



Understanding the role qualitative methods can play in next generation impact assessment

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ABSTRACT

Since its inception, impact assessment (IA) has been perceived by many to be a largely technical, quantitative exercise. However, as jurisdictions shift towards a more sustainability-oriented IA that accounts for a wider range of social, cultural, economic, health and well-being, and equity implications of proposed projects and strategic initiatives, values and subjectivity come more to the fore. Making predictions now needs innovative, and rigorous applications of qualitative methods that enable meaningful inclusion of diverse knowledges, values, and information sources, whilst at the same time giving confidence to decision makers and other stakeholders about the evidence base. Adopting such qualitative methods in practice is hindered by a lack of clarity of the role of qualitative methods in the delivery of sustainability-oriented IA. Guided by findings from a thematic analysis of primary data gathered through an international survey supplemented by semi-structured interviews and a workshop, the novel contribution of this paper is to clarify how and why qualitative methods can best contribute to the effective delivery of next generation IA.

1. Introduction

Impact assessment (IA) is defined by the International Association for Impact Assessment (IAIA) as being “*the process of identifying the future consequences of a current or proposed action*” (International Association for Impact Assessment (2024)). It has its roots in the environmental impact assessment (EIA) process mandated through the US National Environmental Policy Act 1969 (US Congress, 1969) for federal actions having potentially significant impacts. The process has since spread globally (Glasson and Therivel, 2019) as a legal requirement to ensure prior understanding of the environmental implications of proposed projects by those responsible for sanctioning them. It has evolved from being a tool aimed primarily at environmental protection (Vanclay, 2004), to being a tool for the delivery of sustainable development (Bond

et al., 2020). This evolution in the goals of EIA can largely be attributed to the Earth Summit taking place in 1992 at which over 170 nations undertook (through agreeing to Principle 17 of the Rio declaration on the environment and development) to use EIA as one of the key tools for assisting the move towards sustainable development (United Nations Conference on Environment and Development, 1992).

Recognizing that IA informs, rather than makes, decisions, it is important to understand that IA relies on the application of methods in order to deliver predictions that inform decision makers of the likely consequences of their actions (Porter and Fittipaldi, 1998; Pischke and Cashmore, 2006; Noble et al., 2012; Therivel and Wood, 2018). Methods can be understood in multiple contexts, for example, Porter and Fittipaldi (1998) refer to the different foci of IA as domains, and therefore one can conceive of domain-oriented methods (where social impact

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assessment and health impact assessment have long relied on some application of qualitative methods; e.g., Fehr et al., 2014; Vanclay and Esteves, 2024). Morgan (1998) divides methods into four groups: task-oriented, component, integrated, and adaptive; these acknowledge that some methods are, respectively, specific to the stage of IA, to the domain, others are more generic, or focused more on managing outcomes. However, while qualitative methods were acknowledged as being valuable in communication contexts in the early years of EIA (e.g., Munn, 1979), the focus was on quantitative methods (Hollick, 1981; Lawrence, 1993) which Bisset (1978) lamented as potentially masking contentious items in assessments as a means of avoiding conflict. This initial preference for quantitative methods can be traced back to the roots of EIA in engineering and natural science disciplines leading to a situation where, “in many countries, EIAs are undertaken by engineers and technologically trained people who have an affinity for the use of quantitative aids in their work” (Bisset, 1988, p.60). Mostert (1996, p. 191) wrote that “subjectiveness is a real danger for EIA. Subjectiveness occurs whenever the results of EIA are influenced by the subjective norms, values and interests of one or more of the parties involved. This can be detrimental for the quality of the environmental impact statement (EIS) and can make the report controversial. EIA is then unlikely to improve decision making”. While there were also early efforts to include values in EIA methods, notably through the advent of utility theory developed by authors such as Ralph Keeney (see, for example, Keeney, 1977), these approaches were argued to compartmentalize environmental impacts. Further, Bisset (1988, p.53) argued that such methods “are so heavily dependent on quantification, that there must be a great temptation to quantify the unquantifiable”.

Thus, a certain discomfort with qualitative methods and their application can be observed in the literature from the early decades of IA practice. For example (Lawrence, 1993, p.4) argued: “the qualitative methods traditionally used fall well short of what is required. These methods are described as narrative descriptions, checklists, and matrices—all of which lack formal trade-off rules and could more properly be characterized as the absence [sic] of analysis or evaluation”. Outside the field of IA, paradigm loyalty to quantitative methodological approaches are pervasive and can potentially explain a reluctance to embrace qualitative approaches (Hammersley, 1996). Therefore, a shift towards greater use of qualitative methods to meet the challenges of next generation IA is not trivial.

A move towards increasing use of qualitative methods from the time period 1970–1979, to 1980–1989, and then again from 1990 up until the end of the decade was documented by Canter (1998). Their use has continued to increase into the 21st century with the expansion of IA’s scope, the evolution of community-led approaches to IA, and increasing attention to public participation. With respect to scope, over the years, many forms of IA have developed, with varying foci including environment, social, health, equity, language, among many others (Vanclay, 2015). There are calls for greater application at strategic levels of decision making, both regionally and nationally (Fundingsland Tetlow and Hanusch, 2012), with evidence this is happening (International Atomic Energy Agency, 2018) amid calls for more application at a global scale (Nelson, 2023). There have long been arguments for more (or better) consideration of cumulative effects (Clark, 1994; Baxter et al., 2001; Noble, 2015; Bidstrup et al., 2016; Blakley et al., 2017; Roudgarmi, 2018) and alternatives (Steinmann, 2001; Desmond, 2009; Senner, 2011; Geneletti, 2014; González et al., 2015; Ruiz-Padillo et al., 2016). As well, continuing the trend established at the Earth Summit 1992, there have also been calls for greater inclusion of sustainability considerations with associated trade-off rules (Sinclair et al., 2018). IA conducted in a way that addresses all of these imperatives has been termed “next generation” IA (Gibson et al., 2016) and has been considered to be largely aspirational in terms of practical application (Sinclair et al., 2018). Next generation IA requires new ways of thinking about assessment and new assessment methods that can accommodate the extensive range of sustainability issues at the same time as delivering transparent and understandable evidence to the broad range of stakeholders involved in IA.

Some forms of IA, such as social impact assessment and health impact assessment, have long employed the use of qualitative methods. Community-led forms of IA (e.g., Lawrence and Larsen, 2017; Sandham et al., 2019), human-rights IA (e.g., Rights and Democracy, 2011; Watson et al., 2013), and strategic assessment (e.g., Sinclair et al., 2009), for example, also tend to draw heavily on qualitative methods that allow impact identification and evaluation to be rooted in local knowledge and values. Another key trend has been an increase in public participation (Sadler, 1996; Burdett and Sinclair, 2024), requiring a shift towards qualitative methods that were more easily understandable by a greater range of stakeholders, leading to more transparency in political arenas (Bisset, 1980). Indeed, Saarikoski (2000) found that the use of IA as a negotiation vehicle to inform political decision making was inherently unfair because those with knowledge in quantitative data tools dominated the discussion. Prediction methods that are more understandable to a greater range of stakeholders may reduce this unfairness.

Despite this increasing use of qualitative methods in IA, there is indication that qualitative methods are still often seen as having a subordinate role in IA. Therivel and Wood (2018) provide comprehensive guidance on the methods to be applied for impact prediction across a range of components of environmental and social impact assessment, and indicate that “qualitative assessments are typically used where quantitative assessments are difficult or impossible” (p.8). This seems to suggest that qualitative methods remain subordinate to quantitative methods and only have a role in filling in any gaps that quantitative methods cannot fill. Mayoux and Chambers (2005, p.271) take it further in stating “recent debates about integrated impact assessment have tended to treat participatory approaches and methods as a fashionable frill added on to more ‘expert’ quantitative and qualitative investigation”. Their research also highlights some confusion in the understanding of qualitative methods, whereby participatory approaches are clearly distinguished from qualitative investigation, with the latter simply generating data to be used solely by experts.

