The role of values in shaping sustainable development perspectives and outcomes: A case study of Iceland

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Abstract. Sustainability is conceptualized as a process of balancing growth, equity and preservation, a definition that is drawn from the 1987 Brundtland Commission report, Our Common Future. While making sustainability a universal objective, this definition conceptualizes sustainability as a one-size fits all technocratic solution, which removes the concept from the context of specific societies that must engage with sustainable development. Social scientific data about the nature of values, where they come from, with whom they resonate, and what goals for conservation and development they establish are equally necessary for the understanding and framing of sustainability. Policies are more effective if they are embedded in the value systems they engage. Drawing on a case study of Iceland this study examines the nature of values in shaping sustainable outcomes. We argue that regulative, normative, cultural and cognitive institutional structures are in constant interaction with value systems and sustainability conceptions. We find that institutional structures and pro-sustainability values are mutually reinforcing: institutional structures and place amplify value orientation. In turn values influence the orientation of status-quo institutional structures. Working with interview data and using a grounded theory approach we build a model for understanding how sustainability is conceptualized in Iceland working from values through agents and industrial bases to generate strategies of development. Icelanders operationalize concepts of sustainability through innovations that improve the efficiency and preservation of natural resources. Our findings add additional layers to conventional pathways of valuation and demonstrate the importance of place and context in situating values of development.

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1. Introduction

The Brundtland Commission Report's addresses sustainability as a universal objective with attention to technocratic solutions.(World Commission on Environment and Development, 1987). The breadth of this conceptualization of sustainability creates practical challenges, including difficulty in the measurement and operationalization (Jabareen, 2008; Emas, 2015). Furthermore, sustainability is not a fixed endpoint, but rather a constantly evolving process of negotiation within and across societies. While there are sustainable development goals that can be captured in clear quantitative terms, such as access to clean water, the processes of achieving these goals highlights the importance of local values and contexts in shaping sustainability (Pirages, 1994). Within each society there are dynamic tensions between the pillars of sustainability as well as in the balance between power, equality, and justice in the decision-making process. Moreover, as Holden et al. (2017) argue, sustainable development requires constraint on human activities, not just balancing social, environmental, and economic goals.

Drawing on the case of Iceland, this study examines the way the concept of sustainability is syncretically reconstructed through local values and institutions to shape development responses and strategies.[1] An important implication is that polices that operate across larger national and international scales can be made more effective through the resonance at the local level. Values and their differentiation across geographies should be made a consideration in national and

[1] Alternative explanations mainly include the structure of the economy and technology factors.

international policy making. Thus, a sustained research agenda focused on the nature of values, where they come from, with whom they resonate, and the goals for conservation and development they establish is necessary to develop a comprehensive understanding of sustainability policy and practice (Smits et al., 2016). In our analysis, we control for competing explanations, such as the structure of the economy, technological factors and interests, to tease out the role of values in shaping environmental sustainability perspectives and outcomes.

In what follows, we demonstrate the mechanisms (and processes) through which individual and societal values shape environmental sustainability outcomes. We first examine the literature on values and the relationship between values and behavior, specifically addressing the literature that deals with the role of human values in influencing human behavior relevant to (environmental) sustainability outcomes. This literature provides useful typologies of values and basic sets of models for understanding how values drive environmental behavior. Much of this literature is oriented around the generalization of values into a universal framework intended to predict outcomes (Schwartz, 1987; Schwartz, 1994; Kostina et al., 2015). We seek to augment this literature by examining the embedded values of specific cultures (Burningham and O'Brien, 1994; Jones et al., 2016). Working with interview data and using a grounded theory approach we build a model for understanding how sustainability is conceptualized in Iceland working from values through agents and industrial bases to generate strategies of development. While Holden et al. (2017) caution against the notion of defining sustainability based on either the short-term political consensus or parochial preferences of stakeholders, the discourse of sustainability (how the issues,

challenges, values, and goals of sustainability are constructed in language) nevertheless plays an important role in influencing the principles that are foundational to sustainability outcomes in the region.

Our findings add nuance to universalist theories of valuation and demonstrate the importance of place and context in situating values of development. We present a model of sustainability that illustrates the connection of values to both the social structure of communities and their political economies, as well as the conditions of the environment in which the community resides. Unlike preceding models in literature, our model of valuation is based on grounded, contextual process in which values shape sustainability and sustainability effects values.

2. Sustainable development: from behavioral change to value frameworks

Sustainable development as a policy goal is high on the agenda of policymakers to address growing environmental crises and widening global development inequality (Rogers et al., 2008; Reid, 2005; Kuhlman & Farrington, 2010; Papa & Gleason, 2012). In 2015, under the 2030 UN Agenda for Sustainable Development, countries adopted 17 sustainable development goals, which came into force on January 1, 2016, for the purpose of eliminating poverty, reducing inequalities and tackling climate change. These goals are not legally binding, but governments are expected to work towards developing national frameworks for the achievements of these goals. In light of these global efforts, policymakers and scholars need robust frameworks for measuring and assessing progress of sustainable development efforts. Christen & Schmidt (2011) and Holden et al. (2014) propose

metaperspectives to address the issue such as measuring sustainable development progress by analyzing the performance of countries on four key development indicators: basic development (human development index); long-term ecological sustainability (global hectares per person); inter-generational equity (share of renewable energy in total primary energy production); and intra-generational equity (Gini coefficients). These metrics align with a model proposed by Chen et al. (2019) to assess sustainability in transnational public-private partnership (TPPP) projects using social responsibility factors. Holden et al. (2017) provide a framework for measuring, operationalizing, and implementing sustainable development goals at the local scale.

While these frameworks provide a useful starting point, they generally leave aside sociological factors, including culture and the role of socio-cultural values the role of human values in sustainability and how values influence important processes relevant to environmental sustainability outcomes require further exploration. The relative oversight of culture and socio-cultural values is significant. The pursuit of sustainability calls for a change in human behavior (Fisher et al., 2012; Schulz et al., 2018; Graham & Abrahamse, 2017; Wei et al., 2017; Coulthard et al., 2011; Howell, 2013; Faith, 2005). Individual values are powerful predictors and effective levers of bringing about that behavioral change (Steg et al., 2016; Leiserowitz et al., 2004; Demski et al., 2015) and are also important explanatory factors of social-psychological behavior (Schwartz & Bardi, 2001), for values guide individual actions, attitudes and judgments (Rokeach, 1968a; 1968b).

In recent years, there has been a growing interest to understand values as drivers of human behavior (Sagiv et al., 2017; Axsen & Kurani, 2013). However, the research on the role of human values specific to sustainability outcomes is more recent and remains underdeveloped. A large part of the literature on values is embedded in core studies in psychology (Feather & Peay, 1975; Levy, 1986). Within this literature, values have no universal definition (Allport, 1961; Kluckhohn, 1951; Morris, 1956; Rokeach, 1973; Scott, 1965). However, there are five common conceptual features in most definitions of values: (1) values are concept or belief; (2) values are desirable behaviors; (3) values transcend specific situations and contexts; (4) values are metrics of evaluating individual or group behaviors; and (5) values can be ranked in order (Smith and Schwartz, 1997). In addition to these five conceptual characteristics, values also serve three distinct cognitive purposes (1) biology-based requirements; (2) interpersonal coordination; and (3) group welfare (Schwartz, 1992). These commonalities suggest values are simultaneously individually and socially significant.

The intersubjectivity of values raises challenging questions for measurement. Rokeach (1973) was the first to develop a 'universal and trans-institutional' instrument, a survey of thirty-six values designed in part to enable cross-cultural analysis. Rokeach (1973) further groups these thirty-six values into eighteen terminal values, such as freedom, happiness, and equality, and an equal number of instrumental values, e.g., honesty, politeness, and obedience. The degree of values prevalence across cultures allows can generate insight on how sustainability, functioning at the intersection of multiple values, is understood and integrated into policy within and across societies.

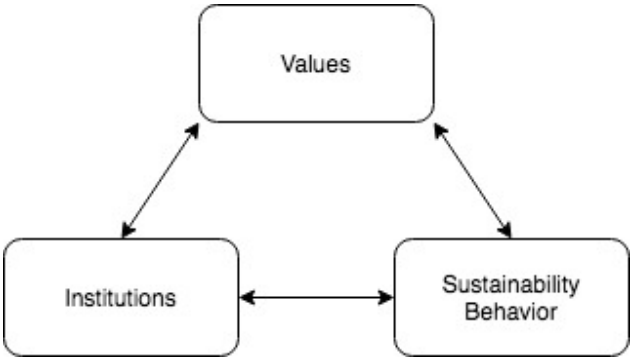
2.1 Predictive frameworks of sustainability behavior

In the literature on human psychology, it has been long argued that values are an important driver of human behavior. Furthermore, with growing evidence of the impact of human behavior on environmental sustainability, there is a growing interest to understand the relationship between values and human behavior, and to identify those values that are important for sustainability outcomes. Kollmuss & Agyeman (2002) give an excellent review of the several kinds of models used to explain the relational mechanism between environmental knowledge, environmental awareness, individual values and pro-environmental behavior. This includes single-stage linear models, multi-stage models, altruism, empathy and pro-social models, and sociological models. Most of these models emphasize individual subjectivity as the primary vector though which values shape pro-environmental behavior. Accordingly, the role of social institutions remains underdeveloped. The increasing focus on bottom-up approaches in policy formulation and implementation highlights the importance of social institutions—both formal (rules) and informal (social norms, customs, etc.) (North, 1990, Scott, 2008)—as a key link connecting individual values and society-wide sustainability policy outcomes.

We directly confront the role of institutions, considering how both formal and informal institutions influence individual perceptions and behavioral intentions around sustainability. We argue that regulative, normative, cultural and cognitive institutional structures are in constant interaction with value systems and sustainability conceptions. We find that institutional structures (and place-based markets) and pro-sustainability values are mutually reinforcing: institutional

structures and place amplify value orientation, influencing pro-sustainability perception and behavior, and this perception and behavior in turn influences the orientation of status-quo institutional structures. Figure 1. This cyclical process reshapes perspective on how a society might accept the challenges around sustainability and plan for future strategies.

Figure 1: values-institutions-sustainability



3. Methods and materials

Iceland is an ideal site for assessing the interrelationship between values, institutions, and sustainability outcomes. The country is ranked highly on sustainability indicators such as the Yale Sustainability Index and on environmentalism indicators in the World Values Survey, suggesting the presence of substantial environmental sustainability related concerns and interests. Iceland's experience in the 2007-2008 global financial crisis, which generated devastating economic and political effects (Fillmore-Patrick, 2013), highlights the tenuous nature of economic sustainability

for small states. This in turn energizes debates about sustainability and the role of institutions in mediating and shaping those debates.

Iceland is also notable for the degree to which strategies based on natural capitalism rooted in Iceland's rich natural legacy and abundance of natural resources has factored into policy (Auty, 2001; Benediktsson & Karlsdóttir, 2011; Eischen, 2001; Shortall & Kharrazi, 2017). Iceland's transition to the sustainable management of natural resources in a relatively short time is an important story. For example, 100% of its energy comes from renewable energy sources, and 90% of the households gets direct heating energy from geothermal energy sources (Hrund Logadóttir, 2015). These strategies provide interesting lessons for neighbor countries, but do not obviate challenges regarding balancing opportunities for growth and conservation of natural resources. For example, tourism in Iceland has grown exponentially in recent years, particularly in the aftermath of the crisis with the depreciated currency and policies to stimulate green economy (Dowling, 2011). Many argue that the rate of growth in the industry is unsustainable and is leading to the erosion of natural sites because infrastructure development has not kept pace.

