007). These measures seek to capture individuals' self-reported happiness, purpose, and satisfaction directly and are considered more democratic and (in some ways) more accurate than economic proxies such as income or economic growth (Graham et al. 2018). Other SWB metrics attempt to capture social sustainability and sustainable development and can include elements such as reduced inequality, political voice (Raworth 2017), and livelihoods (Griggs et al. 2013). Some of these metrics are based in natural and easily understood measures that are collected at the federal, state, and sometimes, municipal levels; other metrics such as personal safety, housing availability, or intrafamily conflict (Straus 2017) are based in proxy or constructed scales.

At the national level, criticism of the gross domestic product or gross national product has led to new constructed measures that incorporate additional S/C concerns (Graham et al. 2018), including the Index of Sustainable Economic Welfare (Daly and Cobb 1994), the Genuine Progress Indicator (Cobb et al. 1995), and Bhutan's Gross National Happiness Index (Ura et al. 2012). There are also examples of municipalities that have generated their own metrics such as the Boston Indicators Project (Kahn and Martin 2011), and examples of municipalities such as Seattle, USA or New Westminster, Canada that have used the concept of a living wage to help determine employee salaries and benefits. Despite the argument of Graham et al. (2018) that there are now best practices for measuring SWB, they and others (National Research Council 2013) acknowledge limitations to such metrics, namely concerns about context, ordering effects, and different implied reference points for satisfaction or welfare.

There are also concerns about the strength of linkages between existing measures of SWB and the foundational aspects of S/C impacts, including issues of governance and the relationship of many communities to the natural ecosystem and place (Biedenweg et al. 2014). These concerns have led to increased interest in the development of S/C measures aimed at capturing concerns and potential impacts at the community (vs. individual) level, such as community resilience (Magis 2010) and cohesion (Cantle 2008). This trend is important because many of the key components of peoples' well-being, such as their status within an extended family or the quality of their interactions with neighbors or work colleagues, depend less on individual characteristics than on the context of social relationships among members of a community. This perspective is particularly true for Indigenous populations along with some ethnic and religious minorities, for whom a sharp decrease in the well-being of one individual or family means that the group as a whole suffers a real and tangible loss. This concept of community health can also apply to the natural environment, for example, when resource extractive activities such as logging or mining adversely contribute to the health and well-being of community members (Bass 2004).

The issue of individual vs. community well-being is often encountered as part of local planning initiatives by municipal governments, e.g., when cities make plans and raise funds for education or new transportation options or recreation initiatives (Magis 2010, Berkes and Ross 2013). In some cases, increases in the social and cultural well-being of the majority may come at the expense of decreases in the well-being of a few; examples include siting highways, wind turbines, or electricity transmission lines. In other cases, the majority may be asked to shoulder a financial burden to improve, or at times protect, the social or cultural well-being of a minority; examples include improving access for those with mobility issues or protecting rare or endangered species of plants and animals. The existence of legal mandates for the activities in question does not do away with the need for careful analyses of the benefits and costs, and their distribution among citizens, a point that is underscored by recent court challenges to environmental laws (e.g., in response to changes proposed in 2019 to the U.S. *Clean Water Act's* protection of navigable waters).

Similar issues arise as part of community health assessments, which are conducted on a routine basis as part of state or federal programs that allocate and supervise local health expenditures (Easterling et al. 2003). The purpose of a community health assessment is to create a picture of the health status of a community, including the various physical and mental health issues most important to residents or requiring resources. Data collection is primarily intended to facilitate health comparisons among different jurisdictions, which has resulted in a reliance on a fairly traditional set of standardized data sources (e.g., mortality, morbidity, access to health care). Measures of social and cultural factors are typically not considered essential components of community health descriptions. This situation has meant that place-based health concerns and more context-specific cultural and spiritual dimensions of health are often ignored, particularly in Indigenous communities. Moreover, because the focus is on individual health statistics, the health of the ecosystem and the relation of the community to the natural environment are rarely covered as part of community health assessments, even though these considerations are highly significant to many communities (Slootweg et al. 2001, Donatuto et al. 2019).

CASE STUDIES

Here, we provide a brief overview of the status of S/C measures as part of several recent or ongoing impact assessment activities. Although insights are drawn from a variety of sources, we focus the discussion on four cases that involved interviews, workshops, or discussions with public officials by one or both of the authors. The principal task facing analysts in each example was to assess the net benefits and risks associated with a proposed government-sponsored policy or project for which S/C measures were anticipated to be important. Although four cases cannot be said to be fully representative of the set of hundreds of possible examples, we have selected these cases to span multiple issues, contexts, and levels of government common to many ongoing project impact assessments across the United States and Canada.

For each case, we describe the decision-making context, review the specific process for generating S/C measures, and evaluate the performance of those measures and the process by which they were selected.

