Master's Thesis

Community-Based Coastal Resource Management As a Contributor to Sustainability-Seeking Communities: A case study for Ísafjörður, Iceland

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Declaration

I hereby confirm that I am the sole author of this thesis and it is a product of my own academic research.

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Abstract

There is an increasing demand from public, private, and government sectors for a coastal resource management regime that ensures sustainability of coastal natural resources while meeting local needs of the people it serves. It is the objective of this master's thesis to explore the suitability of Community-Based Coastal Resource Management (CBCRM) as a contributor to meeting the specific sustainability goals of the Icelandic coastal town of Ísafjörður. While focusing on the local needs of a specific community, CBCRM encourages a participatory role in the sustainable management of their coastal resources for groups and individuals. The research in this thesis aims to evaluate how CBCRM can and cannot contribute to Ísafjörður's sustainability goals by using a combination of research methods. Data representing pre-determined indicators of sustainability was collected while primary research methods included individual interviews held with a cross-section of community members. Additionally, a feasibility study exploring the suitability of CBCRM as a contributor to the town's sustainability goals was conducted. This feasibility study compared components of CBCRM with the specific sustainability goals of Ísafjörður and results showed that CBCRM was well suited to contribute to environmental sustainability goals in Ísafjörður. The feasibility study also revealed that CBCRM has the potential to positively contribute to certain economic and socio-cultural goals however several challenges were identified regarding these two sectors. Recommendations include utilizing the methods and principles of CBCRM to work towards several sustainability goals while continuing to use principles of Integrated Coastal Zone Management (ICZM) in order to achieve a holistic approach that meets the town´s needs.

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List of Acronyms

CBCRM- Community-Based Coastal Resource Management

ICZM- Integrated Coastal Zone Management

UNCLOS- United Nations Convention on the Law of the Sea

EEZ- Exclusive Economic Zones

ITQ- Individual Transferable Quota

NGO- Non-Governmental Organization

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1. Introduction

1.1 Integrated Coastal Zone Management

Integrated Coastal Zone Management (ICZM) is a management process designed to address the complexities of interactions between humans and the coastal zone. More specifically, ICZM governs the interrelationships between human utilizations of coastal natural resources and the resulting environmental, economic, and socio-cultural impacts. ICZM operates according to principles of sustainable development and therefore prioritizes environmental, social, and economic facets of coastal resource utilization. Additionally, it aims to sustain the quality of natural resources for present and future generations of coastal communities (Navarro, 2000). The majority of conflicts and issues arising within the coastal zone are a result of resource depletion or degradation, or conflicts between resource users (Zagonari, 2008). Figure (1.1) depicts the relationships between the coastal zone, its resource system and resource users. It conceptualizes interactions between human activities, the terrestrial environment, and the marine environment within the context of ICZM (Cicin-Sain & Knecht, 1998).

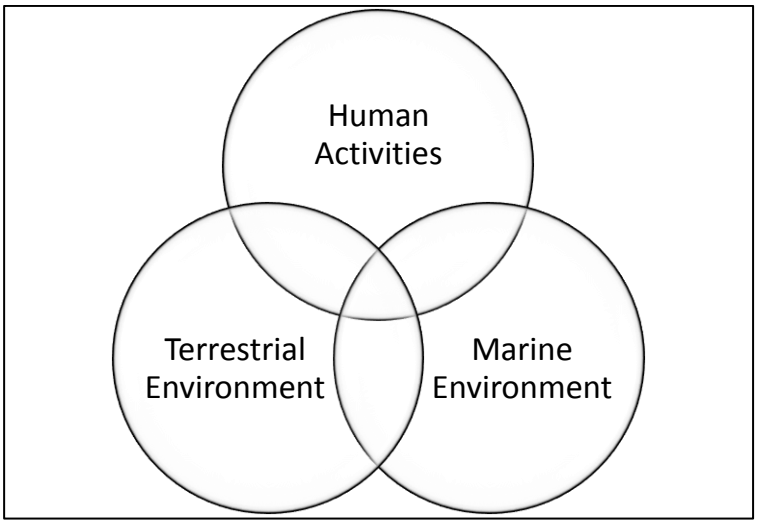

Figure 1.1: The interaction between the Marine Environment and the Terrestrial Environment is understood to be the *coastal zone*. Consequently, the interactions among all three aspects (Marine Environment, Terrestrial Environment, and Human Activities) is understood to be the *coastal resource system* (Cicin-Sain & Knecht, 1998).

In order to understand the boundaries within which ICZM operates, the coastal zone must first be defined. In other words, the area that is to be managed must be delineated. A brief history of humans in the coastal zone highlights previous efforts to define, understand, and manage this complex ecosystem. The process of defining the components of offshore waters, including the coastal zone, began when policy makers and practitioners met at the first United Nations Conference on the Law of the Sea (UNCLOS) in 1956. At the first UNCLOS, terms such as a nation's territorial sea, contiguous zone, continental shelf, and the high seas were defined in an attempt to better utilize and protect the world's oceans (United Nations, 2010b). UNCLOS convened again in 1960 and adjourned with no significant progress. At the third UNCLOS, which adjourned in 1982, international representatives tackled issues such as setting limits and boundaries, navigation, exclusive economic zones (EEZ), continental shelf jurisdiction, exploitation and mining of the deep sea bed, scientific study and protection of the marine environment, and the establishment of a coastal baseline from which to make boundary measurements (United Nations, 2010b). The components of the coastal zone and offshore waters were defined on the international stage and managers, planners, and users of the coast were now able to reference a more concrete framework for national and local ICZM practices. There remains however, debate and ambiguity in defining certain aspects of the coastal zone such as where ecological and environmental boundaries begin and end (United Nations, 2010b). For the purposes of this thesis and the ensuing exploration of sustainability and CBCRM, the coastal zone is defined as the area in which physical interactions occur between the land and sea as a result of natural or anthropogenic processes. This would include, in a geographical sense, upland watersheds, the shoreline and any unique landforms, near shore coastal and estuarine waters, and the ocean beyond these areas affected by coastal processes (Cicin-Sain & Knecht, 1998). Because this thesis makes a case study of sustainability and CBCRM in Ísafjörður, the coastal zone will include the land and waters of Skutulsfjöður and Ísafjarðardjúp. The land and waters of these two fjords are included in the above definition of the coastal zone.

Managers of the coastal zone have been working for over four decades to integrate the environmental, social, and economic aspects of coastal zone ecosystems and multiple-use interdependencies (Cicin-Sain & Knecht, 1998). It is generally accepted that the first formal effort to manage the coastline was initiated by the United States in

1972 with the passing of the Coastal Zone Management Act (United States Fish and Wildlife Service, 1972). Since then, there has been a global movement through a variety of approaches to integrate and implement coastal zone management. An official, international organization addressing global issues of oceanic and coastal management does not exist. However, there have been many attempts at instituting an organization of such capacity. The Global Forum on Oceans, Coasts, and Islands is the largest international establishment working to collaborate on ICZM issues. The Global Forum brings governmental and non-governmental organizations (NGOs), local groups, and individuals to the same table and encourages collaboration and cooperation of these stakeholders (Moksness et al., 2009). This organization exemplifies the aims of ICZM and organizations and governments from around the world are incorporating such components as mentioned here. Now more than ever, there is an evident need to successfully and sustainably implement the principles and goals indentified by such international organizations. In an attempt to accomplish this, complexities of ICZM and natural resource management methods will be explored.

1.2 Community-Based Coastal Resource Management

There is an increasing demand from the public, private, and government sectors for a coastal resource management regime that ensures quality of coastal natural resources while meeting the needs of the people it serves. It is the objective of integrated coastal zone management to meet the needs of the environment and humans by implementing holistically structured coastal natural resource plans. An innovative and locally-based form of ICZM is Community-Based Coastal Resource Management (CBCRM). CBCRM focuses on local resource management needs of a specific community while giving individuals of that community a decision-making role in the management and use of those coastal resources. Furthermore, CBCRM seeks to implement management practices that simultaneously benefit community members and sustainably manage local coastal resources. A core objective of CBCRM is working towards an ultimately sustainable and prosperous future for the members of a particular community. Through creating an understanding of CBCRM's local and sustainable resource management principles, this thesis will ultimately explore the use of CBCRM as a contributor to meeting Ísafjörður's sustainability goals.

CBCRM places certain priority on community-level management of the coastline and its natural resources. CBCRM is based on the belief that a local community has the most to lose or gain from a natural resource management plan (Hildebrand, 2009). It is being implemented in coastal settings globally, and is a natural resource management regime operating on the principle that individuals, groups, and community organizations have a significant role, responsibility, and share in the resource management and decision-making process (Hegarty, 1997). Furthermore, CBCRM looks to build and improve upon the already existing human and natural capital, knowledge, and capabilities of a specific community. It is based upon practices and principles that aim to decentralize and strengthen the management of a coastal community's natural resources (Tulungen, Kussoy, & Crawford, 1998).

The principles of community-based management are especially suited to the coastal zone. As noted by Viles and Spencer in their writings on the interactions between society and the physical components of the coastline, many overarching coastal issues are caused by a synergy of smaller scaled problems (Viles & Spencer, 1995). Therefore, there is an important and pressing need to address small-scale and local problems in order to ultimately find solutions to the larger challenges. CBCRM's inherently focuses on local needs and therefore has the potential to address imminent challenges on a smaller scale while generally working to address overall issues. The issues and challenges specific to Ísafjörður are investigated further in Sections 6.3 and 7.1 and CBCRM's suitability to addressing them will be discussed.

Exploring the underlying objectives of CBCRM and sustainability is the next step in answering the question of whether or not CBCRM can be a contributor to the success of sustainability-seeking communities. It will be shown that the underlying objectives of CBCRM and sustainability provide a foundation for creating and supporting sustainability-seeking communities. In the following section, a table summarizes the principles upon which CBCRM and sustainability are built. The table is presented in a manner that emphasizes the overlapping components of CBCRM and sustainability. This will serve as the foundation for understanding and evaluating the feasibility of CBCRM as a contributing management tool for addressing sustainability shortcomings in Ísafjörður.

1.3 Sustainability and the Triple Bottom Line

The study and practice of sustainable development and sustainable coastal resource management is built upon principles of the triple bottom line. Academic research, media publications, scholarly articles and books, legislation, and government publications from a multitude of disciplines emphasize that sustainable development and sustainable natural resource management is best approached by integrating all three elements of the triple bottom line. These include environmental, economic, and socio-cultural factors. Major international conferences and publications such as the United Nation's "Our Common Future" (Bruntland, 1987), the Rio Declaration on Environment and Development (United Nations, 1992b), Agenda 21 (United Nations, 1992a), and the World Wildlife Fund's "Living Planet Report" 2010 (World Wildlife Fund, 2010) explicitly state that sustainability strategies should build upon and harmonize environmental, economic, and social policies, plans, and circumstances in individual countries and communities (United Nations, 1992a). The following summary of these components of sustainability will create a foundation for the remainder of this master's thesis. Incorporation of triple bottom line principles directed at sustainability-seeking communities brings focus to the integration of environmental protection, economically viable goals, and social well-being (Rogers & Ryan, 2001) and is therefore a vital component of sustainability analysis.

Environment and the Triple Bottom Line

As a result of the United Nation's Millennium Summit in September 2000, collaboration between American universities, the World Economic Forum, and the Joint Research Centre of the European Commission developed the most inclusive Global Environmental Sustainability Index to date (Peacock, 2008). According to this index, the environmental aspects of sustainability encompasses: environmental systems such as air quality, water quality, and biodiversity; environmental stressors such as human population growth, overfishing, freshwater salination, and ecological footprint; and environmental stewardship indicators that include greenhouse gas emissions, pollution, and conservations efforts (Peacock, 2008). The environmental components of sustainability are desirable to coastal communities such as Ísafjörður. Environmental sustainability promotes positive outcomes that are enduring and

support all aspects of life and society. An environmentally conservative society is by principle, based on conservation and reduced consumption of natural resources (Trainer, 1995). By integrating such components and aspects as those mentioned in the Global Environmental Sustainability Index with coastal natural resource policy and management, Ísafjörður can ensure an enduring and environmentally sound future.

Economics and the Triple Bottom Line

A key component of sustainable development is the economy. Because the livelihood of remote coastal communities is closely dependent on economic stability and success, sustainability must provide a component that is both feasible and profitable to local economies. In natural resource management, and particularly in coastal zones, much of a community's economy is based on fisheries and tourism. Therefore, they are considered key components and sectors. In small and remote coastal communities such as Ísafjörður, an economy based on sustainable principles is crucial due to a lack of access to other economic systems. In an interview with a production manager of HG, a local fishing and production company in Ísafjörður, this intricacy was mentioned when asked about his perspective on sustainability in Ísafjörður. He explained his belief that infrastructure, workforce, and natural resources from the area must be utilized before reaching outside the local community for goods and services (K. Joakimmsson, pers. Comm., October 20, 2010.). In other words, the isolation and remoteness creates especially independent economic systems that must be self sufficient and enduring. A self-sustaining economy has the ability to provide its community members with a certain quality of life that is supported by capital which is not significantly dependent on non-local sources (Copus & Crabtree, 1996). Many countries are placing emphasis on sustaining small rural communities as a means to preserve economy, culture, environment, and security. A long-term, locally-based, and sustainable approach encourages focus on the well being of agricultural and fishing families, rural businesses, and remote communities (National Rural Health Alliance, 2009).

Society and the Triple Bottom Line

The third and final component of the triple bottom line focuses on the needs of a society. Social and socio-cultural sustainability is challenging to define and quantify

because it aims to ensure intergenerational equity (Copus & Crabtree, 1996). The components that determine social well-being evolve over time. Therefore, measuring the individual contributors in order to assess overall well-being becomes a subjective task. Social and cultural aspects of sustainability ensure the well-being of individuals by encouraging creativity, participation, and safety while empowering people with shared responsibility, and equal opportunity to demonstrate stewardship of natural resources (Rogers & Ryan, 2001). Furthermore, it seeks to preserve historical and cultural identity. There are two measurable components of social sustainability that create its foundation. The first of these is social capital, or the investments and services that create the framework for society (Goodland, 2002). The second and equally important component is human capital or the health, education, skills, knowledge, leadership, and available resources within a given community (Goodland, 2002). The importance of resources such as social and human capital is invaluable to remote coastal communities such as Ísafjörður. The details of such complex interdependencies will be discussed further in subsequent sections.

1.4 Research Questions

In exploration of the components and intricacies of ICZM, Community-Based Coastal Resource Management (CBCRM), sustainability, and sustainability-seeking communities, answers to the following research questions will be pursued. The entirety of this master's thesis seeks to answer:

Can Community-Based Coastal Resource Management contribute to addressing the shortcomings of Ísafjörður, Iceland as a sustainability-seeking community?

To better understand all aspects of this research question, the following supplementary research questions will also be answered:

- What are the sustainability goals of Ísafjörður?
- What are the shortcomings of Ísafjörður's implementation of their sustainability goals?
- What components of Community-Based Coastal Resource Management will/will not successfully contribute to Ísafjörður meeting its sustainability goals?

1.5 Defining a Sustainability-Seeking Community; Ísafjörður, Iceland

Before exploring the components of a sustainability-seeking community, it is important to understand the meaning of sustainability. There are many definitions and depending on the context, the components can vary. In its most general meaning, sustainability is understood as an ability and capacity to endure. As defined in the United Nation's publication "Our Common Future" sustainability is meeting our current needs without compromising the ability of future generations to meet their needs (Bruntland, 1987). For a community such as Ísafjörður, sustainability incorporates aspects rooted in the foundations of the triple bottom line. Sustainability is a concept that balances the quality of the environment, economy, and society with the needs of a community (Magnússon, 2006). Through seeking this balance, a sustainable community also looks to consider and care for natural and economic resources while taking into account the needs of future generations (North Carolina Environmental Stewardship Initiative, 2002). There are varying degrees to which sustainability can be pursued and adopted and the notion of strong and weak sustainability provides the extremes of the continuum. The difference between strong and weak sustainability is found in the degree to which a community preserves its natural and human capital. Natural capital is considered to be all available forms of resources from the natural environment. This can include minerals, water, air, sunlight, flora, fauna, and organic material (Mariano et al., 2010). As previously discussed, human capital is the collective knowledge, experience, intellectual property, and labor available to a community (Mariano et al., 2010). Given these parameters, strong sustainability seeks to not degrade or diminish natural capital resources and does not seek to replace natural capital and services with human capital and services. Representing the other end of the sustainability spectrum is weak sustainability. It operates on the principle that human capital cannot be a substitute for all natural resources and services provided by the environment. It states that human capital can instead contribute to meeting our needs in combination with natural capital. The principles of weak sustainability are what coastal communities such as Ísafjörður are incorporating into their future plans in an effort to achieve effective management of their valuable natural resources.

Given these definitions, a community that seeks sustainability is one that provides a comfortable lifestyle and meets the basic needs while providing services to

residents of the current generation as well as generations of the future (C. Drake, pers. Comm., October 6, 2010). Describing or qualifying a community as sustainability-seeking proves to be challenging because of its subjective nature. However, with the use of pre-determined indicators and contributors, defining and evaluating a sustainability-seeking community becomes feasible. Indicators and contributors are qualities or characteristics that suggest or lead to a particular outcome. For the purposes of this research, Ísafjörður is considered a sustainability-seeking community because it has recognized and adopted international, national, and local sustainability action plans. In accordance with the guidelines and definitions that have been set forth, Ísafjörður is integrating principles of sustainability with its resource management while striving to preserve the quality and endurance of its resource's services for future generations. This thesis will look to answer the supplementary research questions in an effort to concretely define Ísafjörður´s sustainability goals and determine how Community-Based Coastal Resource Management (CBCRM) is, or is not, suited to meet these goals.

2. Current State of Knowledge

2.1 Sustainability and Community-Based Coastal Resource Management

Exploring the respective and common components of sustainability and CBCRM will create a framework for determining CBCRM's suitability in addressing Ísafjörður's sustainability shortcomings. In this section, the overarching themes of sustainability and CBCRM are explored and are summarized in a table that compares and contrasts the facets of each. Furthermore, the environmental, economic, and socio-cultural aspects of each will be reviewed to identify similarities and differences between the framework and objectives of sustainability and CBCRM. As this section will show, national, regional, and local authorities from around the world have recognized the need for CBCRM in the appropriate settings[1] and as a result, are promoting an integrated and sustainable analysis, planning, and utilization of local natural resources in the coastal zone (Govan & Hambrey, 1995). Furthermore, policy designers and managers are encouraging active, local participation by individuals to promote a stronger commitment to sustainable use of natural resources.

Table (2.1) illustrates the similarities and differences among concepts and framework of sustainability and CBCRM. The left portion of the table deconstructs sustainability into its general, environmental, economic, and social components. The right portion breaks CBCRM into the same components. Key similarities and differences can be summarized as follows:

Major similarities between principles of Sustainability and CBCRM:

- Holistic and integrated resolution of environmental, economic, and socio-cultural natural resource issues
- Preserve, protect, and prioritize the condition of natural resources
- Based on a framework that ensures economic prosperity from a long-term perspective
- Both emphasize the value of community members and stakeholder participation in local natural resource management
- Increased responsibility as a result of CBCRM should foster an interest in sustainable practices (Govan & Hambrey, 1995)

[1] These appropriate settings are reviewed in detail in the Literature Review

Differences between the principles of Sustainability and CBCRM:

- Sustainability encourages acting locally, but thinking globally; CBCRM is community and locally based
- Sustainability is an overarching theme in natural resource management; CBCRM is a more specific tool used to achieve an end goal such as sustainability
- Other differences, which are more specific to the local context of this thesis will be highlighted in subsequent sections

Table 2.1 Comparison of Sustainability and CBCRM

Table 2.1	Sustainability in the Coastal Zone	Community-Based Coastal Resource Management
General Components	• Simultaneously aims to preserve and ensure endurance of natural resources on a global and local scale • Natural resource use that places emphasis on taking a long-term and holistic views (Cicin-Sain & Knecht, 1998) • Balanced consideration aimed at maintaining the integrity of the natural environment, economic prosperity, and quality of life (Gallagher et al., 2004) in an integrated, unified, and interdisciplinary approach • Aims to foster stewardship and responsible management of the coastal zone's natural resources (Gallagher et al., 2004) • Consideration of "functions", "interactions", and "components" of and within the coastal zone (Cendrero et al., 2003)	• Management decisions based on the needs of Ísafjörður • Locally-based integrated coastal management plans (Tulungen et al., 1998) that effectively empower local communities by enabling them to participate, control and influence resource management decisions affecting their lives (Maliao et al., 2009) • Distribution and dissemination of responsibility from government institutions to local community organizations (Pomeroy, 1995) • Government and non-government community-based organizations work together towards common resource management goals (Pomeroy, 1995)
Environmental Components	• Effective management of the coast's natural resources and habitats and ultimately, fostering of appreciation and proper use(Gallagher et al., 2004) • Maintaining and supporting a physical environment that contributes to peace and security (United Nations, 2010a)	• Ultimate goal of sustaining general well-being of local coastal resources (Maliao et al., 2009) • Aims to ensure fair allocation of access rights to coastal natural resources (Maliao et al., 2009) • Aims to implement and properly enforce laws and policy that protect, preserve, and sustain natural resource abundance and quality (Maliao et al., 2009) • Monitors environmental health through indicators such as diversity, abundance, biomass, and size of local species (Maliao et al., 2009)
Economic Components	• Success in achieving sustainable economic development (Bruntland, 1987) • Sustainably structured business plans that consider long-term feasibility (Gallagher et al., 2004) • Communication between stakeholders in the areas of integrated markets and trade (Jentoft, 2000)	• Consultation and incorporation of local business stakeholder groups in natural resource management decisions (Pomeroy, 1995) • Strengthen economic capacity of local institutions and households (Maliao et al., 2009) • CBCRM is implemented worldwide to address socio-economic goals such as conservation and fisheries management (Maliao et al., 2009) • Monitors support to the economic sector through indicators such as income generation and equity of benefit distribution (Maliao et al., 2009)
Social Components	• Success in achieving a high quality of life in the coastal community • Democratically and actively incorporate role of participation by and for natural resource users (Gallagher et al., 2004) • Education and training of individuals and groups in order to promote awareness of coastal sustainability issues • Communication between users and stakeholders of coastal resources (Gallagher et al., 2004) • Transparency in the decision-making process (Gallagher et al., 2004)	• Participatory and community member based decision making (Maliao et al., 2009) • Aims to give bargaining power to local resource users in decision making related to CBCRM (Maliao et al., 2009) • Aims to improve quality of life by meeting the needs of Ísafjörður • Considers Ísafjörður's reliance on coastal natural resources for livelihood, i.e. local fishing community's needs • Monitors success of addressing social needs by measuring indicators such as increased cooperation between stakeholders and resource users (Maliao et al., 2009)

3. Literature Review

3.1 Introduction to Literature Review

This review of current literature seeks to provide a context for the research and results presented in the subsequent sections. The majority of publications and case studies reviewed are representative of the collective research currently being conducted in the fields of sustainable development and CBCRM. CBCRM and its relationship to sustainability will be discussed in this literature review as well as aspects of its history, vocabulary, theories, key variables, methods, and relevant case studies. To identify important central issues and conflicts, an approach that mentions both advocates and critics of CBCRM will be taken. Subsequently, a review of research methods in this field will be used to validate the methods implemented in this master's thesis.