A study of Iceland presents the potential to highlight the context-specific challenges of sustainable development. This study examines how communities balance economic needs with broader community goals by understanding the nature and intersection of social, economic, and environmental values. Contrary to tendencies to view sustainability as a static universal objective, this work situates sustainability in time and place with an emphasis on how values inform contingent conceptions of sustainable development. We share in the view of scholars such as

Holden et al (2017) that the objectives of sustainability vary between countries and in terms of relevance. Comparable to their findings that island communities value climate and biodiversity, we find that the natural landscape and biodiversity are prominent in Icelandic values of sustainability, particularly concerning cultural preservation and considerations of economic development. Understanding the interactions between values, politics, and economic development holds the potential to substantially improve welfare in Iceland and across the region.

Finally, we acknowledged that Iceland is also a country of considerable depth and cultural nuance. We do not mean to negate or oversimplify these complexities in creating a model, but rather to illustrate a framework through which the operation of values and institutions can be understood in society which can be generalized to other contexts. For example, the inability to tax fisheries optimally has been a matter of concern in the sustainable management of the fisheries resources in Iceland (Pantzar, 2016). Despite the political and economic interests around this issue (Young et al., 2018), the Icelandic society concerns environmental sustainability problems central to their underlying values. According to the latest World Values Survey data (2017-2020) for Iceland, 71% of the respondents preferred to protect the environment over economic growth, which is among the highest among 77 countries that were included in the Survey. Thus, better understanding of values of sustainability in each locality could improve local community engagement with policy and enhance the responsiveness of governance systems. It can also help policymakers come to terms with the range of visions of environmental and economic

sustainability in their communities to craft outcomes that maximize social, environmental, and economic welfare.

3.1. Modeling values through interviews and dialogue

The study uses principles from grounded theory, a methodology designed to build theories from data grounded in people's everyday experiences and actions (Strauss and Corbin, 1997). The focus on lived experience as the basis of theory-building calls for a multi-step methodology. First, the key stakeholders (from government agencies, policy consultancies, civic organizations and the private sector) in the negotiation of sustainability were identified through document review and with guidance from several Icelandic academics, policy makers and planners who served as advisors for the project. Planning and policy documents, popular press and new media were analyzed to identify key concepts surrounding principles of sustainability. Building from these concepts, we designed an interview protocol to examine the institutions (cultures, histories, processes) of sustainability in Iceland. Second, stakeholders in the development of sustainable policies were contacted for interview. We first conducted 26 interviews in Reykjavik (roughly two-thirds of the population lives in the metropolitan area), and then 25 interviews around the perimeter of Iceland (the bulk of the rest of the population) to generate insights on the structure of sustainable policy-making, the agents that engage in policymaking, and the scope of sustainable policies within the country. Interview participants were asked questions specific to the structure of their organizations, core policy interests, values and motivations, the nature of their involvement in policy making, and the history of the evolution of the concept of sustainable development.

Interviews also focused on the participant's knowledge of the sustainable policy impacts, influence on economic development in a region, expected outcomes and future outlook to assess the degree to which various actors' cognate the spatial and temporal dimensions of sustainability.

The approach of using grounded theory to analyze interview texts is well established in qualitative research (Charmaz and Belgrave, 2012). To this end, interviews were coded using two approaches. Following Eisenhardt and Graebner (2007), transcripts were analyzed to generate insights on how sustainable development is perceived in Iceland. Working from first-order codes to analytical categories, we identified 23 second-order core concepts. These second-order concepts were then distilled into a set of six analytical categories, by analyzing the relationships and network of these 23 core concepts. The analytical categories and the core concepts under each analytical category were finally consolidated to a processual model of how values influence sustainability perspectives and outcomes and how these perspectives and outcomes influence individual and societal values. (Figure 2).

Second, following Gioia (1998), we treated interlocutors as 'knowledgeable agents,' people who know what they are trying to do and can explain their thoughts, intentions and actions. This grounded the study in accounts of the informants' experience (Gioia et al., 2013). Coded interviews were used to generate insights on the relationship between values, agents, the scope of actions possible and the landscape of decisions. From the knowledge provided by key informants, we constructed accounts explaining how agents use values to negotiate the opportunities and

challenges of sustainability and to devise new strategies of development. Anonymized quotations are used to support key observations**.**

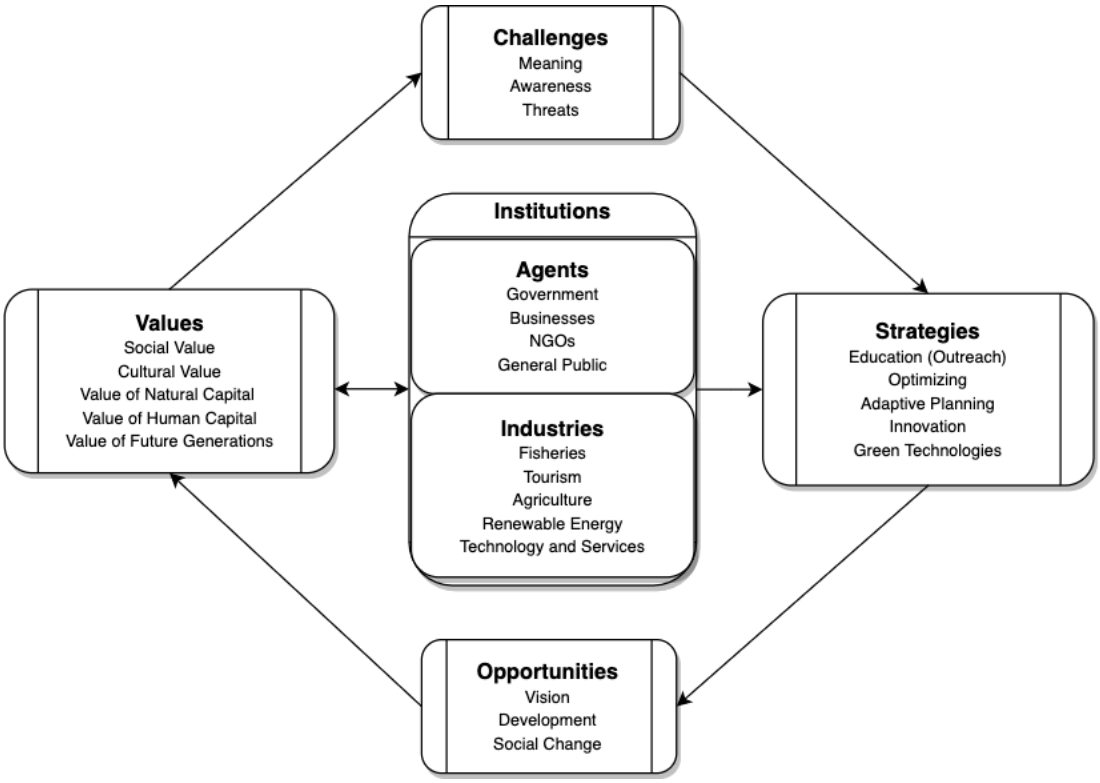
3.2. Modeling environment and behavior as situated in institutional context

In this section, we lay out the values-sustainability analytical model consisting of six prominent analytical categories (*values, agents, productive base, challenges, opportunities,* and *strategies*). Sections 3.l through 3.6 below address each of these categories in turn. In each section, we provide a table drawing on the interview data to demonstrate the structure of sustainability values. To map the values trajectory across the categories, the *first column* (bold font) of each table provides data from the same interlocutor. Other columns present representative data across different interlocutors to demonstrate how the concepts are manifest across different perspectives. Under each analytical category, we identify the 23 most prominent concepts (see Figure 2, under each analytical category). These manifestations are based on exploration of various relationships among 455 open codes from 51 interview documents, evidenced by 712 quotations across the 51 interviews that were conducted. Within each of the six analytical concepts, we see clear connections among locally embedded value systems and sustainability perceptions not adequately explained by existing models. As Holden et al (2017) suggest, values set some parameters around the function of societies. The model is establishing direct connections between values and institutions (social, physical/ formal and informal) with regards to how individuals in a society conceptualize, plan and initiate sustainable development.

4. Results and Discussion

A discussion of sustainability begins with the emphasis on place: how the concept of sustainability is interpreted and possibly transformed through existing value systems. These are shaped by and related to the productive bases, a combination of resources respondents have access to and the ways in which their societies utilize these resources. Their perspectives are also shaped by their agency, and the particular socio-demographic identity each respondent holds. In the model in Figure 2 we represent 'agents' with nature of employment (or dimensions of institutions in governance), but the nature of the agent could vary across socio-demographic characteristics and organizations. The way individuals are situated both socially and environmentally help identify the opportunities and challenges for sustainability that respondents perceive and the way that their values shape their development strategies and objectives. Our analytical model evidences the theoretical conception we started with: hypothesizing that institutional factors along with place-specific conditions mutually reinforce value systems. Our model is also cyclical, confronting challenges (both structural and cognitive), and forming strategies to create opportunities to enhance value systems. These values systems become a foundation for altering existing institutional forms, or creating new institutional arrangements. The model illustrated in Figure 2 combines the insights of models described by Kollmuss & Agyeman (2002) while making explicit the relationship between values, institutions and the built environment in understand how individuals conceptualize sustainability, as derived from our grounded theory analysis. In the next section we walk through the segments of the model and provide examples from the dialogue and experiences of several of our interlocutors from different regions and sectors of Iceland.

Figure 2. Analytical model of sustainability values (grounded from coded interview data)



4.1. Values

Through the coding of the interview data we identify the five most prominent conceptualizations of underlying values (social value, cultural value, value of natural capital, value of human capital, and value of future generations). In this section we illustrate the model with quotations from a respondent conceptualizing the sustainable development in Iceland through the interview discourse.

The concept of social value can be unpacked under two strands: inherent value and creation of capital. First, it is understood as the representation of innate interconnectedness, a sense of community. Participants emphasize how individuals and communities are interconnected and sustainability issues can affect people from various channels, therefore ought to be addressed

collectively. Second, the concept of social value encompasses the notion of social bonding (such as forming a social group for organic green farming), or the value of collective well-being, as well as social capital (networks). Social value can be understood as an asset to generate a use-value - by forming groups as a mechanism to seek collective well-being. In our analytical model, social value is one of the key concepts that help shape some of the strategies (i.e. education and outreach) identified from the data. Cultural value is conceptualized as a set of norms, beliefs, and practices that upholds a symbolic value of the built socio-cultural environment. Some participants perceive cultural value as synonymous to the value of preservation (environment is identified as a crucial asset of the Icelandic community). Similarly, respondents view natural capital as an element of identity, pride, and heart of the country beyond resources for commodification. Two issues stand out under the value of human capital. The first is more closely associated with human security, such as risks on human lives more immediately from natural disasters and more distantly from food insecurity. Silja Bára Omarsdottir (2018) has found that the public discourse in Iceland focuses more on threats to societal and environmental security rather than on military security. The second issue is associated with the value of human capital directly, emphasizing the role of humans in transitioning more fully towards sustainable practices, despite continued aging population concerns. For this reason, participants underscore the value of future generations in face of uncertain yet inevitable future challenges.