Case study 1: wildlife decisions in Ohio

Context

In 2017, as part of an Ohio Division of Wildlife (DOW) initiative, we began a year-long series of workshops with 21 representatives from key stakeholder organizations to inform development of a 10-year deer management plan. Ohio's deer management plan is a DOW internal document that is shared with the public and used for managing deer populations based on historical perspectives, stakeholders' interests, and science-based management. In an effort to better align the deer management plan with stakeholders' interests as well as improve the DOW's current data collection methods, DOW decision makers reached out for assistance in structuring and facilitating the workshop series. In initial meetings with the DOW, a structured decision-making process (Gregory et al. 2012) was described and recommended, with the urging that structured decision making would aid stakeholders in identifying their most important values, concerns, and objectives with regard to deer management and provide means of translating, i.e., measuring, those objectives effectively and comprehensively.

Intended role of social and cultural measures

The expectation for the early workshops was that stakeholders would identify critically important objectives and suggest metrics for tracking them. Then, at later workshops, they would evaluate a selection of specific management strategies that had been adopted in nearby states (e.g., habitat-based deer management units and deer management assistance programs) as well as any options or policies identified by workshop participants. The values, objectives, and metrics discussed would ultimately be characterized in the deer management plan, and strategies or policies that performed well according to the agreed-upon metrics would be incorporated.

Performance assessment

Over the course of the first two day-long workshops, participants identified six fundamental objectives, which were reduced after further discussion to four: maintaining healthy deer; minimizing hunter dissatisfaction; minimizing landowner dissatisfaction; and improving communication between DOW, hunters, landowners, and the nonhunting public. A fifth objective discussed by stakeholders, which was ultimately decided to be outside the purview of the DOW personnel involved, included preserving the cultural traditions of deer hunting, a concern often more closely associated with Indigenous groups than with white Midwesterners. With the exception of maintaining healthy deer, all of the identified objectives were considered to be social or cultural values.

Stakeholders were also tasked with identifying specific metrics that could be used to evaluate the predicted performance of potential management strategies across these five objectives. This step led to considerable consternation among both DOW personnel and the stakeholders in attendance, making clear the difficulties experienced when quantifying S/C objectives and selecting measures that are scientifically rigorous and realistic based on available resources, as well as understandable *and preferred by* most, if not all, of the stakeholders involved. Despite this difficulty, stakeholders ultimately identified 25 potential metrics ranging from self-reported hunter and landowner satisfaction (measured using existing survey instruments) to the number of informal complaints received by DOW and the perceived quality of deer hunting opportunities (Bessette and Bruskotter 2018). Other less qualitative measures included the number of days afield, the overall number of hunters, and the number of bucks both seen and harvested.

Despite the five objectives and large number of S/C metrics identified by stakeholders, at the conclusion of the workshops, all participants (stakeholders and DOW personnel) agreed, some more reluctantly than others, that one composite social metric, i.e., (minimizing) hunter and landowner dissatisfaction, could more-or-less capture all five of the stakeholders' fundamental objectives. It was not lost on some stakeholders in attendance (nor those facilitating the workshops) that data supporting this single metric was already being collected by the DOW and had been used for some time in evaluating both potential and existing policies. As a result, questions were raised by some participants as to whether selection of this measure might reflect management habits and budget constraints more than a desire for accuracy or transparency with respect to tracking potential project effects.

Case study 2: municipal planning decisions in Oregon

Context

In 2019, we conducted semistructured interviews with lead state and municipal planners in the university-based City of Eugene, who were involved with a large city-based project intended to redevelop a prime riverfront site located near the downtown area. S/C impacts of this initiative, considered to be critical to its approval and success, were identified as a result of several studies undertaken by City staff and by consultants (City of Eugene, downtown riverfront development: https://www.eugene-or.gov/3506/Downtown-Riverfront-Development). These studies, which involved pairing members of City government with outside consultants, separated impacts into two categories: fiscal and nonfiscal. Using a triple bottom line framework, the City then divided nonfiscal impacts into direct benefits (jobs and housing), social-equity benefits, neighborhood vitality, tourism, cultural identity, and cleanup of contamination from historic practices. Suggested S/C measures included improved access (to the river), contributions to community cohesion, enhanced recreational opportunities, improved personal safety, and contributions to individual and community health.

Intended role of social and cultural measures

The City developed an extensive program of consultation with community members as part of their planning process for the riverfront site. This process included a scoring system to facilitate the inclusion of both economic and noneconomic impacts as part of comparing alternative designs for the development, with the inclusion of S/C measures intended to help incorporate a range of quality-of-life indicators that might otherwise be omitted from the project evaluation. These concerns, largely related to emotional health, well-being, and cultural and social equity benefits associated with the riverfront development, were considered central to the initiative. Development of the site was also positioned as "a living classroom" for local cultural history

and easy access to natural habitat, including stakeholder involvement in development of three art pieces that depict the history of the area. Contributions to community cohesion were highlighted, based on expectations that the park's proximity to the downtown core would make it "a public space where the whole community has an opportunity to interact" (City of Eugene, downtown riverfront development: https://www.eugene-or.gov/3506/Downtown-Riverfront-Development).