This thesis looks to combine two, well studied and understood concepts which are closely related. However, sustainability and CBCRM are not commonly studied in conjunction with each other and therefore, the interrelationships will be discussed in this Literature Review. Here, the science and practice of sustainability will be discussed as it relates to CBCRM, setting the stage for an in-depth review of the sustainability and CBCRM literature presented in Section (4.0). Additionally, an extensive presentation of current literature and publications addressing individual topics and issues of sustainability and CBCRM will be provided in the Section (4.0).

3.2 Coastal Sustainability and Community-Based Coastal Resource Management

3.2.1 History

It is difficult to say exactly when the notions of sustainability and CBCRM arose. This is due in part, because people living on the coast have been practicing principles of sustainability from the dawn of the agricultural era around 8,000 B.C. However, at that time, it was not known or referred to as 'sustainability' or 'resource management'. In 8,000 B.C. man began cultivating the land and its resources which allowed for the establishment of semi-permanent or non-nomadic civilizations. Arguably, this event also marked the beginning of a population growth that over the next 10,000 years conquered the globe. The combination of the two and the resulting interrelationships of population growth, resource use, and the resulting pressures on

the physical environment led to what we now know as the need for sustainable resource management. At present, 38 percent of the world's population resides within 100 kilometers of the coastline and nearly 50 percent live within 150 kilometers (Goudarzi, 2006). Furthermore, current trends predict that an increase in coastal population of up to 35 percent could occur by 2025 (Goudarzi, 2006). The ever increasing pressure on the coastal zone and the valuable resources it provides is undeniable.

These pressures present the need for sustainable coastal management. One cannot say that sustainability and resource management are independent practices. They are in fact, closely related and highly integrated. This notion is the basis of investigation for this thesis as it explores how CBCRM (a specific approach to resource management) can and cannot contribute to the specific sustainability goals of Ísafjörður. Managers and practitioners of the coastal zone have identified the interconnected relationship between sustainability and ICZM throughout international, national, and local policy, guidelines, principles, and methods for management and utilization of our natural resources. All of these seek to accommodate for the aforementioned population growth and migration to the coastline through sustainable and integrative management practices. As shown in Section (2.0) and throughout this thesis, the interrelationships between sustainability and coastal resource management are inherent in their most basic principles. These include a holistic approach that incorporates the triple bottom line, the insurance of a long-term perspective as opposed to sacrificing precious resources for immediate or short-term gains, and emphasis on the value of community member and stakeholder participation. The primary objectives of ICZM include a sustainable use of the coastal zone (Govan & Hambrey, 1995); thus linking the ideals and objectives of sustainable development, ICZM, and CBCRM.

Perhaps the most relevant publication emphasizing the need for sustainable management of natural resources in the coastal zone is Chapter 17 of Agenda 21 (United Nations, 1992a). This internationally recognized document reminds coastal managers of the need to promote and pursue protection and sustainable use of the coastal zone (United Nations, 1992a). Chapter 17 states that such protection and sustainable use requires:

> "…new approaches to marine and coastal area management and development, at the national, sub regional, regional and global levels, approaches that are integrated in content and are precautionary and anticipatory in ambit, as reflected in the following programme areas:
>
> - Integrated management and sustainable development of coastal areas;
> - Marine environmental protection;
> - Sustainable use and conservation of marine living resources under national jurisdiction;
> - Addressing critical uncertainties for the management of the marine environment;
> - Strengthening international, including regional, cooperation and coordination"[2]

Over time, global resource degradation has resulted in a pressing need to better manage coastal resources. Evidence of degradation is present in examples such as the decline of global fishery stocks (Govan & Hambrey, 1995), habitat degradation resulting from pollution and poor waste management (Magnússon, 2006), and the effects of industrial pollution on air, water, and soil quality. Pollution of coastal waters from a plethora of sources such as agricultural run-off, aquaculture, shipping, and industry are serious contributors to environmental degradation in the coastal zone (Govan & Hambrey, 1995). These issues will be further discussed throughout the thesis as they pertain to relevant topics of sustainability and coastal resource management.

The most commonly referenced examples of ICZM and CBCRM are from countries such as Australia, Brazil, Norway, the United States, the Netherlands, Denmark, Japan, and New Zealand. Within their ICZM regimes, regional and local initiatives and power sharing exist. In these cases, it is agreed among researchers that in order to encourage local stakeholders to value coastal quality, a bottom-up or participatory based approach should be taken (Zagonari, 2008). Researchers further argue that this notion is fundamental to achieving ideals of sustainable development in coastal communities.

[2] (United Nations, 1992a)

3.2.2 Current Theories

ICZM can be approached in two ways: top-down and bottom-up. These terms refer to the source of leadership and initiative in a coastal management regime. Because CBCRM is a participatory and community-focused form of resource management, it falls under the bottom-up approach. It should be noted that in many cases, any combination of these two management forms can exists. In other words, there is a continuum between top-down and bottom-up approaches with a corresponding range of government involvement in coastal management (Harvey et al., 2001).

The benefits and downfalls of top-down vs. bottom up (community-based) management approaches are complex. These are discussed extensively in a variety of texts reviewing ICZM[3]. Implementing the appropriate management plan requires careful consideration of the specific community and resources being managed. As explained by Zagonari (2008), developed nations, such as Iceland, should implement a community-based approach when local stakeholders and resource users associate direct values with the quality of their local coastal resources. As results from research conducted in this thesis show, this is the case in Ísafjörður. Direct values are considered to be present when a resource user associates a high monetary or social value to the physical environment and its resources. If the general population of a given coastal area associates indirect values with the quality of their coast, a top-down approach to resource management should be taken (Zagonari, 2008). Indirect values are present when stakeholders and resource users associate no significant monetary or social value with a given resource. It is important to recognize that these characteristics (value of resources and top-down vs. bottom-up) are related to the use of CBCRM through their inherently local characteristics. The values, whether monetary or social-cultural, that local stakeholders associate with their local natural resource should determine whether a top-down or community-based resource management approach is implemented.

An important component of the coastal zone to consider is fisheries. Especially in coastal nations, fisheries significantly influence the economic prosperity, social structure, and cultural identity of the coastal communities. The fishing community is raised and lives in a local, trade-based atmosphere that gives meaning to their lives

[3] (Cicin-Sain & Knecht, 1998; Krishnamurthy et al., 2008; Moksness et al., 2009)

and direction for their behavior (Jentoft, 2000). Local fishing practices and resource utilization are guided by values and knowledge that are common within the industry. The link between ecosystem health and economic and social livelihood is inextricable in historical fishing towns such as Ísafjörður. Despite this being widely accepted by coastal managers, interviews conducted for this thesis revealed that there are differing perspectives on this issue within the fishing community in Ísafjörður. Local managers openly expressed an understanding of this notion, while the operators of some fishing vessels did not as adamantly support the link between ecosystem health and coastal community prosperity (pers. comm.; Kristján Jóakimsson, October 20, 2010 and Guðmundur Konráðsson, November 4, 2010). Extensive studies of sustainable fisheries management is a result of this interconnectedness. In particular, scientists and practitioners place emphasis on understanding the role of local fisheries management and top-down or centrally governed regulations. Research suggests that CBCRM implementation results in a gradual reduction of government control and communities with increased personal responsibility to the future health of fish stocks (Govan & Hambrey, 1995).

Additionally, a major portion of CBCRM research focuses on the social effects of locally-focused resource management. This type of management benefits stakeholders through increased social capital or trust, reciprocity, and networking (Wagner & Fernandez-Gimenez, 2008). Wagner et al. (2008), also identified other substantial benefits including commitment and continuity, increased knowledge, an understanding of coastal and resource processes, and improved transparency in the decision-making process. Unlike the temporary economic benefits of resource exploitation, investments in social capital increase with use and sustain themselves through generations (Wagner & Fernandez-Gimenez, 2008).

In conclusion, socio-economic well-being and cooperation among all community members and stakeholders are fundamental outcomes of CBCRM. Additional essential features of CBCRM include community participation, integration, institutionalization, capacity building, and appropriate policy (Alcala, 1998). All of the key features of CBCRM are summarized in Table (3.2.2). CBCRM places emphasis on achieving sustainable management of coastal natural resource through local and participatory tools and approaches (Zagonari, 2008). Furthermore, emphasis is placed on the three major components of the triple bottom line: the

natural coastal environment, the economic well-being of a particular local community or region, and the social welfare that is undeniably linked to the quality of these.

Table 3.2.2 A summary of features, functions, and challenges regarding the practice of CBCRM

Key Features of CBCRM	**Function/Result of Key Feature**	**Challenges**
General Features		
Resource users become directly involved in the management decision-making process	Delegation of regulatory functions to local organizations resulting in locally collective role of authority (Jentoft, 2000)	Achieving a representative and collective body of decision-makers
Involves the community as a whole in the management of its resources	Strengthens sense of stewardship and collective responsibility for the quality of the region's natural resources	Establishing collective goals and subsequent prioritization of these
Community level implementation	Creates a self-enforcing system	Need for ICZM expertise
Supports a continued appreciation for coastal natural resources	Re-enforces already existing direct values that are associated with the goods and services provided by the surrounding ecosystem	When environmental stewardship is not a priority or destructive behavior is present, a general lack of enthusiasm and cooperation from community members may result
Supports community integration	Creates equal opportunity for collective action (Jentoft, 2000)	Pre-existing social divides may present unforeseen challenges for community integration
Specific Features		
Maintains the specific needs of a given community throughout the management process	Ensures that large-scale or long-term projects that may be environmentally degrading are not successfully implemented in developed countries	Requires stakeholders to associate direct values to coastal improvement projects (Zagonari, 2008)
Reduce government incentives to over-invest in coastal resources such as fish stocks and other marine resources (Govan & Hambrey, 1995)	Increases resource ownership and personal stake in the given resource (Govan & Hambrey, 1995)	Creation and initiation of policy that results in these outcomes
Seeks to promote viable coastal communities that sustainably manage coastal resources	Positive outcomes on the local ecosystem health and the quality of social and economic components of the local community	Environmental, economic, and socio-cultural externalities would prove challenging when attempting to achieve such an intricate and delicate balance
Builds rapport, networks, education and social responsibility for natural resources	Contributes to a larger, collective goal of sustainable community development (Jentoft, 2000)	The actual process of creating such networks and educational initiatives can be costly, complicated, and time consuming
Partner organizations initially serve as co-managers of ICZM projects, and subsequently withdraw to allow for further empowerment of the community (Alcala, 1998)	Creates a support system for the community during initial implementation and ultimately, places the responsibility in their hands	Supporting and maintaining (logistically and monetarily) local partner organizations in the co-management of ICZM projects

As mentioned above, there are many benefits associated with CBCRM for local community members and organizations. There are however, obstacles in the implementation process and potential dangers resulting from locally focused and participatory management regimes. The following summary of cautions to practitioners builds upon those mentioned in Table (3.2.2).

Perhaps the most relevant of these cautions arises from funding and budgeting for the implementation of CBCRM. Long-term financing of CBCRM proves beneficial to national and central governments because expenditures on initial gathering of information, planning phases, monitoring, travel, and the enforcement of local policy are either taken on by local entities or eliminated all together. Despite these benefits, it has been observed that budget limitations can restrict a CBCRM's ability to flourish (Alcala, 1998). This is especially relevant to ICZM and CBCRM in Ísafjörður in view of the economic crisis that took place in Iceland in 2008. Since the crisis, sectors such as healthcare, primary and higher education, and special government projects have seen a significant decrease in support and funding from the national government. These important details will be re-visited in the Discussion and Conclusion.

Jentoft (2000) reveals that communities already possessing the necessary social criteria for proper CBCRM implementation are difficult to find. Social groups such as businesses, political groups, NGO's, and volunteer organizations must possess shared beliefs, stable membership, and the expectation of continued interaction among themselves. Communities possessing social inequity, conflicting ideals and beliefs, and power inequity will face challenges in trying to implement CBCRM plans (Jentoft, 2000). This means that CBCRM is not the best solution to coastal resource issues in communities characterized by such qualities. As is the case in most coastal communities, a combination of CBCRM tools with other management regimes components, may best serve specific local needs. Research suggests that a well-functioning community is a necessary pre-requisite for successful CBCRM. Once a CBCRM plan has been implemented, challenges will continue to present themselves. These include, but are not limited to, the potential for improperly implemented and monitored CBCRM initiatives. If there is not a proper balance of community investment (environmental, economic, and social) with assistance from a central governing body during initial phases of implementation, CBCRM runs the risk of

creating unsustainable management. In this context, a community may become unsustainably managed in the sense that an effort to encourage local management might not meet local needs. This may lead to the hindrance of other coastal development (Ruddle et al., 1992). As Govan and Hambrey (1995) point out, case studies from Japan and Australia show how fishery cooperatives and bottom-up management yielded too much power to the industry and actually hindered other coastal developments. The focus of resource management was on fisheries and this resulted in sectors such as tourism, education, and other sustainability objectives receiving little funding or attention. These risks should be accounted for and taken seriously in the planning and early implementation phases of CBCRM.

3.2.3 Research Methods

The objective of this section of the Literature Review is to highlight the challenges faced by researchers in the field of CBCRM, provide methodological insight, and identify aspects of CBCRM that need further research.

Challenges presented by researching and implementing CBCRM programs are due in part to it being a relatively new practice. The passing of the Coastal Zone Management Act (United States Fish and Wildlife Service, 1972) in the United States marked early attempts to define and implement ICZM policy and practice (Cicin-Sain & Knecht, 1998). Because CBCRM was subsequent to ICZM, its practice and principles are even less established. This means that much of the current literature available aims to answer larger research questions, while still having little grasp of the intricate and contributing components of CBCRM.

Common research methodology in this field includes the use of mixed-methods, qualitative, and quantitative research design (Krishnamurthy et al., 2008; Maliao et al., 2009). Data collection methods include surveys, focus-group and individual interviews with structured and semi-structured design, as well as gathering statistics addressing geography, resource consumption, energy use, resource exploitation, development, economic well-being, population demographics, and social constructs (Marshall & Rossman, 2006). Often, primary and secondary data are gathered in combinations that support and complement one another.

3.3 Literature Review Conclusions

There is a spectrum of approaches to ICZM and each presents benefits and challenges. The key to properly managing a given area's natural resources is choosing the management regime that best fits the circumstances and characteristics of that particular ecosystem or community. Many regimes of ICZM are discussed in detail by Stojanovic et al. (2004). In this article, the factors of each type of coastal management contributing to a successfully integrated coastal zone are reviewed.

This literature review considers the suitability of CBCRM in promoting sustainable resource utilization and management. CBCRM programs around the world are found in developing and developed nations where a specific community identifies a particularly strong value with its natural resources. It is argued that this particular form of participatory or local management thrives in conditions where resource users are not as greatly affected by economic pressures such as market forces and over-capitalization (Govan & Hambrey, 1995). These notions will be further explored in the subsequent sections of this master's thesis in the context of Ísafjörður.

4. Context

4.1 Sustainability and Ísafjörður, Iceland

4.1.1 International Context

In the international sustainability theatre, the United Nations (UN) sets the stage for sustainability policy, action plans, and recommendations. Under the main body of general assemblies, installments such as the Environment Programme, the Environment, Society, and Culture Organization, and the Development Programme have published numerous documents addressing sustainability in a global context. Unifying these publications is a common thread addressing the urgent need for all nations to promote and achieve sustainable development in the future.

"Humanity stands at a defining moment in history" (United Nations, 1992a). Agenda 21 is the most widely implemented and globally recognized international sustainability document. It clearly states that in this defining moment, mankind is confronted with the continuing deterioration of the ecosystems on which we depend for our well-being. It also reminds us that the integration of environmental and development objectives will lead to a more prosperous future. "No nation can achieve this on its own; but together we can - in a global partnership for sustainable development" (United Nations, 1992a). Many nations, including Iceland, craft environmental documents in accordance with the global objectives of Agenda 21, incorporating a local sustainable development mission.

In addition to Agenda 21, there is a comprehensive collection of international material addressing sustainability in a global context. The most widely known and referenced of these is summarized in Table (4.1.1). Among the others are international conferences, summits, agreements, and initiatives addressing global sustainable development. The principles, concepts, framework, and context presented in these create the foundations for sustainable development around the world.

Table 4.1.1: Major International Conferences and Publications Regarding Sustainability

Conference or Publication Title	Aims and Objectives	Outcome
UN Conference on the Law of the Sea I, 1956	Address the ambiguity of jurisdiction, navigation, and utilization of the earth's oceans. (The United Nations, 2010)	Four Conventions: (The United Nations, 2010) • Territorial sea and contiguous zone • Continental shelf • High seas • Fishing and conservation of living resources in the high seas
UN Conference on the Law of the Sea III, 1982	Address topics and issues such as: the territorial sea and contiguous zone, the exclusive economic zone, the continental shelf and high seas, protection and preservation of the marine environment, marine scientific research (The United Nations, December 10, 1982).	Ocean boundaries such as territorial sea, contiguous zone, continental shelf, and high seas defined. Management regimes created and prescribed to abate marine pollution, support scientific marine research, and control mineral resource exploration in the high seas. Established the International Seabed Authority and Common Heritage of Mankind principle (The United Nations, December 10, 1982).
UN's Our Common Future, 1987	Summarize and publish the outcomes of the World Commission on Environment and Development's work over the course of its three years of assembly	Elaborated on common global concerns of the future, sustainable development, and the role of the international economy. Reported on common challenges such as (Bruntland, 1987): • Population and human resources • Food security • Species and ecosystems • Energy, environment, and development • Industry and the production of more using less • Urban development Common endeavors defined and discussed, on topics including managing the world's commons, peace and security, and proposals for institutional and legal change (Bruntland, 1987)
UN Conference on the Environment and Development (Earth Summit), 1992	To address current issues of the environment and sustainable development	Major resulting documents (The United Nations, 1997): • Agenda 21 • The Rio Declaration on the Environment and Development • The Statement of Forest Principles • The UN Framework Convention on Climate Change • The UN Convention on Biological Diversity Implementation of follow-up mechanisms (The United Nations, 1997): • Commission on Sustainable Development • Inter-agency Committee on Sustainable Development • High-level Advisory Board on Sustainable Development

Table 4.1.1 (continued): Major International Conferences and Publications Regarding Sustainability

Conference or Publication Title	Aims and Objectives	Outcome
The Earth Summit +5, 1997	Special session of the General Assembly that convened to review and appraise the implementation of Agenda 21 (The United Nations, 2000) Its objectives were as follows: • Renew and inspire commitments to sustainable development • Identify major failures • Identify success and understand reasons for success • Re-define priorities for post-1997	Identified how well countries, international organizations, and social components responded to the recommendations set forth in the 1992 Earth Summit (The United Nations, 2000)
Agenda 21 from the UN Conference on the Environment and Development (Earth Summit), 1992	Develop an action plan that comprehensively addresses human impacts on the natural environment. Provide a framework for global, national, and local organizations (United Nations, 1992a)	Four sections of the document provide guidance on and framework for (United Nations, 1992a): • Social and economic dimensions • Conservation and management of resource for development • Strengthening the role of major groups • Means of implementation
UN Millennium Summit and Declaration, 2000	Produce a report that works to end global poverty through focus on development that is sustainable and equitable. At the time, it was the largest gathering of world leaders to date (United nations millennium declaration.2000) .	The final outcome of the Summit, entitled the UN Millennium Declaration, included a statement of values, principles, and objectives for 21st century development. One of the major components handled the specifics of global development in a sustainable manner (United nations millennium declaration.2000).
UN World Summit on Sustainable Development, 2002	Work towards improving the global quality of life and conserving natural resources. Build upon the accomplishments of the Rio Declaration and present an opportunity for global leaders to adopt concrete steps and identify quantifiable targets for the implementation of Agenda 21 (The United Nations, 2003).	Outlined the action plan known as the Johannesburg Plan of Implementation.
World Wildlife Fund's 2010 Living Planet Report	Produce a science-based analysis of the health of Earth and the impact of human activities on it	The extensive document can be summarized as follows; "We're all part of the complex web of life on earth- the Living Planet Report helps us understand where we fit in- and how we can help" (World Wildlife Fund, 2010).