The literature therefore suggests several barriers to more extensive application of qualitative methods in IA, including inertia (restricting a move from quantitative methods) and the technical backgrounds of the IA practitioners, among others. Yet a range of drivers, primarily including key elements of next generation IA (broader consideration of sustainability requiring better integration of wide ranges of values) indicate a need for the more robust application of qualitative methods. At the very least, these different messages point to a lack of clarity on the role that qualitative methods could and should play in IA. In addition, advancements in next generation IA may facilitate a paradigm shift in the application and acceptance of qualitative methods. The research question arising from this background is thus: what roles could, and should, qualitative methods play in next generation IA? This leads to the aims of the paper to contribute to research on overcoming one key barrier to broader adoption of qualitative methods in IA, that being a lack of extensive understanding of the roles that such methods can play in IA. Ultimately, this task will help clarify the contribution that can be made through application of qualitative methods, and therefore potentially ease their acceptance in future practice.

The research was undertaken as a component part of a three-year project (documented in Walker et al., 2023) directed by a core team of international IA researchers, some of whom are co-authors of this paper. The work of the core team was supported by a Best Practice Advisory Committee that provided direction as well as input on key research questions and results. Qualitative research undertaken in the context of IA was defined in the project as research that “explores people’s perceptions, experiences, and knowledges that contribute to an in-depth understanding of the potential effects of proposed land and resource development projects, plans, and/or policies” (Walker et al., 2023, p.3). The outcomes of the research project can be divided into three which, given the volume of research, form the basis for three separate journal publications. The first deals with the identification of specific qualitative methods available for IA; this outcome has been published in Walker

et al. (2024) and describes seventeen methods which we list in Table 1 to provide the necessary context for this paper. The second output is the focus of the present paper on the potential roles of qualitative methods. The third outcome, which is a work in progress at the time of writing, relates to identification and overcoming of barriers to the application of qualitative methods in EIA.

The 17 methods in Table 1 illustrate the overlapping nature of qualitative and quantitative methods, as they cannot always be easily separated, whereby the application of some of these methods in IA relies on an integration of both qualitative and quantitative approaches to data collection or their analysis (e.g., multi-criteria analysis). In examining the role of qualitative methods, we have focused on those listed in Table 1, recognizing that there are substantial differences in terms of their focus on data collection as opposed to data analysis, and their level of integration, if any, with quantitative methods. Given this complex relationship between qualitative and quantitative methods we have taken the approach of defining as qualitative any methods that comprise a significant qualitative component (in this context, what constitutes 'significant' is a judgement made by the research team).

IA literature and methodological practice tend to be biased towards western values and ways of thinking, which fail to recognize Indigenous Peoples' worldviews (O'Faircheallaigh, 2017). While Walker et al. (2024) include qualitative methods being applied in community- and Indigenous-led IA, we acknowledge that it does not do justice to the breadth and depth of Indigenous methodologies being applied in IA. Indeed, some researchers separate Indigenous methods from Western research methodologies and argue for decolonization of research (see, for example, Simonds and Christopher, 2013). Our research focuses on Western research methods and, while the findings remain valid in the majority of global IA settings, there remains a significant gap around the roles qualitative methods can play to help to meet obligation under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations, 2007). This is an area where further work is needed and readers should note the importance of this omission where any IA involves Indigenous Peoples.

The next section sets out the methodological approach for achieving our aim to clarify the potential roles and contributions of qualitative methods; this includes a survey of practitioners, supplemented by semi-structured interviews with a subset of survey respondents, and a workshop. This is followed by a results section with five sub sections, each dealing with a different role. Finally, we end with conclusions that summarise the findings, align them with the literature, and set them into the context of the need for a wider research agenda aiming to facilitate greater adoption of qualitative methods in IA.

2. Methods

The data presented in this paper derive from a survey, interviews, and a workshop, as described below.

The core team designed an international online survey for IA practitioners that sought the experience of respondents with the use of qualitative methods in IA. While the survey used a combination of open-ended and closed questions (Bhattacharjee, 2012) the bulk of the data presented in this paper came from a part of the online survey related to the use of qualitative methods in IA. Since it was not possible to determine the total population of IA professionals, we used a non-random, purposive sampling strategy (e.g., Neuman, 2014). The sampling strategy involved:

- 1) 238 emails being sent directly to a list of potential participants known to have expertise in qualitative research in IA, as identified by the research team, the international advisory committee and an extensive literature review described in Walker et al. (2023);
- 2) publicising the survey, and providing a link, through nine national and international IA professional associations' newsletters and/or social media platforms (e.g., International Association for Impact

Table 1
Qualitative methods suitable for application in EIA (identified and described in Walker et al., 2023).

Method category	Description
Deliberative Methods	Rely on discussion-based approaches to engage the public in collaborative problem solving and decision-making. Examples of deliberative methods include deliberative polling, world café, community forums, citizens' juries, and open-space technologies.
Delphi method	A technique for systematically eliciting advice, and ultimately consensus, from a panel of anonymous experts through iterative rounds of questionnaires.
Document analysis	The systematic analysis of various types of documentation, such as news articles, archival documents, official reports, policy documents, and academic literature.
Focus groups	Involves facilitator-moderated group discussion that explores experiences, perspectives, and opinions about a specific topic. Data are generated through interaction among participants (typically 6–8).
Fuzzy sets	Fuzzy sets can be considered as "computing with words." It involves transforming qualitative, descriptive data into a form that can be mathematically described and manipulated in a rigorous way that accounts for the subjective nature of the descriptors.
Interviews	A one-on-one exploration of individuals' experiences, perspectives, and opinions about a specific topic. Interviews can take place face-to-face, online, or via telephone.
Matrices	A grid that links systems components with project activities. We are interested in matrix approaches that use qualitative data, analysis, and/or reporting.
Multi-criteria analysis	Multi-criteria analysis (MCA), also known as multi-criteria decision analysis (MCDA), is a family of mathematical techniques that support decision-making by assessing and aggregating performance of options (such as alternative development proposals) against multiple, often conflicting, criteria. Participatory or qualitative approaches may be used to collect and integrate qualitative data into the analysis.
Narrative methods	Involves engaging with and interpreting people's experiences through storytelling.
Q methodology	Uses statistical analysis to identify dominant perspectives/discourses around a specific issue by having participants sort and rank a set of qualitative statements representing a full range of opinions.
Qualitative data analysis	The systematic analysis of non-numerical information gathered through a variety of qualitative data collection methods, often managed using computer-assisted data analysis software (e.g., NVivo).
Scenario-based methods	Integrate qualitative future-oriented scenarios (i.e., plausible pathways by which the future could unfold) into IA analysis. Examples of scenario-based methods include participatory scenario analysis and simulation gaming.
Participatory spatial methods	Participatory mapping techniques that integrate qualitative data collection and/or analysis (e.g., community mapping, land use and occupancy mapping, participatory geographical information systems [PGIS]).
Surveys	Questionnaires that explore individuals' experiences, perspectives, and opinions about a specific topic. Surveys can include open-ended qualitative components.
Systems/network analysis	Involve the representation and analysis of the relationships between systems components relevant to an Impact Assessment. The analysis may include one or more systems (e.g., ecological, social, economic, institutional).
Visual methods	Collect and analyze visual or audio-visual images as data. Visual methods include, for example, photo-elicitation, photovoice, video narratives, social media image analysis, and seasonal calendars.
Workshops	Facilitated participatory sessions in which participants discuss, brainstorm, and identify solutions for a specific problem. Workshops typically include more participants than a focus group discussion.

