RESEARCH ARTICLE

Bioenergy development and the implications for the social wellbeing of Indigenous peoples in Canada

Melanie Zurba , Ryan Bullock

Received: 31 October 2018 / Revised: 5 February 2019 / Accepted: 28 February 2019 / Published online: 21 March 2019

Abstract In this article, we focus on wellbeing as an important concept relating to bioenergy development in Canada. We use a three-dimensional or social approach to understanding wellbeing, which includes *subjective* and *relational* aspects in addition to the more traditional *material* dimension of wellbeing (e.g. financial resources, a healthy environment). Indigenous business leaders engaged in forestry, energy, and related resource sectors were recruited through our partner organization, the Canadian Council for Aboriginal Business, as a representative sample of key people to be engaged in the scoping of existing and future bioenergy partnerships in Canada. Participants often responded in ways that did not discretely fit into categories, but instead reflected a perspective on their own and their community's dimensions of social wellbeing, which we captured through open coding for emergent themes. Our findings on material wellbeing illustrate that relationships between different wellbeing dimensions need to be considered for community-appropriate bioenergy development.

Keywords Bioenergy · Indigenous partnerships · Renewable energy · Social wellbeing

INTRODUCTION

Globally, Indigenous¹ communities continue to be some of the most marginalized in the face of the growing demand for energy and “greener” solutions to energy production

(Hunsberger et al. 2014; Aguilar-Støen 2016). Coinciding with the growth of the renewable resources economy is the need to acknowledge Indigenous rights and enhanced engagement of Indigenous peoples in resource-based decision-making processes (Bullock and Zurba 2017). Among the suite of possible energy alternatives, biofuel and/or bioenergy can be derived from any living organisms or their by-products (biomass). Various technologies are used to produce biofuel and bioenergy, resulting in different types of impacts to the environment and communities that are aiming to obtain benefits through engaging in bioenergy production and/or the bioeconomy (i.e. sales and export of biomass or bioenergy). In Canada, bioenergy is expected to be a major contributor to renewable energy development (NRCan, n.d.), and forestry is centred to play an important role in engaging Indigenous communities in the bioeconomy due to their proximity and relationship with vast forestlands (O’Flaherty et al. 2008). Although bioenergy presents a range of advantages (e.g. greenhouse gas displacement, energy self-sufficiency, and regional economic benefits), its widespread use is a point of contention and political debate. The bioenergy industry is often perceived to overstate its environmental benefits (Popp et al. 2014), and communities may encounter a number of social, economic and environmental risks and barriers associated with bioenergy development (Bullock et al. under review).

How resource-based developments might affect the wellbeing of Indigenous peoples is at the heart of questions

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s13280-019-01166-1>) contains supplementary material, which is available to authorized users.

¹ We use the term ‘Indigenous’ as the more globally accepted term for First Peoples, which in the Canadian context includes First Nations, Métis, and Inuit people. We use the term “Aboriginal” only when it is part of a formal name (e.g. Canadian Council for Aboriginal Business).

around how Indigenous peoples are to engage in resource-based decision making (Sikka et al. 2013). In considering the wellbeing of Indigenous people and communities, it is important that wellbeing be accounted for in a way that is meaningful and culturally appropriate (Stetson 2012). A three-dimensional or “social” approach to understanding wellbeing includes *subjective* and *relational* aspects in addition to the more traditional *material* dimension of wellbeing (e.g. financial resources, a healthy environment). The material and relational dimensions are objective because they are based on tangible and outwards experiences, whereas the subjective dimensions of wellbeing are based on values and perspectives that are processed internally (Coulthard 2012). The subjective dimension in the social approach includes culture, beliefs, norms and values that shape people’s feelings about their quality of life, and the relational dimension contains the social interactions influencing people’s wellbeing (Armitage et al. 2012). This approach to understanding wellbeing empowers people to express wellbeing within their own terms, and generates nuanced information through accounting for diverse and potentially divergent perspectives (Zurba and Trimble 2014). The social approach has been used for research *with*, *for* and *by* Indigenous communities (Armitage et al. 2012). It has been especially useful for expressing wellbeing in a fashion that accounts for cultural constructs and value systems linked to the collectives (Coulthard et al. 2011). The social approach is therefore highly suitable for accounting for wellbeing according to Indigenous community-based contexts (Armitage et al. 2012).

The objective of this study was to use the social wellbeing framework to explore wellbeing perspectives of Indigenous business leaders’ involved in energy, forestry and other allied natural resource sectors, with an eye to better understanding how different aspects of wellbeing can be accommodated. This paper has five main parts. The following section reviews the current state of Canadian energy policy, economy and Canada’s place in the global sector. In particular, Canada’s bioenergy programming and policy work is juxtaposed with Indigenous rights and goals for natural resource and local development. “[Methods](#)” section outlines our interview method, including our approach to participant recruitment, data collection and analysis, as well as the rationale for our approach, and it presents relevant participant demographic information. Results on material relational wellbeing with cultural wellbeing as a cross-cutting theme are presented in “[Results](#)” section. The final section presents a discussion of our key findings and concluding statements.