4.1.2 National Context

At the national level, Iceland has set forth clear and definitive intentions to pursue sustainable development in accordance with key international publications such as Agenda 21. In addition to global objectives, Iceland has set forth its own goals and strategies. In 2002, *Welfare for the Future: Iceland's National Strategy for Sustainable Development* (The Icelandic Ministry for the Environment, 2002) decisively outlined the nation's objectives. Iceland continued their efforts toward sustainable development by identifying their priorities in *Welfare for the Future: Framework for Sustainable Development in Icelandic Society* (The Icelandic Ministry for the Environment, 2006) which was published in 2006[4]. Both documents prescribe how Icelandic sectors and organizations such as universities, research institutes, business development institutions, and numerous local initiatives from the environmental, economic, and social sectors should work with the national government to fulfill sustainable development objectives. The following is a review of Icelandic government structure as well as the nation's short and long-term sustainability goals.

[4] It should be noted that after the completion of this Master's Thesis, the Icelandic National Government published an updated version of this document entitled Velferð til framtíðar: Sjálfbær þróun í íslensku samfélagi, Áherslur 2010-2013.

4.1.2.1 National Government Structure

The Ministries of the National Icelandic Government and their respective responsibilities with respect to issues of sustainability and coastal resource management are summarized in Table (4.1.2.1). All information in this table was gathered from the official website of the Icelandic National Government[5]

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Table 4.1.2.1: Icelandic National Government Structure

Ministry	Responsibility
The Prime Minister's Office	Support the Prime Minister and organizes committees appointed by the Prime Minister
The Ministry of Economic Affairs	Trade and business, the financial and stock markets, foreign investments, and sustainable economic development
The Ministry for the Environment	Affairs pertaining to Icelandic nature including conservation of flora and fauna, recreation, pollution prevention, planning and building matters, surveying and cartography, forestry, soil, and marine conservation, and environmental monitoring and surveillance
The Ministry of Fisheries and Agriculture	Conduct research and protect fish stocks and other living marine resources. Researches and supervises agriculture, commercial forestry, import and export of animals and plants, food inspection, and food research
The Ministry of Health	Public health affairs
The Ministry of Justice and Human Rights	Uphold law and ensure that civil rights are respected. Surveillance of territorial waters and fishing grounds
The Ministry of Transport, Communications, and local Government	Road construction, vehicle monitoring, aviation, and navigation and registration of seamen
The Ministry of Education, Science, and Culture	Education at all levels, research and science, sports and youth activities
The Ministry of Finance	Oversee state finances, budgets, taxation, customs, etc
The Ministry for Foreign Affairs	Foreign policy and development aid
The Ministry of Industry, Energy, and Tourism	Industry and innovation, technological development, utilization of energy, regional matters, business development, and tourism
The Ministry of Social Affairs and Social Security	Social well-being in the form of social welfare, social services, and employment

[5] http://www.government.is/g-offices/government-offices/

4.1.2.2 Iceland's Sustainability Goals

Agenda 21 is the leading document guiding sustainability policy and objectives in Iceland. Although it is an international document published by the United Nations, Iceland's national government has adopted its principles and objectives in the form of policy and local initiatives. In accordance with Agenda 21, countries can develop and implement successful monitoring and evaluation systems by identifying sustainability indicators that measure changes across economic, social, and environmental dimensions (United Nations, 1992a). Identification of sustainability indicators is an important step in achieving sustainability goals. Furthermore, Agenda 21 recommends that a national or local strategy for achieving sustainable development is established (United Nations, 1992a). The following Icelandic publications were produced in conjunction with these recommendations.

Welfare for the Future:

Iceland's National Strategy for Sustainable Development 2002-2020

The nation's sustainability goals are summarized in the *National Strategy for Sustainable Development* published in 2002 (The Icelandic Ministry for the Environment, 2002). They are summarized as follows:

- Strengthen policy instruments for sustainable development
- Work towards sectoral integration
- Integrate Local Agenda 21 and regional development principles with current policy and methods
- Define the role of civil society as it relates to other components of sustainable development

The nation's priorities and means of implementation as stated in *Welfare for the Future 2002-2020* are summarized as follows (The Icelandic Ministry for the Environment, 2002):

- Create and maintain a healthy and safe environment
- Ensure the protection of Icelandic nature
- Utilize the natural resources of Iceland in a sustainable manner
- Address global issues related to sustainable development

Welfare for the Future:

Framework for Sustainable Development in Icelandic Society; Priorities 2006-2009[6]

In 2006, the Icelandic Ministry for the Environment published its first update to the original Welfare for the Future document. The new publication's main objective was to provide the Icelandic people with a framework and foundation for sustainable development that is unique to Icelandic society, government, and culture. The major components of this document, including 17 main objectives divided into four major groups, are summarized below (The Icelandic Ministry for the Environment, 2006):

I. A healthy and safe environment
    - Clean air
    - Clean freshwater
    - Safe food products
    - An environment free of hazardous substances
    - Outdoor activities in harmony with nature
    - Protection against natural disasters

II. Protection of Icelandic nature
    - Protection of Iceland's biota
    - Protection of unique geological formations
    - Wilderness conservation

III. Sustainable use of resources
    - Sustainable use of living marine resources
    - Sustainable use of vegetation and reclamation of land
    - Increased utilization of renewable energy
    - Reduction of and improved handling of waste

IV. Global issues
    - Clean ocean
    - Limitation of climate change stemming from human activities
    - Protection of the ozone layer
    - Protection of biodiversity

[6] An update of this document was published immediately after the completion of this Master's Thesis and is entitled Velferð til framtíðar: Sjálfbær þróun í íslensku samfélagi, Áherslur 2010-2013.

Welfare for the Future:

Iceland's National Strategy for Sustainable Development; Statistical Indicators 2006

Again in 2006, Iceland published an additional update to their National Strategy for Sustainable Development as part of the Welfare for the Future series (The Ministry for the Environment in Iceland, 2006). This update includes what Iceland considers to be the statistical indicators of sustainable development. The indicators outlined in this publication will be used as a tool to shed light on Ísafjörður's sustainability goals in subsequent portions of this thesis. The indicators are discussed in detail in the Section (5.0).

4.1.3 Local Context

For the remote coastal community of Ísafjörður, sustainability is not as objectively defined as it is on the international and national levels previously revealed. There is only one major publication that addresses environmental, economic, and social components of sustainability, development, and natural resource management and utilization in Ísafjörður. In 2002, members of the local sustainability committee set out to determine what sustainability in Ísafjörður meant and how it could be achieved. Subsequently, they published *Staðardagskrá 21 fyrir Ísafjarðarbæ* (Agenda 21 for the Municipality of Ísafjörður). On December 7, 2006, the committee also presented *Sustainable Development - Environmentally Sound Perspectives* to town officials. The committee's intention was to, "prepare the administrative level closest to the local population in order to get the general public to participate" in sustainable development (The Icelandic Ministry for the Environment, 2002). The committee disbanded in late December of 2006 and since then, has not reassembled. The current state of sustainability pursuit and implementation in Ísafjörður will be discussed in depth in the Results and Discussion Sections (6.0 and 7.0).

4.1.3.1 Local Government Structure

The structure of the local municipal government of Ísafjörður is depicted in Figure (4.1.3.1a). A summary of each branch's responsibilities in relation to issues of sustainability and coastal resource management are also provided.

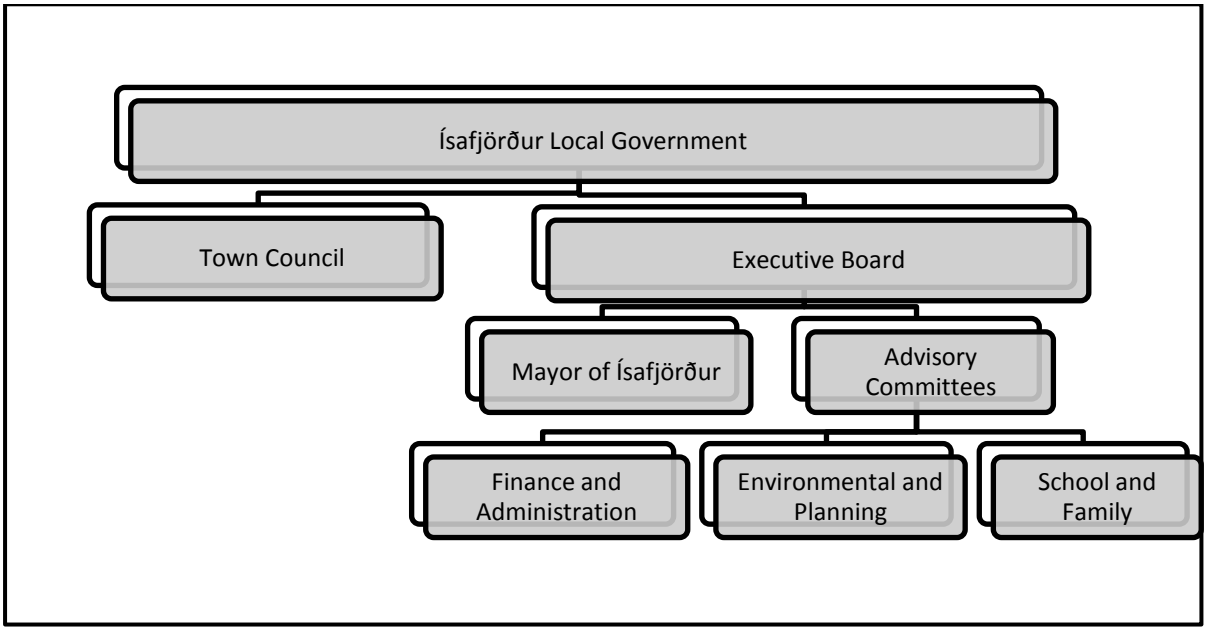

Figure (4.1.3.1) Translated and Summarized Structure of Ísafjörður's Local Government

Table (4.1.3.1) Ísafjörður's Local Government Structure

Component of Municipal Government	**Responsibilities and/or Role in Sustainability**
Town Council	Decision making body in Ísafjörður - 9 elected members
Executive Board	Consists of 3 elected members who also serve on the Town Council. Oversee Town Council meetings
Mayor of Ísafjörður	A member of the local government hired (not elected) by the town. Holds managerial role in town affairs. Is not politically affiliated.
Advisory Committees	Offer expertise on matters before Town Council. A non-decision making component of the local government
Finance and Administration Committee	Oversee budget and administrative aspects of sustainability initiatives and implementation
Environmental and Planning Committee	Advise and address many of the sustainability issues in Ísafjörður. Examples of this include waste management, environmental planning and zoning, inspections, etc.
School and Family Committee	Handle educational and social aspects of Town government. Responsible for implementation of educational and community outreach components of sustainability

4.1.3.2 Ísafjörður and Local Agenda 21

On June 14, 1992 the United Nations Conference on Environment and Development (also known as the Earth Summit) met in Rio de Janeiro, Brazil. It was at this conference that the United Nations published Agenda 21; their most extensive document on sustainable development at the time. This lengthy publication is composed of 40 chapters and four majors sections. The chapters cover a variety of topics which are categorized as Social and Economic Dimensions, Conservation and Management of Resources for Development, Strengthening the Role of Major Groups, and Means of Implementation (United Nations, 1992a).

The 28th chapter presents the need for local communities to adopt the principles and objectives of Agenda 21 in order to contribute to a global action plan to attain sustainable development. This section is commonly known as Local Agenda 21. Ísafjörður, Iceland is one of the many communities around the world that have made a commitment to the objectives and principles of Agenda 21. Since committing itself to the objectives of Agenda 21, the local municipality, which includes the town of Ísafjörður, has written and published its own Local Agenda 21 implementation plan. In this thesis, the collection of primary data is focused on understanding Ísafjörður's commitment to and implementation of its Local Agenda 21.

Local Agenda 21 in Ísafjörður focuses on integrating aspects of the triple bottom line with long-term visions for development and coastal natural resource utilization (Magnússon, 2006). The community's specific sustainability goals and methods of implementation, taken from their Local Agenda 21, are outlined below in a table that depicts the aspects of sustainability addressed and the method of implementation suggested (Magnússon, 2006):

Table (4.1.3.2): Sustainability goals of Ísafjörður as outlined in the Local Agenda 21

Aspect of Ísafjörður's Local Agenda 21	**Method of Implementation**	
1. The Environment	State the policies and vision needed to ensure conservation, protection, and proper utilization of Ísafjörður's surrounding nature.	
	Action	**Benefit**
Conservation	Make the Westfjords a green tourism destination	Increase tourism in the Westfjords while preserving nature
	Create a comprehensive nature plan for sensitive areas in Ísafjörður	Nature conservation would result in increased awareness/ understanding and therefore improved access
Traditional Waste	Improve in-home waste management	Improve processing techniques and opportunities for recycling
	Encourage proper waste disposal	Avoid uncontrolled burning of domestic waste
Organic Waste	Install community composting	Improve fertility of the land
Business	Investigate the Green Globe certification for local businesses	Provide local businesses opportunity to engage in more environmentally responsible practices
Education	Work towards "Grænfánanum" (Green Flag) certification in local schools	Encourage local schools to incorporate themes of sustainability into their curriculum and educational environment
2. The Global Perspective	Outline how and where Ísafjörður can integrate global principles of sustainability and natural resource utilization into local policy and action	
	Action	**Benefit**
Resource Use	Create comprehensive plan for all resource utilization in the Westfjords	Natural resources used in a responsible and sustainable manner having positive effect on local residents
Noise and Air Pollution	Urge residents to avoid polluting	Clean air, and a quiet and peaceful environment
Energy Conservation	Provide information to residents regarding energy conservation, consumption, alternatives, etc.	Increase knowledge, change attitudes, improve energy efficiency
Consumption Patterns and Lifestyle	Distribute informational packet on eco-labeling setting forth the value of choosing environmentally friendly products,	Lifestyles characterized by consistent and healthy diets, resulting from locally grown food
	Increase cultivation of local organic products	Food distribution in the community that contributes to health and local community
3. The Community's Health	This section addresses the factors affecting the health of the community including promoting healthful lifestyles that support environmental and natural resource objectives	
	Action	**Benefit**
Drinking Water	Investors define how they will utilize/affect freshwater resources	Industrial and municipal income increased; water quality level monitored
Sewage	Make necessary improvements to piping system	Allow municipality to bring environmental concerns to light; create a positive image for the town

Table (4.1.3.2) (continued): Sustainability goals of Ísafjörður as outlined in LA 21

Aspect of Ísafjörður's Local Agenda 21	**Method of Implementation**	
4. The Economic Perspective	Similar aims and goals as under the business components of the environmental portion of this document (part I)	
	Action	**Benefit**
Employment	Make Westfjords business and tourism green and sustainable	Economic benefits that include increased income; incentive for business to remain or become more environmentally responsible
5. The Social Perspective	Addresses social aspects such as social welfare, planning, and future generations with respect to the interdependencies between these and the natural environment	
	Action	**Benefit**
Modern Society and Democracy	Emphasize the need for services to and obligations of local community members with respect to social welfare and quality of life	Create resident awareness of community-based management, services, and rights
Planning	Create a master plan for the development of Ísafjörður municipality (It should be noted that in 2009, this master plan was created (Teiknistofan Eik ehf., 2009)	Encourages proper development, zoning, and use of available land
Children and Young People	Provide conditions conducive to development and education of youth within the community of Ísafjörður	Foster a sense of belonging and stewardship to the physical environment that is Ísafjörður
6. Education and Culture	Recognizes that in its broadest meaning, sustainability can include cultural and educational endeavors. In this small and remote community, all levels of education are provided, from pre-school to university, with many opportunities to educate the community on matters of sustainability. Additionally, this section recognizes the need to strengthen and embrace the cultural diversity present in Ísafjörður.	
	Action	**Benefit**
Multiculturalism	Maintain the historical uniqueness of the town through architectural and infrastructural regulations	Maintain sense of place and community for current residents and visitors
Multiculturalism	Preservation of archeological highlands	Protection of cultural heritage
Multiculturalism	Create equal education opportunities to all	Increase equity among students and residents
Multiculturalism	Introduce business and educational community to changing environments and multicultural ideology	Increased tolerance, improved communication, and opportunity for innovation and development
Schools	Increase the proportion of skilled teachers at all levels to ensure competitiveness of the region	Provide the community with incentive for residents to reside and remain in the area

4.2 Community-Based Coastal Resource Management

4.2.1 CBCRM in an International Context

Globally, CBCRM is recognized as an integral component of ICZM, and its key components have been implemented in coastal areas around the world. Its principles have been integrated at the national, regional, and local levels of many ICZM programs. CBCRM is a form of coastal resource management used to narrow existing gaps between the top and bottom of the stakeholder hierarchy. It brings the higher levels of government closer to the communities they govern by empowering local organizations, businesses, governments, and individuals by giving them a more direct role in the management of the natural resources on which they depend. This means that the individuals who live and work in the coastal community are increasingly sharing the planning and decision making responsibilities with government (Hildebrand, 1997) As Cicin-Sain and Knecht point out, local community concerns, in even the most centralized of governments or political systems, are important to integrate in coastal management processes (Cicin-Sain & Knecht, 1998). This need for involving communities in the management of their resources is justified for at least three reasons (Cicin-Sain & Knecht, 1998): (1) The contributions provided by the individuals who use and rely on the coastal zone is invaluable; (2) support and cooperation from users in the strengthening and implementation of ICZM is imperative; and (3) governments are finding it increasingly necessary to foster private-public partnerships in order to successfully accomplish coastal resource management and sustainability goals. As exemplified in community-based coastal initiatives implemented worldwide, community organizing, networking, and environmental education are given priority in CBCRM (Alcala, 1998). These activities provide a community the opportunity to investigate and identify its own needs and challenges en route to achieving socioeconomic well-being. Socioeconomic well-being and cooperation among all community members and stakeholders are fundamental outcomes of CBCRM. Other essential features of CBCRM include community participation, integration, institutionalization, capacity building, and appropriate policy (Alcala, 1998).

As pointed out in the Literature Review, CBCRM programs have been implemented in a spectrum of coastal settings. Commonly, CBCRM is used in

developing nations to provide management needs where large, organized central government is lacking. In this context, CBCRM creates the framework to strengthen proper management and utilization of coastal natural resources. However, CBCRM is becoming an increasingly powerful method of bridging national and local resource management gaps in developed countries. In both cases, CBCRM's main objective is to address the needs of local communities. This includes addressing topics and issues such as local fisheries management, conservation of natural resources, promoting sustainable sources of well-being for local business and community members, and fostering a sense of connection and responsibility among individuals. It is argued that CBCRM is a feasible approach to filling voids between international and national ICZM prescriptions and local practices. In other words, CBCRM could integrate global goals of sustainable resource management and the local initiatives that must occur for them to succeed. It should be noted however, that there are many steps that must be taken before such integration can be successful[7].

4.2.2 CBCRM in a National and Local Context

In a nation whose inhabitants live almost entirely on its 4,970 kilometers of coastline (Hagstofa Íslands, 2010), the management of Iceland's coastal natural resources is a vital and critical component of their livelihood and well-being. According to principles of ICZM, Iceland works to protect and sustainably utilize their unique biota, geologic formations, marine and land resources, and pristine wilderness (The Icelandic Ministry for the Environment, 2006). Figure (4.2.2) represents the factors contributing to coastal management in Ísafjörður and Iceland and provides a context for the role CBCRM.

[7] These steps were reviewed in the Literature Review of this thesis.

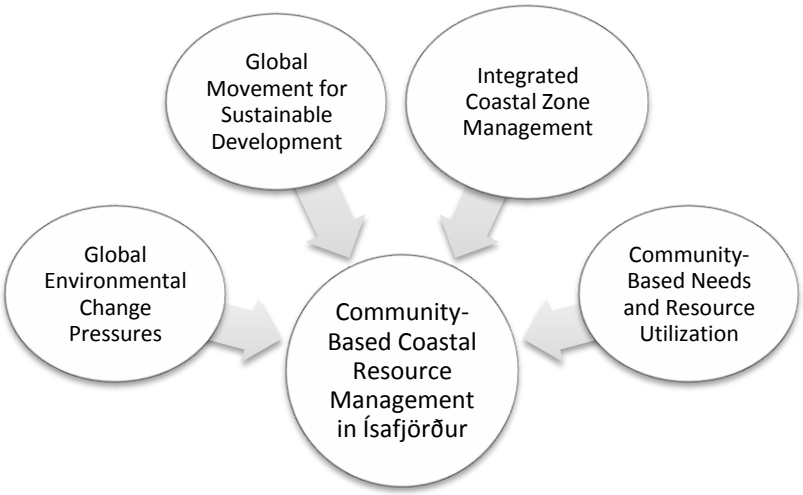

Figure (4.2.2) The relationship that CBCRM would have with the other components of ICZM in a global, national, and local context (Harvey et al., 2001).