- Assessment [IAIA], IAIA affiliates, and SIAHub [an online hub for the social impact assessment community]);
- 3) information cards distributed at the IAIA annual meeting held in Vancouver, Canada, in May 2022; and,
 - 4) snowball sampling was also adopted as a “traditional method” (Bryman, 2016, p.415) for identifying additional connections suggested by participants for interviews.

This sampling strategy can lead to biases already present in the networks of the research team and international advisory committee, and through the memberships of the professional associations and subset of practitioners that can attend IAIA meetings. Also, academic literature tends to bias towards research published by academics based in developed countries. There is, therefore, a bias towards English-speaking participants from richer nations (as detailed in the next paragraph), and this can have implications for the relevance of the study to other nations.

One hundred and forty-five responses were received, with 111 respondents indicating their location spread across 6 continents and 25 countries (Canada, Australia, the United States, the United Kingdom, Netherlands, Brazil, Sweden, Thailand, and South Africa were the only countries with more than one response; see Walker et al. (2023, p.7) for full details). The combined population of the countries hosting more than one respondent (878 million at the time of writing) comprises 10.7 % of the global population (8.2 billion at the time of writing) – which together with the focus on English language does indicate a sample which cannot be considered globally representative. Reflecting the client for the research (which may be expected to be the main focus for application of the findings), the Impact Assessment Agency of Canada, 50 of the 111 respondents who provided their location details were from Canada (which, with 40 million inhabitants, comprises <0.5 % of the global population at the time of writing). Respondents represented a number of roles in IA, with some having multiple roles (private consultant/practitioner (52 %), academic/researcher (40 %), government/regulatory agency (12 %), non-governmental organization (8 %), industry (5 %), panel member (4 %), Indigenous peoples/organization (2 %), and professional association representative (2 %)). Eighty respondents indicated they were willing to engage in a follow-up interview. Thus, while the sample is large enough to be able to draw useful conclusions, it is inherently biased and cannot be considered to be globally representative.

A workshop was held in association with the IAIA annual meeting in Vancouver in the spring of 2022. This occurred at the same time that the survey was being completed. Invitations to the workshop were in part selective and in part random. Through contacts of the core team and international advisory committee, there was awareness of some people who planned to attend the conference, and these were invited to the workshop. In addition, business cards that included a QR code advertising the research were distributed by core team members at the conference. This resulted in some people choosing to come to the workshop when on-site in Vancouver. In the end, twenty-seven IA professionals, including government regulators, researchers, non-government organizations, and representatives of Indigenous peoples, joined the workshop. At the workshop, participants engaged in discussion about qualitative methods identified through the literature review and online survey as having a potential role to play in IA where the following questions were posed to prompt discussion (see Walker et al., 2023 for more details):

- Are there methods that might be particularly innovative/novel/interesting?
- Were there any key methods missing from the cards?
- How were/are these methods applied in IA cases that you have been involved in?

Data were collected through written responses to a short survey and contemporaneous notes taken by four notetakers.

Lastly, semi-structured interviews were undertaken to allow more detailed data to be collected about the qualitative methods identified (see Table 1) and their potential role in actioning next generation IA. Interviewees who had experience working with the different qualitative methods were identified through the online survey. In the first instance, 46 of the 80 survey respondents who indicated they would be willing to be interviewed were selected as being able to provide sufficient breadth of experience (that is, across all these interviewees there was experience related to all 17 methods) in terms of the different methods identified. Forty of these people consented to an interview. An additional eight IA professionals who were known to have experience using specific qualitative methods in IA, but had not responded to the survey, were also interviewed to fill in some gaps in relation to experience in the use of some qualitative methods. The interview schedule is provided in Walker et al. (2023, see Appendix B). As with the surveys, the greatest proportion of participants were from Canada; however, we also sought to learn from innovative practices and multi-sectoral experience from jurisdictions around the world. Interviewees were from 17 countries, including Canada ($n = 18$), Australia ($n = 6$), the United Kingdom ($n = 5$), South Africa ($n = 3$), Netherlands ($n = 2$), Brazil ($n = 2$), Sweden ($n = 2$), and one each from Argentina, Denmark, Iceland, India, Italy, New Zealand, Nigeria, Portugal, Uganda, and the United States. Of these, 62 % were IA practitioners, 38 % were researchers, and 15 % were government or regulatory staff (some participants reported multiple roles, explaining the total greater than 100 %). All interviews were undertaken using Microsoft Teams or Zoom, using their respective transcription functions. The interviews lasted from one to almost three hours in duration, with subsequent editing of automatic transcriptions typically taking at least three hours per interview.

The qualitative survey data, workshop notes and interview transcripts were uploaded and coded together in NVivo 12. We applied a deductive-inductive thematic qualitative analysis, in which deductive codes were initially established in relation to specific project objectives (see Walker et al., 2023 for more detailed explanation of the coding process related to project objectives). For example, we were interested in what participants perceived as the roles of qualitative methods in IA; therefore, we set “role of qualitative research” as a first-level code – this focused our attention on data to analyze to characterise the roles. Grounded themes emerged from both the inductive and deductive coding following the practice established by Braun and Clarke (2006). One hundred and twenty-five discrete sections of data were deductively coded to “role of qualitative research in IA”. These data were reviewed in turn and second-level codes were inductively developed to cluster the data into meaningful groups. The content of the codes was reviewed again, and related codes merged into broader themes. In this way, key themes were identified for each of the specific project objectives (see Walker et al., 2023).

The trustworthiness (credibility and dependability) (Creswell and Creswell, 2018) of our research was ensured using techniques such as member checking, external auditing, and triangulation (see Walker et al., 2023). Triangulating among the coded survey, interview, and workshop data provided additional confidence in the results. In terms of member-checking, participants were provided with a link to their individual transcript and allowed the opportunity to review it for accuracy if they wished. The project’s Best Practice Advisory Committee performed the external auditing function for the work. Other procedures were used to safeguard the reliability of the coding and analysis. One team member was responsible for leading the coding process while another did audits of this work to ensure consistency. Direct quotes are often used in reporting the results to evidence the key themes identified. Ethical approval was obtained from the University of Manitoba to help ensure minimisation of risks to all participants and safe management of data. All research team members undertook ethics training pursuant to Canada’s Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (Course on Research Ethics) and, where required, the ethics protocol approved by the University of Manitoba was subjected to

a multi-site ethics review process. In line with the ethical approval received for conduct of the survey and interviews, participants remain anonymous beyond a numerical code (to distinguish different participants) and a broad category of practice affiliation (where the survey respondents and interviewees were divided into self-reported roles encompassing: private consultant/practitioner; academic/researcher; government/regulatory agency; non-governmental organization; industry; IA review panel member; Indigenous peoples/organization; professional association). Participants frequently self-reported multiple roles.

3. The roles of qualitative methods in next-generation impact assessment

Five essential roles of qualitative methods in IA, which are not exclusive, were identified through the thematic analysis of the 125 discrete sections of data that had been deductively coded to “role of qualitative research in IA”:

- integrating values and subjective perspectives;
- providing rich, contextual information/data;
- embracing and respecting complexity;
- supporting the broadening scope of IA;
- complementing quantitative research.

Each of these is considered in turn below, with examples provided of transcript excerpts coded against each of the roles.

3.1. Integrating values and subjective perspectives

Integrating values and subjective perspectives into IA processes was a commonly cited role for qualitative methods in IA. The core idea shared by participants is that, in contrast to perceptions of IA as a technical process as discussed in the introduction, IA is in reality an inherently qualitative, values-based process, and what constitutes acceptable or significant impacts largely depends on the values of those who experience and define them.

Participants noted the true nature of IA as a values-based process and that “*showing the many ways in which [qualitative information] runs through everything that we do is very important*” (Interview, P66, IA practitioner). Another participant who was asked about the role of qualitative methods responded:

It’s an eminent role, and impact assessment is by nature qualitative. People don’t know that. I mean, because we use quantitative information, some people think that it’s a technical quantitative technique, but it’s a qualitative tool that is informed by many types of quantitative methods. In the end, judgement of acceptability is extremely qualitative. We have been concerned about the quantitative techniques that can be used to predict particular impacts, but we have dozens of impacts that in the end will be understood through qualitative value-laden reasoning.