Performance assessment

Despite the care given to the development of an exemplary planning process and the centrality of nonfiscal benefits to project approval and construction, analyses relied heavily on economic measures of value based on residents' willingness to pay for similar experiences in commercial venues in the absence of public parks. Using the mid-range of values from an earlier study conducted in Seattle, for example, the social equity value of the park was estimated on the basis of a value of USD $3 per each of 1000 daily visits, for a total of USD $1.1 million/yr. No tests for the validity of this arms-length monetary measure of value were reported, despite a large body of empirical and philosophical literature questioning its relevance (e.g., Sagoff 2004), and no evidence was presented as to whether this measure was considered meaningful by potentially affected stakeholders. Other valued S/C components such as improved outdoor access, contributions to community cohesion, increased pedestrian safety, and positive effects on emotional health, all of which are amenable to measurement using constructed scales or, in some cases, proxy measures of value, were described but not estimated in quantitative terms and, ultimately, did not directly enter the summary project assessments that were provided to decision makers. As a result, there appears to be little basis for estimating the relative contributions of the S/C components to the overall assessment of the riverfront site redevelopment and limited means for comparing alternative project designs (e.g., a project design with a higher level of community cohesion and reduced access vs. another with lower cohesion ratings and increased access).

This perspective is supported by interviews conducted with State employees and with consultants regularly employed as advisors to other similar municipal planning decisions. Our interviews with city staff and other professionals typically emphasized two reasons underlying the absence of explicit S/C measures as part of municipal planning efforts. The first is a lack of knowledge regarding how to construct defensible measures of S/C impacts that could be compared directly to standard economic or environmental metrics as part of project analyses. One State-level employee, for example, expressed support for the inclusion of S/C measures at a conceptual level but then commented negatively on "subjective scoring" and the "arbitrary" nature of results perceived to accompany the use of constructed scales. The second reason (albeit with some notable exceptions) is a general lack of funding for obtaining information on S/C variables and objectives, which typically are not included as part of standard census or other city- and state-supported information collection procedures.

Case study 3: electricity decisions in Michigan

Context

Twenty-nine states and three U.S. territories with an interest in reducing reliance on fossil fuels have adopted renewable portfolio standards (RPS). Michigan's RPS requires electricity providers to achieve a retail supply portfolio of 15% renewable energy by 2021. Although scholars increasingly debate the economic and environmental benefits and costs of RPS and their specific role in spurring renewable energy development (Barbose et al. 2016, Upton and Snyder 2017), the Michigan Public Service Commission evaluates the success of its RPS (PA 295/PA 342) using the number of renewable energy credits, the cost-effectiveness of different types of renewable energy (relative to new conventional coal-fired electric generating facilities), and employment (Talberg and Saari 2019). This economic focus persists despite a report arguing that the technical potential of renewable technologies in Michigan requires incorporating siting and "social constraints that might limit development" (VEIC 2015), and PA 295 stating specifically that its purpose is to "provide improved air quality and other benefits to energy consumers and citizens of this state." No mention of social constraints or benefits beyond employment is made in the Michigan Public Service Commission's reports (Talberg and Saari 2019).

Intended role of social and cultural measures

These quantitative energy, infrastructure, and economic measures certainly help to determine the success of PA 295/342; however, they do little to measure RPS's effect on communities, culture, and traditions in Michigan, most of which are experiencing rapid change as a result of renewable development, not all of which are positive, according to committee reports and a systematic review of the values, concerns, and renewable energy objectives of Michigan residents identified at public meetings and in the popular media (Bessette and Depew 2019). Our review identified a host of ignored S/C impacts, including community cohesion, quality of life, aesthetics, rural character, and procedural justice concerns. Additionally, an influential energy stakeholder committee argued that wind energy in particular may be resulting in significant changes to the character of Michigan communities (Wind Energy Stakeholder Committee 2018). These changes speak to the "social gap" in wind farm siting decisions, or differences between the broad public support for wind power used to drive policy decisions such as PA 295 and the rise in opposition to wind turbines in specific communities undergoing development (Bell et al. 2005). While opposition to solar farms (relative to wind farm development) is in its infancy in Michigan, there remain concerns about utility solar's impact on rural culture and aesthetics as well as adverse effects on the preservation of farmland.

Performance assessment

Despite an ever-expanding list of renewable energy's S/C impacts, for example, to residents' viewshed, noise, sleep, sense of place, fairness, and safety (Rand and Hoen 2017), the Michigan Public Service Commission lacks metrics for evaluating them. It is not alone. Large-scale surveys show support for RPS in the state and nationwide (Mills et al. 2018) and overall benefits to adopting them, mostly in the form of public health benefits of greenhouse gas and air pollution reductions, rather than in reducing electricity costs (Mai et al. 2016). With one exception (Bessette and Depew 2019), little work examines the S/C impacts of achieving various levels of RPS, which suggests an important gap in the policy evaluation and public consultation processes conducted to date.