There are key characteristics regarding the suitability and use of CBCRM as an ICZM management tool in Ísafjörður. To begin, the suitability of CBCRM for remote coastal communities such as Ísafjörður has been noted by scholars of localized management regimes. They argue that it may be less practical to utilize participatory management in central, diversified, and urban areas (Govan & Hambrey, 1995). Therefore, the remote and isolated nature of Ísafjörður may encourage the future implementation of CBCRM. There is already evidence of implemented CBCRM tools in Iceland and Ísafjörður. As noted by Govan and Hambrey (1995), increased resource ownership is facilitated by introducing strategies such as Individual Transferable Quotas (ITQs) in the fishing industry. This method of fisheries management aims to enhance property rights of the local resource users and therefore, when properly implemented, is a participatory and community based approach (Govan & Hambrey, 1995). However, the success of this means of increased participation is conditional as noted by Jentoft (2000) in his critical analysis of community-based and co-management of fisheries. He notes that as management systems implement limited access to fishing rights with systems such as ITQs, communities may become more socially stratified (and therefore less likely to work towards collective sustainable use of fisheries resources) resulting in accumulated

capital and power among certain social groups. The potential for this result will be addressed further in the Results and Discussion section of the thesis.

Successful CBCRM implementation is also facilitated when at least one partner organization such as an academic institution or an NGO is established to aid in the outreach and implementation steps (Alcala, 1998). Such an institution already exists in Ísafjörður in the University Centre of the Westfjords. Support from the University Centre means access to and collaboration with non-governmental organizations (NGOs) such as the Red Cross, government institutions such as the Marine Research Institute, and local business counseling and cooperatives such as Atvest. These organizations would serve a key role in the success of CBCRM implementation in Ísafjörður. They act as catalysts for development by providing initiative, funding, direction, expertise, facilities, and structure (Alcala, 1998). On the other hand, it has been debated that budgeting and funding restrictions are recognized as among the greatest challenges or restrictions to implementation of CBCRM (Alcala, 1998). In light of the economic crisis experienced in Iceland in 2008, it may prove challenging to implement such management tools. These characteristics and others proved significant in the feasibility analysis conducted for this thesis, and will be further explored in Results and Discussion Sections (6.0 and 7.0).

5. Methods

5.1 Introduction to Research Methods

The following sections contain detailed information regarding the primary data collection and other research methods used in this master's thesis. Research objectives include collecting statistics contributing to the understanding of sustainability in Ísafjörður, Iceland. This research also aimed to better understand the perspective and opinions of a variety of community members. Methods of data collection included the gathering of previously published statistics and semi-structured individual interviews. Information was also gathered through personal communication with colleagues and peers in academic, professional, and personal settings. In addition, a feasibility study was conducted. The diagram in Figure (5.1) illustrates the steps taken in answering the primary research questions posed in the Introduction of this thesis. The diagram depicts overarching objectives of each research step and shows how each supplementary research question was answered.

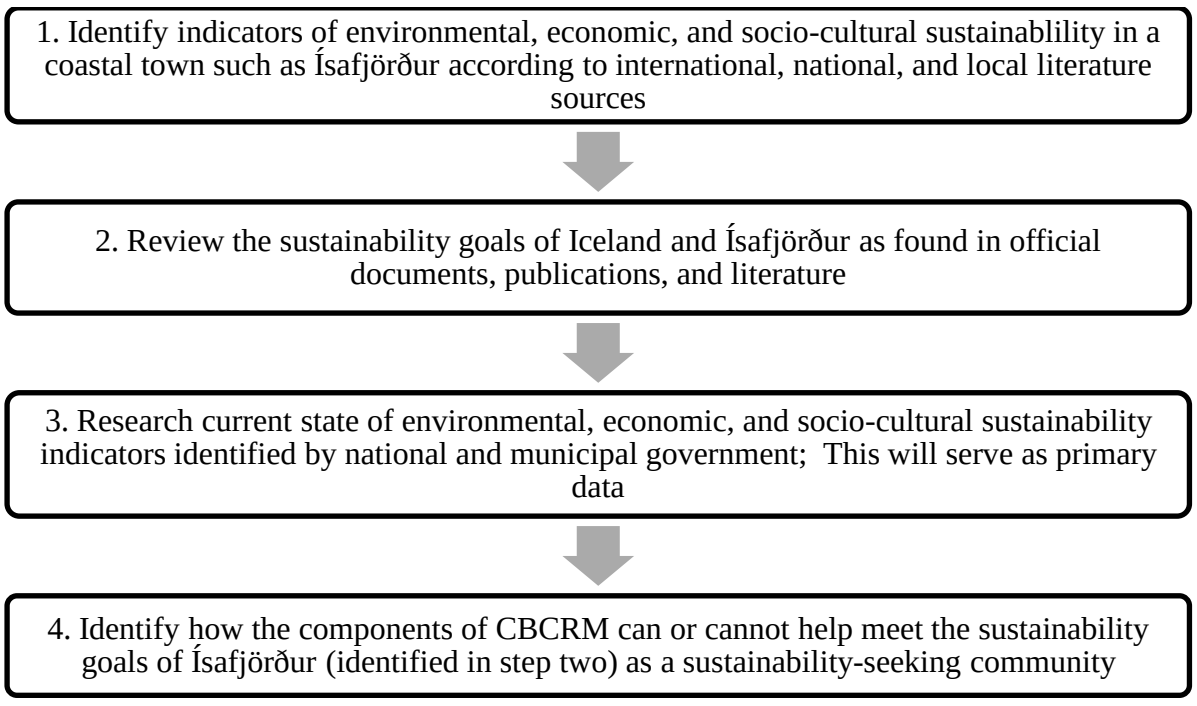

Figure (5.1): Summary of research objectives

5.2 Statistical Indicators of Sustainable Development

There are many ways to qualify, quantify, and understand sustainability and sustainable development. Identifying contributors and indicators is one method that helps researchers paint a realistic picture of how a community or society is working towards environmental, economic, and/or socio-cultural sustainability. For the purposes of this master's thesis, identifying and reporting on sustainability indicators was the most suitable way to quantitatively measure trends. Therefore, this research utilized sustainability indicators as one method of measuring and understanding Ísafjörður's effort to meet its sustainability goals. The other method used was individual interviews and is discussed in Section 5.3.1.1. Statistical indicators were compiled from Iceland's publication, *Welfare for the Future: Iceland's National Strategy for Sustainable Development, Statistical Indicators 2006*[8]. Table (5.2) includes the selected indicators that were relevant to the scope of this thesis. The indicators were categorized according to sub-systems or components of natural resource processes in the coastal zone of Ísafjörður. These sub-systems coincide with the components of the triple bottom line and are comprised from indicators of environment and resources, economic development, and society and culture. These sub-systems were chosen based primarily upon sustainability evaluations conducted in other coastal communities around the world[9]. Where ever possible, historical and current statistics were gathered for each sustainability criterion. This allowed for quantitative statements and observations to be made regarding Ísafjörður's sustainability trends over time.

[8] An updated set of statistical indicators for sustainable development is expected to be published in 2010. These were not available for the research conducted in this thesis.
[9] (Berkes & Farvar, 1989; Cendrero et al., 2003; Copus & Crabtree, 1996; National Rural Health Alliance, 2009; Shi, Hutchinson, & Xu, 2004)

Table (5.2): Statistical indicators related to sustainability as indentified by the Icelandic National Government

Sub-System	Aspect	Criterion
Environment and Natural Resources	Water Quality	Freshwater Quality
		Sea Water Quality
		Waste Water Treatment
	Air Quality	CO2 Emissions
		GHG Emissions
		SO2 Emissions
	Hazardous Material (Waste Production)	Waste Treatment and Disposal
		Local Incineration
		Open Pit Burning
	Conservation	Endangered Species
		Total Land Area
		Protected Areas
	Living Marine Resources	Landings of Fish Species:
	Landings of Fish Species:	Cod
		Haddock
		Greenland Halibut
		Other
	Reforestation	Land Area Reforested
		Trees Planted Per Year
Economic Development	Economic Indicators	GDP
		GDP per Capita
		Economic Income by Sector
	Resource Production	Aquaculture production
	Grazing Animals	Sheep
		Horses
		Cattle
Society	Human-Environment Relationships	Nature Reserves
		Local Population Trends
	Food Safety	Agricultural Statistics
	Social Projects	"Farmers Reforest the Land"
	Energy Use	Energy Use per Capita
		Use of Domestic Energy by Source
		Use of Imported Energy
		Division of Total Energy Use by Source
		Electricity Use

5.3 Case Study Methodology

The collection of primary data was conducted in two phases. The first phase included the collection of statistics mentioned in Section (5.2). These were gathered from various data bases and informational sources in Iceland. The majority of these were collected from public data bases published by the Ministries of Iceland and municipality offices of Ísafjörður (Statistics Iceland and The Farmer's Association of Iceland). The second phase of data collection relied primarily on semi-structured, in-depth interviews with selected individuals of Ísafjörður. The objective of the interviews was to obtain in-depth and detailed information on community perspectives of sustainability in Ísafjörður. Conducting semi-structured interviews was beneficial in exploring and gaining understanding of relevant issues raised by the interviewees. Furthermore, this method allowed interviewees to discuss and elaborate upon topics which they felt were important, while maintaining structure and consistency among interviews. These outcomes or characteristics of semi-structured interviews are beneficial because they allow for comparison among data and information gathered (Marshall & Rossman, 2006). The shortcomings of this method of data collection include difficulty in replicating the interview setting between different interviews, resulting in a difficulty of analysis (Marshall & Rossman, 2006).

Interview questions were designed to obtain information regarding:

- The role of sustainability in the individual's work and personal life
- The types of sustainability issues and topics they are confronted with
- Who or what causes them to be presented with these issues
- Their perspective of sustainability in the community of Ísafjörður
- Their opinions regarding what role sustainability should hold in Ísafjörður's future

5.3.1 Assessing Ísafjörður

The collection of statistics, in combination with the semi-structured individual interviews, was used to gain understanding of a sustainability-seeking community such as Ísafjörður. The interviews provided local and contextual information while serving as a source of further insight in support of relevant statistical data. It is important to note how no single method of data collection can provide holistic

understanding of environmentally, economically, and socially complex issues such as sustainability. Therefore, a combination of data collection methods must be utilized. In circumstances such as these, where some statistical information is unavailable or unrepresentative, seeking alternative methods of assessment leads to better understanding (Maliao et al., 2009).

5.3.1.1 Individual Interviews

Selected Population Interviewed

The individuals interviewed were chosen based primarily on their roles as community members of Ísafjörður and secondly, their availability and willingness to be interviewed. During the original selection process, a wide variety of community members were chosen for the interviews and a balance of representation from environmental, economic, and socio-cultural sectors was maintained. Due to availability, the ideal interview population was not obtained and some aspects of the Ísafjörður community were not represented in the final interview population[10]. Table (5.3.1.1) provides a list of the final interview population.

Table (5.3.1.1) : Final interview population

Position Title	**Name**	**Date**
Previous Mayor of Ísafjörður	Halldór Halldórsson	Oct. 19, 2010
HSVest CMM Student	Carrie Lynn Drake	Oct. 6, 2010
HSVest CMM Icelandic Student	Birna Run Arnarsdóttir	Nov. 7, 2010
Small Business Owner	Gerður Eðvarsdóttir	Oct. 10, 2010
Fishing Industry Member	Guðmundur Konráðsson	Nov. 4, 2010
Fishing Industry Manager	Kristján Jóakimsson	Oct. 20, 2010
Land- Farmer	Betty Petursdóttir	Oct, 10, 2010
Innovation Centre Iceland	Sigriður O. Kristjánsdóttir	Oct. 1, 2010
Cultural Support Center	Elsa Arnarsdóttir	Sep. 30, 2010
ATVEST Employee	Shiran Þórisson	Sep. 29, 2010
Teiknistofan Ehf.	Gunnar Pall Eydal	Oct. 7, 2010
Environmental Engineer	Ralf Trylla	Oct. 4, 2010

[10] See 'Section' 5.4 for limitations of research and methodology

A summary of the interview questions can be found in Appendix B. The interview questions were written and categorized to address issues in the environmental, economic, and social sectors. The questions were then individually tailored for each interview so as to provide a more specific context for the individual being interviewed. For example, questions were tailored according to environmental, economic or business, and social occupations. Continuity was maintained among the general wording, order of questions asked, and the sustainability issues they covered.

Defining Sustainability for the Interview Population

Upon verbal consent from the selected interview population, the letter in Appendix D was provided to each individual with the intent of preparing them to discuss topics of sustainability in Ísafjörður.[11] These issues are complex and ambiguous in nature. In order to avoid confusion and the compromising of data quality (which may have resulted from interviewees finding difficulty in defining sustainability), the letter was intended to inform the interviewee. The letter provided them with the context of this master's thesis as well as selected definitions of sustainability.

The Writing of Interview Questions

Interview questions were written in accordance with the supplementary research questions:

- **What are the sustainability goals of Ísafjörður?**
- **What are the shortcomings of Ísafjörður's implementation of their sustainability goals?**

As mentioned, interview questions were appropriately tailored for the context of each individual interview. The objective of the interview questions included gaining insight into individual experiences, values and personal decisions, and cultural knowledge or perspective regarding sustainability in Ísafjörður. Pilot interviews were

[11] References cited here were not written on the actual copy of the letter/email distributed to the interview participants.

conducted and revisions to the interview questions were made. The content and ordering of questions were revised accordingly[12].

5.3.2 Community-Based Coastal Resource Management Feasibility Study

In order to determine whether CBCRM is an effective contributor to Ísafjörður meeting its sustainability goals, a feasibility study was conducted. This was based on a feasibility study format adapted from various business feasibility plan models (Thompson, 2005). Modifications included converting economic and market assessment factors to the appropriate environmental, economic, and socio-cultural factors. The benefits of conducting this type of analysis were numerous. Most importantly, the CBCRM feasibility study drew insightful conclusions as to whether or not implementing CBCRM is best suited to meet Ísafjörður's sustainability goals. The basic components of the feasibility study were as follows:

- Understand CBCRM- Briefly explored resource management tools and components used by CBCRM
- Feasibility Study- See Section (6.3) for details.
- Results and Conclusions- These were compiled and formulated based upon relationships (between CBCRM and Ísafjörður´s sustainability goals) identified in the feasibility study
- Recommendations- Final recommendations were made based on the assessment of Ísafjörður as a sustainability-seeking community and the potential for CBCRM as a contributor

The feasibility study gave certain focus to the thesis while providing suggestions of how CBCRM management strategies can and cannot meet Ísafjörður´s sustainability goals. The study also shed light on opportunities to work towards sustainability within Ísafjörður. Finally, it provided a general understanding of CBCRM in a local context. The feasibility study showed where and how challenges may be encountered as well as potential reasons not to proceed with a CBCRM plan.

[12] The contact information for the pilot interviewees can be found in Appendix A

A standard multi-attribute analysis was applied. Final conclusions and recommendations were made based on the following evaluation chart:

Criterion/Component	General CBCRM Components	Environmental CBCRM Components	Socio-cultural CBCRM Components	Economic CBCRM Components
Environmental				
Sustainability Goal A	Identified Relationship Here			
Sustainability Goal B				
Sustainability Goal C				
Economic				
Sustainability Goal A				
Sustainability Goal B				
Sustainability Goal C				
Socio-cultural				
Sustainability Goal A				
Sustainability Goal B				
Sustainability Goal C				

Figure (5.3.2): Structure of feasibility matrices used to determine relationships between CBCRM components and sustainability goals of Ísafjörður

The first row of the evaluation chart contains the components of CBCRM. The first column contains the environmental, economic, and socio-cultural indicators of Ísafjörður. Each subsequent cell represents an interaction between the component of CBCRM and the sustainability objective of Ísafjörður. The interaction between the CBCRM component and the sustainability objective was evaluated using the following system in a context specific to Ísafjörður:

(-) Destructive: This component of CBCRM would have a negative net effect. In other words, this component would result in a change that would be counterproductive and/or not useful to Ísafjörður as a sustainability-seeking community.

(0) Neutral: This component of CBCRM would have an insignificant or little net effect on Ísafjörður as a sustainability-seeking community.

(+) Constructive: This component of CBCRM would have a positive net effect. In other words, this component would result in a change that would benefit and/or be useful to Ísafjörður as a sustainability-seeking community.

The general, environmental, economic, and socio-cultural feasibility of CBCRM was depicted in four separate feasibility matrices.

5.4 Limitations and Shortcomings of Designed Methodology

Research design is a complex process that requires adaptive and innovative approach and thought. The scope of this thesis, including the time allotted for data collection, caused significant limitations in the degree to which primary and supplementary research questions were explored. This was the most significant limitation to this master's thesis. However, this constraint did not compromise or devalue the quality of data obtained. As pointed out by literature addressing qualitative research design, other research limitations are inherent in research design of this scale. For example, one cannot interview all relevant circumstances, events, or people intensively and in depth (Marshall & Rossman, 2006).

The original interview population included representatives from the sectors listed in Table (5.3.1.1) as well as three additional sectors: aquaculture, immigrant populations, and education professionals. Although a member of the aquaculture

industry was not interviewed, it is believed that this did not compromise overall results because it was expected that similar viewpoints would be expressed by members of the fishing industry. Sustainability in the fisheries was explored through interviews with a fishing industry member and manager. Interviews with representatives from the immigrant populations in Ísafjörður were not obtained however a foreign student studying at the University Centre was interviewed. This provided perspective from a non-Icelandic community member. Finally, an interview with an education professional in Ísafjörður was not conducted. Unfortunately, no comparable interview was held. Therefore, personal perspective on sustainability issues within the primary and secondary education system in Ísafjörður was not reported. This limited results, and would have added to the understanding of perspectives and goals of sustainability in Ísafjörður.

Additional shortcomings of the research conducted may have resulted from personal biased. As a student-resident of Ísafjörður, the author has been living in and interacting with community members for the past two years. Potential effects of this include but are not limited to:

- An increased/decreased comfort level between the author and the interviewees
- The interview population was not selected at random; biased in selecting individuals with pre-established connections presented itself when selecting some of the interviewees

6. Results

This section presents the results from the investigative case study portion of this master's thesis. In an attempt to answer the main research questions, the results will be presented as a series of relevant statistics as well as summaries of individual and focus-group interviews. Additionally, this section presents the outcome of the CBCRM feasibility study. The results are presented in conjunction with the research objectives of this master's thesis as summarized below:

- Using the statistical indicators of sustainable development, that are relevant to CBCRM and Ísafjörður, as defined by the Icelandic National Government in their 2006 publication: *Welfare for the Future: Iceland's National Strategy for Sustainable Development, Statistical Indicators 2006*, this section reports the most recent information available regarding these indicators
- An investigation of the specific sustainability goals of Ísafjörður through the review of local publications, such as the Local Agenda 21, and other sustainability documents in Section (4.1), regarding sustainability issues. Furthermore, use interviews with selected community members from a cross-section of perspectives and sectors to gain a deeper understanding of the underlying sustainability goals of Ísafjörður
- Gain a better understanding of the community's knowledge, feelings, and opinions of sustainability in a context specific to Ísafjörður
- Investigate the suitability of CBCRM to contribute to the sustainability goals of Ísafjörður

6.1 Statistical and Informational Indicators

The statistical indicators listed in Table (5.2) are compiled from the national Icelandic government's publication: *Welfare for the Future: Iceland's National Strategy for Sustainable Development, Statistical Indicators 2006*. The indicators are categorized according to environmental, economic, and socio-cultural components of sustainability. In this section, the most recent, available, and relevant information regarding each criterion listed will be provided. This section of results will answer the supplementary research question: What do the indicators of sustainable development, as defined by the Icelandic National Government reveal about the

shortcomings of Ísafjörður attaining their sustainability goals? Any identified shortcomings will be discussed in Section (7.1.1.1).

6.1.1 The Environment and Natural Resources

The following statistics and information is relevant to components of the environment and natural resources:

Water quality

Quality of waste water treatment is a key indicator of environmental health (The Ministry for the Environment in Iceland, 2006). Methods of waste water treatment in Ísafjörður consists of collecting household and small business wastewater in a mixed system consisting of two drainage pipe lines. The first pipeline system drains wastewater from houses while the second system drains wastewater from the streets and squares. All water from both systems is piped directly into the sea and diffused via natural currents existing in Skutulsfjörður (R. Trylla, pers. comm., November 25, 2010). Further information regarding the basic design of the wastewater treatment in Ísafjörður can be found in Appendix C. Information regarding freshwater consumption, freshwater quality, and seawater quality in Ísafjörður was unavailable. Information regarding waste water treatment was provided by the Municipality of Ísafjörður.

Air Quality

The following three graphs depict aspects of air quality in Iceland. They show trends of air pollution levels (carbon dioxide, greenhouse gases, and sulfur dioxide) present in the atmosphere in Iceland. The data was collected between 1990 and 2008. Although data regarding local air quality was not available, these graphs are important because they provide perspective on a key aspect of environmental sustainability in the whole of Iceland.