(Interview, P74, IA practitioner and researcher)

Several participants argued that impact “acceptability,” or “significance” at least in part, is subjective and values-based. This is in line with previous research, for example, Haug et al. (1984) had previously distinguished between the ‘fact’ of an impact (that it happens), and the ‘value’ of an impact, which is what it means to different stakeholders, and Thompson (1990, p.241) argued that it “*is the impact of a particular set of findings or predictions upon the minds of individuals, not the impact of the pollutant on the environment per se that is our key unknown*”. Quantitative indicators do not always align with the values and thresholds set by affected communities, which vary across place and time. Participants noted that establishing these values and thresholds is an important part of IA, particularly in cases where Indigenous peoples and their rights may be affected. Using contaminant levels in the environment as an

example, a participant explained that:

Even if they’re not beyond human health thresholds, they are beyond the levels of acceptability for the community. We may not be impacting the human health threshold, which is a quantitative threshold set by the province, but we are affecting the land use and avoidance threshold that is set by the community.

(Interview, P77, IA practitioner)

Going further, participants not only drew attention to the values-based qualitative nature of IA, but also to how appropriate data can be gathered and analyzed to adequately integrate these subjective values. Identifying values by which impacts can be assessed, they argued, is largely the domain of qualitative methods:

I think so many people forget or don’t realize that impact assessment is values-based. There’s an objective side to it, but ultimately comes back to values—whether impacts [are] acceptable or not, or what matters, what are we assessing anyway. I suppose you can quantify people’s values. You can do a questionnaire and ask what people care about and then you can quantify that, but the qualitative methods are more the way to understand people’s values, [be]cause it’s usually a nuanced discussion and one that is not possible in a survey [...] I think in some cases when people maybe are using the term qualitative, what we really need to use is the term value, people’s values, they’re subjective values and that’s what we’re trying to understand. That’s how we should be defining our [valued components] and you know even the baseline impact assessment should be shaped towards what really matters to people and of course the interpretation of the meaning of these effects is all about people’s values.

(Interview, P25, IA practitioner)

...from a value perspective, values are qualitative. That’s the function of them, so you can’t do EIAs without qualitative approaches, I don’t believe.

(Interview, P47, IA practitioner)

Qualitative methods can aid in identifying the diversity of values and perspectives related to a project and its potential impacts and also provide public confidence that their values and perspectives are meaningfully considered in the IA. This is, in part, because “[*q*]ualitative methods allow the participant to speak their mind and not limit to a numerical question” (Survey, P23, IA practitioner) and because it better allows people to recognize how their concerns were addressed in final products:

What I find was in the practice side on qualitative methods is public confidence in EIA. And when you’re going out to the public, you’re talking to them. It’s trying to understand from their perspective what’s their take on the issue [...] But what I find is the real public issues are they feel EIA is not working because their opinions are not being considered in relation to the data that they’re reading in the EIA. You didn’t listen to me. You didn’t hear what I say, or my concern wasn’t incorporated.

(Interview, P52, IA practitioner)

The same participant also mentioned that understanding the range of public perspectives through qualitative methods can contribute to the determination of whether a project is in the public interest.

At the end of the day you’re still making an opinion on what you think is the public interest as a decision maker. So that’s where I think these [qualitative] tools can be very useful to help the decision maker understand the multiplicity of opinions out there.

(Interview, P52, IA practitioner)

The utility of qualitative methods for integrating values and subjective perspectives into IA, however, is dependent on the degree to which it is conducted systematically and is integrated with other components of the IA:

...the way I see it is that outcomes from community engagement activities should form an input as primary research to the SIA, and often that's not the case. Often, I'll read in an SIA that there has been community engagement undertaken and [I have] been looking for the outcomes from that and they're not there. And they'll say "go look for those in a different chapter", and that automatically tells me that they haven't integrated the two things. So, to my mind the connection between [community engagement and social research] is very much that a well conducted community engagement program should produce outcomes that form primary research for the SIA, and therefore the community engagement, in order to enable that to happen, the techniques of community engagement should be chosen such as to enable that. In other words, you should be looking to design a community engagement so that it will produce documented outcomes, which will tell you something about how people expect to experience a project, how they imagine, or expect the impacts to affect them.

(Interview, P110, government/regulatory agency staff)

Despite the promise of qualitative methods for meaningfully integrating values and subjective perspectives in IA, a possible pitfall of their use is the potential for findings to be manipulated to suit specific needs:

It's good that qualitative knowledge is recognized in these regulatory processes and that Indigenous knowledge is explicitly recognized. There's a lot of leeway for that to be misused and abused, especially by proponents who are trying to project an understanding of qualitative information and an understanding of Indigenous knowledge in ways that suit their means. And there's been a number of cases where qualitative methods have, I think, pretty clearly been abused and misrepresented in order to put forward a particular argument that is in favor of an industrial development and is actually completely contrary to what a community-based impact assessment would actually look like.

(Interview, P77, IA practitioner)

This concern highlights the importance of transparency in the presentation of qualitative methodologies, measures that verify the interpretation of results with those who have contributed their knowledge, and the role of decision makers in interrogating the adequacy of qualitative research presented in IAs.

3.2. Providing rich information/data

IA professionals involved in this study considered the provision of rich, or detailed, in-depth, and contextual, information (e.g., [Creswell and Creswell, 2018](#)) as an important role of qualitative methods in IA, and one that is relevant throughout the IA process. As one participant mentioned, "*qualitative data paints a much richer, deeper picture than only quantitative data*" (Interview, P56, IA practitioner). Another suggested there is simply no other way of understanding the core issues in IA: "*Without a qualitative approach, you really don't understand anything [...] you can't get to the heart of the matter without a qualitative element to the research. I truly believe that*" (Interview, P148, IA practitioner and researcher). Participants also spoke more specifically about the points within an IA at which qualitative methods can provide valuable, in-depth, contextual information:

I think qualitative evidence can fill in the gaps and can help make sense of a picture about why a community is saying something or why the impacts... how they're going to appear, how they're going to manifest themselves.

(Interview, P54, government/regulatory agency staff)

Another commented that the social science data that are often collected and analyzed to understand baseline conditions and potential impacts are still largely descriptive rather than interpretive, relying primarily on quantitative statistical information, such as "*how many*

people live in this region? What does the average person earn? What is the average age? What proportion of the population has diabetes? What percentage of people are active harvesters? The stuff that you can pull from census data or health authorities...." (Interview, P149, IA practitioner). While such information is useful, the same participant noted that qualitative methods can more effectively tell the story of relationships within social-environmental systems: "*...but [there's] not a lot about how people interact with their surroundings and each other, which you have to dig a little bit deeper into the qualitative to get at that.*" In addition to providing contextual information about how people interact with each other and the environment, qualitative methods can also provide historical context to the evaluation of potential impacts:

That elements of qualitative research should be more widely recognized in impact analysis, especially for social impacts. Statistics don't necessarily tell the story. Qualitative research also allows for a historical view to impacts rather than a point in time for most impact assessments.

(Survey, P137, government/regulatory agency staff)

The ability for qualitative methods to provide rich, in-depth information, however, is not automatic; it requires thoughtful development and application. One participant, for example, alluded to the necessity of strong analysis to achieve effective, in-depth understandings of IA issues through qualitative methods:

We need to consider our bias towards qualitative analysis and recognize that there's so much we can do with qualitative data, with good analysis [that] can really help us better understand... and understand the data with a lot more depth than we would otherwise.