BACKGROUND

Bioenergy development in Canada

Canada is a top five energy producer worldwide, making it a global leader in energy resources (Council of the Federation 2015). The energy sector is a key driver of the Canadian economy, creating jobs, supporting important programs and services, and domestic energy demands. According to Natural Resources Canada, bioenergy accounts for approximately 6% of Canada’s total energy supply and the Government of Canada is heavily investing in bioenergy systems research and development through CanmetENERGY (NRCan 2018a). Bioenergy has been part of Canadian forestry (mainly in the production of pulp and paper) for over 28 years (Ashton et al. 2007). Forestry contributed over \$24.6 billion to the Canadian economy and over 7% of all Canadian exports in 2017 (NRCan 2018b). Biomass from forestry includes salvaged trees (e.g. from fire, pests and disease), residues from harvesting and thinning operations, unsuitable trees redirected from lumber mills, and purpose-grown plantation trees (NRCan 2018c). In order to support the development of the biomass industry in Canada, the Canadian Forest Service conducts research to identify additional sources of biomass and improve the efficiency of fibre growth, harvesting, collection and transportation to bioenergy conversion facilities, in order to prove the viability and sustainability of biomass supply (NRCan 2018b). Canada also participates along with 16 other countries in research through the International Energy Agency (IEA), and is planning on supporting further research on bioenergy due to a shared anticipation that forest bioenergy will become increasingly attractive as ecological and economic needs evolve (NRCan 2018c).

In Canada, bioenergy policy falls within both federal and provincial jurisdictions. NRCan (federal) has several past and on-going policies that support heat and power production from forest, agriculture and municipal sectors. All Canadian provinces and territories have policies and programs aimed at supporting biofuels development and partnerships, although some are more advanced than others (Bullock and Zurba 2017). For example, British Columbia’s Bioenergy Network has invested approximately \$1.64 million into 12 capacity-building projects, including market evaluations, availability studies, and planning and technical feasibility studies (BC Energy Network n.d.). Bioenergy development has also been a part of Canada’s strategic priorities programming (NRCan 2012).

Given the significance of Canada’s energy role, the sector also attracts investment as well as international demand. Canada is thus in a leadership position with respect to how it engages in international markets and,

increasingly, energy partnerships. More so, the potential local outcomes of all of this investment, attention and expertise development, coupled with the locus of forest bioenergy installations and fibre production, points to the need for demonstrated Canadian leadership in meaningful Indigenous, rural and remote community engagement.

Bioenergy development and Indigenous communities

Bioenergy development effects on wellbeing for Indigenous communities vary depending on the region and biomass source. Forestry related bioenergy production in the global north and south often differs significantly because of how biomass is produced and harvested. In the north, woody biomass as a by-product of forestry is more prevalent as a source for bioenergy (Sikka et al. 2013). Over 600 Indigenous communities have lands and traditional territories in Canada's Boreal Forest (NRCan n.d.), and Indigenous engagement in energy development is being heavily promoted in Canada (Gris 2013). High demands are placed on Indigenous communities in Canada to participate in energy development because of their proximity and access to forests, their own needs for energy and economic development, and their rights to natural resources are perceived to provide access to fibre (Eckberg 2015). Furthermore, governments and proponents are acknowledging that more needs to be done to design and conduct proper engagement processes, build cross-cultural partnerships, and understand similarities and differences in views and values (Coates and Crowley 2013). According to the *Canadian Energy Strategy*, provincial and territorial governments seek to be officially involved in international energy dialogues, while their commitment to collaboration with their Indigenous leadership counterparts is based on observing Aboriginal and treaty rights. At the same time, growing global demand and international firms place demands on Indigenous communities and lands where local goals, perspectives and needs may differ from those embodied in current international strategic agreements. This creates trilateral, multi-level, and in the case of bioenergy, multi-sector (e.g. energy and forestry) arrangements for engagement that involve parties with different rights, capacities, and objectives, as well as different forums for engaging one another.

Bioenergy development in Canada has the potential to impact and/or benefit Indigenous communities in similar ways to other natural resources developments, such as forestry and other types of energy projects (Krupa 2012; Zurba and Bullock 2018). Benefits to Indigenous communities from resource development projects generally include short- and/or long-term economic gains, such as employment and other forms of community enhancements

such as infrastructure (Caine and Krogman 2010). Impacts can also be both short- or long-term, including ecological degradation and the depletion of wellbeing for community members, including impacts on Indigenous rights and civil liberties (Vermeulen and Cotula 2010). Other examples of adverse effects to wellbeing include the contamination of lands and waters, as well as the disconnection from traditional territory and practices, such as hunting, fishing, trapping and traditional medicine gathering (Tobias and Richmond 2014). Connected to these impacts and the disassociation from traditional ways of life are emotional pain and numerous social effects affecting individuals and entire communities (Craft 2013). The trans-generational negative impacts associated with colonization and ongoing development on traditional territories, as well as their impacts on individual and community wellbeing and governance is only beginning to be understood and represented in the emerging literature from communities and academics (Big-Canoe and Richmond 2014).

There is a major gap in the current literature on how renewable energy development affects the wellbeing of Indigenous people and communities; however, some studies have been conducted. A study by Sikka et al. (2013) looked at socio-ecological (material) wellbeing in the context of energy independence for Indigenous communities in Alaska and found bioenergy had potential for enhancing economic, environmental and social outcomes, such as enhancing core assets, employment generation and decreased oil dependency. In this case, several environmental and economic risks were also identified, such as supply shortages and market vulnerability (Sikka et al. 2013). Another study by Bullock et al. (forthcoming) explored Indigenous perspectives on bioenergy development and found that perspectives around the favourability of bioenergy opportunities were diverse and often depended on geographical contexts (i.e. remote and/or northern communities versus southern communities), previous experiences with starting new business enterprises, and knowledge of biomass production and its potential ecological and socio-economic outcomes. A nuanced yet reliable knowledge base that includes information on how the bioeconomy will affect Indigenous people's is required if Canada is to foster and maximize innovation needed to have a bioenergy industry that will contribute to community and national economic development and environmental goals. Such a knowledge base will require different stages of engagement and inquiry beginning with the people who will be some of the first points of contact for scoping bioenergy partnerships Indigenous communities, such as Indigenous business leaders with knowledge and experience in forestry, energy and related resource sectors.