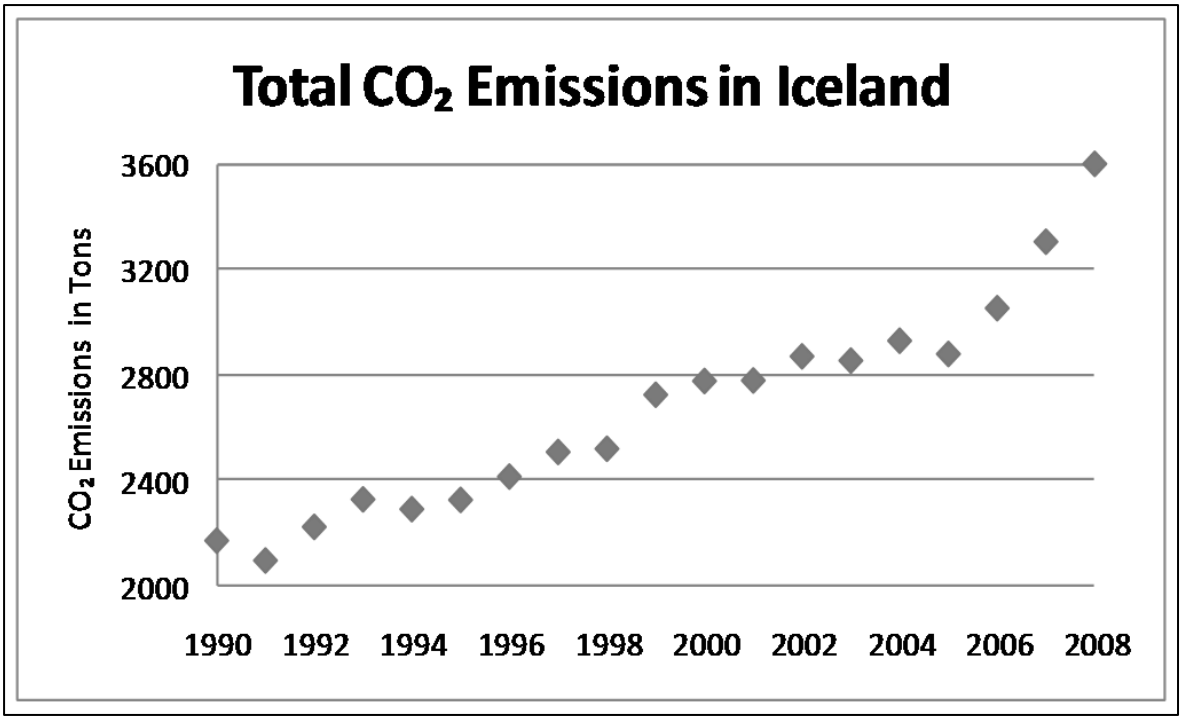

Figure (6.1.1a) Total CO_2 Emissions in Iceland; these measurements include the following sources of atmospheric carbon dioxide (CO_2): Fuel Combustion (Industry and Construction, Road Transportation, Other Transportation, Fishing Vessels) and Industrial Processes (metal industry, other industries, waste, waste disposal, and geothermal power plants). The data represented in this graph does not include international transport emissions. Primary Data Source: (Hagstofa Íslands, 2010) Trends observed in this graph indicate a significant increase in CO_2 emissions. To provide perspective, the Intergovernmental Panel on Climate Change has stated that a reduction to 80 percent below 1990 CO_2 emissions is needed globally (IPCC, 2007). It becomes clear that Iceland must make immediate and drastic changes in order to meet this recommendation. In addition to this figure, the following two figures also indicate similar trends for other Green House Gases.

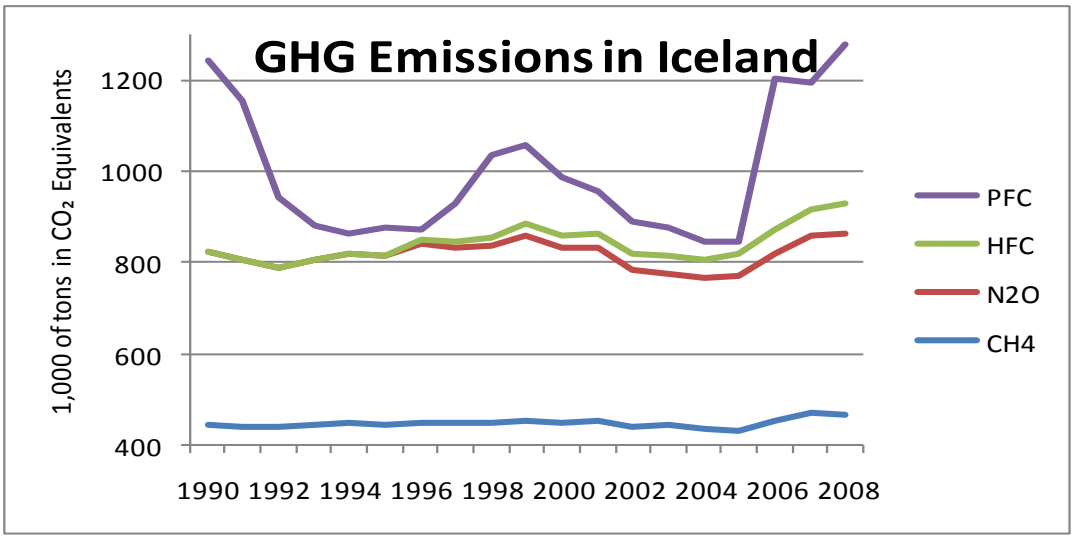

Figure (6.1.1b) Total Green House Gas (GHG) Emissions in Iceland; these measurements include the following Green House Gases: Perflourocarbons (PFCs), Hydroflourocarbons (HFCs), Nitrous Oxide (N_2O), and Methane (CH_2). Primary Data Source: (Hagstofa Íslands, 2010)

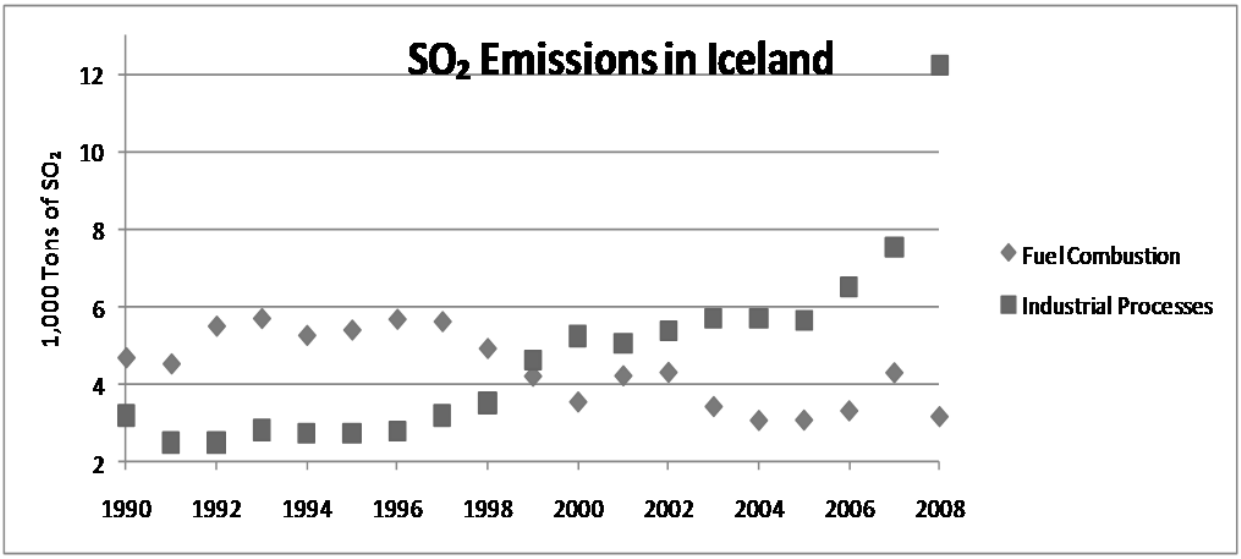

Figure (6.1.1c) Total SO_2 Emissions in Iceland; these measurements include the following sources of atmospheric sulfur dioxide (SO_2): Fuel Combustion (Industry and Construction, Road Transportation, Other Transportation, Fishing Vessels) and Industrial Processes (metal industry, other industries, waste, waste disposal, and geothermal power plants). The data represented in this graph does not include international transport emissions. Primary Data Source: (Hagstofa Íslands, 2010)

Waste Treatment and Disposal

At present, open-pit burning is not openly practiced as a method of refuse treatment in Ísafjörður. However, local farmers practice open-pit burning on their land as a means of disposing annual waste such as plastic wrapping from hay-bails, tires, and other agricultural waste (Anonymous, pers. comm., October 10, 2010). Because open-pit burning utilizes no filtration for resulting air pollution, this practice is extremely hazardous to the immediate environment. Landfill is the primary method of processing non-burnable waste. Incineration at a local site is another method of waste processing.

Incineration is the primary method of solid waste treatment in Ísafjörður, but this is not considered as environmentally damaging as open-pit burning. Incineration utilizes highly technical methods of burning and filtration which reduces the direct impacts on the immediate environment (pers. comm., Ralf Trylla, October 4, 2010).

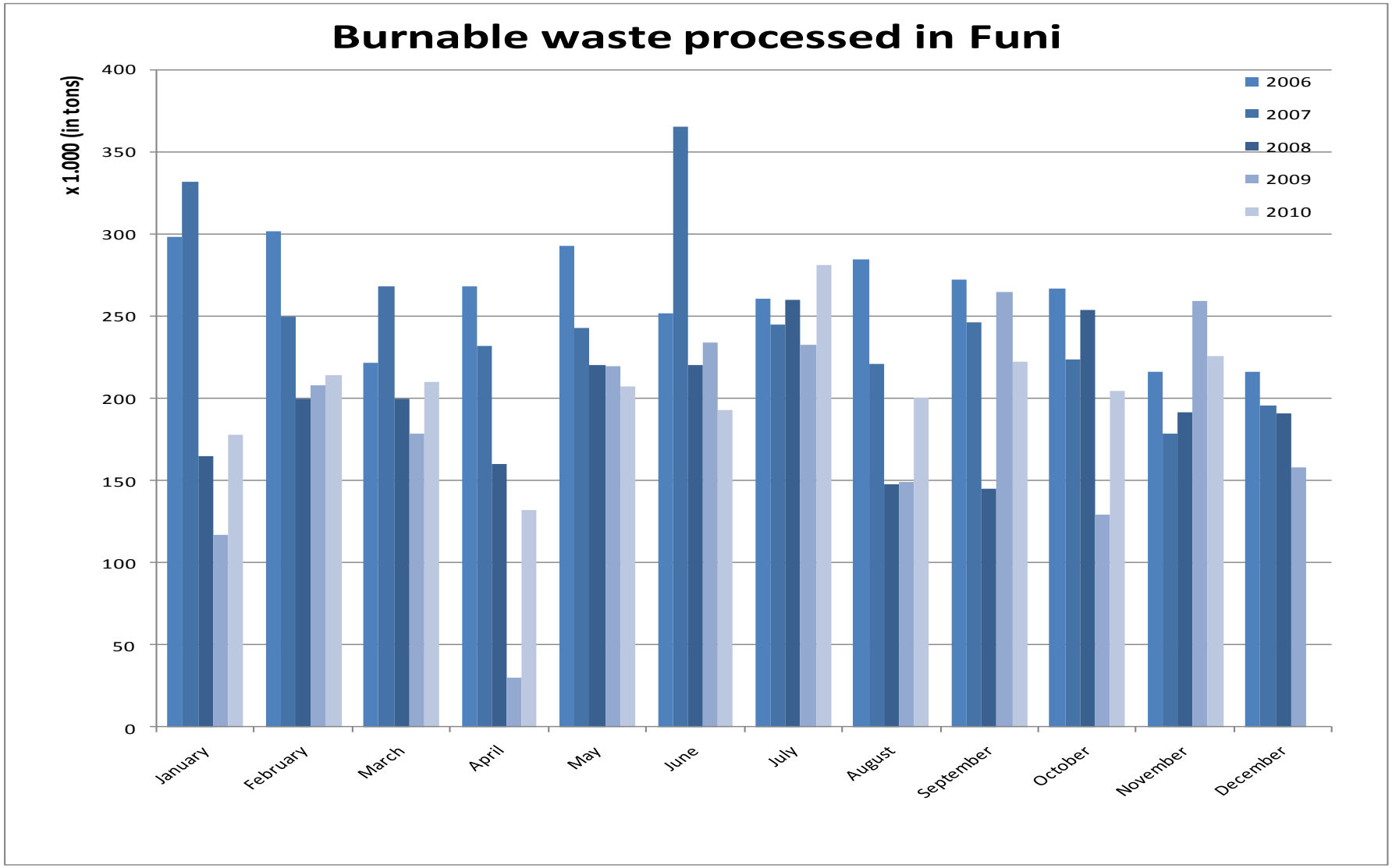

Figure (6.1.1d) This figure quantifies the solid waste that is processed via incineration within Skutulsfjörður and Ísafjörður.

Conservation

The categories of protected areas in Iceland include country parks, monuments, national parks, nature reserves, and other areas (Umhverfisstofnun, 2002). "According to the Nature Conservation Act a Nature Reserve is an area protected for its importance for wildlife (flora and fauna) and landscape" (Umhverfisstofnun, 2002). According to this Act, there are 31 plants protected in Iceland. Hornstrandir, one of the largest nature reserves in Iceland is located just north of Ísafjörður. Over 260 species of flowering plants are found on the reserve; it has not been inhabited since post-World War II; the region has been completely preserved for decades; approximately 30 species of birds nest in Hornstrandir; and exploration of the nature reserve is only allowed on foot (Umhverfisstofnun, 2002).

Iceland maintains an endangered species list consisting of Red Listed flora and fauna, as well as protected flora. These species are protected under the Nature Conservation Plan (pers. comm., Trausti Baldursson, November 29, 2010).

Living marine resources

The following graphs depict information regarding common living marine resources in the Westfjords of Iceland. They focus on the landed catch[13] of fisheries in the Westfjords and the whole of Iceland.

[13] Landed catch is defined as the total amount of fish brought to shore by fishing vessels

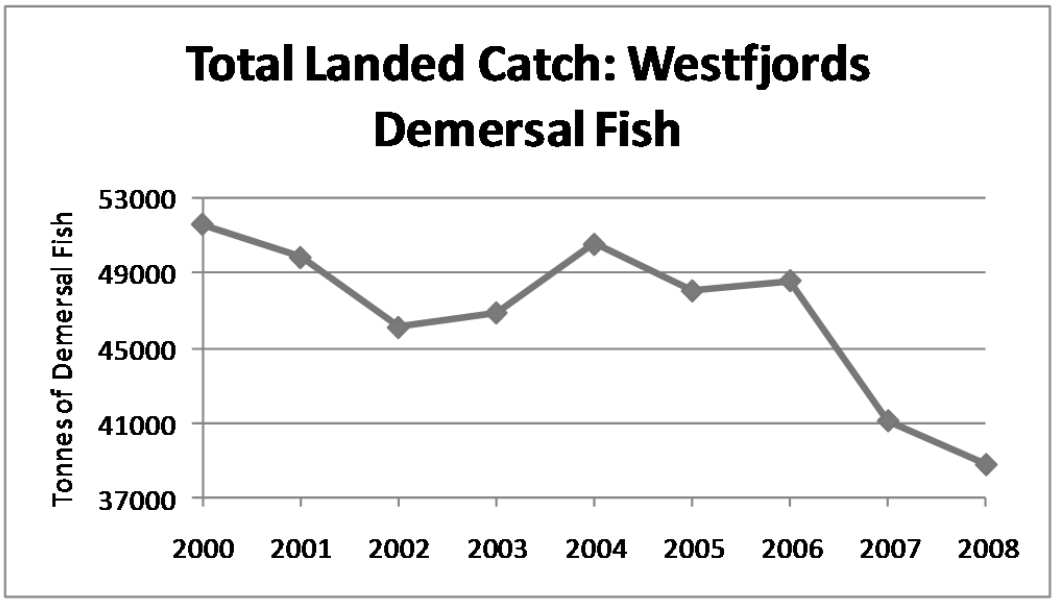

Figure (6.1.1e) Total landed catch of demersal fish in the Westfjords of Iceland; the measurements of landed demersal fish in the Westfjords of Iceland include major harvested Icelandic species such as Cod, Haddock, and Greenland Halibut

6.1.2 Economic Development

Economic Indicators

For the purposes of comparison to other countries, GDP is reported in USD. Iceland's GDP in 2009 was $12.15 billion and it was ranked number 142 in comparison to countries in the rest of the world. Its GDP per capita was $39,600 in 2009, $42,700 in 2008, and $42,600 in 2007 (US Central Intelligence Agency, 2010).

Resource Production

Resource production is identified by the Icelandic National Government as an indicator of sustainable development. Examples of resource production in Iceland include the cultivation of grain, other crops, livestock, and aquaculture. Data collected by the Farmer's Association of Iceland shows that over the last 20 years, cultivation of grain has increased steadily (Icelandic agricultural statistics 2009, 2009). It has nearly tripled in the last two decades, and the most recent data reports that in 2007, over 11,000 tons of grain was cultivated in Iceland (Icelandic agricultural statistics 2009, 2009).

Another indicator of resource production in Iceland is livestock population. The Westfjords claims approximately 2% of Iceland's total population (Hagstofa Íslands, 2010). The farmers of the Westfjords are responsible for an average of more than 3% of the nation's livestock (cattle, dairy cows, sheep and horses) (Icelandic agricultural statistics 2009.2009). Furthermore, the farmers of the Westfjords are responsible for raising over 10% of the nation's ewes. Figure (6.1.2) shows the changes in herd size among farmers in Iceland. In addition, the data is presented according to farm size. In general, the picture shows a decrease in herd size on small farms, and an increase in herd size on large farms (Icelandic agricultural statistics 2009, 2009).

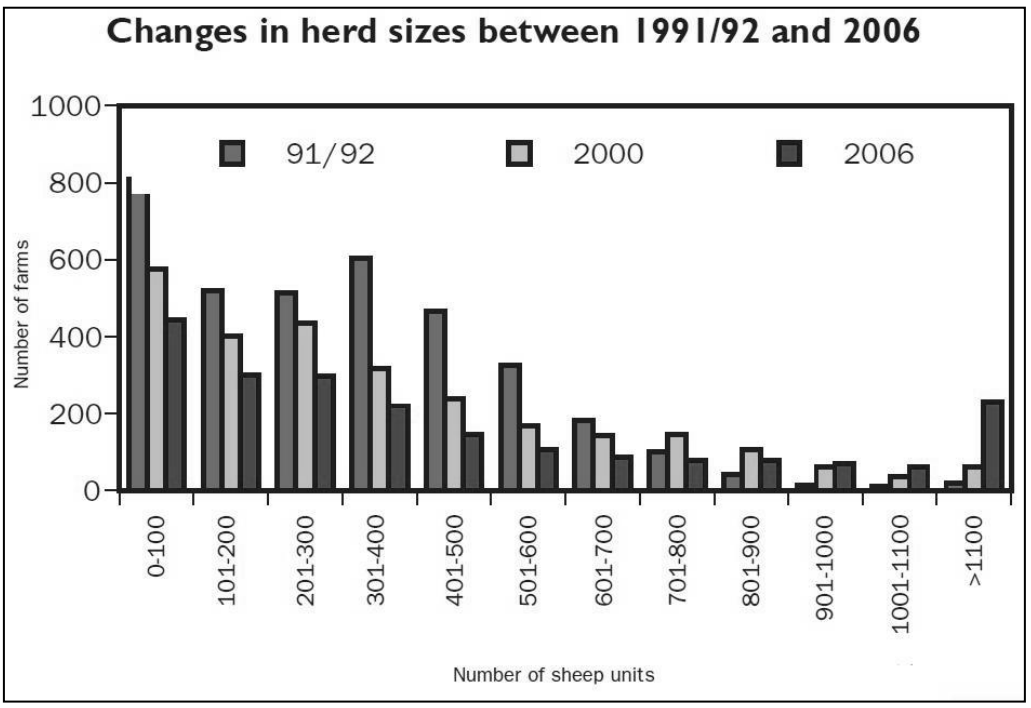

Figure (6.1.2): Changes in her populations show a decrease in number of farms

Aquaculture is the third means of resource production practiced in Iceland. Aquaculture (or fish farming) has seen a significant increase in the farming of Cod and Arctic Char. At present, Iceland is producing over 4,500 tons of Cod and Char each year (Icelandic agricultural statistics 2009, 2009). This has multiple implications when considering effects on sustainable resource production in Iceland. Economically, this serves as a positive contribution to local resource production. Environmentally, the effects of aquaculture are not well understood but it is suspected that it may have negative long term effects.

6.1.3 Society

Human-Environment Relationships: Population Trends

As described in Section (3.2.1), population trends in coastal areas greatly affect pressures on coastal zone ecosystems. Furthermore, population trends have direct effects on socio-cultural sustainability. These are discussed in Section (7.1.1.1).