Table 1. Examples of Value of Future Generations

Value of future generations			
Fisheries	Tourism	Geothermal	Waste and Innovation

Our goal is to create a positive regional development in some way or another…We have different perspectives from different generations. We have younger people focused on the variety of the opportunities, and we have the older people saying, "We need a stable company. We need a stable employer. That's going to save us. –Director, University Center, May 9, 2016	There is an obvious tension between tourism and other fields such as infrastructure. Everybody wants electricity, but nobody wants to see how it's moved from one place to another. So, there will be struggles between these different sectors. If you talk to the young people, they all look towards technology where they want to work. That is something that worries me with tourism where we don't have so many well-paid, well-educated jobs. –Director, Environmental Protection Agency, March 16, 2016	Geothermal has been used through the centuries, but in the first decades of the 20th century systematic use for house heating evolved. It was first mainly in individual houses that were connected to a nearby hot spring. Here in Reykjavik there was drilling for hot water with washing pools in the town. Now, Iceland is looked upon as one of the main leaders in geothermal development. The value is both the scientific methodology in getting to know the geothermal area, and also applying the different existing technologies to the utilization of the resource. –Director of Public Affairs, Water Utility, December 3, 2014	I brought this with me into the company. Whereas we are harnessing natural resources, ground water and geothermal, I said, from the very beginning, "There is no waste." And the Resource Park, its mission is a society without waste. So that is the spirit of this. Deputy CEO, Energy Industry, April 22. 2016 One of the things that's really unique about Icelandic fishing, is that you use 80 or 90% of the fish and most people throw away 40% of the fish or 50% of the fish. So, most companies use the fillets, that's what everybody wants. But Icelanders are learning to use every part of the fish, so the intestines, the skin, all sorts of products are being made. –Chief Technology Officer, Industry, December 10, 2014_

While older generations may have valued a steady commercial enterprise in a remote location, younger generations have different priorities and aspirations. These different values create different development outlooks and trajectories, which are responsive to environmental and social conditions, and which in turn shape the strategies communities develop (Figure 2). In the spirit of innovation, respondents also acknowledge

the significant relationship between social and natural capital and the importance of preventing waste of their natural resources. This mentality pervades industry sectors.

4.2. Agents

There are numerous ways to define agents. Building from the interview data, we represent four broad-based types of agents within Iceland's political economy that shape sustainable development--government, businesses, non-governmental organizations (NGOs), and the general public.[2] The government is perceived as the final decision-making body and often described as a regulator. Our analysis reveals that the government, embedded in the Icelandic community, faces two challenges: lack of clear direction in pro-sustainability policymaking, and inadequate stakeholder engagement in the process of decision-making.

We find that local businesses and firms play a critical role in advancing the discussions on sustainability related practices, through organized efforts such as corporate social responsibility programs and procedures. Firms in the marketplace (particularly in the tourism, geothermal, and fisheries sectors) take responsibility because their activities are dependent on sustaining the ecological base. Non-governmental organizations play a key role in raising the overall awareness and getting the initial discussion around sustainable concepts started. Data suggest that while the

[2] We note that this division is not meant to be conclusive, but illustrative of the model. Beneath each agent category are a series of sub-codes within our interview data. Here we represent agents from an occupational standpoint, but could also have worked other forms of identity, including age, gender, politics, regional affiliation, etc. From the standpoint of the model the occupational role is most significant, but in subsequent survey work, we probe the nature of agency and its effects further.

importance of the public is widely understood and agreed, access to information and direct public involvement or participation still seems to be in question. The respondents acknowledge that the path to sustainable development varies depending on the nature of one's position. This captures their agency. Common across the discussion is an internationalization of the opportunities and challenges of sustainable development across industries. This also begins to highlight some of the tensions and tradeoffs between priorities such as nature preservation and tourism.

Table 2. Examples of agents across sustainable development industries and strategies

How agents resonate in the analytical model (across industries and strategies)			
Fisheries	Tourism	Geothermal	Waste and Innovation
For the last maybe 20, 30 years in Iceland, in the rural areas, both the state government and also the municipalities have been focusing very much on trying to get one big opportunity in each area, industry: aluminum or any sort industrial project, a silica plant, a silica metal plant. An 18-year-old here in Húsavík is not going to say, "I'm going to stay in Húsavík because there is going to be a stable company in the aluminum smelter that's going to save me and my family. The 18-year-old probably wants to go abroad or something, move to another country for a few years and get an education and look around and maybe come back. The reason they come back is not the job in the only plant in the area, it because there are a variety of jobs and sort of city-like conditions to live. – Director, University Center, May 9, 2016	The challenge is to build more high-tech industries to keep well-educated young people in Iceland, which is very important. We have been focusing on that for the last 15 years or so and have been very successful, but we need to do more. Tourism is out of bounds too. We have no control over the growth. It is just growing. Our land cannot take more people because nature is vulnerable. People are driving off roads going across the country, or whatever. We need to have a balance between the load of each person and the equality of the nature, and we are not able to do that yet. Executive Chairman, Maritime Industry Organization, –December 23, 2014	We are in a very unique position when it comes to renewable energy. Almost no other country in the world has the same chances for becoming a society building almost entirely on renewable energy. We have the hydro, and geothermal, and of course, the wind like anyone else or even more of it. What we need is to speed up things in terms of energy change in the traffic sector, fishing fleet, and so on. We are already producing all our electricity, warming all of our houses with renewable energy. We have potential to change from fossil fuels to renewable energy in a matter of 10 to 20 years almost entirely. –Member of Parliament, December 16, 2014	That's a population center of 3,000 [inaudible] people. So there you have the hospital and the shopping center and the high school and its kind of the service center for the region. And there we have a smaller campus there but we have fish biology and teach aquaculture and things like that. And there is-- around that there's been and in relation to the fishing company they've built up kind of a science park in biology and fish biology. So it has actually been an interesting partnership that has resulted in small innovation and establishing gulf companies like focusing on products that will use the skin of the fish or the protein to develop some kind of drugs or food supplements. And so there are a lot of research and innovation going on in that science park, if you say.

–Professor, University, May 7, 2016

4.3. Productive base (industries)

Through our coding of the interviews, four industries emerge as mainstream productive bases in the discussion of sustainability in Iceland: fisheries, tourism, renewable energy and technology and services. These bases illustrate some of the ways in which conceptions of sustainability are embedded in place, and reflect social, economic and environmental conditions on the ground. Fisheries are one of the key industries to sustain a healthy living for the Icelandic society. The use of technology and scientific data helped create more value within the fisheries industry. The Icelandic government, with the help of the research center, administered quotas to sustainably limit over-fishing. At the same time, concerns have been raised about "commodifying" fishing quotas too heavily, raising a question about the initial motivation behind putting fishing quotas in place as illustrated by the following perception of one of the interviewees:

> But people started selling their quotas, so they stopped fishing and that was a delicate issue. The quota itself became valuable… But that is what is disturbing to people, that the fishing industry is using our common natural resource, the fish, the sea and benefit from it, but the people don't benefit as much. – Analyst, City Council, December 15, 2014

Those who own fishing quotas began selling these quotas to fishing companies who are located miles away. This nature of market mechanism somewhat converged with governmental regulations in the fishing industry creating unique opportunities and challenges. To some extent this finding also illustrates the evolution of significant industries in time. This is a point our interlocutor s makes as well:

Table 3. Examples of industries in the analytical model

The evolution of key industries			
Fisheries	Tourism	Geothermal	Waste and Innovation
If you think 20 years back, it should have [been different], if we had been able to get each region to have its quota and to have the business inside of that. I've often wondered why didn't we do that? Why didn't we take maybe 100 to 200 kilometers of coastline and say, "This is the Northeast region; you can buy or sell whatever you want, but it's not going to go any further than that"? And the people who are dependent on it in one way or another, processing fish or whatever, you can plan your future. I mean, if you are working in fish or anyhow dependent on it, you know the quota's going to be there. No matter if my friend here is going to sell his quota to the next. The quota is not going anywhere. – Director, University	Tourism is now becoming the major interest here in Iceland. Where I think we need this kind of a holistic policy thinking vision that we had with the quota system for other areas, like with the power or energy sector, and with the fishing. Those are the three main sources of income for the island: fishing, energy, and tourism at the moment. – Managing Director, CSR Industry Association December 29, 2014	We are able to produce all the livestock products, and we are able to produce as I said before about 40% of the vegetables, and we could increase tremendously the production of greenhouse products because we have the geothermal energy. We have firstly the heat, and of course our radiators and our swimming pools have the hot water, then secondly, we have electricity for light. We are supplementing light in many greenhouses nowadays in the winter time so this extends the growing season. –Farmer, Farmers Association, December 9, 2014	We have learned how to precipitate the silica out of the brine at the right form. If you purchase the skin care products from the Blue Lagoon, there are two active ingredients: silica which the skin barrier can absorb or pick up and algae, which are very specific for this area, and have a very beneficial effect in the deeper layer of the skin. These algae are green so there is chlorophyll there. Add chlorophyll, CO2, and energy or sunlight, and you have the sugar compounds for the metabolism. Our geothermal gas is rather clean, so they get CO2, our off-gas, to grow the algae. Then there is one company out there which is a fish-drying facility. Fish heads, fish bones, and so on, are sold to Africa as an excellent source of high-quality proteins. And the beauty of it, we are using geothermal to do that. –Deputy CEO, Energy Industry, April 22. 2016

Center, Husavik, May 9, 2016

Here the respondents highlight a broad-based economic trend or shift in productive bases necessitated by the loss of fishing quota. After the 'cod wars' with England in the 1970s, Iceland instituted a strict quota system which has generated great ecological success in the management of Iceland's fish stocks. However, the decision to privatize the quota and allow exchange, in time led to a consolidation of quota around two major processing centers. The loss of quota has been devastating for small communities, and has led to a need to rethink and regenerate the productive

bases of Iceland's rural economy. Many of the strategies of small communities (as illustrated below) are crafted in response to this outcome.

According to the data, agriculture also seems to be gradually fading away from the mainstream economic activity of a number of communities. Livestock, primarily sheep are still an important agricultural product, but some respondents noted concern about the diversity of stocks, and also the lack of social capital, particularly across generations, to continue traditional agricultural practices. Respondents express concerns that large corporations now dominate the agricultural market and have enabled the introduction of genetically modified organisms (GMOs). The concerns around agricultural quality and livestock farming practices lead respondents to emphasize the role of "eco-friendly" agriculture, and to generate sustainable development strategies that synergize across economic activities. For example, if cattle are raised differently, it can benefit the tourism industry as well generate opportunities for eco-tourism.

The data reveal advantages and disadvantages of promoting the tourism. On the one hand tourism has revitalized the Icelandic economy in the aftermath of the 2008 financial crisis and allowed for diversification of declining industries. Between 2008 and 2018, the number of foreign tourists visiting Iceland increased from 0.5 million to 2.34 million (as a point of comparison the Icelandic population reached a little over 350,000 as of 2018), achieving a compound annual growth rate (CAGR) of 16.6% over the period (Iceland Tourist Board, 2018). The contribution of tourism in Iceland's GDP increased from 6.2% in 2015 to 8.1 in 2016 and 8.6 in 2017 (Statistics Iceland, 2018). And yet, the level of activity raises concerns because of the impact tourism has on

natural sites (Hale, 2018). The lack of infrastructure means that there are not adequate road, parking and utility services across Iceland's fragile natural environments (Jóhannesson & Huijbens, 2013).

Individuals driving without care and walking off trails can damage fragile moss, tundra and other flora and fauna. Providing sufficient food and accommodations is another concern in small towns where the number of visitors easily outmatches local populations. Crowding is a feature of visits to Iceland's once remote wilderness spots that diminishes everyone's experience. The number of outside visitors increases the occurrences of individuals getting lost, running off of roads, or otherwise falling into trouble across Iceland's wild landscapes. These instances take a toll on Iceland's volunteer Search and Rescue teams, more frequently called to respond to accidents involving foreign visitors. While tourism has boosted Iceland's economy, there is much turmoil and debate about how to sustainably manage the negative impacts of tourism while creating meaningful experiences and long-lasting value (Jóhannesson et al., 2010). Options such as a nature pass fee which would provide revenue for additional infrastructure have been considered, but are weighed against Icelander's strong value that nature should be free.