MATERIALS AND METHODS

Recruitment of participants

This research analyses Indigenous business leaders' perspectives around bioenergy development and wellbeing using an interview questionnaire with closed-ended as well as open-ended questions. Our research partner, the Canadian Council for Aboriginal Business provided a directory of Indigenous businesses and their leadership (referred to as “business leaders” from here on) from across Canada that was used as a sample frame. We used the inclusion criteria that business leaders must be involved in forestry, energy or an allied natural resource sector. Purposive sampling of this sort is a highly appropriate technique for qualitative research that aims to obtain detailed knowledge relating to particular topics (Palinkas et al. 2015). After research ethics clearances were completed (Research Ethics #: HE08644), all business leaders ($N = 126$) in the sample were contacted by email and asked to participate in the study, and eighteen business leaders in total agreed to take part in the interviews. There was no indication from non-participants why they chose not to be interviewed, and some business leaders were simply not reachable. Demographical information was requested for all participants, as well as information relating to the participant's business (location, sector) and role within the business (Table 1).

Most of the participants were male, which is typical in natural resource sectors in North America. The total age range for participants was wide; however, most participants fit within the range of 41 to 50 years of age. The highest level of education for participants was highly variable. All participants held upper-level positions within their companies. Most participants resided in British Columbia and Ontario, and businesses were located almost equally on and off reserve land.² Business leaders from companies that fit within the natural resources sector in a broad sense were the most prevalent, followed by forestry and energy.

Data collection

Participants were interviewed by phone by two trained interviewers whom also conducted the process of informed consent, which included verbal consent and sending a copy of the consent form by email. Participants were given the option of abstaining from responses to any questions. The length of the interview depended on how much each participant wanted to say in response to the questions.

² Reserve lands are held by the Crown rather than by individuals or organizations and First Nations have the “right to exclusive use and occupation, inalienability and the communal nature of interest” (AANDC 2018).

Table 1 Participant demographical information

Participants: indigenous business leaders involved in energy, forestry and other natural resources ($n = 18$)

	<i>N</i>	%		<i>N</i>	%
Gender			Province residing		
Male	13	72	British Columbia	7	39
Female	3	17	Manitoba	1	0.5
No response	2	11	Ontario	5	28
Age range			Newfoundland	1	0.5
31–40	2	11	Nunavut	2	11
41–50	6	33	No response	1	0.5
51–60	5	28	Sector		
60+	3	17	Energy	4	22
No response	2	11	Forestry	5	28
Identity			Energy and forestry	1	0.5
First Nations	8	44	Natural resources	7	39
Métis	2	11	No response	1	0.5
Inuit	3	17	Position in the company		
Settler	1	0.5	Owner	8	44
Other	2	11	President/Director	3	17
No response	2	11	Shareholder	1	
Highest level of education			Manager	5	28
High school or graduate equivalency	3	17	No response	1	0.5
Trade school	3	17	Business location		
College/some university	3	17	On-reserve	8	44
Undergraduate degree	2	11	Off-reserve	7	39
Graduate degree	5	28	Both on and off-reserve	2	11
No response	2	11	No response	1	0.5

Interviews lasted from approximately 10–35 min. Business leaders who were unfamiliar with bioenergy were given a brief summary of bioenergy sources and outputs so that they could proceed with the questions that followed from a more knowledgeable standpoint.

The close-ended questions in the interview script (Appendix S1) allowed for short responses relating to demographics and the open-ended questions allowed for the emergence of different subthemes that were deemed important by the participants (Cresswell 2012). Open-ended questions fell within the following interview schedule categories: (i) knowledge of bioenergy; (ii) attitudes towards development of bioenergy industry (iii) perspectives on the risks and benefits associated with Indigenous involvement in bioenergy development; and (iv) perceived problems and solutions associated with Indigenous involvement in bioenergy development. Wellbeing was a strongly emerging subtheme within all categories and interviewers used probes when wellbeing was highlighted by participants in order to

elicit deeper and more detailed responses (Cresswell and Poth 2016). Interviews were digitally audio recorded and the log technique for data recording was used (after Merriam 2016). This technique involved listening to interviews multiple times and transcribing participants' most specific and full responses verbatim, taking notes on the responses to questions and paying special attention to the tone of the response, as well as other verbal cues recorded detailed field notes (Merriam 2016).

Data analysis

The data coinciding with wellbeing lent to a thick description and interpretation of results, which is especially appropriate for analyses that aim to maintain social-cultural constructs in the data (Geertz 2008). Specifically, we categorized units of meaning from the data and extracted themes. One senior researcher reviewed and coded the interview data and field notes for statements relating to the three dimensions of social wellbeing towards ensuring data reliability. *NVivo*, a computer aided qualitative data analysis software, was used for organizing data and coding themes. The textual data was then handled according to van Manen's (1990) method for data analysis, which involves reducing reoccurring and textual data that was emphasized by participants into the emergent sub-themes. The three parent themes in our analysis were 'material wellbeing', 'relational wellbeing' and 'subjective wellbeing'. Four subthemes emerged under the material wellbeing theme, which were 'employment', 'infrastructure', 'land-based livelihood practices' (i.e. fishing, hunting, trapping and gathering) and 'environmental sustainability'. One subtheme, 'connection to ceremony', emerged under the subjective wellbeing theme. Four subthemes emerged under the relational wellbeing theme, which were 'relationships with the land', 'relationship with oneself', 'relationships within the community', and 'relationships with industry/proponents'.