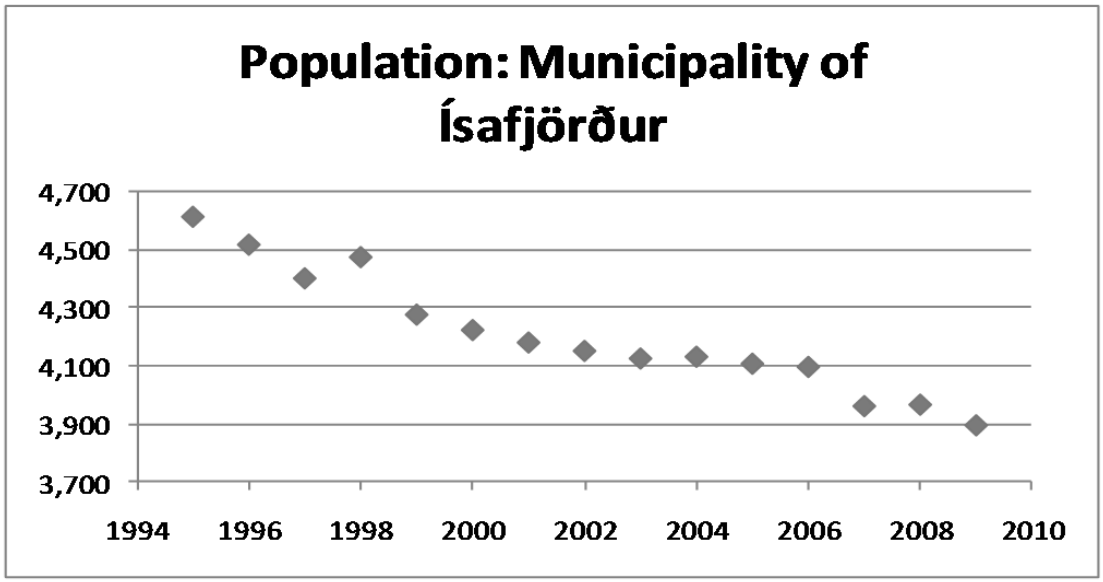

Figure (6.1.3a): Population Trend Graph for Ísafjörður**;** The following graph depicts the population trend in the municipality of Ísafjörður over the last two decades. Primary Data Source: (Hagstofa Íslands, 2010)

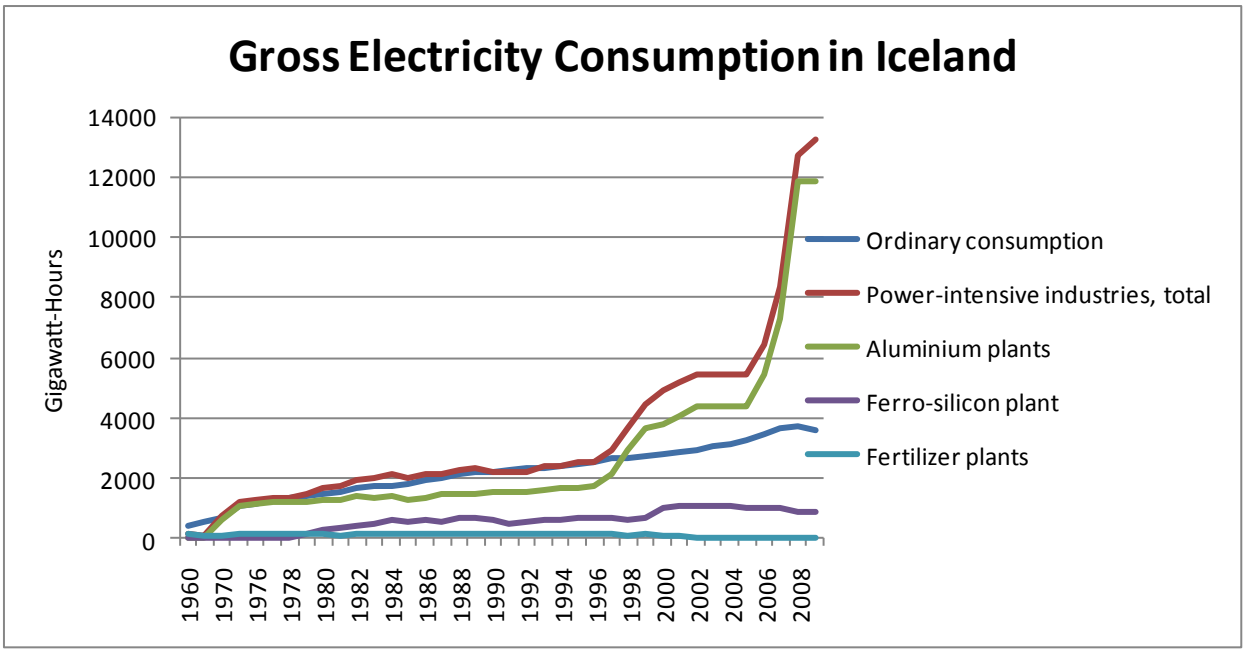

Figure (6.1.3b) Gross Electricity Consumption in Iceland: by Source; The measurements depicted in the graph below represent the sources of electricity consumption in Iceland and energy consumption trends over the last five decades from sources such as ordinary domestic consumption, power-intensive industries, aluminum smelting plants, ferro-silicon plants, and fertilizer plants. The data represented in the graph below includes transmission losses through delivering infrastructure (Hagstofa Íslands, 2010). This loss contributes to a 4.5% loss in delivered electricity. Primary Data Source: (Hagstofa Íslands, 2010)

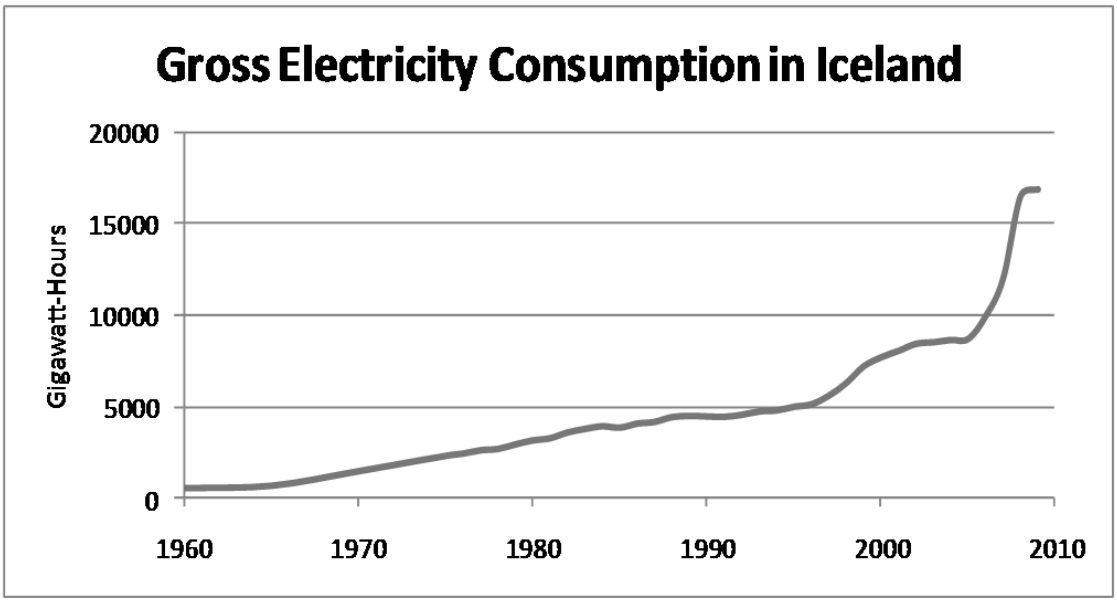

Figure (6.1.3c) Gross Electricity Consumption in Iceland; this graph represents the gross, total electricity consumption in Iceland over the last five decades. The data represented in the graph below includes transmission losses through delivering infrastructure (Hagstofa Íslands, 2010). This loss contributes to a 4.5% loss in delivered electricity. Primary Data Source: (Hagstofa Íslands, 2010)

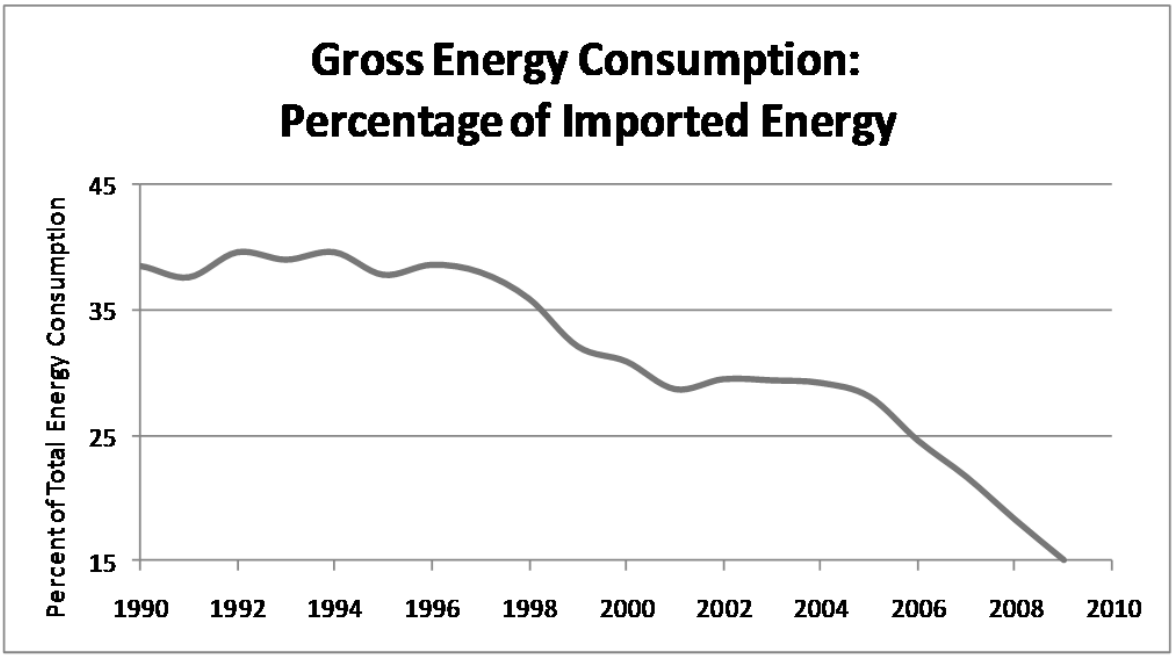

Figure (6.1.3d) Percentage of Imported Gross Energy Consumption in Iceland; the information represented below shows the general decline in energy consumption coming from imported energy sources in Iceland. Primary Data Source: (Hagstofa Íslands, 2010)

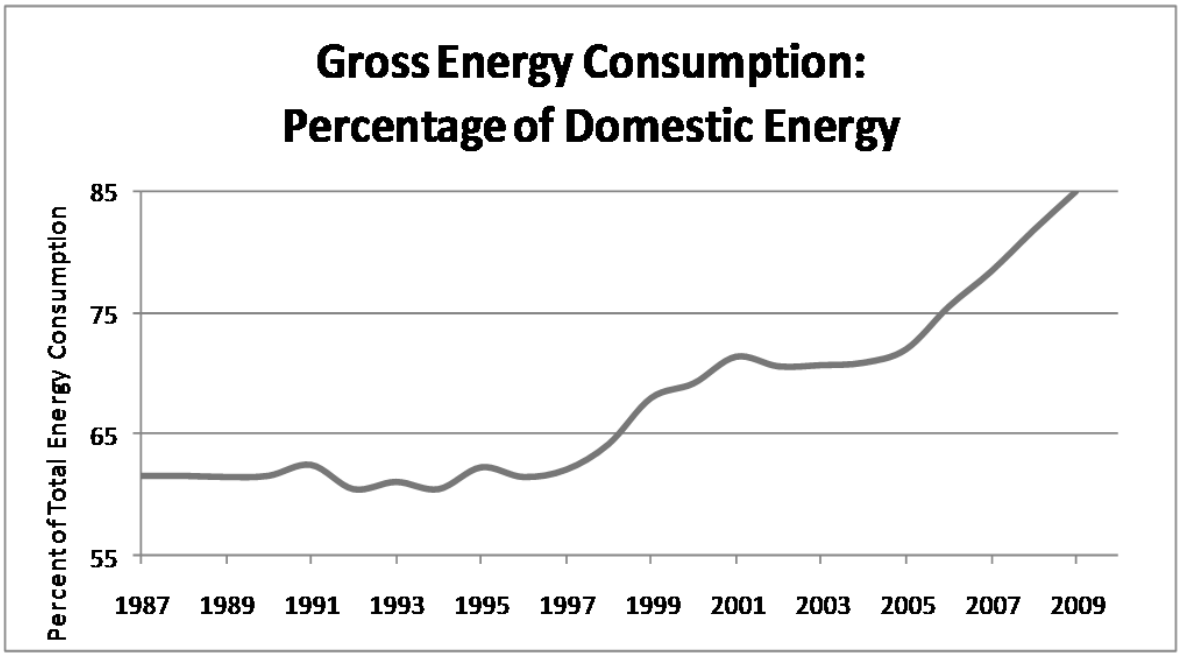

Figure (6.1.3e) Percentage of Domestic Gross Energy Consumption in Iceland; the following graph represents the energy consumption in Iceland that is of domestic origin. Its measurements include domestic sales and purchases by aircraft vessels abroad for own use, and the figure shows primary energy measured in physical units (Hagstofa Íslands, 2010). Primary Data Source: (Hagstofa Íslands, 2010)

6.2 Interviews

6.2.1 Individual Interviews

The findings from individual interviews will be presented and discussed in depth in the Discussion and Recommendations section. The official transcriptions from the interviews can be obtained upon request. The following individuals were interviewed[14]:

Position Title	**Name**	**Date**
Previous Mayor of Ísafjörður	Halldór Halldórsson	Oct. 19, 2010
HSVest CMM Student	Carrie Lynn Drake	Oct. 6, 2010
HSVest CMM Icelandic Student	Birna Run Arnarsdóttir	Nov. 7, 2010
Small Business Owner	Gerður Eðvarsdóttir	Oct. 10, 2010
Fishing Industry Member	Guðmundur Konráðsson	Nov. 4, 2010
Fishing Industry Manager	Kristján Jóakimsson	Oct. 20, 2010
Land- Farmer	Betty Petursdóttir	Oct, 10, 2010
Innovation Centre Iceland	Sigriður O. Kristjánsdóttir	Oct. 1, 2010
Cultural Support Center	Elsa Arnarsdóttir	Sep. 30, 2010
ATVEST Employee	Shiran Þórisson	Sep. 29, 2010
Teiknistofan Ehf.	Gunnar Pall Eydal	Oct. 7, 2010
Environmental Engineer	Ralf Trylla	Oct. 4, 2010

6.2.2 Other Personal Communication

On October 10, 2010, the community members of Ísafjörður came together to participate in a global action day against climate change. During the day's activities, there was an open forum where individuals were invited to discuss topics of sustainability. There were a variety of community members present including adults and young adults, teachers, local business owners, farmers, journalists, and other citizens. At the meeting, topics of sustainability were discussed as they relate to the coastal environment surrounding Ísafjörður, the local economy, and society. Participants were asked to provide topics they wished to discuss during the forum.

[14] Details regarding the methodology used in these interviews can be found in the Methods section.

Environmental sustainability concerns raised by participants include:

- A need for outdoor and environmental education in local schools
- Creating a community system for sharing tools, equipment, or amenities
- The government playing an active role in encouraging more recycling and less waste production
- An increased use of natural resources from local sources

Economic sustainability concerns mentioned include:

- Increasing recycling opportunities in order to create more jobs and resources available to the community
- More localized fisheries management
- Using local energy sources such as geothermal
- Create local goods and services markets that support local business and local economy

Social sustainability concerns mentioned include:

- Raising awareness in the community and changing habits as a result
- Forming community action groups or interest clubs related to sustainability and environmental issues
- Increase the knowledge of global issues related to social equity and quality of life
- Social support of local businesses that are sustainable

6.3 Community-Based Coastal Resource Management Feasibility Study

In order to determine how, and in what ways, CBCRM can and cannot contribute to reaching the sustainability goals and objectives of Ísafjörður, a feasibility study was conducted. The environmental, economic, and socio-cultural components of Ísafjörður´s sustainability goals were discussed in Section (4.1.3.2) and the same components of CBCRM were discussed in Sections (2 and 4.2). These sustainability goals and CBCRM components were placed in four matrices according to general, environmental, economic, and socio-cultural aspects. The relationships between each sustainability goal and CBCRM component were evaluated in Figures (6.3a, 6.3b, 6.3c, and 6.3d). Relationships were determined to be constructive (+), destructive (−),

or neutral (o). In other words, it was determined whether each component of CBCRM could have a constructive, destructive, or neutral effect on achieving the sustainability goal it was compared to. In order to make the matrices more readable and understandable, abbreviated names were given to each component or goal. These abbreviations are listed below and the corresponding matrices follow.

General Sustainability Goals:

Address Global Issues	Related to sustainable development as identified by Agenda 21 and other major international publications (The Icelandic Ministry for the Environment, 2002)
Integration	Sectoral integration among all components of society in Ísafjörður (United Nations, 1992a)
Monitoring and Evaluation	Ensure that these components are integrated into local resource management objectives
Sustainable Planning	Create a comprehensive plan for resource utilization in the Westfjords that follows global principles of sustainable development (Magnússon, 2006)
Master Plan	Create and implement a Master Plan for the municipality[15]

General CBCRM Components:

Integration	Government and non-government community-based organizations work together towards common resource management goals (Pomeroy, 1995)
Distribution	Distribution of responsibility from government institutions to local community organizations (Pomeroy, 1995)
Local	Management decisions based on the needs of Ísafjörður. Locally-based integrated coastal management plans (Tulungen et al., 1998) that effectively empower local communities by enabling them to participate, control, and influence resource management decisions affecting their lives (Maliao et al., 2009)

[15] It should be noted that this has been done and is entitled Aðalskipulag Ísafjarðarbæjar 2008-2020

Environmental Sustainability Goals:

Environmental Health	Create and maintain a healthy and safe environment (The Icelandic Ministry for the Environment, 2002)
Icelandic Nature	Ensure the protection of Icelandic nature (The Icelandic Ministry for the Environment, 2002)
Local Resource Use	Utilize local natural resources in a sustainable manner (The Icelandic Ministry for the Environment, 2002)
Conservation	Ensure conservation by creating a comprehensive nature plan for the surrounding area (Magnússon, 2006)
Waste	Encourage proper waste disposal

Environmental CBCRM Components:

Access	Promotes access to natural capital such as habitat, water, conservation land, food, and other valuable resources. Ensure fair allocation of access rights to coastal natural resources (Maliao et al., 2009)
Local	The direct involvement of local stakeholders ensures that decisions reflect the specific needs of the local environment.
Environmental Health	Ultimate goal of sustaining general well-being of local coastal resources (Maliao et al., 2009)
Policy	Aims to implement and properly enforce laws and policy that protect, preserve, and sustain natural resource abundance and quality (Maliao et al., 2009)
Monitoring	Monitors environmental health through indicators such as diversity, abundance, biomass, and size of local species (Maliao et al., 2009)

Economic Sustainability Goals:

Green Tourism	Make the Westfjords a green tourism destination (Magnússon, 2006)
Green Certifications	Invest in Green Globe certification for local businesses and "Green Flag" certification in local schools(Magnússon, 2006) (Magnússon, 2006)
Economic Sustainability	Make business and tourism in the Westfjords economically and socially sustainable (Magnússon, 2006)
Employment Opportunities	Create and maintain employment opportunity within the community in a long-term and sustainable fashion (H. Halldórsson, pers. comm., October 19, 2010)

Economic CBCRM Components:

Implementation Costs	Costs of implementing ICZM for national governments are related to information gathering, planning, routine management, and enforcement (Govan & Hambrey, 1995). However, the implementation of CBCRM provides an opportunity to integrate these costs into already existing, local practices.
Local Economy Decision-Making	Decisions for the community must consider enhancement of local economic structure and organization. This includes consideration of factors such as labor markets, technology development and utilization, infrastructure maintenance and development, and finances (Jentoft, 2000). Direct involvement of local stakeholders ensures that management decisions are best suited to the needs of the local community.
Cost Effectiveness	Some of the burden of information gathering, planning, routine management and enforcement can be shifted from central government to local responsibilities (Govan & Hambrey, 1995).
Economic Effects	Provides opportunity for access to additional economic benefits such as grants and research funding (Wagner & Fernandez-Gimenez, 2008)
Economic Capacity	Strengthen economic capacity of local institutions and households (Maliao et al., 2009)
Large Scale Economy Suppression	Economies of large scale that rely heavily on foreign imports and markets may not be achieved due to CBCRM's inherently local focus (Govan & Hambrey, 1995) Therefore, access or investment may be denied to large scale, outside interests (non-local), and therefore, large-scale business and industry may be suppressed (Govan & Hambrey, 1995). This could potentially result in access or investment from potentially better suited or efficient, non-local enterprises to be denied.
Implementation Challenges	Already existing large-scale fisheries or large-scale local business would not perceive any benefit from this management regime and therefore, would likely resist (Govan & Hambrey, 1995). This potential challenge is something that needs to be explored further in the context of Ísafjörður. It is not known whether the larger fishing, processesing, or shipping companies in Ísafjörður would oppose or support management efforts that seek to empower and involve local, smaller-scale stakeholders.