One of the recurring themes is the area of contradiction between continuous development and protection of environmental value. Renewable energy is a key industry to promote sustainable development such as geothermal and the potentials of hydropower. Yet, somewhat contradictorily, some respondents noted that renewable energy perpetuates business as usual practices (i.e. unsustainable use of resources) because of a sense that the use of renewable energy makes heavy

industries more sustainable, when it in fact does not. This has, for example, long been the case with aluminum smelters across Iceland. The concern additionally highlights the importance considering sustainability from both the production side (i.e., from renewable energy) and consumption side (i.e., monitoring and regulating the use of energy, both in terms of magnitude and type of use).

Iceland's experience with the quota system to save fisheries and recognition around the limitations and need for conservation of natural resources is has created a mentality of innovating up the waste stream of resources and creating high tech industries in the process. Although still a smaller segment of the Icelandic economy, innovation and development in pharmaceuticals across everything from energy technology to fisheries to ecotourism and services is being established as an important niche in the Icelandic economy. For example, Kerecis Limited of Iceland has developed innovative techniques for using fish skin for treating skin wounds (Parshley, 2017). The development of innovative technologies and high-end services allows Icelanders to utilize resources to their maximum potential and to stimulate the interests and values of innovation-oriented younger generations.

4.4. Opportunities

Respondents identify three primary opportunities to bring the discussion on sustainability to center stage (vision, development, and social change). Some participants identify long-term vision as an opportunity despite the continued debate between continued development and environmental protection. Data suggest that when appropriate measures are undertaken to not alter

the ecosystem (i.e. sustainably managed over time), development ought to be viewed as an opportunity. In other words, respondents express optimism towards sustainably planned and managed development rather than completely shutting down cultivation and continued exploitations of natural capital. Despite long-standing social norms and resistance to change, participants acknowledge the effort citizens and municipal governments are making and suggest that in the immediate future, people will become more comfortable with the concept of sustainability and begin to change their views, beliefs, and attitudes. The sustainability "wave" was identified by respondents as being fundamentally driven by gradual shifts in individual values and social influences (and interactions) from multiple forms of institutions.

Table 4. Examples of opportunities in the analytical model

How values-agents-industries shape future opportunities			
Fisheries	Tourism	Geothermal	Waste and Innovation

I think the focus on these areas and these towns and the rural areas in Iceland has to change, and I think it is changing. So, I think I could say the social values are changing between the generations. And that's a reason I think that Húsavík as a small town in the north of Iceland is going to thrive and develop in a positive way. It's not because of the only [aluminum] plant being built, but rather because we will build up a variety of different opportunities similar to those we find in most cities. -–Director, University Center, May 9, 2016	The opportunity is to develop tourism for other areas. Most of the people are only going to very few areas where you meet hundreds of thousands of people. In the beginning of June, I've never seen so many people at the Glacier Lagoon as this year. The parking lot was filled with cars with no place anymore for people for the time being. We have to improve the infrastructure. But there are also opportunities for areas that are far away, and have not had any visitors because they are further away from the main road or from this area here where most people arrive from the Southwest. –Project Manager, Government Association, November 13, 2014	Our main opportunities in renewable is replace fossil fuels in our infrastructure, which is more or less fishing vehicles and the fishing vessels and vehicles. We have done that previously. 40 years ago, all houses in Iceland were heated with oil. Now, they use geothermal heat. So we've gone through one transition like that before, and we can do it again. That is a huge opportunity for us. –CSR Director, Financial Institution, December 23, 2014	At the Blue Lagoon, they are getting one million visitors a year. There are three main activities there: the spa, an R&D center for research, and a clinic treating people with skin disorders, mainly psoriasis. They are using this brine. according to Icelandic law, the brine or the fluid in Blue Lagoon is classified as industrial waste. But it's very healthy. People around the world look at the the geothermal resource only as a resource of thermal energy for generating power. But my big learning is that there is much more in the resource than energy. Sustainability boils down to always having a holistic approach to whatever we do. – Deputy CEO, Energy Industry, April 22. 2016

Here, the respondents highlight a gradual shift in social values on sustainable development, particularly across generations, and again a desire to rebuild or reconsider industry bases, and economic approaches which will reconcile the values between generations, and provide more sustainable pathways for small towns in the future. The discussion of opportunities is shaped by the acknowledgement of the divergent productive bases and values of different agents. Additionally, the vision of opportunity through diverse industries, rather than conventional industrial practices, reflects a responsiveness to the various productive bases operating in these communities and to the pathways they create for development.

4.5. Challenges

Participants identify three primary challenges of reaching closer to sustainable pathways based on the Icelandic locality (meaning, awareness, and threats). While sustainable development is a widely-used concept, it is sometimes criticized for its broad, elusive, and non-contextual meaning. Interview data confirm there is a disconnect between a loosely defined universal concept of sustainable development and what is central to the locality in Iceland. For example, some participants believe that the symbolic cultural value of natural capital (for example a sense of pride on what the nature provides) is largely ignored by both the politicians and the general public. Furthermore, respondents identify the significance of understanding the difference between a consensus on what needs to be done versus what is truly being done on the ground as part of sustainable development efforts. Additionally, participants identify awareness of both the inherent value of natural resources, as well as threats to these resources as major challenges. Transitioning to a sustainable society requires confronting conventional (unsustainable) beliefs and practices. While the degree of disparity may differ across localities, data suggest some individuals in the Icelandic community remain intransigent in their stance towards changing their conventional behavior, since change requires substantial effort. These individuals might be favorable towards the overarching idea of sustainable development, but simply may not be willing to alter daily practices or routines. Another drawback identified by the respondents are direct threats, both in physical form and in the form of phenomena. Physical threats include lack of proper infrastructure and necessary technology to support the scale of

tourism that Iceland has achieved in recent years (with millions of visitors each summer). Broader threats are identified by respondents in the form of phenomena including change in demographics (loss of young people from rural areas), aging of the population, and lack of political will for sustainable initiatives such as electrification of Iceland's vehicle fleets.

Table 5. Examples of challenges in the analytical model

How challenges manifest across values-agents-industries			
Fisheries	Tourism	Geothermal	Waste and Innovation
And the decision to protect the fish becomes a side effect. You can look in Raufarhofn. You can find a sleeping village just 150 people now, and they just look out of the window, and there's fish in the sea. But there's nobody fishing it, because they are not allowed to do it, because some family decided to sell their quota. –Director, University Center, Husavik, May 9, 2016	We have to make some changes with regards to how the flow of tourism comes to Iceland, and how we go about it, because the Golden Circle is over-utilized. I'm afraid that that can ruin our reputation as an unspoiled country of beautiful nature. We need to start opening up better access to other beautiful areas in the countries, and start putting some quotas on how many tourists can come by buses into these areas. Member of Parliament, December 19, 2014	It is like oil. You drill down into a tank, and if you take water out, you just drain the tank. I find it a bit strange that geothermal power plants are being looked at as being sustainable. What is sustainable though is the low temperature geothermal use; the way we use it here in Reykjavik for space heating. We take the heat out of water that is just flowing here from the glaciers at the highlands. We have to make sure that we do not take too much otherwise the ocean will come in and the system will break. Planner, Professional Services, December 22, 2014	What you look at the Blue Lagoon is the experience; it is not like an endless resource. We have to protect it. That's why we, for example, added the booking system because, if you're here and it's really crowded, that's going to take away from your experience. And I think we need to think about that and Iceland in general, to protect the nature resources and the experience of our industries. –Director of Public Affairs, Tourism Industry, March 15, 2016

These phenomena manifest in a variety of ways. Across Iceland's small villages, the loss of fishing quota has for example led to a loss of productive revenue. As a consequence, young people are leaving the villages, and there is a sense of missed opportunity. The sense that there are resources to be had, but no way to take advantage of them resonates with a sense that the policies

put in place have understood and balanced some values (the protection of fish stocks), but not other, the distribution and access to resources across the country side.

Fisheries are important for Iceland's economy. According to the Central Bank of Iceland, in 2015, about 42% of goods exports (equivalent to 22% of total export earnings from goods and services) were from fisheries. In many parts of Iceland, fisheries are the most important driver of the local economy, which makes it a politically sensitive issue (Arnason, 1996). However, like any common pool resource, fisheries have suffered from overexploitation despite various measures taken by the government, including effort restrictions and setting up of total allowable catches (TAC) and extending fishing limits of other nations. The economic nature of the sector and its political importance due to its contribution to the economy and jobs, the allowable catches by the government often surpass the scientifically allowed limits (OECD, 2017).

Individual Tradable/Transferable Quotas (ITQs), aimed at correcting the failure arising due to the lack of property rights in common pool fisheries resources, have been an important policy approach for the sustainable management of several marine species, including fisheries (Heal and Schlenker, 2008). Iceland has been among the first countries to manage its fisheries by introducing the quotas, and various forms of ITQs have been functional in Iceland since 1979 (Arnason, 1993). The switch to the ITQs in Iceland in its current form occurred in 1990. This quasi-privatized system (Kokorsch and Benediktsson, 2018) of transferability changed the common pool resource to a system of tradable assets (Benediktsson, 2014). There has been a huge political influence in the

management of ITQs (Kokorsch, et al., 2015), and the system, in general, has resulted in large economic and political rifts over the years (Eythórsson, 2003)

4.6. Strategies

Through the coding of the interview data we highlight five prominent strategies to gradually overcome the aforementioned challenges and reach closer to future opportunities (education, optimizing, adaptive planning, innovation, and green technologies). To be effective, the role of education (outreach) ought to be strengthened to raise greater awareness on sustainable development issues, which play a critical role in shifting social norms or established thinking. Participants underscore educating the youth to incrementally transform long established social beliefs against sustainable practices. Educating future generations as well as the current, is critical in bringing sustainability issues to center stage. The idea of sustainability is deeply embedded in the Icelandic education system. For example, in the city of Reykjavík, the municipality has an appointed official working on sustainability outreach in the education sector. The municipality runs open meetings and invites people from the public, including teachers, and actively discusses contents related to sustainable development. Written records of these open meetings are then submitted to the ministry for review.

The notion of optimizing involves taking the best value of existing resources or capital, rather than venturing into new areas often associated with new technological advancements (which might be associated with new risks). Participants identify adaptive planning as an essential strategy both in decision-making procedures and operations on the ground. For example, data indicate that

environmental impact assessments ought to be revisited periodically to come up with more appropriate measures. In addition, innovation ought not only to expand the productive base or existing industries, but create new windows to uphold the value of natural capital. For example, respondents underscore the need to continue developing green technologies to utilize and generate value from clean energy while curbing carbon emissions, rather than extending contracts to aluminum smelters.

Finally, these conditions also shape how respondents view sustainable strategies in their local context. Some strategies draw on the values and principles of regional development and seek to activate human capital across multiple generations. This allows residents to tap into different consumptive practices, while also accessing the new productive base of tourism and creative economy. The respondents in our example highlight how these forces operate within the model and how they are transforming industries in Iceland.