RESULTS

In keeping with the conversational format utilized, participants often responded in ways that did not discretely fit into categories, but instead reflected a perspective on their own and their community's dimensions of social wellbeing, which we captured through open coding for emergent themes. The dimensions that were emergent during the interviews with business leaders are summarized in Table 2, which presents material and relational dimensions (objective dimension) of wellbeing as discrete, and the connection to culture (subjective dimension of wellbeing) as a cross-cutting subtheme.

Material wellbeing, including connections to culture

Material wellbeing emerged strongly when business leaders responded to the question, "What do you think are the socio-economic benefits and risks of bioenergy development for Indigenous communities?" In response to this question, the participants talked about how bioenergy could potentially improve the socio-economic situation of their communities, or Indigenous communities in general, by creating opportunities for prosperity through employment. As an example, a community shareholder from a forestry service provider (participant 02) related economic prosperity to the quality of the planning that would potentially go into a bioenergy development project. The participant specified that investments and work force are important aspects of bioenergy development that would contribute to enhancing the community members' ability to prosper, participate in environmental management, and have a healthier environment:

"The socioeconomics, if planned properly, and if investments are planned properly, you get a work force that can actually go out and they're learning, and they're able to pay their bills... They can actually start working together more to get out on the land and start managing it. It's just a healthier environment for them".

However, the participant also had some reservations about how enhanced prosperity could be a "double-edged sword" for the wellbeing of people in the community, and described some of the social problems that become either enhanced or more prevalent in communities with increased incomes. The participant qualified their statement by saying that the work environment and education could contribute to diminishing this negative potential outcome for wellbeing:

"[Greater prosperity would] enable a population to go out and keep their bad habits going, so you get drinking and driving charges, drug related charges; you get abuse that stems from it. So, you know, it's how do you create a good work environment and teach responsibility to the people that are actually out there working on behalf of your community"

Infrastructure was also an emergent subtheme relating to material wellbeing. Participants mainly talked about community infrastructure when asked, "Do you think biomass should be developed on Indigenous lands?" Participants often related infrastructure to energy independence, as well as the benefits of reducing energy costs by having their own bioenergy operations. A director from an Indigenous renewable energy project (participant 06) related energy dependence to energy costs and First Nations being able to

Table 2 Emergent subthemes and potential outcomes (both positive and negative) relating to social wellbeing. Subjective wellbeing was distinguished as a crosscutting theme relating to certain emergent subthemes under material and relational (objective forms of) wellbeing

Dimension of wellbeing	Emergent subthemes	Potential outcome for wellbeing		Connection to culture (<i>subjective wellbeing</i>)
		+ve	–ve	
<i>Material wellbeing</i> (objective)	Employment	Employment opportunities as leading to greater prosperity within the community	Employment and new prosperity leading to social problems (e.g. drug abuse, spousal abuse)	Reduced marginalization of culture in decision-making (<i>indirectly discussed</i>)
	Infrastructure	Bioenergy is a good source of energy for First Nations communities to rely on and it could bring other infrastructure to communities	<i>None discussed</i>	<i>None discussed</i>
	Land-based livelihood practices	<i>None discussed</i>	Bioenergy development can affect access to the traditional livelihoods practices, such as harvesting of traditional food and medicines	Cultural traditions guiding livelihood practices
	Environmental sustainability	Bioenergy is a carbon neutral (more sustainable fuel source)	Risk of deforestation for the sake of energy production	Cultural perspective on sustainability
<i>Relational wellbeing</i> (objective)	Relationship with the land	<i>None discussed</i>	Taking too much from the land	Cultural value systems for the relationship with land
	Relationships within the community	<i>None discussed</i>	Relationships within the community can be complicated by new resource developments	<i>None discussed</i>
	Relationships with proponents and industry	Potential for relationships with industry to help Indigenous communities build capacity for bioenergy in their communities	There is the potential for further marginalization if partnerships are not developed in a fashion that benefits Indigenous communities	<i>None discussed</i>

access power during outages, which would enable a community to restore their everyday operations and services, without being fully dependent on power companies:

Some bands are at the ends of lines, so during a power outage they are the last to get fixed. They pay very high transmission costs. Sometimes exceeds the power costs.

Several participants responded to a number of questions in the interview guide with comments about land-based livelihoods practices, a topic at the intersection of material (objective) and cultural (subjective) wellbeing. A participant who is a natural resources company owner (participant 04) conveyed their worldview when responding to the question about “the socio-economic benefits and risks of bioenergy development”. For this participant, the materials that could be used for bioenergy held value and meaning that were connected to traditional livelihoods (food foraging) practices. The participant explained how colonization and land-based policies have changed the ability to manage traditional foods through controlled burns:

I have other uses for the biomass besides creating money and energy... One of our Elders made this

document. It’s called ‘Burning Mountain Sides’ and it goes like this: They burnt the mountainside so they would get good crops there. They told others who went there to do the same. Our only hills were like a garden, but now because of the white man really watches us we don’t burn anything. We realize already it seems the things that we had eaten before, our forefathers, have disappeared.

The participant’s response speaks to relational wellbeing as well as to material and subjective wellbeing because it describes a change in relationship with the land - something that will be discussed further in the next section. The participant’s (02) reflections also connected to material, subjective and relational wellbeing in the context of land-based livelihood practices connected to particular food species and how Indigenous people’s happiness is often more associated with their ability to practice their land-based cultural traditions.

“Some people don’t need an ‘economy’ around them. They’ve got land and see that as their economy. They’re happy going out fishing and hunting and picking berries and powwowing and making arts and

crafts. Some communities are just happy doing that and they need land to be able to do it”.