(Interview, P8, IA practitioner)

In a similar vein, others warned against the quantification of qualitative data, feeling that such attempts "flatten" the potential of qualitative methods to contribute richness and depth to our understanding of potential impacts:

Sometimes we work with companies, and they give you their matrix of all their interviews and it's just dot points. Whereas when you talk to people, they bring alive the subject, which reflects the values but it's [also] more persuasive.

(Interview, P36, IA practitioner)

I'm going to collect all this qualitative data and then it just kind of disappears and gets all flattened out into nothing because they decide to measure it all. They turn it all into measures! A certain amount of quantification is fine, but not if it gets in the way of the story of what's actually emerging from the data.

(Interview, P123, researcher/academic)

Retaining the richness through qualitative data analysis and presentation is vital if qualitative methods are to effectively fulfill their role of providing in-depth, contextual information in IA. These participants' sentiments also reflect good practice qualitative data collection and analysis, for which the intent is generally to make sense of data by organizing segments of textual or image data into themes (e.g., [Creswell and Creswell, 2018](#)).

3.3. Embracing and respecting complexity

Another role of qualitative methods is their ability to help address the inherent complexity involved in predicting and evaluating potential impacts in IA. Participants noted that an emphasis on quantitative measurement can lead to reductionist, siloed approaches that belie the "messiness" of assessing potential impacts within complex systems:

...my perception is that our profession, our community of professionals and practitioners and theoreticians see impact assessment

as this very probabilistic, quantitative, technically sophisticated exercise. When the reality is that it's super messy.

(Interview, P25, IA practitioner)

According to some participants, qualitative methods can facilitate a more holistic understanding of the complex interactions among valued system components and potential impacts on these components.

Well, I think in the EIA you have two different things. One is the environmental aspects and within the aspects there are many, many different methods used—quantitative and qualitative methods—and that's fine. And they are tried out for a long time and some certain methods work for certain aspects or need to be done for certain aspects to get the result. But then when you want to get an overall picture and get away from these silos, you definitely, I think, need a qualitative method to have a full understanding of the entire system. I just can't get away from it and I can't find anything else. I have thought about it a lot, but I can't find anything else that does it justice.

(Interview, P118, researcher/academic)

As jurisdictions continue shifting towards next-generation, sustainability-oriented IA, qualitative methods also play an important role in understanding complex interactions within and across social and ecological systems. Participants drew attention to the value of qualitative methods for understanding the connections among biophysical, social, cultural, and health impacts. For instance, one interviewee noted:

And if you make the connection between the biophysical and social impacts, for example using the idea, the concept of ecosystem services, that's one context, one situation where qualitative data is very important to really understand how the communities use the resource[s] of the place where they live, or where they work.

(Interview, P71, researcher/academic)

Projects subject to IA are usually highly technical and complicated and they often occur within complex social-ecological systems. While quantitative approaches have long been a staple of IA, qualitative methods are essential for providing a comprehensive foundation for decision-making about complex issues and interactions:

Qualitative research is such a broad tool that is essential to most impact assessment work. Impact assessment can rely on a lot of quantitative work but these types of human decisions on complex projects can't be figured easily into a purely quantitative approach. Both will be needed in the continuing future.

(Survey, P75, IA practitioner)

Certainly, you want the best evidence available for the decision-making process, and so I can't see how you wouldn't use qualitative methodologies to provide that evidence. As a decision maker, you absolutely want to see that kind of work being included in an impact assessment. And there [are] always debates about methodologies and so on, but really, I think it just really contributes to the evidentiary base that you're using. For some pretty complex and difficult issues I would say.

(Interview, P150, researcher/academic)

3.4. Supporting the broadening scope of IA

Next-generation, sustainability-oriented IA is resulting in a transition from a primary emphasis on biophysical impacts to increasing requirements for a broader suite of social, cultural, health and well-being, economic, and equity and rights-based considerations. Such considerations have not always had a prominent role in IA, as one participant observed:

...socio-economic/cultural/social/human health effects have largely been the lost child of EA, left wandering in the wilderness relative to

the attention-grabbing biophysical effects (nothing like those stirring data tables and colourful GIS maps). And yet, in my view it is the human effects that should get top billing, from which all else flows (versus the current reverse).

(Survey, P92, IA practitioner)

Participants indicated that as the scope of IA continues to broaden, new and innovative methods—including qualitative methods—will be necessary to meet the challenges of assessing potential social, economic, cultural, and health impacts.

...we assume the issues are biophysical, but in reality it's the social issues, the economic issues, health issues that are just massive in those cases [referring to large-scale projects] that are really challenging to deal with.

Interviewer: And hard to quantify?

Exactly, exactly. So how do decision makers deal with that? It's easier if you can say "yes, these are the impacts on fisheries, we have data here to tell us this", and analysis is done appropriately. But mental health impacts, what's a good approach to doing that? So, it's all going to be new. (Interview, P150, researcher/academic).

Qualitative methods may be particularly important in the assessment of intangible values and impacts, such as associations to place in cultural impact assessment:

...qualitative methods are absolutely the foundation of cultural impact assessment here. It's all about using methods to really capture people's association to place, and once you've got that association to place and what's most important, then starting to look at what the impact of the proposed activity could be and again using a range of different qualitative methods.

(Interview, P57, IA practitioner & researcher)

In some jurisdictions, including under Canada's federal IA framework, requirements for assessing this wider range of potential impacts are now enshrined in legislation. Participants suggested that qualitative methods will play an important role in meeting the expectations of these regulatory IA requirements, such as the application of gender-based analysis plus (GBA+) and the mandatory consideration of Indigenous knowledge:

Some of the requirements of the new Act, let's say gender analysis, for my understanding predominantly it requires a qualitative approach. If you are requiring that legally now, that requires a qualitative approach. Maybe gathering Indigenous knowledge, some of that requires a qualitative approach. Some of it should be driven by recent reforms, I think, in legislation and guidance as well. I'm thinking high level, what might drive qualitative approaches and then increasingly demonstrate a good practice for sure.

(Interview, P53, IA practitioner and researcher)

Another participant spoke about how a commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations, 2007) in some IA frameworks (see, for example, Impact Assessment Agency of Canada, 2021; Government of British Columbia, 2024) is resulting in greater requirements for partnerships with Indigenous rights-holders and for Indigenous-led IA. These opportunities, in turn, create new prospects for the integration of qualitative information in IA processes and decision-making:

I think the thing that I would share is just to let everyone know that impact assessment is changing. The Declaration on the Rights of Indigenous Peoples—legislation in [British Columbia is] upholding that. The expectations of the new Acts that reference UNDRIP. Things are changing so that our work—when we do good qualitative research for impact assessment—is being considered by decision makers that are not just provincial decision makers or federal decision makers. It's being considered by Indigenous decision makers

that have equal or greater authority. That's happening right now on the ground.

(Interview, P77, IA practitioner)

Indigenous rights, culture, knowledge, and health and well-being are playing, and will continue to play, an increasing role in Canada and particularly within federal IA processes. Indigenous-led IAs tend to have a much higher qualitative component than western scientific inputs, as they focus on “*tell[ing] a story of change*” (Interview, P77, IA practitioner) and better reflect values and relationships associated with land (Joly et al., 2018). From this we infer that Indigenous-led IA, in Canada and all other countries with Indigenous populations, should therefore be seen as leading examples of how qualitative methods can effectively support the broadening scope of IA.

3.5. Complementing quantitative data

Some participants described the role of qualitative methods in terms of its relationship with quantitative approaches in IA. Generally, there was agreement that both types of methods are necessary:

The one notion that keeps coming to mind concerns combining qualitative methods with [quantitative] social and economic and, for that matter, environmental data. They are all part of the story. As someone said, “numbers are symbols that people use to make arguments”—and so are words.