Case study 4: pipeline decisions in western United States and Canada

Context

Fossil-fuel pipelines, typically carrying bitumen (aka heavy oil) or liquefied natural gas, are among the more controversial large infrastructure projects currently debated by federal and state/provincial officials in both Canada and the United States (Gregory et al. 2020). The past decade has seen numerous large-scale pipelines proposed for North America, with projects becoming front-page news because of their high up-front costs (USD $5–15 billion), fervent opponents (concerned about adverse social and ecological impacts, climate change, and Indigenous rights), and associated controversy (related to predictions of both benefits and risks). Beginning in 2011, we held a series of workshops intended to help provide information legally required as part of impact assessments of two major pipeline proposals, the Northern Gateway project and the Trans Mountain pipeline expansion.

Intended role of social and cultural measures

The common justification for fossil fuel pipelines is economic: they are said to provide a long-term source of revenue, both to industry and to governments (via royalties and other taxes), and a short-term source of jobs due to construction and material needs. In recent years, pipelines also have been favored for reasons of national security, as a means to reduce reliance on overseas trading partners of uncertain standing. Citizen opposition to pipelines was initially due to ecological concerns, related to possible spills (on land or water) or interference with fisheries and wildlife. In recent years, however, important S/C concerns also have been raised, with particular attention given to potential impacts on Indigenous communities (First Nations in Canada, Native Tribes in the United States). These concerns take many forms but, in general, they originate in the special relationship of many Indigenous communities with the natural environment: studies have shown that traditional practices (hunting, fishing, gathering, trapping), stewardship of natural resources, social relationships (among families or clans) within the community, and the intergenerational transfer of knowledge and skills can all be placed at risk by major pipeline and other large fossil-fuel resource developments (Berkes 1999, Turner et al. 2008, Gregory and Trousdale 2009).

Performance assessment

The neglect of S/C impacts is central to several recent high-visibility fossil fuel transportation controversies. In North Dakota, residents of the Standing Rock Sioux Tribe, joined by members of other Tribes and hundreds of supportive Veterans, blocked construction of the Dakota Access pipeline for two main reasons: inadequacies in the scope of S/C studies conducted by government and proponents, and disagreements with significance thresholds identified for S/C and ecological damages in the event of an accidental pipeline rupture. Government statistics relied on standard measures of health impacts (e.g., fatalities, hospital admissions) and largely neglected cultural measures relating to traditional practices or the associated social and health benefits. Proponents and industry researchers emphasized the anticipated effectiveness of mitigation initiatives, yet residents of the Sioux reservation and nation-wide protestors argued that protection of S/C thresholds was left unresolved and key questions (e.g., the minimum distance of pipeline routes from protected grave sites) were unanswered, with the result that issues that might have been resolved by better informed analysis instead led to conflict, court action, and back-room political maneuvering.

Similar dissatisfaction with evaluation of S/C thresholds led to widespread protests against the proposed Trans Mountain pipeline expansion in British Columbia. Background project impact assessments included lengthy and comprehensive discussions of a wide range of valued S/C practices that required safeguards in light of potential project-related accidental spills and other operational hazards. However, the official 2011 construction application, for a USD $7–10 billion project to carry diluted bitumen, traversing > 100 Indigenous territories, included only two metrics for identifying cultural impacts (language retention and distraction from aboriginal participation in hunting, fishing, or gathering due to wage labor employment); both were later excluded from the official impact assessment because of a presumed lack of measurable parameters and data. A similar data-driven fate was met by S/C impacts in the context of the Enbridge pipeline (Line 5) extension in Michigan, where necessary qualitative data collection was not undertaken because it was considered too expensive and demanding of time (Dynamic Risk Assessment Systems 2017). In both cases, the absence of meaningful S/C impact measures has led to extensive (and costly) litigation and highly visible disputes among different levels of government.

RESULTS AND DISCUSSION

The reality of social and cultural metrics

In this section, we summarize our observations on the status of S/C metrics based on the four case study results noted in the previous section and insights gained from other environmental impact assessments conducted over the past decade. Five main issues are noted as sustaining the persistent gap between the promise and reality of accurately identifying and then fully integrating S/C impacts as part of project analyses and the formal documentation reviewed by decision makers (Table 1). For each issue, we offer brief recommendations as to how the gap between reality and promise could be addressed.

Neglect of important impacts

Many researchers and practitioners have written about the widely recognized bias of project assessments in favor of economic and material impacts, resulting in a wide range of S/C effects being omitted from project evaluations (Satterfield et al. 2013). Turner et al. (2008) termed such missing impacts “invisible” and noted the frequent omission of S/C considerations that include cultural and lifestyle changes, emotional and psychological harm to both individuals and communities, and losses of self-determination.