The sustainability of the environment also emerged as a subtheme relating to material wellbeing, especially when asked “What do you think are the benefits and risk of bioenergy development for the environment?” Several participants stated that bioenergy could contribute to environmental sustainability in a broad sense (i.e. by reducing carbon emission and making use of “waste wood”), but that there were issues that could arise at the community level with regards to forests and the local environment. Some participants were not in favour or were reluctant to develop bioenergy from forestry by-products; however, several participants stated that forest-based bioenergy would be acceptable and could maintain a healthy local environment. For example, participant 06 talked about bioenergy development on Indigenous lands as being acceptable as long as it was done in a responsible fashion:

“You’ve got to plan it out before you go out and do it. You can’t be like the movie *The Lorax* where you’re chopping down all the forest to feed the power plants... If you do it responsibly [planting trees], it will be okay”.

Furthermore, a director of a natural resources company (participant 08) related sustainable bioenergy development to the ability of First Nations to prosper economically:

One of the biggest walls that First Nations face is economic development within their own land. If there’s an opportunity to do it in a sustainable manner, then we should try to sustain it and grow it.

Relational wellbeing, including connections to culture

As reported in the previous section on material wellbeing and connections to culture, ‘land-based livelihoods practices’ were reflected on as being part of material, subjective and relational wellbeing. Several participants spoke about bioenergy development as something that could potentially negatively impact their relationship with the land. One business owner from a forestry company (participant 09) drew an explicit connection between social wellbeing, the land and harvesting practices for bioenergy development:

A social downfall would be that we’re taking this much from the land.

Relationships within the community also emerged as a subtheme under relational wellbeing. Most participants spoke of intra-community relational dynamics in terms of

leadership and how it is necessary for bioenergy developments to have strong leadership and communication if they are to benefit community and reflect community values. One energy company owner (participant 10) stressed the importance of leaders first acknowledging that they themselves need to develop knowledge regarding the sector:

Leadership is important in communicating with First Nations. The first thing the leader would need to do is admit they don’t know what is going on.

‘Relationships with proponents and industry’ was also a strongly emergent subtheme. This data emerged especially when asked “What kinds of partnerships would be helpful in the transition to bioenergy?” Most participants, at the very least, made some comments about how they thought that industry partners should play a role in helping communities establish new bioenergy enterprises - for community uses, as well as for export beyond the community. Perspectives on relationships with proponents and industry in this sense were strongly connected to thoughts about how partnerships should be evolved and how participation within a partnership ought to take place. For example, participant 02 reflected on an on-going renewable energy (hydro run of the river) project and talked about the importance of the attitudes that proponents come forward with, how participation styles differed among as well as within communities, and how having the right people within a partnership is important for developing a realistic business plan. Accordingly:

[The proponent] needs to do due diligence before partnering with a community and ask if [the community] is ready for it... In their minds they’ve already assumed that because we’re First Nations that we will fail... We all have different ideas about how we want to participate. You need to have a clear investment plan. A lot of the time we don’t. We don’t have the right people sitting at the table with us to talk about what it’s going to cost us up front. We’ve got to realize that we have to pay debt off. We have to realize that you don’t just actually get into the business and have dividends start flowing.

Participant 08 also commented on relationships with industry proponents and the importance of knowledge sharing towards building First Nations capacity and finding opportunities for meaningful collaboration.

There’s something to be said for professionals with knowledge traveling to Nations so people can lean over a map in a boardroom table and say ‘Hey, this is what we’ve got’ and the person with the knowledge can say ‘Hey, we have something that can fit.

DISCUSSION AND CONCLUSION

This paper used the social wellbeing framework to explore wellbeing perspectives of Indigenous business leaders' involved in energy, forestry and other allied natural resource sectors, with an eye to better understanding how different aspects of wellbeing can be accommodated. Social wellbeing was used as a framework because, in addition to accounting for material and subjective wellbeing, it accounts for the relational aspects of wellbeing that are often neglected in research, which often focusses heavily on material dimensions of wellbeing (Sikka et al. 2013). Accounting for relationships and relational concepts in research that seeks to account for Indigenous experiences and perspectives is essential because relationships are central to Indigenous worldviews (Wilson 2008; Srigley and Varley 2018). The social wellbeing framework has been applied successfully to cases seeking insights into Indigenous perspectives for wellbeing (Armitage et al. 2012; Zurba and Trimble 2014), as well as other resource management cases, including those related to small-scale fisheries (Weeratunge et al. 2014), aquaculture production (D'Anna and Murray 2015), and ecosystem assessments (Breslow et al. 2016). This current study is the first time the framework has been applied in the context of bioenergy development and Indigenous wellbeing.

Our findings on material wellbeing illustrate that the intersections as well as the individual dimension of social wellbeing need to be considered for community-appropriate bioenergy development. It may not be the case that employment opportunities alone provide automatic benefits and improvements (Armitage et al. 2012); social wellbeing considerations such as mental health need to be considered as part of a larger development strategy to support new industries and the Indigenous community members who will lead and support such initiatives (Sikka et al. 2013). New employment opportunities are essential, but especially those linked to broader goals and needs outlined by the community in a wellbeing-informed business plan. This is consistent with Zurba and Trimble's (2014) study on the social wellbeing of youth that found that economic incentives alone were insufficient motivators for youth to participate in traditional (fisheries) and non-traditional (forestry) resource extraction activities. Furthermore, our findings regarding new infrastructure and self-sufficiency confirm findings from other studies (Berkes and Ross 2013; Sikka et al. 2013) that outline the importance of infrastructure investment and development to local resilience. Rural, remote and northern Indigenous communities often lack vital infrastructure to bridge physical (and cultural divides) such as in energy, but also road, rail and air

transportation, high-speed internet, health, and education. In this way, it is acknowledged that new energy infrastructure could support wellbeing improvements in areas beyond the obvious sectoral needs for energy. This is because energy is central to the provision of other services and activities that are, in turn, also crosscutting for youth and adult wellbeing, such as access to properly equipped housing, food and water, education and services for seniors (Cook 2005).