Table 6. Examples of strategies in the analytical model

How strategies manifest from values-agents-industries			
Fisheries	Tourism	Geothermal	Waste and Innovation
If I was going to start a new village on the northeast of Iceland, I would say, "Do not depend on fishing. Do something else. Think outside that. Do not start fishing as your key resource." Not with this quota system. You cannot depend on it. But the other factor is that the world is changing. Our village in the twenty-first century in Iceland is not going to be full of young	Our city slow movement came from Italy… it's both to slow the tourists down—when you come into the center, okay, slow the car down—and also kind of mentally…We've done the trail map for bird watching in 2008…. Around the harbor we have 34 sculptures of eggs, of birds bathing in this area, connecting art and nature. So, it's kind of the connection there. And from the artist, I don't know if you've heard of him, but it's very famous. And his wife owns	We are in a very unique position when it comes to renewable energy. Almost no other country in the world has the same chances for becoming a society building almost entirely on renewable energy. We have the hydro, and geothermal, and of course, the wind like anyone else or even more of it. What we	We are using every component of the fish that comes from the sea. We're using it for something, and that's what happening in here as well. There's a lot of innovation in here, both for technology helping the fisheries and use of fish in a different way that doesn't hurt the environment as much. For example, there's a company over there that's creating collagen. Consultant, Energy Company, December 14, 2014

people working in fisheries. There are some people, but not a whole village, like 40 or 50 years ago. You have a very divided and broad spectrum of employment for the people here. Tourism is absolutely one of the key factors, I think. Not because of just the tourism itself, but more because of the services and infrastructure of the tourism gives the locals and lots of young people. We cannot attract a 25-year-old person from Reykjavik if we say "We've got no cafe. We've got no restaurants. We've got none of the social infrastructure that you are looking for. –Director, University Center, Husavik, May 9, 2016	a Chinese-European Art Center in in China, and they have been working with the community within the last two years, and again now to have a large art exhibition in here in this-- in the old fish factory, which is now abandoned. One of our kind of big designers is working with reindeer skin, and fish skin, or fish leather. And that's all kind of sustainable art, our design, because she only takes what would be thrown away. – Municipal Association, Tourism and Cultural Officer, May 10, 2016	need is to speed up things in terms of energy change in the traffic sector, fishing fleet, and so on. We are already producing all our electricity, warming all of our houses, with renewable energy. We have potential to change from fossil fuels to renewable energy in a matter of 10 to 20 years almost entirely –Member of Parliament, December 14, 2016	We take fish skin, and we take away everything that makes the fish a fish. So you're leaving the structure and the long-chain fatty acids in this piece. And then you put this piece into a wound and the wound uses the skin substitute, both to stabilize the wound and as a scaffold to build up the new tissue, like with bandage on top. So that's how we use the fish skin. It had been used prior, and is still mostly used as animal feed, but we are making, obviously, a more valuable product of it. We are also looking into other surgical products for reconstructing tissues all around the body. –Chemist, Pharmaceuticals Industry, May 6, 2016

The above strategies generate a vision of what sustainability might become, rebalancing the quota system which has been incredibly effective from an ecological standpoint of managing Iceland's fish stocks, but detrimental because it was established as a system of property rights, which over time were sold out of small villages and consolidated by a few holders in a few industrial production centers in Iceland. The privatization of fishing rights and the capacity to exchange these rights is a challenge. The opportunity for sustainability might therefore be conceptualized as redistributing and limiting the exchange of fishing quotas, such that these are held by communities or villages rather than individuals. The development pathway might instead

by perceived as moving the community to another productive base entirely, for example tourism. The strategies for tourism and energy revolve around the development of more sustainable practices and models that learn from the example of fisheries and make better use of the resources over time. Across all of these discussion, interlocutors highlight the importance of innovating up waste streams and conserving resources, bringing the discussion back to the linked values of human and natural capitals (Figure 2).

Beginning from the standpoint of the values of maintaining natural (and cultural) capital and human capital, Iceland faces challenges such as the destruction of natural resources because tourism is growing at an exponential rate without infrastructure and regulation to manage the damage that tourists have on the environment. Quantity and speed are being prioritized by tourists and unplanned development over quality. The solution perceived by the respondent in this example is to create a slow tourism movement that keeps tourists longer, limiting the number that come, and engaging creative industries that establish worthwhile opportunities for young people. Respondents in a small village in Eastern Iceland have linked with an international initiative called 'city slow' to promote and create sustainable tourism opportunities built around the appreciation of cultural artifacts in the town. The goal is to encourage tourists to visit more than once and sustain a longer engagement with the community, while also to create economic opportunities in the arts and creative industries that will keep young people in the region.

The processual model starts from the values, uses these to opportunities and challenges within the productive bases, and then derive strategies. The strategies are related

both to the productive bases of the economy as well as social values. This extends the conversations around environmental context to discourses in which the economy is grounded within a physical place. Values are essentially mediated through the environmental, cultural, economic (industries), and institutional (agents) context in which the locality functions. In turn, variations in values lead to different variations in future sustainability perceptions and outcomes.

5. Conclusion

The relationship between values and environmental outcomes has long been a topic of interest in the environmental sustainability literature. The conventional models that have been established tend to be linear and to have a two-stage approach through which values shape environmental outcomes. Through a grounded theory approach, we have conceptualized a non-linear model through which values interact with social and environmental context, as well as the assessment of opportunities and challenges to shape strategies for development and change. This suggests that values are critically important to sustainable development, but also socially and environmentally interactive. At the same time policies and practice impact values. For this reason, our model is circular and responsive rather than linear.

Our grounded approach suggests that interviews of public and private stakeholders provide sociological and economic insight into the development of sustainable policies. The detailed explanations of both the processes of negotiations and the motivations and values of stakeholders enable conclusions about the ways in which sustainable outcomes can be shaped and achieved.

Interviews provide a deep understanding of the role agency plays in driving policy and can be used to analyze mechanisms of engagement, organizational dynamics, and spatial and temporal aspects of sustainable development. However, interviews limit the scope and scale of the analysis. While there are more than 50 sets of observations that framed the analysis and shaped the development of our conceptual model, survey data will provide greater insight about the interaction of various factors of the model at greater scales.

Multidisciplinary research on sustainable development as it exists in diverse international settings is essential for developing integrated perspectives to achieving sustainability. The challenge of many modern environmental problems is that they are transnational in impact. This characteristic suggests that coordinated action at the international level is required to address these problems. Nevertheless, global level action faces serious hurtles to success. By addressing the transmission and syncretic internalization of sustainability within cultural context, this work addresses a major point of tension at the junction of international coordination of domestic practice. The insights gained from this work could substantially improve the prospects of global action on transnational environmental problems by providing a basis for building flexibility into international environmental discourses and agreements.

The modern world, particularly in the economic sphere, is an increasingly globalized one. At the heart of this dynamic is a dispute between universalistic narratives and local cultures and practices. Understanding how universalistic discourses are interpreted and integrated into local practice offers insight into how universal concepts are translated through local values and

institutions. While the scope of this study is limited to Iceland, we hope to extend this analysis to other countries so that we can conduct comparative analysis of the values, institutions and outcomes that are comparable as well as divergent. Understanding this dynamic is important to the creation of cross-geographic policymaking that seeks to realize the benefits of universalistic ideas (sustainable development) by making policy making more effective at translating those ideas into local contexts.

The discursive construction of sustainability (how the issues, challenges, values and goals of sustainability are constructed in language) is critical to the process of establishing the principles from which legal frameworks are built. This work is the first step into a broader project to provide social-scientific insight into the nature of values, where they come from, with whom they resonate and which goals for conservation and development they establish for the region. This information is essential to the construction of better-informed cross-regional policy. Insights such as those provided in the study could help policy makers at a broader scale understand the priorities of communities in different regions, and the kinds of policies that are more likely to generate success. For Iceland, sustainable development as conceptualized and operationalized by participants requires a focus on innovation and creativity that can provide exciting avenues for growth for younger generations, but which rely on traditional resources and values of conservation. Sustainable development is a process of decision-making guided by human ambitions and values. As this work demonstrates, the nature of this process is not linear, but multi-dimensional and shaped by both environmental as well as social context.

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Dear Scott,

Please find attached our revised Manuscript ID SD-20-0255 re-titled: 'The Role of Values in Shaping Sustainable Development Perspectives and Outcomes: A Case study of Iceland.' We would like to thank you and the reviewers for their careful attention to the article and for the very helpful suggestions. We have taken on board all of the reviewer comments and completed extensive revisions to the manuscript, which we feel have strengthen the argument. I am attaching a spreadsheet we used to organize and respond in detail to the reviewer comments as well as our responses.

In sum:

- We have reframed the argument away from the discussion for the Arctic and instead to focus on the relationship between values, institutions and perceptions and strategies of sustainable development.

- We have added additional references to the literature review highlighting the nuanced arguments around the relationship between values and sustainable development.

- We have added additional references to articles published within the journal to create a greater degree of continuity with this scholarship.

- We have clarified the argument: In particular, we argue that regulative, normative, cultural and cognitive institutional structures are in constant interaction with value systems and sustainability conceptions. We find that institutional structures (and place-based markets) and pro-sustainability values are mutually reinforcing: institutional structures and place amplify value orientation, influencing pro-sustainability perception and behavior, and perception and behavior in turn influence the orientation of status-quo institutional structures.
- We have reorganized the empirical material into a table format so that we could not only trace the operation of our model across the dialogue of a single interlocutor but also illustrate the concept across many different stakeholders with key focus on critical sectors of the Icelandic economy including fishing, tourism, renewable energy, and technology and innovation.
- We have also added additional discussion of the Icelandic quota system, of the ways in which values and priorities at times create conflict, and how these are resolved through the strategies citizens generate, such as innovating creative technologies (e.g. fish skin band aids) working up the waste stream.

- Finally, in line with your very helpful suggestion we have re-tilted the article to be more general: The Role of Values in Shaping Sustainable Development Perspectives and Outcomes: A Case study of Iceland

We hope the manuscript is now suitable for publication, but please don't hesitate to reach out with any additional recommendations. Thank you for your consideration.

With kind regards,

Janelle (Jung and Shekhar)

Reviewer A

Comment	Comment no.	Line Number (Prior to Revision)	Has it been addressed in the manuscript.
The reviewer suggests to use the word "grow" instead of "accelerate"		43	We have replaced the word as per the reviewer's suggestion.
The reviewer is asking us to use IEA's World Energy Outlook projections to underscore the point on growth in global energy demand.	PG1	44	We have now added the IEA reference: IEA. 2019. *World Energy Outlook 2019*, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2019.
A typo		52	We have corrected the typo. "indigenous".
The reviewer makes a point about the non-binding nature of most Arctic agreements. The reviewer further underscores the need to use the word "political" rather than "legal" to highlight the non-binding nature of the Arctic Council agreements.	PG2	53-54	Yes, we agree with the reviewer's observation that most of the Arctic Council agreements are legally non-binding. We also agree with the reviewer that instead of using the word "legally", it's better to use the word "politically" and "more broadly" instead of "socially" to reflect this distinction. We have made these changes in the revised draft.
Suggests a slight change in the wording of the sentence	PG3	57	The reviewer recommends a slight rewording of the sentence, which, we agree, makes our point more clear. We have revised it.
The reviewer is asking us to be clear about the specific values literature that we are mentioning in our study. The reviewer also suggests us to include a couple of examples to make our point more clear.	PG4	64	We are referring to the value literature, which deals with the role of human values in influencing human behavior relevant to (environmental) sustainability outcomes. We have added examples of this literature on values. Please refer to the PG5 comment.