As seen in our case study of RPS in Michigan, in many cases a comprehensive listing of S/C impacts have been reduced to changes in labor patterns or employment. One reason is that this information is more readily available, often through standard census data collection procedures. At a time when federal and state agencies often are faced with tight budgets, it is viewed as effective from a cost perspective (even if inaccurate from an impacts perspective) for impact assessments to rely on standard measures. Another reason is that these same, familiar metrics are often easier to justify from a political perspective: increasing

Table 1. The promise and reality of social and cultural (S/C) metrics, and eight recommendations for closing the gap.

Issues	Gaps	Recommendations
Neglect of important S/C impacts	• Omission of relevant intangible concerns (e.g., cultural, emotional, place-based, family, psychological) • Poor, minority, rural, and Indigenous communities ignored	• Expand set of S/C impacts based on discussions with stakeholders and the recognition of both individual- and community-level effects
Difficulty in identifying clear evaluable metrics	• Lack of clarity or explicitness of concepts • Generation and comparison of alternatives is perceived to be complicated or impossible	• Incorporate proxy and constructed metrics to help overcome measurement difficulties and provide information about context-specific S/C impacts
Metrics ignore formal regulatory, legal, or cultural criteria	• Lack of public input results in politically motivated choices • Ignorance of the importance assigned to place and context • Legal challenges due to inadequate measures of impacts	• Seek to meaningfully engage the diverse potentially affected interests • Develop measures that are readily understood, concise, and operational to facilitate implementation in decisions
Measurement considered an overtly technical undertaking	• Technical judgments favored in lieu of value judgments • Failure to question the effectiveness of proposed mitigation actions • Reliance on questionable monetary measures of value (e.g., willingness to pay)	• Adopt a values-focused approach that allows for personal experience and facilitates analysis of alternatives • Document value trade-offs and key risk tolerances
Measures considered unimportant by decision makers or stakeholders	• Partial metrics chosen to suit decision makers' perspectives or political objectives • Qualitative measures seen to lack justification, creating focus on resource quantity rather than quality • S/C effects included in stand-alone reports but ignored in final analyses	• Adopt best practices regarding risk and impact communication to highlight S/C impact assessments in final reports • Incorporate stakeholder perceptions into assessments and inventories

employment opportunities, for example, carries high political acceptance despite the fact that the jobs associated with many large infrastructure projects are often temporary (e.g., related to construction) and have been identified as resource transfers rather than true job growth (Barbose et al. 2016, Phelan et al. 2017).

Another important class of situations in which S/C impacts often are neglected is community health assessments and assessments of community well-being, particularly in Indigenous communities. As noted in case study 4, the continued reliance of impact assessments on published or census data results in an emphasis on physical health (e.g., measures of illness or fatalities) rather than more context- or location-specific impacts such as social, mental, or spiritual aspects of both community and individual well-being. A related set of problems arises as part of environmental justice analyses, which, for more than two decades, have been included (under the 1993 Executive Order 12898, 58 FR 51735) as part of federal environmental decision making. This situation is due to the recognition that the interests of poor and minority communities are often neglected as part of evaluations of public initiatives (Mohai et al. 2009). As one example, the 2016 draft environmental impact statement for the Atlantic Coast pipeline largely overlooked important S/C connections of the Indigenous peoples living along the pipeline route, including tribal connections to identity, culture, governance, and spirituality, as the result of a flawed depiction of the importance of Native American citizens as part of the potentially impacted population (Emanuel 2017). The recent Dakota Access pipeline protests provide another highly visible demonstration of the controversy and acrimony that can result when important S/C impacts are not meaningfully included as part of project evaluations.

Difficulty in identifying metrics

In contrast to most conventional economic measures of value (e.g., jobs, revenues) and many environmental metrics (e.g., water quality or emissions), S/C impacts are often context specific and therefore difficult to enumerate or measure using standard metrics or in ways that facilitate the generation and comparison of alternatives. Consider impacts on community cohesion; positive effects might occur as a result of a municipal site redevelopment effort (as in case study 2) or negative impacts could accompany a large proposed resource development project (as in case study 4) supported by one segment of a community but opposed by another. The resulting discord and dissention can lead to a lack of trust among neighbors who previously lived in harmony. For example, in case study 3 neighbors often join opposing sides over potential wind farm development and, in case study 4, adjacent communities may differ with respect to support or opposition for pipeline construction. Sadly, these losses of community cohesion can persist regardless of whether the farm or pipeline is constructed. Despite recognition of the effect, an analyst or official in charge of evaluating project impacts will face a challenging task in, first, reaching agreement on an acceptable term for this impact (mistrust? polarization? anger? solidarity?) and, second, developing a measure that can assist in evaluating a range of alternatives and mitigation initiatives. Even if a concern is listed in guidelines for the conduct of S/C evaluations, it first has to be identified and measured accurately (e.g., comparing a past state to current or predicted future conditions) and then expressed in a manner that will resonate with stakeholders but also catch the attention of decision makers so that it is successfully integrated into overall project decisions.