Participant perspectives on livelihood generation highlight that traditional practices and economies may be impacted by bioenergy development in a way that could negatively impact wellbeing. It must also be acknowledged that not all Indigenous peoples and communities will value such opportunities in the same ways given their own livelihood choices and practices. New "opportunities" may not be of benefit to everyone or be perceived by all to be valuable, and new bioenergy projects could be perceived as negative if they do not accommodate non-market and traditional practices and needs. Such values cannot be neglected, and have been expressed globally by Indigenous communities when faced with their participation in new and ongoing natural resource development projects (Strickland-Munro and Moore 2013; Country et al. 2015). Likewise, land stewardship for environmental sustainability is a major consideration in decisions and practices related to on and off reserve natural resource extraction and energy projects (Sikka et al. 2013). As pointed out by participants in this study, the importance of and demand for economic development within communities make new energy projects attractive; however, such new developments cannot override environmental stewardship roles and responsibilities. Local involvement in decision making and business ownership can potentially engrain Indigenous stewardship values into practices and enhance links between human and environmental wellbeing (Weeratunge et al. 2014; D'Anna and Murray 2015; Breslow et al. 2016).

Relational aspects of wellbeing, including intra-community relations and relationships with the lands, will be critical for the development of energy partnerships that are meaningful to Indigenous communities (Égré et al. 2007). Normative aspects of business partnership development are important to maintaining relational wellbeing, that is, participants in this study point out that industry community relationships *should* help communities advance their local agendas as well as produce energy for export, rather than be purely extractive. Findings are consistent with other studies that show relationships with industry can be socially constructive and valued (Maclean et al. 2015; Berg et al. 2016), especially those that support the kinds of local and technical knowledge exchanges needed to mount

successful bioenergy partnerships. Participants involved in this study recognized the importance of confirming the suitability of partners, or matching communities with industry proponents according to mutual goals and views. These relational attributes are essential for building and sustaining partnerships. Another study by Zurba (2019) that was focussed on a dismantled First Nation–Industry partnership in the Canadian Boreal found that a mis-match of goals and values was a significant reason behind the collapse of the partnership. Relational wellbeing includes more than the ties between and among partners; it involves pairing the skills and competencies of individuals in leadership teams that can help bring forward effective plans for energy development that support other relationships, such as intra-community and land-focussed relationships that are important to Indigenous peoples. This also connects strongly to community capacity building, which is a critical component of building equitable partnerships with Indigenous communities (Krupa et al. 2015; Karanasios and Parker 2016; Bullock et al. 2017).

Indigenous business leaders stand to play a prominent role in new partnerships linked to forest-based bioenergy as they possess the business and local knowledge that could help such initiatives. It will be critical that governments, proponents and communities pay attention to the wellbeing of Indigenous communities affected by bioenergy development including the relational dimension, which is typically not accounted for in most environmental assessment processes (Jones and Bradshaw 2015). The multiple and intersecting dimensions of wellbeing, different strategies for engaging community members in expressing values and aspirations and taking on meaningful roles in decision making should be pursued towards understanding the future of Indigenous participation and leadership in bioenergy development in Canada. Strategies could include co-designing meaningful participatory processes for enhancing the diversity of community (generational, gender, economic status) representation (Reo et al. 2017) and the developing land-based and other approaches that exemplify holistic worldviews for wellbeing (Johnson et al. 2016; Wesche et al. 2016). Such considerations and approaches will not only be important for Canada's transition to renewable resources, but will also be important in other global contexts where communities play important roles in supporting such a transition.

Acknowledgements This work was supported by the Social Sciences and Humanities Research Council (SSHRC) of Canada (#872-2016-1036), SSHRC Canada Research Chair in Human-Environmental Interactions (950-231641), and BiofuelNet Canada (#SO-3-Bullock). In-kind support was provided by the Canadian Council for Aboriginal Business. The authors thank the study participants for sharing their knowledge. Thanks also to our capable research assistants, Shannon Ganter and Miranda Hamilton. Any errors or omissions are our own.