The reviewer is asking us to make our statement on the role of time, place, and local contexts more explicit by giving a couple of examples of both the universalistic tradition as well those who underscore local contexts.	PG5	72	Some of the examples of universalistic traditions of values include Schwartz (1987), Schwartz (1994), and Kostina et al. (2015). Burningham and O'Brien (1994) and Jones et al. (2016), on the other hand, are examples that emphasize the role of local contexts in understanding global concepts like the environment. We have added references: Schwartz, S. H. 1987. Towards a universal psychological structure of human values. Journal of Personality and Social Psychology, 53(3): 550-562.Schwartz, S.H. 1994. Are there universal aspects in the structure and content of human values? Journal of Social Issues, 50(4): 19-45.Kostina, E., Kretova, L., Teleshova, R., Tsepkova, A., and Vezirov, T. 2015. Universal human values: Cross-cultural comparative analysis, 214, 1019-1028.Burningham, K., and O'Brien, M. 1994. Global environmental values and local contexts of action. Sociology, 28(4): 913-932.Jones, N. A., Shaw, S., Ross, H., Witt, K., and Pinner, B. 2016. The study of human values in understanding and managing social-ecological systems. Ecology and Society 21(1):15
The reviewer suggests to include a para in the introduction to provide a brief summary of the main arguments of the paper. The reviewer has pulled a para from the discussion that fits well at th end of the introduction.	PG6	73-80	We agree with the reviewer's suggestion. We have now added a brief summary of the core arguments of our paper in the revised version.
Regarding the literature on the value-human relation, the reviewer suggests whether we are referring to specific sustainability literature. We need to make it more clear.	PG7	109	There has been a growing body of literature on the role of human values in influencing human behavior. However, the research on the role of human values specific to sustainability outcomes is relatively more recent and remains underdeveloped, and is the motivation for the present study. We have made these points clearer in the revised version.

A typo		587	We replaced the word as per the reviewer's suggestion.

Reviewer B

Comment	Comment no.	Line Number	Has it been addressed in the manuscript.
The reviewer has highlighted that in Our Common Future Report, the role of local contexts is underscored	EH1	8,9	We agree with the reviewer's observation that the importance of the role context has been highlighted in the OCF Report. It's the role of local context (value literature that builds on the local contexts) on environmental sustainability outcomes has been systematically explored in this study. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf
The reviewer suggests that in addition to technocratic factors, the role of values in achieving sustainability outcomes is also mentioned.	EH2	15	We agree with the reviewer that the role of human values in sustainability outcomes has been mentioned in the OCF Report. The present study is, in fact, contributing to the specific literature that is concerned with the role of human values on sustainability outcomes.
This is related to the EHI and EH2 comments. The reviewer expresses a disagreement that the Brundtland Commission Report suggests a one-size-fits-all approach.	EH3	31	We agree with the reviewer and we have already mentioned it in response to EH2 and EH3 comments. In the original version, our aim was to highlight the fact that the role of values remains underinvestigated in the sustainability literature.

We entirely agree with the reviewer that there are some absolute (end) goals, e.g., poverty alleviation. We are focusing on the processes in achieving these end goals and the role of human values in those processes. The reviewer suggests the reference Holden et al. (2017) pp. 20-22 and 108-109. https://hvlopen.brage.unit.no/hvlopen-xmlui/bitstream/handle/11250/2465433/TheImperativesofSustainableDevelopment.pdf?sequence=6	EH4	35	We have framed sustainability as a process. We agree with the reviewer's observations that there are indeed absolute universal sustainable development goals mentioned in clear quantitative terms, but the role of processes in achieving these goals is also important, which remains understudied. Many scholars have emphasized the importance of studying sustainability as a process. For example, Dennis Pirages in Futures (Pirages, 1994). The role of human values in influencing these processes remains understudied, which has been emphasized in this study. Pirages, D. 1994. Sustainability as an evolving process. Futures, 26(2): 197-205.
On balance and tension, the reviewer suggests the reference Holden et al. (2017) pp. 19-20.	EH5	36	This is a very helpful reference. Holden et al. (2017) argue against the conventional approaches of looking at sustainability more like balancing the social, environmental, and economic goals and suggest that more than a balancing act, sustainable development, on the contrary, is more like a constraint on human activities.
In the original version of the paper, the authors had mentioned only of the negative impacts of economic activities on the ecology. However, the reviewer wants them to also	EH6	51	We agree with the reviewer. In the revised version, we have rephrased the sentence as suggested by the reviewer. Beyond economic development and improvements in living standards of the locals, fishing,

think about some of the positive impacts of these activities, e.g., an increase in per capita income.			transit, mineral extraction, and other development activities will also have profound impacts on the ecology of the region as well on the lifestyles of the people, particularly indigenous communities, living in the region (Poelzer & Wilson, 2015).
The reviewer suggests an important reference for the authors to reflect more critically on the use of language in constructing various dimensions of sustainability.	EH7	56	The reviewer's suggestion is helpful. Holden et al. (2017) caution against the notion of defining sustainability based on either the short-term political consensus or parochial preferences of stakeholders depending on what they think is feasible. Holden, E., Linnerud, K., Banister, D., Schwanitz, V.J., and Wierling, A. 2007. The imperatives of sustainable development: Needs, justice, limits. Routledge.
The reviewer suggests whether two of the references the authors have used are very relevant to make the point about the interests of policymakers in policies related to sustainable development. The two references are Drummond and Marsden (1995) and Dalal-Clayton and Bass (2002).	EH8 [The reference needs to be updated to include Stephen Bass also)	74	As per the reviewer's suggestion, to include only those references, which are strongly related to the point, we have removed Marsden (1995) and Dalal-Clayton and Bass (2002) as they mention only tangentially about the sustainable development policy goals, and are not very relevant here.
The authors have mentioned that UN goals are legally non-binding. The authors need to make the expression clearer.	EH9	78	We have rephrased the sentence. We originally intended to highlight the fact that the SDGs are not legally binding, but more like policy guiding instruments. National governments are expected to

			developing national frameworks for the achievements of these goals.
The reviewer suggests a reference to discuss the measurement of sustainability.	EH10	82	Holden et al. (2017) provide a framework for measuring, operationalizing, and implementing sustainable development goals at the local scale.
The reviewer mentions his take on values and sustainability literature. Firstly, the UN's sustainable goals are absolute, and the means to achieve these goals are quite diverse and context-dependent, e.g., values, technical factors. Secondly, human values might also be a starting point for change or what the reviewer refers to as a "sense of sustainability."	EH11	98	We have taken note of the reviewer's two important observations to imagine the role of human values in influencing sustainability outcomes, and have made appropriate changes. First, sustainable development goals are universal, but the means to achieve those goals could be based on technology or driven by values to bring about change in human behavior. Also, these means are likely to context-dependent. Second, the starting point to change sustainability outcomes is to change values. Such motivations may arise due to our sense of just or unjust or what Rawls (1999) calls as our moral powers. Holden et al. (2017b) refer to these motivations as our "sense of sustainability." Rawls, J. 1999. A theory of justice, revised edition. Cambridge, Massachusetts: Harvard University Press.
The reviewer wonders whether the authors are referring to are informal institutions.	EH12	146	Yes, in this sentence, we intend to emphasize the role of informal institutions.

The reviewer suggests the authors make the meaning of the highlighted text more clear.	EH13	148-152	We have rephrased this to: Iceland is an ideal site for assessing the interrelationship between values, institutions (informal), and sustainability outcomes.
The reviewer suggests that the following needs to be re-phrased: "Contrary to tendencies to view sustainability as a singular objective, this work situates sustainability in time and place with an emphasis on how values inform contingent conceptions of sustainable economic development". Reviewer comment: Sustainability is not a singular objective. The UN suggests there are (at least) 17 objectives. We argue in Holden et. al for six key objectives (themes). Importantly, the objectives vary between counties in terms of relevance. For Island (and other rich countries) climate and biodiversity are the most relevant goals. For poor, undeveloped counties poverty eradication and increased social equity are most relevant. Thus, sustainability indeed differs in terms of time and place. Why now “economic”?	EH14, EH15	170-172	We have adjusted the text to acknowledge the point of plural perspectives. We have also moved the word "economic" into a consequence rather than a driving factor of conceptions of sustainable development. The text now reads: "Contrary to tendencies to view sustainability as a singular objective, this work situates sustainability in time and place with an emphasis on how values inform contingent conceptions of sustainable development. We share in the view of scholars such as Holden et al (2017) that the objectives of sustainability vary between countries and in terms of relevance. Comparable to their findings that island communities value climate and biodiversity, we find that the natural landscape and biodiversity are prominent in Icelandic values of sustainability, particularly concerning cultural preservation and considerations of economic development."

Comments on methodology: how the key stakeholders are identified, does using an interview protocol align with grounded theory method and who were intereviewed, how many?	EH15	183-189	The technique of conducting interviews and analyzing with grounded theory is common in qualitative studies. We have added reference to Charmaz and Belgrave (2012). We have also clarified the selection technique. We conducted interviews with 50 individuals, half of whom resided in Reykjavik, and half of whom reside in small villages around Iceland's perimeter. We analyzed organizational documents to select organizations to review, received advice from Icelandic scholars and policy makers. In particular several municipal planning orgainzations around Iceland provided recommendations and introductions. Finally, we used a snowball technique and accepted recommendations from those individuals interviewed. We took an approach to balance subjects geographically across Iceland, and also to seek respondents from Icelans' many industries and sectors.
Got lost between concepts and categories.	EH20	218	We added a phrase which describes where to look the how categories and concepts differ, and what they are.
Rephrased the sentence based on reviewer's comment.	EH21	222-223	We rephrased the sentence to clarify what we meant in terms of how the understanding of sustainable development comes from the "moral imperatives of it" and how this depends on the locality of it as well (and how they are filtered through the

			value systems within the locality).
Rephrased the sentence based on reviewer's comment.	EH22	229-231	We softened the language to clarify what we meant: not to suggest that we can frame our own sustainabilty objectives.
Rephrased the sentence based on reviewer's comment.	EH24	253	To minimize confusion we substituted "elements" with "concepts".
reviewer comments on difference between agents and agency.	EH25	278-279	We have added a footnote to address this point. Other changes have been made in the manuscript.
regarding figure 2 model, what are the new insights from the model that cannot be derived from other existing studies? What are the added values of the model?	EH23	238	We have clarified this in the text. The model illustrated in Figure 2combines the insights of models described by Kollmuss & Agyeman (2002) while making explicit the relationship between values, institutions and the built environment in understand how individuals conceptualize sustainability, as derived from our grounded theory analysis.
All direct quotes from single source except one?	EH29	452	We originally used a single narrative to explicitly demosntrate how the model of sustainable conceptualization operated through our model. But we have added two additional examples to diversify the geographies and sectors from our database of 51 transcripts.
Interviews are not use to categorize agents and production bases, but to impart insights into how and to what extent values can change practice?	EH27	312	Yes, agreed while latter should be the main objective, we are using the grounded theory approach to draw out what agents and productive bases are from the perspective of the society and essentially their

			value systems and institutions. Yes, these can be inferred but we are confirming that these categorizations are grounded.
example of symbolic cultural value of natural capital?	EH28	429	As suggested by the reviewer, we included an example of the symbolic cultural value of natural capital.
Reviewer suggests using the grounded theory approach to impart insights into how and to what extent values can change practice and policies (potentially other way around).			We acknolwedge the point and have added a statement that the relationship is dynamic, and practices and policies can also be understood to shape values. We made the model circular to have this effect. We believe institutions play a role both through input and output.
Reviwer expects discussion part to include a discussion of the findings with other relevant literature.			We have incorporated additional literature into the discussion.
issue with conclusion - how the findings from the paper show "Understanding how universalistic discourses are interpreted and integrated into local practice offers the promise of major insights on a range of dynamics across geographies".		571-572	We have moderated and specified this claim: "Understanding how universalistic discourses are interpreted and integrated into local practice offers insight into how universal concepts are translated through local values and institutions. While the scope of this study is limited to Iceland, we hope to extend this analysis to other countries across the Arctic region so that we can conduct comparative analysis of the values, institutions and outcomes that are comparable as well as divergent. Understanding this dynamic is important to the creation of cross-geographic policymaking that seeks to realize the benefits of universalistic ideas (sustainable

			development) by making policy making more effective at translating those ideas into local contexts."
reviewer questions the policy implications (broadly defined) and the implications for theory from the study.			We have clarified this with the above clarifying policy statements and text below: "Specifically, the discursive construction of sustainability (how the issues, challenges, values and goals of sustainability are constructed in language) is critical to the process of establishing the principles from which legal frameworks are built. This work is the first step into a broader project to provide social-scientific insight into the nature of values, where they come from, with whom they resonate and which goals for conservation and development they establish for the region. This information is essential to the construction of better informed cross-regional policy."