(Survey, P98, researcher/academic)

However, there was some diversity in perceptions about the roles of qualitative and quantitative methods in relation to each other. One perspective was that qualitative methods are most useful for supplementing, supporting, or filling gaps in quantitative findings. One participant, for example, noted that “*[q]ualitative research is, in my view, a companion to the quantitative. It is best used as a means to supplement or explore quantitative data that is limited in scope or deficient in some way*” (Survey, P96, IA practitioner & researcher). Another argued that “*quantitative research has some great features, but unless it is matched with qualitative, it is often hard to really understand results*” (Survey, P113, multiple roles). Qualitative methods were also described as a valuable precursor to further quantitative research, particularly useful as an exploratory tool to identify pertinent IA issues:

Results from qualitative research can be an indicator of previously unidentified issues and lead to quantitative research that further enhances EIA and the long-term follow-up actions.

(Survey, P137, government/regulatory agency staff)

More often, however, participants acknowledged that qualitative and quantitative methods produce different, but complementary types of information:

...they fill the gaps in each other, but they do both bring different things and sometimes they do give a different picture. Unfortunately, I think that often the qualitative results only get used to serve the quantitative, rather than considering whether the qualitative data are telling you something different—that it is actually being presented as an authentic, different interpretation of what's happening. If it is only selectively used to support what the quant[itative] is showing, then that's problematic.

(Interview, P123, researcher/academic)

Therefore, qualitative methods should not just serve quantitative approaches (or vice versa), but they should be equal partners in contemporary IA processes, the two approaches are complementary. There is likely a need, however, for resources and guidance on harmonizing qualitative and quantitative data to ensure qualitative findings become an integral component of IA reporting, rather than being tacked on in appendices.

4. Discussion and conclusion

As is evident in the rich qualitative data collected in our research, qualitative methods enable the integration of diverse values and perspectives, yield rich contextual information, facilitate the understanding of interactions in complex systems, support the broadening scope of IA, and complement quantitative data collection and analysis. Use of qualitative methods is entirely appropriate in light of some of the inherent characteristics of IA.

IA by nature is subjective – the paths followed in an IA (scoping, identification of valued environmental components, etc.) and decisions taken rely on values, with “*much debate on the findings of EIA is a consequence of competing philosophies, values and priorities, rather than controversy over scientific issues*” (Cashmore, 2004, p.411–412). Judgement of the acceptability of an undertaking is values based, and those impacted by a decision can have very different values than those making the decisions. As noted by Munday (2020, p.343) “*a people-centred, 21st century model of impact assessment calls for qualitative and insightful research that tells a powerful story about how a community's values, lifestyles, livelihoods, vulnerability, resilience, wellbeing and social fabric will be affected by development*”. She advocates that the identification of diverse values of potentially impacted communities at early stages of IA—and their integration into scoping, indicator development, and significance evaluation—can enhance the effectiveness and efficiency of assessments and the equity of decisions. Qualitative methods can provide an important window into these values without compromising the credibility of evidence needed for decisions. Indeed, they may provide the sole means of eliciting the weight of feeling about different values placed on affected sustainability components. There are many examples from a variety of forms of IA that demonstrate how qualitative methods can be used to identify and integrate local values in IA. For instance, visioning workshops used to identify locally significant future values in a strategic assessment (Sinclair et al., 2009); narrative methods used to foreground Anishinaabeg (an Indigenous group) values in a highway twinning project assessment (Niiwin Wendaanimok Partnership, 2021); participatory spatial methods for determining social values of a river estuary in the location of a proposed mine (Pearce et al., 2021); and, focus groups to identify a community's values around well-being in a health impact assessment (Cameron et al., 2011)—just to name a few. As such, qualitative data provide rich information for decision makers, such as details on why and how a proposed activity is perceived as an impact. The data tell the story of social-environmental systems. Qualitative data can facilitate a more holistic understanding of the complex interactions among valued environmental components and potential impacts on these systems.

Development projects and undertakings occur within complex socio-ecological systems and many of the projects themselves are complex and it has been argued that EIA “*is not a science, but uses many sciences (and engineering) in an integrated interdisciplinary manner, evaluating relationships as they occur in the real world*” (Caldwell, 1989, p.9). Therefore, qualitative methods can help us to understand the connections among biophysical, social, cultural, and health impacts that quantitative approaches struggle to accommodate in a meaningful way. It is only through understanding the interactions between people and their environment that a clear picture can be obtained of the interactions (including cumulative effects) that are important – those that identify impacts that would otherwise be missed from the evidence underpinning the decisions. This tallies with the findings of researchers who promote scenario analysis combining qualitative and quantitative methods as the best means of conducting IA (e.g., Becker, 1988). More recently, we are seeing an emergence of innovative applications of qualitative approaches in scenario analysis (e.g., McBride et al., 2017; Ernst et al., 2018) multi-criteria analysis (e.g., Priya and Venkatesh, 2021), and systems analysis (e.g., Ehrlich, 2022) methods to understand these complex human-environment interactions in IA.

Next generation IA incorporates a broader suite of social, cultural,

health and well-being, economic, and equity and rights-based considerations than were traditionally considered within IA at its advent. These considerations broaden the scope of IA towards sustainability – a goal that is characterized by subjectivity, therefore lending itself towards qualitative methods (Wilkins, 2003). A particular concern of many respondents was also the need to encompass the values of Indigenous peoples into the IA process (including by shifting IA structures), to align with the United Nations Declaration on the Rights of Indigenous Peoples (United Nations, 2007). This will only be achieved through the robust implementation of Indigenous approaches combined with qualitative science.

Our results support the contention of Therivel and Wood (2018) that qualitative methods be used to complement quantitative methods, but furthermore it is important to realize that they most often dig into areas that quantitative approaches do not expose. We would also argue that the converse holds to be equally true; i.e., that quantitative methods can usefully be applied to complement qualitative studies in IA practice. The results also reveal that it is important to use established standards for ensuring data trustworthiness, and proven methods for safeguarding reliability in qualitative research to avoid abuse of qualitative data – which often relates to inconsistent coding and the cherry-picking of participant quotes to support certain actions or inaction in IA. The analysis strongly supports the need to use both quantitative and qualitative data to complement each other, in line with other studies that have examined individual components of next generation IA in isolation, for example Yauch and Steudel (2003) for cultural impacts, Harris et al. (2012) for health impacts, Harrison (2011) for human rights impacts, and the Interorganizational Committee on Principles and Guidelines for Social Impact Assessment (2003) for social impacts. In combining qualitative and quantitative analysis it is important to maintain the richness of qualitative data, not “flatten” them through quantification.

The paper has focused on just one of the barriers that restricts broad application of qualitative methods in IA, namely lack of knowledge of the various roles that such methods can usefully play. We recognize that better understanding these roles is just one small part of a wider strategy that is needed to change IA policy and practice. Other barriers to the application of qualitative methods in IA identified in Walker et al. (2023) such as inertia in IA practice and lack of expertise among IA practitioners, need to be fully explicated and research is needed into solutions to these challenges. As such, although this research provides a contribution to improving the application of qualitative methods in IA, much more work is still needed in this regard. A limitation of this study was a sampling strategy that resulted in an underrepresentation of Indigenous worldviews and methodologies. We recognize many qualitative methods do not align with Indigenous worldviews and are not appropriate in some IA contexts. Further work is needed to more fully articulate the roles qualitative methods can play in projects potentially affecting Indigenous communities and to meet the principles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Finally, our research did not focus on the potential for integration of qualitative and quantitative methods in IA, or the specific relationship between them. Nevertheless the fact that there is a relationship between qualitative and quantitative methods in IA came across strongly in the analysis and points to the need for further research to identify how they can be integrated to best contribute to the effective delivery of next generation IA.