REFERENCES

- Aboriginal Affairs and Northern Development Canada (AANDC). 2018. Land Management. Retrieved from <https://www.aandc-aandc.gc.ca/eng/1100100034737/1100100034738>.
- Aguilar-Støen, M. 2016. Beyond transnational corporations, food and biofuels: The role of extractivism and agribusiness in land grabbing in Central America. *Forum for Development Studies* 43: 155–175.
- Armitage, D., C. Béné, A.T. Charles, D. Johnson, and E.H. Allison. 2012. The interplay of well-being and resilience in applying a social–ecological perspective. *Ecology & Society* 17: 15.
- Ashton, B., T. Needham, and T. Beckley. 2007. How is crown forest policy developed? Probing New Brunswick's protected areas strategy. *Forestry Chronicle* 83: 689–698.
- BC Energy Network. n.d. Capacity building. Retrieved from <http://bcbioenergy.ca/what-we-do/capacity-building/>. Accessed 2 May 2018.
- Berg, S., E. Valinger, T. Lind, T. Suominen, and D. Tuomasjukka. 2016. Comparison of co-existing forestry and reindeer husbandry value chains in northern Sweden. *Silva Fennica* 50: 5.
- Berkes, F., and H. Ross. 2013. Community resilience: Toward an integrated approach. *Society & Natural Resources* 26: 5–20.
- Big-Canoe, K., and C.A.M. Richmond. 2014. Anishinabe youth perceptions about community health: Toward environmental repossession. *Health & Place* 26: 127–135.
- Breslow, S.J., B. Sojka, R. Barnea, X. Basurto, C. Carothers, S. Charnley, S. Coulthard, N. Dolšák, et al. 2016. Conceptualizing and operationalizing human wellbeing for ecosystem assessment and management. *Environmental Science & Policy* 66: 250–259.
- Bullock, R., and M. Zurba. 2017. Framing Indigenous partnerships in energy and allied renewable resource sectors. Final knowledge synthesis report for the Social Science and Humanities Research Council of Canada. Centre for Forest Interdisciplinary Research, The University of Winnipeg. Winnipeg, Manitoba, Canada: 24 pp.
- Bullock, R., D. Kirchhoff, I. Mauro, and M. Boerchers. 2017. Indigenous capacity for collaboration in Canada's energy, forestry and mining sectors: Research metrics and trends. *Environment, Development and Sustainability* 20: 883–895.
- Bullock, R., M. Zurba, J. Parkins, and M. Skudra. Indigenous business leaders' perspectives on renewable (bio)energy: Risks, barriers, benefits and opportunities. *Energy Policy* (under review).
- Caine, K.J., and N. Krogman. 2010. Powerful or just plain powerful? A power analysis of Impact and Benefit Agreements in Canada's North. *Organization & Environment* 23: 76–98.
- Coates, K., and B.L. Crowley. 2013. *New beginnings: How Canada's natural resource wealth could re-shape relations with aboriginal people.*, Aboriginal Canada and the Natural Resource Economy Series Ottawa: MacDonald-Laurier Institute.
- Cook, C.C. 2005. *Assessing the impact of transport and energy infrastructure on poverty reduction.* Manila: Asian Development Bank.
- Coulthard, S. 2012. Can we be both resilient and well, and what choices do people have? Incorporating agency into the resilience debate from a fisheries perspective. *Ecology and Society* 17: 4.
- Coulthard, S., D. Johnson, and J.A. McGregor. 2011. Poverty, sustainability and human wellbeing: A social wellbeing approach to the global fisheries crisis. *Global Environmental Change* 21: 453–463.
- Council of the Federation. 2015. Canadian Energy Strategy. https://www.gov.mb.ca/jec/energy/pubs/canadian_energy_strategy.pdf.
- Country, B., S. Wright, S. Suchet-Pearson, K. Lloyd, L. Burarrwanga, R. Ganambarr, M. Ganambarr-Stubbs, B. Ganambarr, et al.