One helpful approach is to look beyond natural measures to either proxy or constructed metrics. In some cases, an impact such as the loss of cultural identity can be traced back to potential reductions in a keystone species such as salmon or moose, or to fears of interference with an activity such as prohibitions on engaging in a religious or ceremonial practice because of the proximity of a proposed facility to a site of special significance (Turner et al. 2008). With agreement from the affected population,

the extent of this loss can function as a rough measure of the extent of impacts in something as presumably intangible as cultural identity (e.g., increasing the distance of a transmission line from a sacred area can result in a lowered impact score). Constructed scales also are useful to the extent that they capture ordinal or relative levels of an effect yet still facilitate the comparison of different alternatives. For example, one plan to mitigate a specified social or cultural effect (e.g., funding to establish a cultural camp as a means to address lost knowledge within a community) may be scored as reducing an effect from a level 8 to a level 5, whereas another (more ambitious) plan may reduce the effect to a level 3. In some cases, trade-offs between these social or cultural initiatives and economic impacts, such as the added financial cost associated with a mitigation plan, can be translated into monetary effects as a means for aiding decision makers (Gregory et al. 2012).

The effort to articulate S/C impacts in a meaningful way can itself prove to be a positive aspect of the evaluation process (Gregory et al. 2012), but only if there is opportunity for deliberation among stakeholders and follow-through from managers in the form of relevant measures and data collection. In case study 1, for example, over 20 deer management S/C metrics were identified and desired by stakeholders as part of an open and helpful discussion. Although some reduction in this number of measures (e.g., eliminating redundancy) is desirable, DOW personnel decided that they lacked the financial resources, methodological expertise, and time to collect the requisite data, and instead chose a single composite measure focused on hunter dissatisfaction. The negative side of this choice is that, although (as argued) a composite measure might loosely track overall trends, it provides little in the way of specifics about what exactly is contributing to, or potentially could alleviate, stakeholders' dissatisfaction. The positive side is that the process by which the agency and its stakeholders identified and evaluated that metric was both science-based and values-focused. In hindsight, the composite metric proved to be a useful, though not entirely successful, compromise between selecting multiple S/C measures requiring unrealistic increases in financial, political, and human resources and ignoring S/C impacts altogether.

Metrics ignore formal criteria

Measures used to assess changes in valued components are often developed as part of exercises that introduce a scenario and encourage stakeholders to suggest ways in which changes in a highlighted value could be evaluated over time. These efforts typically are run by consulting facilitators or agency staff and often seek to include large numbers of participants through formats such as town-hall meetings or focus groups. In terms of documenting a proactive public participation stance (as well as from the standpoint of consultants' revenues), these efforts can work well. From the standpoint of developing measures that meet formal criteria, however, these efforts are often less successful, as identified by DOW personnel in Ohio and by the Courts in the context of case study 4 (e.g., initial approval of the Northern Gateway pipeline application was overturned by a Federal Court due to a lack of "meaningful consultation" concerning likely S/C impacts of the project). Although there is no single agreed-upon standard for the selection of impact metrics, both research and common sense suggest that measures should be easily understood, concise, not redundant (which leads to overcounting), and operational (in that data can be collected to demonstrate changes; Keeney and Gregory 2005). These ideas are easily stated and incorporated as part of prescriptions for assessing S/C impacts, but their implementation often rests in the hands of municipal staff or consultants who lack appropriate training or are unfamiliar with the multiple nuances of eliciting and measuring concerns in ways that will withstand scrutiny from opponents of an action.

One of the difficulties in establishing defensible S/C metrics is ensuring that the relevant stakeholders understand and support their selection and the underlying methodologies. At the deer management workshops in Ohio, for example, stakeholders' perceptions often conflicted with the technical assessments and data presented by DOW personnel, resulting in opposition to what were otherwise straightforward and valid measures. In one case, DOW data showed a highly significant, near perfect negative correlation between the size of the deer herd and the number of hunters. Such data contradicted stakeholders' arguments that increasing the number of deer on the landscape was necessary to stem declining hunter participation rates; the result was reduced support for the DOW's science-based recommendations. At the end of the day, it remained unclear whether numeracy, motivated reasoning (Kunda 1990), or poor data quality was the cause of the enduring dispute.

The "operational" criteria of a S/C metric, and the necessity of collecting data that reference the selected metric, has also proven challenging for both analysts and stakeholders. With respect to cultural ecosystem benefits, for example, many S/C impacts refer to adverse changes over time in the quality of a resource; conventional measures of environmental impact may be unchanged, but the quality of a resource (e.g., after exposure to chemical contamination) may be changed sufficiently that it no longer is safe to consume or appropriate for use in cultural ceremonies (Berkes 1999, Chan et al. 2012). Collecting data on geographic areas or the mass of organisms may be quite straightforward and widely accepted; collecting data on changes in quality, which often are subject to contextual and seasonal distinctions, may be more difficult and controversial.