CRediT authorship contribution statement

Heidi Walker: Conceptualization, Formal analysis, Investigation. **Alan Bond:** Conceptualization, Methodology, Writing – original draft, Investigation. **A. John Sinclair:** Conceptualization, Methodology, Writing – original draft, Investigation. **Alan P. Diduck:** Writing – review & editing, Validation. **Jenny Pope:** Conceptualization, Methodology, Formal analysis, Investigation. **Francois Retief:** Writing – review & editing, Validation. **Angus Morrison-Saunders:** Writing – review &

editing, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data source is referenced in the paper

References

- Baxter, W., Ross, W.A., Spaling, H., 2001. Improving the practice of cumulative effects assessment in Canada. *Impact Assess. Proj. Apprais.* 19 (4), 253–262.
- Becker, H.A., 1988. Social impact assessment by scenario projects combining quantitative and qualitative analyses. *Impact Assessm.* 6 (1), 89–102.
- Bhattacharjee, A., 2012. *Social Science Research: Principles, Methods, and Practices.* University of South Florida, Tampa.
- Bidstrup, M., Kornøv, L., Partidário, M.R., 2016. Cumulative effects in strategic environmental assessment: the influence of plan boundaries. *Environ. Impact Assess. Rev.* 57, 151–158.
- Bisset, R., 1978. Quantification, decision-making and environmental impact assessment in the United Kingdom. *J. Environ. Manag.* January, 43–58.
- Bisset, R., 1980. Methods for environmental impact analysis: recent trends and future prospects. *J. Environ. Manag.* January, 27–43.
- Bisset, R., 1988. Developments in EIA methods. In: Wathern, P. (Ed.), *Environmental Impact Assessment: Theory and Practice.* Routledge, London, pp. 47–61.
- Blakley, J., Duinker, P., Grieg, L., Hegmann, G., Noble, B., 2017. Cumulative Effects Assessment. FASTIPS No. 16, October 2017. Available at https://www.iaia.org/uploads/pdf/Fastips_16%20Cumulative%20Effects%20Assessment_1.pdf.
- Bond, A., Pope, J., Fundingsland, M., Morrison-Saunders, A., Retief, F., Hauptfleisch, M., 2020. Explaining the political nature of environmental impact assessment (EIA): a neo-Gramscian perspective. *J. Clean. Prod.* 244, 118694.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101.
- Bryman, A., 2016. *Social Research Methods.* Oxford University Press, Oxford.
- Burdett, T., Sinclair, A.J. (Eds.), 2024. *Handbook of Public Participation in Impact Assessment.* Edward Elgar Publishing, Cheltenham, UK.
- Caldwell, L.K., 1989. Understanding impact analysis: Technical process, administrative reform, policy principle. In: Bartlett, R.V. (Ed.), *Policy through Impact Assessment: Institutionalized Analysis as a Policy Strategy.* Greenwood Press, New York, pp. 7–16.
- Cameron, C., Ghosh, S., Eaton, S.L., 2011. Facilitating communities in designing and using their own community health impact assessment tool. *Environ. Impact Assess. Rev.* 31 (4), 433–437.
- Canter, L.W., 1998. Methods for effective environmental information (EIA) assessment. In: Porter, A.L., Fittipaldi, J.J. (Eds.), *Environmental Methods Review: Retooling Impact Assessment for the New Century.* U.S. Army Environmental Policy Institute, Fargo, North Dakota, pp. 58–68.
- Cashmore, M., 2004. The role of science in environmental impact assessment: process and procedure versus purpose in the development of theory. *Environ. Impact Assess. Rev.* 24 (4), 403–426.
- Clark, R., 1994. Cumulative effects assessment: a tool for sustainable development. *Impact Assessm.* 12 (3), 319–331.
- Creswell, J.W., Creswell, J.D., 2018. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Sage Publications, Thousand Oaks, California.
- Desmond, M., 2009. Identification and development of waste management alternatives for strategic environmental assessment (SEA). *Environ. Impact Assess. Rev.* 29 (1), 51–59.
- Ehrlich, A., 2022. Collective impacts: using systems thinking in project-level assessment. *Impact Assess. Proj. Apprais.* 40 (2), 129–145.