Reviewer C

Comment	**Line Number**	**Has it been addressed in the manuscript.**

The reviewer's comments are quite general and require broad changes in the paper. In the introduction and literature review sections, the reviewer is suggesting to exclude the references of the Arctic Circle meetings, which in her/his view are mostly elite gathering with exorbitant registration fees. The reviewer further suggests we focus more on grassroots experiences of sustainability.	**N/A**	**We build a focus of grassroots experiences of sustainability through the addition of quoted material from other interlocutors to demonstrate how the model operates for them. In addition, we removed the discussion of the Arctic as it was not necessarily helfpul to our argument.**
The reviewer is asking to clarify/reframe the research question and also think about pitching the key messages for practitioners.	**N/A**	**The research is designed to examine the way in which sustainable development as a universal context is filtered through local values and institutions to share development responses and strategies. For practitioners, a key message is that universal policy prescriptions are always translated through local values and institutions in determining outcomes. In turn, policies that operate across larger, national and international scales, can be made more effective by considering their resonance and translation at a local level. Values and their differentiation across various geographies should be made a consideration in national an international policy making to make these policies more effective. We added: " We argue that regulative, normative, cultural and cognitive institutional structures are in constant interaction with value systems and sustainability conceptions. We find that institutional structures (and place-based markets) and pro-sustainability values are mutually**

		reinforcing: institutional structures and place amplify value orientation, influencing pro-sustainability perception and behavior, and this perception and behavior in turn influences the orientation of status-quo institutional structures."

The reviewer is asking for more info on data collection, where the interviews are conducted how many contacted, how many interviewed etc.	**N/A**	**The technique of conducting interviews and analyzing with grounded theory is common in qualitative studies. We have added reference to Charmaz and Belgrave (2012). We have also clarified the selection technique. We conducted interviews with 50 individuals, half of whom resided in Reykjavik, and half of whom reside in small villages around Iceland's perimeter. We analyzed organizational documents to select organizations to review, received advice from Icelandic scholars and policy makers. In particular several municipal planning organizations around Iceland provided recommendations and introductions. Finally, we used a snowball technique and accepted recommendations from those individuals interviewed. We took an approach to balance subjects geographically across Iceland, and also to seek respondents from Iceland's many industries and sectors.**
discuss the findings more clearly in connection with figure 2	**N/A**	**We added additional discussion in connection with Figure 2, how values and productive bases in the economy impact the outcomes in sustainability over time.**
all direct quotations but one come from the same respondent? (check references for direct quotes again)	**N/A**	**We added additional examples from our database of 51 transcripts.**
if necessary, indicate exemption status via COUHES	**N/A**	**Our research activities meet the criteria for exemption as defined by Federal regulation 45 CFR 46 under the following: Exempt Category 2 - Educational Testing, Surveys, Interviews or Observation.**

Iceland population needs to be updated	**379**	**We updated this on the manuscript.**

Reviewer D

Comment	Comment no.	Line Number	Has it been addressed in the manuscript.
The reviewer makes a comment about our remark "one-size fits all" to underscore the point about the importance of local context.	**RGB1**	**8,9**	**We agree with the reviewer's observation that the role of local context in sustainability outcomes that has been systematically explored in this study has also been emphasized in the UN's Our Common Future Report. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf**
The reviewer raises a point about the authors' claim that sustainability solutions are more urgently needed for the Arctic due to its fragile environment. The authors need to provide more justification for choosing Iceland as the case for this study.	**RGB2**	**11**	**The Arctic environment is very fragile and one of the most threatened regions globally due to fast unfolding socio-economic and environmental challenges (Barber et al., 2008; Petrov et al., 2017) that underscore an urgent need to better understand the drivers of environmental change and more effective ways to promote environmental sustainability in the region. It forms important motivations for the study, for the role of values in influencing (environmental) sustainability outcomes is important but remains understudied. The authors attempt to make contributions to this aspect of the literature. Petrov, A.N., BurnSilver, S., Stuart Chapin III, F., Fondahl, G., Graybill, J.K., Keil, K., Nilsson, A.E., Riedlsperger, R., Schweitzer,**

			P. 2017. Arctic Sustainability Research: Past, Present and Future. Routledge. **Barber, D.G., Lukovich, J.V., Keogak, J., Baryluk, S., Fortier, L., & Henry, G.H.R. 2008. The changing climate of the Arctic, Arctic, 61 (Supplement 1): 7-26.**
The reviewer suggests the authors be more clear about the role of the Arctic Council in the decision-making. The authors have given an impression as if the body maks decision, but the reviewer (rightly) suggests that it only shapes decisions as the decisions are ultimately non-binding.	**RGB3**	**14-15**	**We agree with the reviewer's note. Yes, most of the agreements of the Arctic Council are not legally binding. We have made this point clear in the revised text.**
The authors are emphasizing that the Brundtland Commission (relatively) ignores the role of local context in defining the concept of sustainability. The reviewer wonders if that's a bad thing to do, and why.	**RGB4**	**32**	**The role of local context in sustainability outcomes has been mentioned in the OCF Report and remains one of the main focuses of this study. Making the concept very broad has several practical difficulties, including difficulty in its measurement (Jabareen, 2008; Emas, 2015).Jabareen, Y. 2008. A new conceptual framework for sustainable development. Environmental, Development, and Sustainability, 10, 179-192.Emas, R. 2015. The concept of sustainable development: definition and defining principles. Brief for GSDR 2015. Available at https://sustainabledevelopment.**

			un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf
The authors emphasize that societies are not homogenous and are composed of myriad sociopolitical and cultural elements. The reviewer wonders whether it's a new finding.	**RGB5**	**33**	**We share the reviewer's concern here. However, we mentioned this point, not as a new finding, but more to underscore the role of heterogeneity of societies and their values, and the role of local contexts.**
The reviewer raises an objection to our arguments against the fixed characterization of the phenomenon of sustainability.	**RGB6**	**34**	**There are indeed absolute universal sustainable development goals mentioned in clear quantitative terms, but the role of processes in achieving these goals is important, which remains understudied. For this reasons, we are are studying sustaianbility as a process in this paper. Many scholars have emphasized the importance of studying sustainability as a process. For example, Dennis Pirages in Futures (Pirages, 1994).** **Pirages, D. 1994. Sustainability as an evolving process. Futures, 26(2): 197-205.**

The reviewer wants to make it clear why authors see limitations with the Brundlant Commission's definition of sustainable development.	**RGB7**	**37-38**	**We are making a distinction in the definition of sustainability based on the fixed point characterization vs imagining it as a process towards some end (environmental sustaianbility related) goal. Our response to RGB6 also complements this.**
The reviewer repeats the RGB2 objection and wonders why the Arctic is an important place to explore the role of values and sustainability.	**RGB8**	**39**	**Same as our response to RGB2 (cell D3)**
The reviewer is objecting to using the word "legally " in the context of SAO meeting of Arctic Council member states.	**RGB9**	**53-54**	**We have taken note of the reviewer's suggestion. Yes, the agreements are not legally binding. We have deleted the word "legally" that is giving an impression as if the agreements made by the Arctic Council are always legally binding, which they are not. The decisions are made by a consensus among the member states, and most of the agreements of the Council are not legally binding.**
The reviewer is asking why the authors are using the reference of the Arctic Circle Meeting specifically to make a point of sustainability demands in the region.	**RGB10**	**55**	**The Arctic Circle meeting is a large annual gathering held every year in October with participants from more than 60 countries in which scientists and representation from governments and non-governmental organizations discuss the future of the Arctic. The meeting has the potential to shape sustainability policies in the region, for many of these debates influence the agenda-setting of sustainable development in the region.**

The authors are emphasizing that the outcomes of the SAO meetings are critical for the sustainability outcomes in the Arctic, for they build a roadmap to the various legal frameworks that have a role in sustainability. The reviewer wants the authors to be more clear on this.	**RGB11**	**58**	**We have rephrased the wording to address the reviewer's concerns. It reads as follows now: "In addition to a wide-ranging discussion on the future of the Arctic in these deliberations, the discourse of sustainability (how the issues, challenges, values, and goals of sustainability are constructed in language) also take place that plays an important role in influencing the principles that are foundational to sustainability outcomes." .**
The reviewer is asking about alternative explanations, e.g., interests, of sustainability in the Arctic, and whether the authors have controlled for the competing explanations to tease out the role of values. The reviewer's comment is in response to the authors' argument that they are exploring the role of values.	**RGB12**	**62-63**	**Alternative explanations mainly include the structure of the economy, technology factors, and interests. Yes, in our qualitative analysis, we have controlled for competing explanations to tease out the role of values in explaining the dependent variable (environmental sustainability outcomes). We are not giving a precise quantitative estimates of the explanatory powers of competing factors, but merely suggesting their roles and mechanisms (processes) in outcomes.**
The reviewer is raising the question whether interests could be an important explanatory variable of sustainability.	**RGB13**	**91**	**As mentioned earlier, while interests could be a competing explanation, in the present study, we are specifically looking at the role of values conditional upon controlling for other explanatory factors.**

The reviewer is asking why the role of values in sustainability outcomes is not surprising in the sense that researchers are increasingly relying on the value-based explanation for sustainability outcomes.	**RGB14**	**120-121**	**In the literature on human psychology, it has been long argued that values are an important driver of human behavior. Furthermore, with growing evidence of the impact of human behavior on environmental sustainability outcomes, there is a growing interest to understand the relationship between values and human behavior, and to isolate those values that are important for sustainability outcomes. These outcomes when we imagine sustainability as a process.** **We have framed sustainability as a process. There are indeed absolute universal sustainable development goals mentioned in clear quantitative terms, but the role of processes in achieving these goals is also important, which remains understudied. Many scholars have emphasized the importance of studying sustainability as a process. For example, Dennis Pirages in Futures (Pirages, 1994).** **Pirages, D. 1994. Sustainability as an evolving process. Futures, 26(2): 197-205.**
The reviewer is asking for a justification for choosing Iceland as the case for this study and is suggesting to talk more about the historical background and the role of natural resources in Icelandic society.	**RGB15**	**146**	**We agree on the significance of natural resources and how they have shaped economic productivity. Sustainable management of natural resources is key to Iceland's growth in its key economic sector (e.g., tourism, energy, fisheries).**

The reviewer is suggesting authors to be more specific on the role of natural resoruces in the development of the Icelandic society.	**RGB16**	**157**	**Iceland's transition to the sustainable management of natural resources in a relatively short time is an important story. For example, 100% of its energy comes from renewable energy sources, and 90% of the households gets direct heating energy from geothermal energy sources (Hrund Logadóttir, 2015).** **Hrund Logadóttir, H. (2015, December). Iceland's sustainable energy story: A model for the world? UN Chronicle, Vol. LII No. 3 2015**
Comment [RGB17]: This balance does not suggest understanding sustainable management of renewable natural resources for indefinite harvest.	**RGB17**	**161-162**	**Yes, we agree with the reviewer. This balance is between economic growth and the preservation of natural resources.**