Measures considered as technical undertakings

In many cases, impact assessments rest in the hands of consultants hired either by the proponent, for example, an industry or local government (as in case study 2), or by the resource managers (e.g., a state, federal, or provincial wildlife agency or a regional utility), as in case study 1. Those undertaking the assessment will face a preexisting set of regulatory guidelines that must be met and, often, severe financial, temporal, and capacity constraints. As a result, the temptation exists to engage in an evaluation process that meets the "letter of the law" to a degree sufficient that approvals may be granted quickly, but does not necessarily meet the "spirit of the law" in the sense of providing a comprehensive description of possible impacts that meaningfully addresses the concerns of stakeholders.

Two implications are especially important. The first is that potential S/C effects may largely be left out of the evaluation process because impact assessments are viewed as technical or scientific undertakings in which the main task facing an analyst or decision maker is to develop a defensible picture of the likely

economic and environmental consequences of an action (as in the evaluation of Michigan's RPS and Ohio's deer management plan). What this process leaves out are the more nuanced and values-based perspectives of stakeholders regarding what matters most to them. This issue arises most strongly in the context of impact significance determinations, in which technical judgments about the importance of impacts and the effectiveness of mitigation actions to reduce adverse effects generally are considered technical judgments about which stakeholders are unlikely to have valid opinions (Lawrence 2007, Gregory et al. 2020).

The second implication is that there exists little incentive to address any S/C concerns left out of normal assessment practices or legal guidelines. In case study 4 focused on pipeline assessments, for example, safety measures that are announced for dealing with low-probability accidental spills into waterways (e.g., streams crossed by the pipeline) are typically sufficient for any residual impacts to escape more detailed analysis following the logic that, as long as the proposed mitigation effort is successfully implemented, the risk of a significant spill is considered "negligible." However, people living near the waterway may be far less tolerant of these risks and therefore question the efficacy of the proposed mitigation efforts. This continued perception of the pipeline as a threat, despite the reassurances of technical experts, can result in either individual (e.g., worry, loss of sleep) or collective (e.g., loss of family status due to shifts in access to historic resources) impacts that, because they are considered highly unlikely, fail to receive further consideration. Experiences of cumulative S/C effects, perhaps related to governance histories or climate change, provide another common example of sharp differences in perceived risks that reflect varied perspectives and trade-offs (Joseph et al. 2017). The bottom line in such cases is that residents may have lower risk tolerances than do technical experts brought in from the outside; in such cases, reductions in well-being and individual welfare that are not covered by most S/C impact assessments are nevertheless very real to the affected stakeholders.

Measures considered unimportant by decision makers

Decision makers, whether staff managers or elected officials, are responsible (to a greater or lesser extent) to their constituents. As a result, it is generally the case that impact evaluations not only follow conventional practice and legal requirements but also seek to be defensible in the sense of focusing scarce assessment resources on those impacts that are most salient (to the public and other stakeholders) or most easily justifiable (e.g., to voters). In this context, it is no surprise that so-called soft or intangible impacts, which include many S/C effects, are often considered to be less important than the more tangible or hard impacts such as economic, ecological, or physical health effects. Supporting a project because of its likely job creation benefits (case studies 3 and 4) or the cleanup of a historically contaminated site (case study 2) is likely to be more popular than supporting a project because it will help to restore community cohesion or permit a renewal of ceremonial practices. Similarly, opposing a project because of its long-term impacts on the traditional livelihood and practices (e.g., hunting, fishing, berry collection) of a rural community may require foregoing the short-term economic benefits of construction jobs. Even if decision makers promote a comprehensive assessment of the benefits and risks of an undertaking, it is likely that, in the summary analyses and as part of public statements, the more tangible and prominent impacts will receive the highest weight (Slovic 1995). In such cases, S/C effects are often implicitly or explicitly assigned a lower weight in the overall decision-making process than more easily measured or more visible economic impacts.

Adding to this second-tier status of S/C assessments is that, even when relevant social or cultural measures are included, it is often as part of distinct social impact or traditional use studies (e.g., for Native American communities). These studies form part of a separate, stand-alone document, and their results may not be included in summary discussions or evaluations of a proposed project. For example, guidance provided by the USEPA describes social impact indicators related to six general categories, i.e., population impacts, infrastructure needs, institutional arrangements, conflicts between residents and newcomers, political and social structures (i.e., governance), and individual- and family-level impacts, and within each category, reference impact indicators such as "disruption in daily living and movements patterns" (USEPA 2009). At an abstract level, therefore, many S/C topics appear to be well covered. However, the reality is that even if these S/C effects are carefully described as part of a stand-alone, separate report, they may be viewed as less central to the concerns of voters or more difficult to explain in ways that will resonate with supporters, and therefore may be omitted from the list of final criteria used by decision makers to analyze or defend public choices.