- Ernst, A., Biß, K.H., Shamon, H., Schumann, D., Heinrichs, H.U., 2018. Benefits and challenges of participatory methods in qualitative energy scenario development. *Technol. Forecast. Soc. Chang.* 127, 245–257.
- Fehr, R., Villiani, F., Nowacki, J., Martuzzi, M. (Eds.), 2014. *Health in Impact Assessments: Opportunities Not to Be Missed*. WHO Regional Office for Europe, Copenhagen.
- Fundingsland Tetlow, M., Hanusch, M., 2012. Strategic environmental assessment: the state of the art. *Impact Assess. Proj. Apprais.* 30 (1), 15–24.
- Geneletti, D., 2014. Integration of impact assessment types improves consideration of alternatives. *Impact Assess. Proj. Apprais.* 32 (1), 17–18.
- Gibson, R.B., Doelle, M., Sinclair, A.J., 2016. Fulfilling the promise: basic components of next generation environmental assessment (2016). *J. Environ. Law Pract.* 29, 257–283.
- Glasson, J., Therivel, R., 2019. *Introduction to Environmental Impact Assessment*. Routledge, London.
- González, A., Thérivel, R., Fry, J., Foley, W., 2015. Advancing practice relating to SEA alternatives. *Environ. Impact Assess. Rev.* 53, 52–63.
- Government of British Columbia, 2024. *Free, Prior and Informed Consent within the Context of UNDRIP and Environmental Assessments*. Available at www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/environmental-assessments/environmental-assessment-revitalization/documents/free_prior_informed_consent_in_an_ea_context.pdf>. Last accessed 22 January 2024.
- Hammersley, M., 1996. The relationship between qualitative and quantitative research: Paradigm loyalty versus methodological eclecticism. In: Richardson, T.E. (Ed.), *Handbook of Qualitative Research Methods for Psychology and the Social Sciences*. BPS Books (The British Psychological Society), Leicester, pp. 159–174.
- Harris, P.J., Kemp, L.A., Sainsbury, P., 2012. The essential elements of health impact assessment and healthy public policy: a qualitative study of practitioner perspectives. *BMJ Open* 2 (6).
- Harrison, J., 2011. Human rights measurement: reflections on the current practice and future potential of human rights impact assessment. *J. Human Rights Pract.* 3 (2), 162–187.
- Haug, P.T., Burwell, R.W., Stein, A., Bandurski, B.L., 1984. Determining the significance of environmental issues under the National Environmental Policy Act. *J. Environ. Manag.* 18 (1), 15–24.
- Hollick, M., 1981. The role of quantitative decision-making methods in environmental impact assessment. *J. Environ. Manag.* 12, 65–78.
- Impact Assessment Agency of Canada, 2021. *Implementing the United Nations Declaration on the Rights of Indigenous Peoples*. Available at https://www.canada.ca/content/dam/iaac-acei/documents/participation-indigenous-peoples/UNDRIP_backgrounder-eng.pdf>. Last accessed 22 January 2024.
- International Association for Impact Assessment, 2024. *IAIA - The Leading Global Network on Impact Assessment*. Available at <https://www.iaia.org/>>. Last accessed 23 August 2022.
- International Atomic Energy Agency, 2018. *Strategic Environmental Assessment for Nuclear Power Programmes: Guidelines*. IAEA, Vienna.
- Interorganizational Committee on Principles and Guidelines for Social Impact Assessment, 2003. *Principles and guidelines for social impact assessment in the USA*. *Impact Assess. Proj. Apprais.* 21 (3), 231–250.
- Joly, T.L., Longley, H., Wells, C., Gerbrandt, J., 2018. Ethnographic refusal in traditional land use mapping: consultation, impact assessment, and sovereignty in the Athabasca oil sands region. *Extract. Industr. Soc.* 5 (2), 335–343.
- Keeney, R.L., 1977. The art of assessing multiattribute utility functions. *Organ. Behav. Hum. Perform.* 19 (2), 267–310.
- Lawrence, D.P., 1993. Quantitative versus qualitative evaluation: a false dichotomy? *Environ. Impact Assess. Rev.* 13, 3–11.
- Lawrence, R., Larsen, R.K., 2017. The politics of planning: assessing the impacts of mining on Sami lands. *Third World Q.* 38 (5), 1164–1180.
- Mayoux, L., Chambers, R., 2005. Reversing the paradigm: quantification, participatory methods and pro-poor impact assessment. *J. Int. Dev.* 17 (2), 271–298.
- McBride, M.F., Lambert, K.F., Huff, E.S., Theoharides, K.A., Field, P., Thompson, J.R., 2017. Increasing the effectiveness of participatory scenario development through codesign. *Ecol. Soc.* 22 (3).
- Morgan, R.K., 1998. *Environmental Impact Assessment: A Methodological Perspective*. Kluwer Academic Publishers, London.
- Mostert, E., 1996. Subjective environmental impact assessment: causes, problems, and solutions. *Impact Assessm.* 14 (2), 191–214.
- Munday, J., 2020. *Objective truths or subjective realities: A model of social and cultural impact assessment to deliver socially, culturally, ecologically and economically sustainable development of Northern Australia*. Available at <https://ris.cdu.edu.au/ws/portalfiles/portal/46112404>>. Last accessed.
- Munn, R.E. (Ed.), 1979. *Environmental Impact Assessment (Scope 5)*. John Wiley & Sons, Chichester.
- Nelson, P., 2023. *Planning for a Better, Greener Future: A Global Strategic Environmental Assessment*. Amazon Marketing Hub.
- Neuman, W.L., 2014. *Social Research Methods: Qualitative and Quantitative Approaches*. Pearson Education Limited, Harlow.
- Niiwin Wendaanimok Partnership, 2021. *Harmonized Impact Assessment Twinning of the TransCanada Highway – Phase 1, April 2021*. Available at <https://niiwinwenndaanimok.com/projects/>>. Last accessed 1 July 2024.
- Noble, B., 2015. Cumulative effects research: achievements, status, directions and challenges in the Canadian context. *JEAPM* 17 (01), 1550001.
- Noble, B.F., Gunn, J., Martin, J., 2012. Survey of current methods and guidance for strategic environmental assessment. *Impact Assess. Proj. Apprais.* 30 (3), 139–147.
- O’Faircheallaigh, C., 2017. Shaping projects, shaping impacts: community-controlled impact assessments and negotiated agreements. *Third World Q.* 38 (5), 1181–1197.
- Pearce, T.D., Manuel, L., Leon, J., Currenti, R., Brown, M., Ikurisar, I., Doran, B., Scanlon, H., Ford, J., 2021. Mapping social values of the Sigatoka river estuary, Nadroga-Navosa province, Viti Levu, Fiji. *Hum. Ecol.* 49 (5), 579–594.
- Pischke, F., Cashmore, M., 2006. Decision-oriented environmental assessment: an empirical study of its theory and methods. *Environ. Impact Assess. Rev.* 26 (7), 643–662.
- Porter, A.L., Fittipaldi, J.J. (Eds.), 1998. *Environmental Methods Review: Retooling Impact Assessment for the New Century*. U.S. Army Environmental Policy Institute, Fargo, North Dakota.
- Priya, P., Venkatesh, A., 2021. Bringing communities at the Centre of impact assessment of road projects: integrating AHP with qualitative research. *GeoJournal* 86 (4), 1625–1637.
- Rights & Democracy, 2011. *Getting it Right: Human Rights Impact Assessment Guide*. Available at www.oxfamamerica.org/hria>. Last accessed 1 July 2024.
- Roudgarmi, P., 2018. Cumulative effects assessment (CEA), a review. *JEAPM* 20 (2).
- Ruiz-Padillo, A., Ruiz, D.P., Torija, A.J., Ramos-Ridao, Á., 2016. Selection of suitable alternatives to reduce the environmental impact of road traffic noise using a fuzzy multi-criteria decision model. *Environ. Impact Assess. Rev.* 61, 8–18.
- Saarikoski, H., 2000. Environmental impact assessment (EIA) as collaborative learning process. *Environ. Impact Assess. Rev.* 20 (6), 681–700.
- Sadler, B., 1996. *International Study of the Effectiveness of Environmental Assessment Final Report - Environmental Assessment in a Changing World: Evaluating Practice to Improve Performance*. Minister of Supply and Services Canada, Ottawa, p. 248.
- Sandham, L.A., Chabalala, J.J., Spaling, H.H., 2019. Participatory rural appraisal approaches for public participation in EIA: lessons from South Africa. *Land* 8 (10), 150.
- Senner, R., 2011. Appraising the sustainability of project alternatives: an increasing role for cumulative effects assessment. *Environ. Impact Assess. Rev.* 31 (5), 502–505.
- Simonds, V.W., Christopher, S., 2013. Adapting Western research methods to indigenous ways of knowing. *Am. J. Public Health* 103 (12), 2185–2192.
- Sinclair, A.J., Sims, L., Spaling, H., 2009. Community-based approaches to strategic environmental assessment: lessons from Costa Rica. *Environ. Impact Assess. Rev.* 29 (3), 147–156.
- Sinclair, A.J., Doelle, M., Gibson, R.B., 2018. Implementing next generation assessment: a case example of a global challenge. *Environ. Impact Assess. Rev.* 72, 166–176.
- Steinmann, A., 2001. Improving alternatives for environmental impact assessment. *Environ. Impact Assess. Rev.* 21 (1), 3–21.
- Therivel, R., Wood, G. (Eds.), 2018. *Methods of Environmental and Social Impact Assessment, the Natural and Built Environment Series*. Routledge, New York and London.
- Thompson, M.A., 1990. Determining impact significance in EIA: a review of 24 methodologies. *J. Environ. Manag.* 30, 235–250.
- United Nations, 2007. *United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)*. available at https://www.un.org/development/desa/indigenouspeople/s/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf>. last accessed 24 January 2024.
- United Nations Conference on Environment and Development, 1992. *Earth Summit '92*. Regency Press, London.
- US Congress, 1969. *The National Environmental Policy act of 1969*. US Congress, Washington DC.
- Vanclay, F., 2004. The triple bottom line and impact assessment: How do TBL, EIA, SIA, SEA and EMS relate to each other? *JEAPM* 6 (3), 265–288.
- Vanclay, F., 2015. Changes in the impact assessment family 2003–2014: implications for considering achievements, gaps and future directions. *JEAPM* 17 (01), 1550003.
- Vanclay, F., Esteves, A.M., 2024. *Handbook of Social Impact Assessment and Management*. Edward Elgar Publishing, Cheltenham.
- Walker, H., Pope, J.A., Sinclair, J., Bond, A., Diduck, A., 2023. *Qualitative Methods for the Next Generation of Impact Assessment*. available at <https://www.canada.ca/content/dam/iaac-acei/documents/research/qualitative-methods-next-generation-impact-assessment.pdf>>.
- Walker, H., Pope, J., Morrison-Saunders, A., Bond, A., Diduck, A., Sinclair, A.J., Middel, B., Retief, F., 2024. Identifying and promoting qualitative methods for impact assessment. *Impact Assess. Proj. Apprais.* 42 (3), 294–305.
- Watson, G., Tamir, I., Kemp, B., 2013. Human rights impact assessment in practice: Oxfam’s application of a community-based approach. *Impact Assess. Proj. Apprais.* 31 (2), 118–127.
- Wilkins, H., 2003. The need for subjectivity in EIA: discourse as a tool for sustainable development. *Environ. Impact Assess. Rev.* 23 (4), 401–414.
- Yauch, C.A., Steudel, H.J., 2003. Complementary use of qualitative and quantitative cultural assessment methods. *Organ. Res. Methods* 6 (4), 465–481.