2015. Co-becoming Bawaka: Towards a relational understanding of place/space. *Progress in Human Geography* 40: 455–475.
- Craft, A. 2013. *Breathing life into the Stone Fort Treaty*. Saskatoon: Purich Publishing Ltd.
- Cresswell, J. W. 2012. *Qualitative inquiry and research design: Choosing among five approaches*. 3rd ed. Thousand Oaks: SAGE: p. 472.
- Cresswell, J.W., and C.N. Poth. 2016. *Qualitative inquiry and research design: Choosing among five approaches*. Singapore: SAGE.
- D'Anna, L.M., and G.D. Murray. 2015. Perceptions of shellfish aquaculture in British Columbia and implications for well-being in marine social–ecological systems. *Ecology and Society* 20: 57.
- Eckerberg, K. 2015. Future forest governance: Multiple challenges, diverging responses. In *The Future use of nordic forests*, ed. F. Kraxner, K. Beland Lindahl, and E. Westholm, 83–97. Heidelberg: Springer.
- Égré, D., V. Roquet, and C. Durocher. 2007. Monetary benefit sharing from dams: A few examples of financial partnerships with Indigenous communities in Québec (Canada). *International Journal of River Basin Management* 5: 235–244.
- Geertz, C. 2008. Thick description: toward an interpretive theory of culture. In *The cultural geography reader*, ed. P.L. Price and T. Oakes. New York: Taylor & Francis.
- Gris, P. 2013. *Responsible energy development in Canada*. Environment and Aboriginal Issues: Charrette on Energy.
- Hunsberger, C., S. Bolwig, E. Corbera, and F. Creutzig. 2014. Livelihood impacts of biofuel crop production: Implications for governance. *Geoforum* 54: 248–260.
- Johnson, J.T., R. Howitt, G. Cajete, F. Berkes, R.P. Louis, and A. Kliskey. 2016. Weaving Indigenous and sustainability sciences to diversify our methods. *Sustainability Sciences* 11: 1–11.
- Jones, J., and B. Bradshaw. 2015. Addressing historical impacts through impact and benefit agreements and health impact assessment: Why it matters for Indigenous well-being. *The Northern Review* 41: 81–109.
- Karanasios, K., and P. Parker. 2016. Recent developments in renewable energy in remote aboriginal communities, Ontario, Canada. *Papers in Canadian Economic Development* 16: 82–97.
- Krupa, J. 2012. Blazing a new path forward: A case study on the renewable energy initiatives of the Pic River First Nation. *Environmental Development* 3: 109–122.
- Krupa, J., L. Galbraith, and S. Burch. 2015. Participatory and multi-level governance: Applications to Aboriginal renewable energy projects. *Local Environment* 20: 81–101.
- Macleay, K., C.J. Robinson, and D.C. Natcher. 2015. Consensus building or constructive conflict? Aboriginal discursive strategies to enhance participation in natural resource management in Australia and Canada. *Society & Natural Resources* 28: 197–211.
- Merriam, S.B. 2016. *Qualitative research: A guide to design and implementation*. San Francisco: Wiley.
- Natural Resources Canada (NRCAN). 2012. Evaluation of the Sustainable Bioenergy Strategic Priority. Retrieved from <http://www.nrcan.gc.ca/evaluation/reports/2012/798>. Accessed 12 Sept 2017.
- Natural Resources Canada (NRCAN). 2018a. Bioenergy systems. Retrieved from <http://www.nrcan.gc.ca/energy/renewable-electricity/bioenergy-systems/7311>. Accessed 2 May 2018.
- Natural Resources Canada (NRCAN). 2018b. How does the forest industry contribute to the economy? Retrieved from <http://www.nrcan.gc.ca/forests/report/economy/16517>. Accessed 2 May 2018.
- Natural Resources Canada (NRCAN). 2018c. Bioenergy from biomass. Retrieved from <http://www.nrcan.gc.ca/forests/industry/bioproductions/13323>. Accessed 2 May 2018.
- Natural Resources Canada (NRCAN). n.d. Solid biofuels bulletin No. 1. Accessed May 2, 2018, from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/NRCAN_BB_no1_e_accessible.pdf.
- O'Flaherty, R.M., I.J. Davidson-Hunt, and M. Manseau. 2008. Indigenous knowledge and values in planning and sustainable forestry: Pikangikum First Nation and the Whitefeather Forest Initiative. *Ecology and Society* 13: 6.
- Palinkas, L.A., S.M. Horwitz, C.A. Green, J.P. Wisdom, N. Duan, and K. Hoagwood. 2015. Purposeful sampling for qualitative data collection and analysis in mixed methods implementation research. *Administration and Policy in Mental Health and Mental Health Services Research* 42: 533–544.
- Popp, J., Z. Lanker, M. Harangi-Rákos, and M. Fári. 2014. The effect of bioenergy expansion: Food, energy, and environment. *Renewable Sustainable Energy Review* 32: 559–578.
- Reo, N.J., K.P. Whyte, D. McGregor, M.A. Smith, and J.F. Jenkins. 2017. Factors that support Indigenous involvement in multi-actor environmental stewardship. *AlterNative* 13: 58–68.
- Sikka, M., T.F. Thornton, and R. Worl. 2013. Sustainable biomass energy and Indigenous cultural models of wellbeing in Alaska forest ecosystems. *Ecology & Society* 18: 38.
- Srigley, K., and A. Varley. 2018. Learning to unlearn: Building relationships on Anishinaabeg territory. In *Indigenous research: Theories, practices, and relationships*, ed. D. McGregor, J.-P. Restoule, and R. Johnston, 46–64. Toronto: Canadian Scholars Press.
- Stetson, G. 2012. Oil politics and Indigenous resistance in Peruvian Amazon: The rhetoric of modernity against the reality of coloniality. *Journal of Environment & Development* 21: 76–97.
- Strickland-Munro, J., and S. Moore. 2013. Indigenous involvement and benefits from tourism in protected areas: A study of Purnululu National Park and Warum Community, Australia. *Journal of Sustainable Tourism* 21: 26–41.
- Tobias, J.K., and C.A.M. Richmond. 2014. “That land means everything to us as Anishinaabe...”: Environmental dispossession and resilience on the North Shore of Lake Superior. *Health & Place* 29: 26–33.
- van Manen, M. 1990. *Researching lived experience: Human science for an action sensitive pedagogy*. London: State University Press.
- Vermeulen, S., and L. Cotula. 2010. Over the heads of local people: Consultation, consent, and recompense in large-scale land deals for biofuels projects in Africa. *The Journal of Peasant Studies* 37: 899–916.
- Weeratunge, N., C. Béné, R. Siriwardane, A. Charles, D. Johnson, E.H. Allison, P.K. Nayak, and M.C. Badjeck. 2014. Small-scale fisheries through the wellbeing lens. *Fish and Fisheries* 15: 255–279.
- Wesche, S.D., M.A.F. O'Hare-Gordon, M.A. Robidoux, and C.W. Mason. 2016. Land-based programs in Northwest Territories: Building Indigenous food security and well-being from the ground up. *Canadian Food Studies* 3: 23–48.
- Wilson, S. 2008. *Research is ceremony: Indigenous research methods*. Winnipeg: Fernwood.
- Zurba, M. 2019. Framing the governance lifecycle of First Nation-industry forestry collaboration in northwestern Ontario. *Canadian Journal of Forest Research*, online first.
- Zurba, M., and R. Bullock. 2018. Framing indigenous bioenergy partnerships. *The International Indigenous Policy Journal* 9: 1–22.
- Zurba, M., and M. Trimble. 2014. Youth as the inheritors of collaboration: Crises and factors that influence participation of the next generation in natural resources management. *Environmental Science & Policy* 42: 78–87.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

AUTHOR BIOGRAPHIES

Melanie Zurba (✉) is an Assistant Professor at the School for Resource and Environmental Studies and the College of Sustainability at the Dalhousie University. Her research interests include environmental governance, collaboration, boundary work, and the advancement of ethical protocols for community-partnered research. *Address:* School for Resource and Environmental Studies and the

College of Sustainability, Dalhousie University, Kenneth C. Rowe Building, 6100 University Ave., PO BOX 15000, Halifax B3G 4R2, Canada.

e-mail: Melanie.Zurba@dal.ca

Ryan Bullock is an Associate Professor and Canada Research Chair in Human–Environment Interactions in the Department of Environmental Studies and Sciences at The University of Winnipeg. His research interests include northern and rural development, Indigenous partnerships, community forests and climate change.

Address: Environmental Studies and Sciences, The University of Winnipeg, Winnipeg, Canada.