Socio-Cultural Sustainability Goals:

Policy	Create the necessary policies to ensure conservation, protection, and proper utilization of Ísafjörður's surrounding natural resources (Magnússon, 2006)
Role of Society	Define the role of civil society as it relates to other components of sustainable development (United Nations, 1992a)
Education	Educate members of the community on aspects such as proper waste disposal, energy conservation, consumption, and alternatives; and environmental health and safety issues such as food safety, air and water pollution, drinking water, and sewage treatment
Community Initiatives	Install community initiatives that encourage pro-environmental behavior such as community composting, community gardening, and community action days
Community Services	Emphasize the need for services to and obligations of local community members with respect to social welfare and quality of life (Magnússon, 2006)
Healthy Environments	Provide healthful and enriching environment in which the youth of the community can grow and learn (Magnússon, 2006) and provide an equal opportunity to all youth and adults
Cultural and Historical Uniqueness	Maintain the historical uniqueness of the town (Magnússon, 2006)

Socio-Cultural CBCRM Components:

Local	"Direct involvement of all the stakeholders across a wide cross section of the community ensures that decisions better reflect local social, economic, and environmental conditions" (Govan & Hambrey, 1995). Considers Ísafjörður's reliance on coastal natural resources for livelihood, i.e. the needs of the local fishing community.
Local Knowledge Use	"More effective use made of local knowledge and existing linkages (Govan & Hambrey, 1995) More effective use is made of local knowledge and existing linkages and networking within a community
Political Challenges	Management may be influenced by local politics or prejudice[16]
Cultural Preservation	Community decisions must consider enhancement and preservation of local social and cultural characteristics. The role of health, education, cultural and historical identity, and over all well-being must be taken into consideration.
Unified Community	A well-functioning and unified local community is a necessary pre-requisite for successful CBCRM implementation.
Education	Increased awareness of resource users is a primary objective of CBCRM and aims to ensure knowledge of sustainability issues (Govan & Hambrey, 1995)
Increased Human Capital	Increases access to human capital such as information, skills, and scientific experience (Wagner & Fernandez-Gimenez, 2008)

Taking into account a continuum of top down and community-based coastal management regimes, this feasibility study was conducted to show that some aspects of CBCRM are better suited to meet sustainability goals than others. An in depth discussion of the feasibility matrices presented above will provide further insight and understanding of the specific interactions and potential outcomes of CBCRM implementation to meet sustainability goals in Ísafjörður. This discussion will bring to light the potential benefits and challenges that are specific to this case study and provide recommendations and conclusions regarding the research conducted for this master's thesis.

[16] This potential challenge is considered further in the Discussion section.

Figure (6.3a) General Components Feasibility Matrix

CBCRM Component →	Integration	Distribution	Local
Sustainability Goal ↓	–––	–––	–––
Address Global Issues	+	O	–
Integration	+	–	O
Monitoring and Evaluation	O	O	+
Sustainable Planning	+	O	+
Master Plan Creation	+	+	+

Figure (6.3b) Environmental Components Feasibility Matrix

CBCRM Components→	Access	Local	Environmental Health	Policy	Monitoring
Sustainability Goal ↓	–––	–––	–––	–––	–––
Environmental Health	O	O	+	+	+
Icelandic Nature	O	O	+	+	+
Local Resource Use	+	+	+	+	O
Conservation	+	+	+	+	O
Waste	O	O	+	+	O

Figure (6.3c) Economic Components Feasibility Matrix

CBCRM Characteristic →	Implementation Costs	Local Economic Decision-Making	Cost Effectiveness	Economic Effects	Economic Capacity	Large-Scale Economy Suppression	Implementation Challenges
Sustainability Goal ↓	———	———	———	———	———	———	———
Green Tourism	+	+	–	O	+	O	–
Green Certifications	O	O	–	O	O	O	O
Economic Sustainability	+	+	–	+	+	O	–
Employment Opportunities	+	O	–	+	+	–	–

Figure (6.3d) Socio-cultural Components Feasibility Matrix

CBCRM Characteristic →	Local	Local Knowledge Use	Political Challenge	Cultural Preservation	Unified Community	Education	Increased Human Capital
Sustainability Goal ↓	———	———	———	———	———	———	———
Policy	+	+	−	O	+	O	O
Role of Society	+	+	O	+	+	+	+
Education	O	O	O	O	O	+	+
Community Initiatives	+	O	−	+	+	+	+
Community Services	+	O	−	O	+	+	+
Healthy Environment	O	O	−	+	+	+	+
Cultural and Historical Uniqueness	+	+	O	+	+	+	O

7. Discussion

Section (7.1.1.1) addresses the statistical data presented in the results. Its focus is sustainability issues in the whole of Iceland. Section (7.1.1.2) focuses on the individual interviews. Finally, a discussion of the feasibility study in Section (7.1.2) will reveal where CBCRM can and cannot contribute to Ísafjörður's sustainability goals.

7.1 CBCRM and Sustainability: Ísafjörður, Iceland

Generally, the data collected regarding the statistical indicators for sustainable development reveal that in many respects, Ísafjörður is working towards attaining its sustainability goals. It also reveals the town's shortcomings in implementing sustainability regulations, policy, and practice. The individual interviews conducted with various community members further support these findings. They shed light on many aspects of sustainability that cannot be measured by indicators. These aspects included underlying challenges and shortcomings not revealed by standard data records and the community's true perception of sustainability. Most importantly, the results indicate a strong relationship between the specific sustainability goals of Ísafjörður and the core principles of CBCRM. Results indicated that in many ways, CBCRM is a coastal management regime suited to help Ísafjörður meet certain sustainability goals. They also revealed that there are some goals which CBCRM may not be suited to meet. Ultimately, the research conducted in this thesis revealed that in order to effectively and properly manage the resources of a coastal community such as Ísafjörður, an integrated and holistic approach must be taken. No single management regime can address every challenge or issue presented by the complexities of the coastal zone. The approach taken must incorporate all stakeholders and all aspects of society, as well as the surrounding physical environment.

7.1.1 Statistical Indicators

Of all the numerical data gathered, information regarding the total CO_2 emissions in Iceland is the most alarming. CO_2 emissions are an indicator used around the world as a measure of industrial activity and environmentally degrading practices (both commercial and domestic). Figure (6.1.1a) clearly shows that these emissions

in Iceland have been steadily increasing over the last two decades. This trend is most likely due to increased industrial processes in Iceland. Major CO_2 producing industries such as aluminum smelting, ferrous-silicon processing, and fertilizer manufacturing are on the rise in Iceland. In addition, gross electricity and energy consumption is increasing in Iceland. It is difficult to say without further investigation, which is beyond the scope of this thesis, whether this is due to domestic or industrial consumption. In order to pursue intervention and take the appropriate actions, it will be important to identify the source. The same industrial activities that are responsible for mass amounts of CO_2 emissions are also responsible for heavy electricity consumption. Also making it difficult to understand exactly how these factors are related, is Iceland's unique production of electricity and heat via geothermal energy. The small island nation's physical location on the mid-Atlantic ridge provides a highly sustainable opportunity to harness energy and heat from deep within the earth. The Westfjords, as well as the majority of Iceland, is powered by geothermal-generated electricity.

A potential offset to this increase in CO_2 emissions is Iceland's decreased dependency on imported energy sources. Figure (6.1.3e) shows that over the last two decades, Iceland has increasingly harnessed its domestic energy sources. This positively contributes to Iceland's sustainability goals because any use of local energy sources evades externalities such as transportation costs and dependency on foreign markets. It should be noted however, that any energy consumption contributes to harmful emissions through infrastructure and distribution processes.

The statistics and numerical information highlight major sustainability issues and challenges faced by Iceland and Ísafjörður. These include:

- Waste treatment in Ísafjörður: Waste water and solid refuse treatment is possibly the largest environmental challenge faced by the community. Waste water is not treated before being piped into the open ocean, and solid refuse is processed via incineration or land-fill. All three of these practices are highly unsustainable and highly polluting to the delicate ecosystem of which the Ísafjörður community is a part.

- Local fish stocks and harvesting: This issue is extremely difficult to comment on because it is so complex. Data regarding harvesting, fish stock migration patterns, climate change, ecosystem and habitat quality, actual fish stock numbers, vessel size, fishing methods, and respective quotas must all be taken into consideration. These factors are all outside of the realm of this thesis, but it should be noted that this is a major aspect of sustainability and natural resources in Ísafjörður. Because fisheries are integral to the town's economy and community, it is relevant to the objectives of CBCRM and further investigation is needed.
- As indicated by data from Statistics Iceland, Iceland's GDP per capita has significantly decreased since the recession in 2008. Recall that in 2007, the GDP per capita was $42,400 USD, $42,700 USD in 2008, and after the crisis that year, it was $39,600 USD. This will prove to be a significant challenge to all sectors of commerce and government in the coming years of recession and recovery and will significantly affect the role that sustainability will play in future policy and actions.
- Population trends in Ísafjörður Figure (6.1.3a) indicate a slow decline over the last two decades. As mentioned in interviews with various community members, this factor makes sustainability in a small coastal town such as Ísafjörður very difficult to achieve (pers. comm.: K. Jóakimsson, October 20, 2010; B. Petursson October 10, 2020, and G. Konráðsson, November 4, 2010). There is a critical mass that is necessary to make social services realistic. If this trend continues over the coming decades, challenges in areas such as education, social, and health services may present themselves.
- The statistics and numerical information also highlight the sectors in which Ísafjörður is positively working towards its sustainability goals. These examples include resource production in which Iceland is increasingly utilizing the natural resources and resource production opportunities available to them. Agriculture and fish farming are two examples of this.

7.1.2 Interviews

Personal, semi-structured interviews were conducted and recorded with twelve individuals from a cross-section of industries and sectors. In general, the interviews provided extremely valuable insight regarding local perspectives of sustainability issues and/or topics. Interviewees were provided with common definitions of sustainability before the interviews were conducted. At the interviews, they were asked to provide their understanding of sustainability for a small coastal community, how they perceived sustainability in Ísafjörður, and future aspirations for the area. Interestingly, many individuals expressed that they relate sustainability to two major characteristics. First, that they can have access to the Icelandic nature that is unique to Ísafjörður; and secondly, that the population consistently remains at a level that can provide basic amenities and services.

General Findings

Interviews and general research revealed that there is evidence of national and local government encouraging sustainable practices in Iceland including Ísafjörður. This effort to encourage sustainable behavior is reaching communities on a local level. Significant examples of this in Ísafjörður include principles of sustainability incorporated into select local business plans as well as a presence of sustainable ethics related to resource use. Interviews with employees of Atvest (a local business investment firm), the local branch of the Innovation Center, municipal planning and environmental offices, the University Centre of the Westfjords, and local fishing companies such as HG revealed that encouragement to incorporate sustainably minded actions in their business operations and decision making process is present. These individuals indicated that this encouragement comes from a variety of sources such as personal initiative, government and company regulations, and in some cases, from employees and/or community members. Furthermore, evidence of policy addressing sustainability in a local context include a Local Agenda 21 and the Master Plan for Development in Ísafjarðarbær. There are however, aspects of implementation that are failing to result in positive actions and proper resource management. These will be discussed later in this section.

Investigating the implementation of Agenda 21 and sustainable practices in Ísafjörður was one of the main objectives of this master's thesis. Interviews with all

individuals contributed to understanding what sustainability is and how it is implemented in a coastal community such as Ísafjörður. The most significant findings are summarized below:

1) There are a select few municipal publications addressing sustainability in Ísafjörður. Of these, the Local Agenda 21 (Staðardagskrá 21 fyrir Ísafjarðarbæ, published in 2006) is the most comprehensive document. Research revealed that implementation of such documents exists in the form of small-scale initiatives, minor integration of sustainable practices and/or frame of mind, and a general increased awareness of sustainability topics and issues.
2) At a glance, or superficially, it appears that little has been done to implement objectives of Local Agenda 21. Interviews revealed that in actuality, the principles of sustainability identified in Ísafjörður's Local Agenda 21 and summarized in Table (4.1.3.2) in Section (4.1.3.2), are integrated and hidden within the local government (pers. comm., Halldór Halldórsson, October 19, 2010). That is, efforts to bring principles of sustainability to the community manifested as integration in mindsets, attitudes, and personal beliefs of resource managers and local decision makers.
3) Interviews revealed that the average resident, "…wants to live in a sustainable way. They want to live here because there is good access to the nature. You can go sailing, hiking, skiing, and all these are connected to sustainability. But, if you talk to people about sustainability, they maybe wouldn't understand the language. They would maybe not define it as sustainability, but it is, they are thinking about sustainability" (pers. comm., Gunnar Pall Eydal, October 7, 2010)[17].

These findings demonstrate how successful integration of sustainable principles cannot be gauged upon the number of pamphlets published, "green" signs in store windows, or even government publications and announcements regarding "green" practices. Instead, integration of sustainability should be evaluated according to the frame of mind in which decision makers approach components of sustainability such

[17] It is important to note that for the quality of information gathered during the individual interviews; this ambiguity was overcome by providing the definitions of sustainability.

as resource management, education, politics, healthcare, social well-being, tourism, and environmental preservation and conservation. As highlighted by the significant findings, it is evident that efforts are being made to integrate principles of sustainability into local environmental, economic, and socio-cultural decision making. However, at present there are still few tangible outcomes of these efforts in the forms of policy, community and educational initiatives, and general public behavior. These conclusions will be discussed further in Section (8.0).

Major challenges in promoting and achieving sustainability

In nearly every interview, waste management issues in Ísafjörður were raised as a serious concern. People expressed two major concerns: first, that the environmental and human health effects resulting from incineration of their solid waste are unacceptable and potentially causing harm; and second, the alternative methods of waste management, such as exporting solid waste to Europe, have the potential to be equally harmful to the environment. Because Ísafjörður is remote from the capital of Iceland, and Iceland is so distant from Europe, elaborate transportation routes would be needed to export and properly dispose of or treat solid refuse. Ísafjörður's current conundrum is this: Incinerate and landfill all of their solid waste, resulting in direct pollution of the delicate coastal ecosystem of which they are a part, or transport their waste abroad, using fossil fuels and further degrading the environment. It is undeniably clear that waste treatment is a major concern of locals in Ísafjörður and a spectrum of challenges, complexities, and tensions surround the issue. Alternative suggestions to address these problems include increased recycling capabilities and educating community members on ways to reduce overall consumption and therefore waste production. As will be discussed in Section (8.0), this serious situation could be addressed by action plans resulting from resource management that is locally and community-based.

Other significant issues raised by community members fall under categories such as global and local sustainability challenges, community education, job creation, and local population trends. As pointed out in the Literature Review and Context sections, the international standards and recommendations for pursuit of sustainable development are extensive and explicit. Funding, infrastructure, and management are needed to accomplish sustainability, and Ísafjörður simply does not have the

magnitude of financial, infrastructure, or human resources necessary to accomplish them. Community outreach and education presents another challenge. There have been efforts to integrate principles of sustainability into the primary and secondary educational programs, however these have been amateur at best (pers. comm., C. Drake, October 6, 2010), and schools are seriously lacking the tools and knowledge necessary to educate the younger generations on global and local issues of resource utilization, environmental preservation and conservation, and the political and social complexities of sustainability (pers. comm.: Gunnar Pall Eydal, October 7, 2010; Ralf Trylla, October 4, 2010).

In Ísafjörður, local population trends and job creation go hand in hand and are the source of another major sustainability concern. As Figure (6.1.3a) in Section (6.1.3) shows, the population of Ísafjörður has been slowly declining for the last two decades. All of the interviewees that were affiliated with business, job creation, or held important decision making roles expressed that finding ways to keep the population in Ísafjörður at its current levels or higher is a critical and underlying need. A select few also mentioned that in certain instances, meeting this need took precedence over choosing industry or business that was sustainable and environmentally responsible (pers. comm., Shiran Þórisson, September 29, 2010). In addition to population concerns, the importance of job creation was emphasized as well. When asked about the conflicts between these issues and environmental considerations, Sigriður O. Kristjánsdóttir expressed:

> "Everyone would like to be sustainable… we sincerely want to leave this place {in good condition} and use our natural resources in a sustainable manner, but when it comes to costs and developing, I think sometimes, sustainability is set aside for a momentary gain."[18]

An excellent example of this came in the last decade when an offer to build an oil refinery was presented to town officials. The company proposing the construction offered to create 500 jobs for the people living in and around Ísafjörður. The community went as far as investigating potential locations for construction, but in the end, the refinery was not built. The experience was described by the previous Mayor of Ísafjörður:

[18] Personal Communication, Sigriður O. Kristjánsdóttir, October 1, 2010

> "We couldn't find agreement to say no… the reason {was} not that we wanted to be environmental, the reason {was} that people looked at the other side of it, we have been losing jobs and we have been losing people… Yes, it was a really bad thing… I think we will learn from this a lot and probably, if it will come again, people in the Westfjords will say no."[19]

This experience demonstrated two key points: first, that livelihood and survival often take precedence over objectives of resource management and sustainability in remote and fragile communities; and secondly, that residents of Ísafjörður do care for and consider their physical and social well-being. This incident demonstrates, through the town's inability to come to a decision, that certain town residents were not willing to sacrifice the pristine and unique nature that surrounds them for the potential of temporary benefits.

These examples surmount to the same conclusion: Whether they identify it as sustainability or not, many community members demonstrated an interest in preserving and maintaining the quality and quantity of the coastal natural resources available. As revealed in interviews with individuals such as fisherman and managers of local industry, the resources available to Ísafjörður are vital to its continued success, quality of life, and sustainability. Many explicitly stated a personal interest in utilizing Iceland and Ísafjörður's coastal resources in a sustainable manner and many consistently remarked that fellow community members share the same interest. Although an interest in the pursuit of sustainability is present, it generally appears to be just an interest. Finally, it is not believed that this interest is enough to achieve the explicit goals stated in the Local Agenda 21.

CBCRM could contribute in making the transition from interest to action. It is believed that the potential for successfully utilizing CBCRM would be best focused in facing Ísafjörður's final challenge of raising community awareness of sustainability and resource management issues. There is a large discrepancy in knowledge among community members (pers. comm., Gunnar Pall Eydal, October 7, 2010). Using

[19] Personal Communication, Halldór Halldórsson, October 19, 2010

CBCRM as an outreach and education method for issues of local sustainability could address the lacking presence of knowledge as well as the discrepancy between local interests and local action.

Conclusions regarding sustainability

When asked if there are any sustainability components that community members would like to see made a priority in the town, many mentioned that they hope for a shift in resource utilization. They explained that Ísafjörður is greatly dependent on foreign resources such as food, oil, manufacturing, and health care, and they wish to see the community become more sustainable by better use of local resources. "I want to live in a community that is quality… a sustainable community where I do have all the services needed… I like the community which can utilize the resources in the area and we can look to make something better" (pers. com., Kristján Jóakimsson, October 20, 2010).

"You can define sustainability with technical vocabulary and concepts, but understanding its importance and relevance is more about relating sustainability to the personal lives and interests of the residents of Ísafjörður" (pers. comm., Halldór Halldórsson, October 19, 2010). As the next section of this discussion connects sustainability issues with the principles and practice of CBCRM, we will see how the notion of local and personal connections comes into play.

7.2 CBCRM Feasibility Study

This section will look at each of the CBCRM feasibility matrices presented in the Results. A detailed review of each matrix will provide a better understanding of the overall feasibility of CBCRM in contributing to Ísafjörður's sustainability goals. Additionally, it will set the stage for the presentation of recommendations based on the research outcomes of this thesis.

7.2.1 General Components Feasibility

Integrated objectives and locally-based management principles and practices are the two major components of CBCRM that are best suited to meet the needs of Ísafjörður and its sustainability goals. The integrative objectives of CBCRM would

positively contribute to all the identified goals[20]. In addition, Figure (6.3a) of Section (6.3) shows that CBCRM's integrative nature would positively contribute to meeting and addressing global sustainability issues through fostering more integrative approaches to coastal resource management. Furthermore, CBCRM's integrative principles include all aspects of the triple bottom line, and would set a foundation for sustainable development in Ísafjörður.

At the core of CBCRM are the locally-based management principles and practices that make it a notable contributor to local sustainability goals. Contributions would include more consistent monitoring and evaluation of environmental, economic, and social processes, and sustainable municipal planning.

The ways in which CBCRM does not contribute to identifying sustainability objectives are found first, in the interactions between CBCRM's localized feature and Ísafjörður's goals to address global issues; and secondly, between CBCRM's inherent power distribution and Ísafjörður's goal to further integrate management components. The first conflict is of concern because CBCRM encourages communities to create and implement plans that are focused on the specific needs of that community. This does not align with the town's stated goal of overcoming global and international sustainability challenges. The second conflict is of concern because Ísafjörður is looking to integrate various levels and branches of government. Although it is possible to accomplish this through CBCRM, one of the main objectives of local management is to distribute power throughout the local level and eventually, have the community be self-serving and self-functioning.