CONCLUSION

Any brief review of S/C measures as used in project evaluations and environmental impact assessments leaves itself open to several criticisms: that each impact assessment context is unique, that hundreds of different S/C measures have been included in various reports over the years, or that decision makers and the evaluation processes they endorse need to satisfy innumerable financial, temporal, and information constraints. We acknowledge these critiques and, in general, the many difficult challenges facing those who seek to undertake comprehensive impact assessments of major proposed initiatives. However, we believe that many project assessments could more fully articulate S/C impacts and provide more meaningful metrics for encouraging dialogue and defensible decisions about potential changes in the full range of valued components.

Our main sources for this perspective are twofold. The first is our four summarized case studies in which promises were made by officials to review, identify, and incorporate S/C impacts alongside measures of economic, environmental, and physical health, yet in each case, important S/C consequences of actions failed to be either adequately predicted or measured as part of the final project assessment. The second source is a review of the literature and historical record: a disturbing proportion of important public policy initiatives lacks social license or defines it inadequately (Moffat et al. 2016, Brueckner and Eabrasu 2018), and as a result, for better or worse, is effectively blocked by stakeholders (often aided by expensive and time-consuming litigations) who feel their concerns are being left out of the decision-making process.

This brief survey of experiences with S/C measures as part of project planning and impact assessments identifies a number of important gaps between the promise and reality of incorporating S/C measures. The observation that development of accurate and

useful measures of S/C effects is challenging is not an excuse for continuing with current assessment practices that sometimes give only lip-service and vague promises relating to their inclusion. We specifically recommend that decision makers not only incorporate S/C impact assessments into their reports and formal analyses but prioritize them as part of deliberative processes and subsequent community engagement initiatives. The adoption and elevation of more comprehensive and responsive S/C measures could go a long way toward not only expanding the range of effects that are meaningfully assessed but generating policies that better respect and address the public's priorities.

We also identify an optimism about what can be done if proper methods are used and decision makers can be encouraged to pay sufficient attention to the S/C effects of proposed initiatives (Table 1). For instance, adopting processes in which proxy and constructed metrics are identified by stakeholders, such as in case study 1, can be an effective means of overcoming measurement difficulties and a lack of data. Expanding the use of qualitative metrics and scales can help to ensure that important S/C concerns are identified, clarified, and evaluated in a transparent manner. Relying on previously validated metrics and on narratives collected from concerned stakeholders can overcome concerns decision makers may have about the legitimacy of S/C concerns or the costs associated with gathering extensive additional data (Costanza et al. 2007, Magee et al. 2013).

Of course, it is important to recognize that many S/C measures are context dependent and may require additional research and consideration beyond the general lists now provided as part of guidelines or regulatory initiatives (Magee et al. 2013). For instance, a recent National Research Council panel argued that in addition to measuring positive contributions to social well-being, policy makers and project managers should not ignore the negative dimensions of SWB such as emotional suffering or income inequality in so far as reducing extreme levels of past damages or suffering in specific communities may warrant small increases in costs or risks to those more mainstream populations that are far better off (National Research Council 2013). Additionally, decision makers should be encouraged to acknowledge the importance of S/C measures to affected populations and know that it may be justified to afford those measures a higher importance weight relative to economic or ecological effects when seeking to balance the different positive and negative effects of a proposed initiative.

Simply completing a careful social impact assessment is not by itself sufficient because identifying and characterizing S/C impacts is only a means to the desired end of encouraging the redesign of projects to maximize their net benefits across the full range of impacts while reducing adverse effects on vulnerable populations. In such cases, decision-making processes that explicitly compare alternative project options would permit their redesign to better achieve identified S/C values. In addition, much can be done to improve the communication of how projects and their impacts have been evaluated. For example, decision-makers would be wise to adopt best practices with regard to risk communication that address the full range of project impacts and acknowledge the role that perceptions of S/C risks can play in shaping the public's priorities.

In addition to selecting the right metrics, incorporating stakeholders into impact assessment processes in ways that are both deep and meaningful is critical and, ultimately, also helpful to both proponents and governments. The process of articulating S/C considerations provides benefits to management agencies in terms of better understanding stakeholder priorities and generating creative alternatives, and to stakeholders in terms of encouraging community residents to talk openly about shared and relational values.

A key takeaway from many case studies, including the year-long process of working with affected interests and the DOW in Ohio or the decade-long process of working on pipeline sitings, is the experience that both the agency and its stakeholders gain in participatory deliberation (Dryzek et al. 2019). These experiences are in stark contrast to the limited and unstructured opportunities for public response provided by some state and federal agencies, often critically referred to as "decide, announce, defend." In this sense, the simple act of engaging stakeholders, finding ways to first document their concerns and then to bring them into a formal analytic structure, is itself a positive social impact and can contribute to closing the gap between the promise and reality of S/C metrics.

Responses to this article can be read online at:
http://www.ecologyandsociety.org/issues/responses.php/11730

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Data and analyses, including notes and reports from each of the four case studies, are available upon request.

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