The reviewer raises the question: "Is that the problem for Icelandic society? I would argue that the problem for Icelandic society is inability to tax the substantial fish rents from highly efficient ITQ managed fisheries. The significant fish rents contribute to a clientelistic and relative corrupt political culture (compared with other Nordics). Iceland was grossly overrepresented in the Panama and Paradise Papers compared to other Nordic countries."	**RGB18**	**161-163**	**Yes, we agree with the reviewer that the inability to tax fisheries optimally has been a matter of concern in the sustainable management of the fisheries resources in Iceland (Pantzar, 2016), in addition to the prevalence of political and economic interests around the issue, which has contributed to corruption. It has also contributed to corruption (Young et al., 2018). However, even in the face of these failings, Icelandic society values environmental sustainability concerns. According to the latest World Values Survey data (2017-2020) for Iceland, 71% of the respondents preferred to protect the environment over economic growth, which is among the highest among 77 countries and societies that were included in the Survey.** **Pantzar, M. 2016. Total Allowable Catch (TAC), Individual Transferable Quota (ITQ) and fishing fee for commercially exploited fish species in Iceland. Institute for European Environmental Policy. A case study. https://ieep.eu/uploads/articles/attachments/985c3722-4e79-468f-b17a-841f17be48f6/IS%20Fisheries%20Management%20final.pdf?v=63680923242** **Young, O.R., Webster, D.G., Cox, M.E., Raakjær, J., Blaxekjær, L.Ø., Einarsson, N., Wilson, R.S., 2018.**

			Moving beyond panaceas in fisheries governance. Proc. Natl. Acad. Sci. 115 (37), 9065–9073. https://doi.org/10.1073/pnas.1716545115.
comment about how our analytical model helps explain something beyond what other studies or models explain. Comment also raised by reviewer B.	**RGB19**	**219**	**As Holden et al (2017) suggest, values set some parameters around the function of societies. The model is establishing direct connections between values and institutions (social, physical/ formal and informal) with regards to how individuals in a society conceptualize, plan and initiate sustainable development.**
question about Figure 2: How to account for context of renewable natural resource based economy? Fisheries management system? Quota taxation?	**RGB20**	**238**	**We tried to account for the things the reviewer mentions under "Indutries" in our model, more specifically through examples from fisheries, geothermal energy, tourism., and innovation and waste remediation.**

The reviewer raises comment about how it is not market mechanism that manages fish stocks.	**RGB22**	**316-319**	**Comment addressed with the addition of a discussion of the operation of the Quota system in Iceland, and the recognition of the two outcomes, one to preserve fish stocks, and two to create something more of a commodity of fisheries, which is exchanged. This was not the intent when the system was esbalished. The market mechanism is not what manages the fish stock.**
Concerns about interviewer anonimity.	**RGB24**	**330**	**We acknowledge there is some concern here, and have adjusted the titles to be more discreet. Nevertheless, the point was made by many respondents that anonimity is challenging and maybe not neccessary because "everyone knows everyone in Iceland." We provide a few quotations, however, the topic matter is not sensitive to specific individuals. Additionally, none of the quotations provided are unique, but rather emblamatic of discussions or trends that were common amongst many respondents.**
Yes, TAC and ITQ can be very efficient in ensuring biological sustainability and economic efficiency. Great (hidden) fortunes have been amassed in Icelandic society from this system, and these benefactors will expend much political effort defend their fortunes from taxation as well as	**RGB25**	**334-335**	**This example represents interests. We are with our model trying to get at deeper underlying values. Fisheries captures a deeper relationship and understanding (as described by interlocutors) of the significance and evolution of the resource in Iceland's history. however, in adding new quoted material from other sectors we also introduce some discussion about the ways in which various interests and values can lead to tensions and**

use offshore tax havens. Is that interests or values?			**tradeoffs between objectives such as promoting tourism and conserving natural resources.**
Why compare long-term vision (and not long-term interest) with shortterm interests?	**RGB28**	**396-397**	**Taking into account the comment, and to eliminate the confusion, we revised the sentence by removing the comparison (between long term and short term) and emphasizng the importance of longer term vision.**
Again, what does "between development and environmental protection" look like with renewable natural resources? Does development equal environmental protection (sustainable management for indefinite harvesting instead of stock collapse)?	**RGB29**	**398-399**	**The phrase "between development and environmental protection" is meant to describe the conventional debate between solely focusing on development as opposed to thinking about the environment and maybe halt development fully. We tried to make this clearer by adding that development is being understood differently over time when resources are managed sustainably over time.**
What is the real change in views for a population which has had to survive within Iceland's terrestrial and marine carrying-capacity for a 1000 years? An old understanding with a new term? Or a genuinely new understanding?	**RGB30**	**404-405**	**Our observations show the strong relationship between values and attitudes towards sustainability. The values, in turn, are influenced by the changes in the social, economic, and political spheres in the country and the region. The analytical observations that we are making help us in better understanding these relationships and changes.**

The need for diversification of the Icelandic very narrow economic base has been a constant theme for centuries. What is new?	**RGB31**	**413**	**This quote was intended to show that social values are important and has been changing historically in the Icelandic society.**
Need to demonstrate such shift better for a historically renewable natural resources-based society and economy.	**RGB32**	**415-416**	**We have integrated other examples to demonstrate how values and institutions are integrated into the conceptualization and operaiton of sustainable development. To address this important point, we have added a table with additional quotations to show what this looks like in our data across different sectors of hte resource based economy. Innovation is seen as critical to sustainable development, and yet there is an emphasis within the dialoague on maintaining and preserving Iceland's traditional natural resources.**
Is that another word for interests?	**RGB33**	**419**	**We acknowledge the ambiguity of using the word "needs" therefore clarified what we meant by substituting the word with "productive bases".**
Beware of strawpeople concerning universal concept and beware of false uniqueness of – here – Icelandic case.	**RGB34**	**427-428**	**In response to the reviewer's concern, we have softened our claim here, we can only argue for what we determned from our interviews.**

Ignores very significant financial interests in ITQ system and bitter political fights to protect this system.	**RGB35**	**454-457**	**Fisheries are important for Iceland's economy. According to the Central Bank of Iceland, in 2015, about 42% of goods exports (equivalent to 22% of total export earnings from goods and services) were from fisheries. In many parts of Iceland, fisheries are the most important driver of the local economy, which makes it a politically sensitive issue (Arnason, 1996). However, like any common pool resource, fisheries have suffered from overexploitation despite various measures taken by the government, including effort restrictions and setting up of total allowable catches (TAC) and extending fishing limits of other nations. The economic nature of the sector and its political importance due to its contribution to the economy and jobs, the allowable catches by the government often surpass the scientifically allowed limits (OECD, 2017).** **Individual Tradable/Transferable Quotas (ITQs), aimed at correcting the failure arising due to the lack of property rights in common pool fisheries resources, have been an important policy approach for the sustainable management of several marine species, including fisheries (Heal and Schlenker, 2008). Iceland has been among the first countries to manage its fisheries by introducing the quotas, and various forms of ITQs have been functional in Iceland since 1979**

			(Arnason, 1993). The switch to the ITQs in Iceland in its current form occurred in 1990. This quasi-privatized system (Kokorsch and Benediktsson, 2018) of transferability changed the common pool resource to a system of tradable assets (Benediktsson, 2014). There has been a huge political influence in the management of ITQs (Kokorsch, et al., 2015), and the system, in general, has resulted in large economic and political rifts over the years (Eythórsson, 2003).

Kokorsch, M., and Benediktsson, K. 2018. Prosper or perish? The development of Icelandic fishing villages after the privatization of fishing rights. Maritime Studies 17, 69-83.

OECD. 2017. Sustaining Iceland's fisheries through tradeable quotas: Country Study," OECD Environment Policy Papers 9, OECD Publishing.

Benediktsson, K. 2014. Nature in the 'neoliberal laboratory'. Dialogues in Human Geography 4(2): 141–146.

Eythórsson, E. 1996. Theory and practice of ITQs in Iceland. Privatization of common fishing rights. Marine Policy 20 (3): 269–281.

Arnason, Ragnar. 1996. On the ITQ fisheries management system in Iceland. Reviews in Fish

			Biology and Fisheries, 6, 63-90. **Arnason, Ragnar. 1993. The Icelandic individual transferable quota system: A descriptive account. Marine Resource Economics, 8, 201-218.** **Heal, Geoffrey., and Schlenker, Wolfram. 2008. Sustainable fisheries. Nature, 455, 1044-1045.** **Kokorsch, M., Karlsdottir, A., and Benediktsson, K. 2015. Improving or overturning the ITQ system? Views of stakeholders in Icelandic fisheries. Maritime Studies, 14. https://doi.org/10.1186/s40152-015-0033-x** **The economy of Iceland. 2016. https://www.cb.is/library/Skraarsafn---EN/Economy-of-Iceland/2016/Economy_of_Iceland_2016.pdf**
Where are interests and conflicts?	**RGB36**	**460**	**We have added new material from other industires in Iceland and engaged in the coversation around the ways in which different objectives come into conflict. For example, as highlighted by one of our interlocutors. Everyone wants clean, efficient energy across the country, but they do not want to see the transmission lines bringing the genergy through the highlands.**

Author needs deeper and more critical understanding of Icelandic society.	**RGB38**	**528**	**We acknowledge the readers point. There is a great deal of nuance and depth to Icelandic society, and do not mean to over simplify with our model, but rather to create a working framework through which the operation of values and institutions can be understood in society which can be generalized to other contexts. We have added additonal comments to acknowledge these complexities.**
Where are interests and conflicts in this image? Icelandic society and politics is largely shaped by domestic conflicts over natural resources rents.	**RGB39**	**569-571**	**We have added this discussion to our results. Each of the sectors of the economy are to an extent relying on the same natural resources. One of the strategies developed around this is to reduce waste and improve innovation so as to develop more value form a constrained set of resources.**
"In the coming decades the Arctic region will face tremendous change as the sea ice melts, and opportunities for development arise. The governing frameworks are in the process of creation, and discourse between observer states, indigenous peoples, scientists, industry representatives, and activists is important to the framing of governance." Why is Iceland a relevant case here? Iceland has (hardly) no sea-ice and no indigenous peoples. Iceland is a highly-developd sub-Arctic Nordic welfare state capitalist market economy.	**RGB40**	**476-579**	**We have refocused the intro and the conclusion aroudn the discussion of the relationship between values instutions and sustainable development and removed the Arctic. As the reviwer helpfully points out it was not helping to frame our argument.**

The Role of Values in Shaping Sustainable Development Perspectives and Outcomes: A Case Study of Iceland

Abstract. Sustainability is conceptualized as a process of balancing growth, equity and preservation, a definition that is drawn from the 1987 Brundtland Commission report, Our Common Future. While making sustainability a universal objective, this definition conceptualizes sustainability as a one-size fits all technocratic solution, which removes the concept from the context of specific societies that must engage with sustainable development. Social scientific data about the nature of values, where they come from, with whom they resonate, and what goals for conservation and development they establish are equally necessary for the understanding and framing of sustainability. Policies are more effective if they are embedded in the value systems they engage. Drawing on a case study of Iceland this study examines the nature of values in shaping sustainable outcomes. We argue that regulative, normative, cultural and cognitive institutional structures are in constant interaction with value systems and sustainability conceptions. We find that institutional structures and pro-sustainability values are mutually reinforcing: institutional structures and place amplify value orientation. In turn values influence the orientation of status-quo institutional structures. Working with interview data and using a grounded theory approach we build a model for understanding how sustainability is conceptualized in Iceland working from values through agents and industrial bases to generate strategies of development. Icelanders operationalize concepts of sustainability through innovations that improve the efficiency and preservation of natural resources. Our findings add additional layers to conventional pathways of valuation and demonstrate the importance of place and context in situating values of development.

Key words: Sustainable Development, Values, Environmental Policy, Institutions, Fisheries, Tourism, Geothermal Energy