7.2.2 Environmental Components Feasibility

In the environmental components matrix, there are no negative interactions. This raises two important points. First, although there are no negative interactions (which makes CBCRM an excellent management tool in addressing environmental goals), it is important not to forget that there are many factors considered in this feasibility study. Therefore, all the aspects (environmental, economic, and social) must be taken into consideration before drawing conclusions about CBCRM's ability to contribute to Ísafjörður's sustainability goals. Secondly, this raises the question: How important

[20] It should be noted that CBCRM's integrative feature has a neutral interaction with the monitoring and evaluation goals set forth by the town.

is meeting environmental sustainability goals as opposed to economic and social factors? As Sigriður Kristjánsdóttir pointed out, the people of Ísafjörður want to take care of their environment, but when an opportunity for job creation or development presents itself, people will take it for a mere momentary gain (pers. comm., Sigriður Kristjánsdóttir, October 1, 2010). Having spoken with the people of Ísafjörður about these issues, it is clear that the economic and socio-cultural factors of sustainability play a key role in the decision making process. Although interviewees suggest that economic and socio-cultural factors hold more weight in decision making, Section (8.2.2.3) points out that the relative significance of environmental, economic, and socio-cultural sustainability components is not well researched and therefore it is difficult to identify an ideal balance of these three factors.

7.2.3 Economic Components Feasibility

CBCRM's inherent economic sustainability is an important benefit of its implementation. When properly implemented, CBCRM creates economic systems that are local and self-sustaining. This would prove beneficial to Ísafjörður because it would positively contribute to the town's goals of maintaining population and jobs. They eliminate excessive dependence on foreign and non-regional resources. This feature is very desirable for Ísafjörður due to its remote location and current dependence on non-local resources in numerous sectors.

The cost effectiveness of CBCRM is beneficial to a central government but can place financial burden on the community in which it is implemented. These effects are all potential, but not inevitable, and are important to note. This feature of CBCRM is the one that posed the most negative interactions in the presented matrices. Another component of CBCRM that may come across as undesirable in Ísafjörður is that it does not allow for large-scale industry or economy. This is related to the community's expressed interest in job creation and population sustainability. However, as an employee of the Innovation Centre in Ísafjörður asks, "What if we don't think oil refinery, and we don't think huge powers… what if we think on a small business scale that will create sustainable jobs?" (pers. comm., Sigriður Kristjánsdóttir, October 1, 2010). There are conflicting fears of job security and preservation of the physical environment among community members and this may be a future source of conflict in coastal resource management. Research was not

extensive enough to conclusively say how and to what extent this will affect development and resource utilization. However, it is most likely that the combination of recent population trends and job security will be significant contributing factors in future decision making.

Other challenges highlighted by the economic feasibility matrix include aspects of CBCRM such as the initial implementation phase. These negative interactions exist because existing large-scale industries would most likely resist the implementation of a management regime geared towards small-scale local, initiatives. This is due in part because CBCRM empowers community members and strengthens unity and decision-making power among individuals and stakeholders. Larger businesses have little to gain from such a regime, and in Ísafjörður, such resistance could occur from larger fisheries or tourism related business.

7.2.4 Social Components Feasibility

The positive contributing factors of CBCRM in the social feasibility matrix are local management, a unified community, education, and increased human capital. By using CBCRM to create and foster these characteristics, a positive contribution to the sustainability goals of Ísafjörður could be made. CBCRM helps to define the role of social well-being, community initiatives, a healthy social environment, and the cultural and historical uniqueness of the community. It accomplishes these through management tools such as community-specific management plans, and emphasizing the role of education in fostering socially, economically, and environmentally sustainable behavior. These positive interactions will weigh heavily in the recommendations for Ísafjörður's pursuit of sustainability. The functions of CBCRM that contribute to the town's social sustainability goals are significant, and are mentioned in Local Agenda 21 as well as individual interviews.

The social components feasibility matrix reveals one potential and serious challenge. If CBCRM were to be implemented, the political will of elected and hired town officials would have to be in favor of its implementation. If a management regime is not supported by community members and important decision-makers alike, it will not be successfully implemented and integrated. Interviews did not reveal a significant potential for adversity to management practices that would contribute to reaching sustainability goals. However, further investigation of this would provide a

deeper understanding of how political will in Ísafjörður would affect CBCRM implementation.

8. Recommendations

8.1 General Recommendations

Principles of sustainable development must be integrated in a way that combines and works towards Ísafjörður's goals. If policy, education, and initiatives aim to achieve local goals through sustainable means, sustainable behavior will be encouraged at the most local levels. As interviews revealed, the people of Ísafjörður are aware of a need to preserve and care for the physical environment and natural resources of the Westfjords. They are also aware of the unique ecosystem of which they are a part, as well as the delicate balance that exists between land and sea. Therefore, promoting strengthened policy, education, and initiatives in the town will provide an opportunity to develop and act upon these feelings.

If Ísafjörður is to work towards sustainable development in such a manner as described above, the question remains: What is the best method to accomplish this? The answer is not simple, but the research conducted in this thesis provides a solid framework for tackling this pressing question. Coastal nations around the world are encountering difficulties in preserving the delicate balance between fragile coastal resources and the ever increasing pressures resulting from development and use of the coastal zone (Wiber et al., 2004). There are many regimes and tools available to coastal managers. This thesis examined one of these, and has shown that in many regards, CBCRM is well-suited to address the needs and goals of Ísafjörður. For a remote coastal community such as Ísafjörður, the power distribution and involvement of local stakeholders promoted by CBCRM creates and encourages resource users to practice sustainable management (Govan & Hambrey, 1995). It cannot be said that CBCRM is the best or most appropriate means to achieving the town's sustainability goals because further investigation of other coastal management regimes and tools need to be explored. CBCRM does however, meet many of the town's goals and it is recommended that the appropriate aspects[21] be implemented.

[21] Refer the CBCRM feasibility matrices for the appropriate aspects.

8.2 Suggested Aspects and Methods of Implementation

In order to gain support of CBCRM from the residents of Ísafjörður, the role of healthy environments and sustainable use of coastal resources as well as the cause-and-effect relationships between local resource users and the physical environment need to be demonstrated to the community. This can be achieved through educational and outreach programs and initiatives (Alcala, 1998) as well as strengthened local policy. It is recommended that Ísafjörður starts by placing emphasis and focus on these two aspects in order to create the foundations for community-based management implementation.

8.2.1 Education

Educational outreach is a common thread through international policy and publications addressing sustainable development. Educating communities is fundamental to achieving all objectives outlined in Ísafjörður and Iceland's sustainability objectives, and through education, it is possible to inspire socially, economically, and environmentally sustainable behavior. Creating education for youth and adults that aims to maintain the town's standards of living and well-being, while sustaining the quality and availability of coastal natural resources and ecosystem services[22], would result in a unified and directed effort to achieve goals such as those set forth in Ísafjörður's Local Agenda 21.

8.2.2 Policy

Strengthened local policy such as action and development plans would result in greater implementation and community-based initiatives. It is recommended that such policy be used as another means of implementing CBCRM principles to meet local sustainability goals. In addition to creating stronger and more explicit policy, the creation of local programs in support of CBCRM must be supported by decision makers and local government officials. As pointed out by the former mayor of Ísafjörður, sustainability is more of a frame of mind than it is a law or a publication

[22] Ecosystem services are defined most generally as, "The processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants" (What are Ecosystem Services: Ecological Society of America, 2010).

(pers. comm., Halldór Halldórsson, October 19, 2010). It is a belief upon which decisions are based. This belief must be present in all forms of decision making.

When creating CBCRM policy, there are steps a local government can take to ensure cohesive, directive, and sustainable policy. First, in order to facilitate effective planning, the overall policy objectives must be defined. These have been outlined in documents such as Ísafjörður's Local Agenda 21 as well as the Master Municipal Development Plan (Teiknistofan Eik ehf., 2009). Secondly, choosing specific policy tools such as those characterized by CBCRM will contribute to effectively obtaining sustainability goals. Finally, once such policy is created, it is important to review the objectives and tools chosen. Ensuring that the policy drafted includes specific means of implementation, and is not simply another list of goals, will aid with timely and effective implementation.

8.2.3 Other Recommendations

Ísafjörður possesses the foundations for educational outreach and strengthened policy. The means to incorporate these recommendations exist in local institutions such as The University Centre of the Westfjords. As Jentoft (2000) suggests, policy, educational, and action plans for a sustainability-seeking community cannot only rest on a single industry or resource. It must employ a broad strategy that takes advantage of all opportunities for the community to sustainably develop and exist in the coastal zone in which it resides (Berkes & Farvar, 1989). The University Centre of the Westfjords is a unique institution that brings together governmental, private, public, and educational organizations in one building with a goal of fostering collaboration and communication among them. The Centre has already demonstrated such community outreach as mentioned by Jentoft (2000) and has established itself as a leader in the community. Examples of its success include collaboration between business, academics, and social services. Many recent environmental and natural resource awareness events in Ísafjörður were organized by students and employees at the University Centre. These included a global awareness day for climate change, teacher education workshops for sustainability, and school-wide sustainability days for local students and children. The Centre is essential to sustaining a network of programs, initiatives, and social groups that work toward sustainability goals. It is

recommended that Ísafjörður continues to take advantage of the dynamics that exist in this institution if implementation of CBCRM is pursued.

Finally, several shortcomings in the research that supports the concepts explored in this thesis are highlighted below. Reviewing relevant and current research and case studies in the fields of sustainability and CBCRM reveal that there are certain aspects needing further investigation:

- Additional evidence that integrated approaches to coastal management and CBCRM result in sustainable and prosperous resource management would strengthen ties between the fields of sustainability and CBCRM (Zagonari, 2008);
- A deeper understanding of the level of community cooperation that is necessary for CBCRM implementation to be successful would shed light on the value of such cooperation (Zagonari, 2008);
- The effect that development in community-based initiatives has on forms of social capital such as knowledge, stewardship, networking, and trust among resource stakeholders would define their importance in CBCRM (Wagner & Fernandez-Gimenez, 2008);
- The measurement of social capital resulting from community-based resource management and its relative value to economic and environmental capital, remains difficult to understand on a community-wide scale (Wagner & Fernandez-Gimenez, 2008). Therefore, research that seeks to quantify and compare social/human, economic, and environmental capital in the coastal zone is needed;
- Jentoft (2000) cautions that there is no guarantee of community-based management building or creating functional resource management systems. Research that provides a more thorough understanding of how and in what ways CBCRM components lead to successful resource management is needed. Perhaps a breakdown of environmental, economic, and socio-cultural components of CBCRM and their resulting effects would help to answer these questions.

8.3 The Big Picture

The research conducted in this thesis has shed light on a much larger issue in the merging of coastal management and sustainable development principles. The final recommendation addresses the need for a new method of evaluating and understanding the integration and implementation of sustainable management principles in a given coastal community. There are many aspects of sustainable resource management that are not definable or measureable by statistical indicators and numerical data collection. Interviews provide valuable insight, however they are time consuming. It is suggested that practitioners and researchers find a means to understand and evaluate sustainable management through a combination of quantitative and qualitative research design that investigates the underlying complexities of sustainability such as knowledge, perceptions, and behavior of individuals in a community. It is hoped that this would result in more holistic and effective integration of sustainability and ICZM on a local level.

9. Conclusions

This thesis explores how and if CBCRM is suited to contribute to meeting Ísafjörður's sustainability goals. It compares the key features of CBCRM with Ísafjörður´s specific sustainability goals as outlined by national and local governments in documents such as *Welfare for the Future* (The Icelandic Ministry for the Environment, 2002) and Local Agenda 21 (Magnússon, 2006). Although this thesis cannot claim to be an exhaustive investigation of CBCRM´s suitability to achieving sustainability in Ísafjörður, it does offer representation of current sustainability policy and objectives, community views and shortcomings, as well as a realistic assessment of CBCRM as a contributor to local goals. Results show that certain features of CBCRM could serve as an advantageous approach to achieving Ísafjörður's sustainability goals in specifically identified environmental, economic, and social sectors. However, potential obstacles and challenges in implementing components of CBCRM were identified.

Results show that CBCRM could contribute to meeting nearly every environmental sustainability goal in Ísafjörður including improvement of overall environmental health, access to Icelandic nature, sustainable use of local resources, increasing conservation, and improving waste treatment and air quality. Economic goals which could potentially be addressed by CBCRM components included job creation and overall long-term economic sustainability. Socio-culturally, CBCRM is well suited to strengthen the role of society, create a healthy social environment, increase knowledge of sustainability principles, and preserve local knowledge as well as cultural and historical uniqueness.

Specific obstacles and challenges making certain components of CBCRM not well suited to meet the sustainability goals of Ísafjörður were identified in Sections (6.0 and 7.0) and included cost effectiveness and potential political opposition or insufficient community support. Such opposition was the most concerning obstacle identified and was highlighted by the socio-cultural feasibility matrix (Figure (6.3d)). As stated in the recommendations, local government support is crucial to successful implementation of CBCRM. It is unknown whether such political opposition will occur; further investigation is needed. Additionally, interviewees revealed that major concerns such as job security and recent decreasing population trends are occasionally

taking precedence over general sustainability goals. This finding emphasizes that in some aspects, sustainability is not a priority among community members. On the other hand, aspects of CBCRM such as implementation challenges and large-scale economy suppression pose concern in regards to meeting Ísafjörður's specific goals.

The results from this thesis do not suggest that CBCRM can address all shortcomings in Ísafjörður's sustainability-seeking quest. They do, however, show that all environmental, as well as selected economic and socio-cultural goals could be achieved with a locally or community-based resource management approach. The acknowledged challenges of meeting local sustainability goals further supports the most fundamental principle of this thesis: Resource management and seeking sustainability must be integrated. It is believed that successful approaches to the sustainable development and coastal resource management dilemma will be found in complementary and compatible relationships among the resource, users, and the larger set of institutional relationships (Berkes & Farvar, 1989). In other words, integrating the local needs of Ísafjörður and the institutional relationships found in sustainable development will strengthen the means to achieving the town's specific objectives. Furthermore, this notion connects all key concepts discussed throughout this thesis: ICZM, CBCRM, and sustainable development are inextricably integrated and are most useful when used in combination with one another in a context where local needs are the focus of its efforts.

As demonstrated and discussed throughout this thesis, the interrelationships between sustainability and coastal resource management are inherent in their most basic principles. These include a holistic approach that incorporates the triple bottom line, the insurance of a long-term perspective as opposed to sacrificing precious resources for immediate or short-term gains, and emphasis on the value of community member and stakeholder participation. The primary objectives of ICZM include a sustainable use of the coastal zone (Govan & Hambrey, 1995); thus linking the ideals and objectives of sustainable development, ICZM, and CBCRM.

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Appendices

Appendix A

Contact information for the interviewees

Position Title	Name	Email Contact
Previous Mayor of Ísafjörður	Halldór Halldórsson	formadurhh@samband.is
HSVest CMM Student	Carrie Lynn Drake	carrielynndrake@gmail.com
HSVest CMM Icelandic Student	Birna Run Arnarsdóttir	johann@internet.is
Fishing Industry Member	Guðmundur Konráðsson	
Fishing Industry Manager	Kristján G. Jóakimsson	kgj@frosti.is
Land- Farmer	Betty	saebol2@gmail.com
Innovation Centre Iceland	Sigriður O. Kristjansdóttir	sirry@nmi.is
Cultural Support Center	Elsa Arnardóttir	elsa@mcc.is
ATVEST Employee	Shiran Þórisson	shiran@vaxvest.is
Teiknistofan Ehf.	Gunnar Páll Eydal	gunnar@teiknistofan.is
Environmental Engineer	Ralf Trylla	ralf@isafjordur.is

Appendix B

Individual Interview Questions

Individuals in Environmental Sectors

- Briefly describe what your job/position/role is in the institution you work for/are a part of?
- When I say sustainability in Ísafjörður, what do you think of?
- In your position, how often would you say you think about or handle sustainability topics? (Every day, once a week, a few times a year, never? (If they ask what sustainability topics are: Anything issue, task, topic, or event you are involved in that is related to the definition you gave me)
- Can you give examples of typical sustainability issues that you encounter or handle? (Environmental legislation, community outreach, educational endeavors, personal) (natural resources, public behavior)
- Can you talk about the source of these sustainability topics/issues? In other words, who or what causes you to be aware of these issues? Is it a result of your job description, personal initiative, the government, school or educational experiences, family, peers, etc.?
- Can you talk about how you would prioritize sustainability among any other environmental (I will say whichever topics they mention in the previous parts of this interview) topics/issues for Ísafjörður? Please try to give a general perspective- I am not looking for you to rank specific projects.
- How do you perceive sustainability in the community of Ísafjörður. What level of involvement is there with sustainability issues?
- What initiatives, events, community members, or community organizations are you aware of that deal with sustainability in Ísafjörður?
- In the future, what significance do you believe sustainability topics/issues should hold for environmental or natural resources topics Ísafjörður?
- Are there any sustainability topics or issues would you like to see Ísafjörður make a priority? If yes, please elaborate on which ones.

Individuals in Economic Sectors

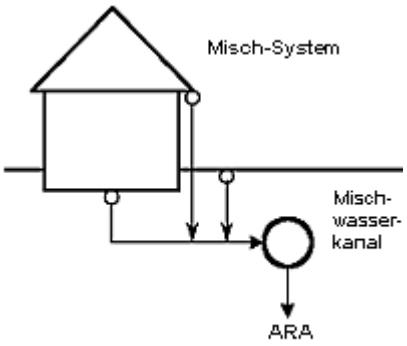
- Briefly describe what your job/position/role is in the institution you work for/are a part of?
- When I say sustainability in Ísafjörður, what do you think of?
- In your position, how often would you say you think about or handle sustainability topics? (Every day, once a week, a few times a year, never? (If they ask what sustainability topics are: Anything issue, task, topic, or event you are involved in that is related to the definition you gave me)
- Can you give examples of typical sustainability issues that you encounter or handle? (Business plans, marketing or advertising, educational endeavors, personal)
- Can you talk about the source of these sustainability topics/issues? In other words, who or what causes you to be aware of these issues? Is it a result of your job description, personal initiative, the government, school or educational experiences, family, peers, etc.?
- Can you talk about how you would prioritize sustainability among any other economic (I will say whichever topics they mention in the previous parts of this interview) topics/issues for Ísafjörður? Please try to give a general perspective- I am not looking for you to rank specific projects.
- How do you perceive sustainability in the community of Ísafjörður. What level of involvement is there with sustainability issues?
- What initiatives, events, community members, or community organizations are you aware of that deal with sustainability in Ísafjörður?
- In the future, what significance do you believe sustainability topics and issues should hold compared to other economic topics such as economic development, job creation, and business development in Ísafjörður?
- Are there any sustainability topics or issues would you like to see Ísafjörður make a priority? If yes, please elaborate on which ones.

Individuals in Social Sectors

- Briefly describe what your job/position/role is in the institution you work for/are a part of?
- When I say sustainability in Ísafjörður, what do you think of?
- In your position, how often would you say you think about or handle sustainability topics? (Every day, once a week, a few times a year, never? (If they ask what sustainability topics are: Anything issue, task, topic, or event you are involved in that is related to the definition you gave me)
- Can you give examples of typical sustainability issues that you encounter or handle? (Community education and outreach, educational endeavors, personal, cultural influences) (natural resources, public behavior)
- Can you talk about the source of these sustainability topics/issues? In other words, who or what causes you to be aware of these issues? Is it a result of your job description, personal initiative, the government, school or educational experiences, family, peers, etc.?
- Can you talk about how you would prioritize sustainability among any other social (I will say whichever topics they mention in the previous parts of this interview) topics and issues for Ísafjörður? Please try to give a general perspective- I am not looking for you to rank specific projects.
- How do you perceive sustainability in the community of Ísafjörður. What level of involvement is there with sustainability issues?
- What initiatives, events, community members, or community organizations are you aware of that deal with sustainability in Ísafjörður?
- In the future, what significance do you believe sustainability topics and issues should hold compared to other social topics like education, employment, and law and policy in Ísafjörður?
- Are there any sustainability topics or issues would you like to see Ísafjörður make a priority? If yes, please elaborate on which ones.

Appendix C

Design of wastewater treatment in Ísafjörður provided by personal communication with R. Trylla, November 25, 2010.



Appendix D

Dear Interviewee,

In order to make the time we have set aside for our interview as effective and productive as possible, I want to provide you with a brief overview of my master's thesis research, the context of the material we will be discussing, and some simple definitions of sustainability (sjálfbærni). Please take a few moments to read these over and feel free to contact me with any questions you may have.

My master's thesis is entitled **Community-Based Coastal Resource Management As a Contributor to Sustainability-Seeking Communities: A case study for Ísafjörður, Iceland.** In my research, I want to learn about the sustainability goals of Ísafjörður. In order to help you think of and talk about sustainability in Ísafjörður, I have provided you with some basic and general definitions of sustainability. Sustainability can be defined as…

- "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Bruntland Report, 1987)
- … a concept that balances quality of economy, society, and the environment with the needs of a community. Through seeking this balance, a sustainable community also looks to consider and care for natural and economic resources while taking into account the needs of future generations (NC Environmental Stewardship Initiative)

During our interview, we will discuss topics of sustainability in Ísafjörður. I will mostly be looking for you to talk about your personal perspective of sustainability as a manager in the fishing industry. Again, please feel free to contact me with any questions you may have.

I look forward to meeting with you next week.

Kveða,

Jamie E. Landry
University Centre of the Westfjords Master's Student
Coastal and Marine Natural Resource Management
Simi: 846-1546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University Centre
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