

Cruising away from strong sustainability?

A case study of the social and environmental trade-offs of cruise tourism in Flåm, Norway

Henriette Sandstå

Master Thesis Series in Environmental Studies and Sustainability Science,
No 2019:012

A thesis submitted in partial fulfillment of the requirements of Lund University
International Master's Programme in Environmental Studies and Sustainability Science
(30hp/credits)



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Submitted May 14, 2019

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Abstract

Cruise tourism is the fastest growing segment within the global tourism industry, allowing tourists to visit spectacular coastal destinations all over the world. Due to its pristine fjord landscapes, Norway is a popular cruise destination. Over the past decades, cruise tourism has increased in the country, both in terms of cruise calls and passengers. Yet, cruise tourism is a source of local air pollution and discontent among local inhabitants in its host destinations, such as in the port of Flåm. Flåm is located in a UNESCO World Heritage fjord on the West Coast of Norway, known for its steep mountains and narrow fjord landscape. Yet, by increasing air pollution and erosion of the shore line, cruise tourism is threatening the economic foundation of both the Norwegian tourism sector and cruise tourism itself, which is dependent upon sustaining the natural environment in host destinations.

This thesis applies a strong sustainability perspective to analyse whether a trade-off is occurring between a growth in cruise tourism and the utility of natural capital for local inhabitants in Flåm. Based on qualitative methods, a literature review and semi-structured interviews, the findings reveal that the cruise industry is, to some extent, generating a trade-off that has a varied impact on the natural capital and people's well-being in Flåm. Although the economic contribution of cruise tourism is still highly valued in Flåm as it sustains livelihoods, the study identified a reduction in cruise tourism as desirable for Flåm, both as a tourist destination and local community. In conclusion, the thesis discusses a preferred path for Flåm to pursue in order to make future economic activity from cruise tourism in line with a strong sustainability approach.

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Cruiseturisme er den delen av det globale reiselivet som øker mest årlig. Dette gjør det mulig for millioner av turister å besøke unike kystlandskap verden over, blant annet i Norge. Norge er en populær cruisedestinasjon, spesielt på grunn av sitt unike fjordlandskap på Vestlandet. I løpet av de senere årene har denne delen av Norge opplevd en vekst i både cruiseanløp og cruisepassasjerer. Denne veksten har ført til økt forurensning og lokal motstand på populære cruisedestinasjoner, blant annet i Flåm. Flåm er en del av Nærøyfjorden, et UNESCO Verdensarvområde på Vestlandet kjent for sine bratte fjell og smale fjordlandskap. Veksten av cruiseturisme i Flåm har ført til økt belastning på naturen grunnet luftforurensning fra cruiseskipene og økt erosjon av kystlinjen. Dette truer det økonomiske grunnlaget for både det norske reiselivet og cruisesektoren ettersom turister reiser til Norge for å oppleve ren og uberørt natur.

I denne oppgaven vil jeg ta i bruk et «strong sustainability»-perspektiv for å analysere hvorvidt en økning i cruiseturisme i Flåm har ført til økt belastning på naturen og redusert livskvalitet blant

lokalbefolkningen. Analysen baserer seg på kvalitative metoder, som inkluderer en litteratur oversikt og semistrukturerte intervjuer med lokalbefolkningen i Flåm. Resultatene peker mot en delvis økt belastning på naturen i Flåm, i tillegg til en varierende påvirkningen på lokalbefolkningens livskvalitet. Den økonomiske betydningen av å ha cruiseturisme i Flåm er verdsatt av lokalbefolkningen, men resultatene indikerer at en reduksjon i cruiseturisme vil være en fordel både for Flåm som turistdestinasjon og lokalsamfunn. Til slutt diskuterer oppgaven hvilke tiltak som må til for at framtidig økonomisk aktivitet fra cruiseturisme i Flåm skal bli opprettholdt på en bærekraftig måte.

Key words: cruise tourism, air pollution, social and environmental impact, strong sustainability, sustainable tourism, Norway

Word count: 13 987

Acknowledgements

First, I want to thank my parents for always supporting me in my choices, showing genuine interest and belief in what I do. Your care and endless love, in forms of encouraging emails and texts, hugs, food, money (yeah, environmentalists need money too), discussions and an open house, have gotten me through six years of education, which has resulted in this final thesis. My gratefulness cannot be expressed in words; without you, I'm not sure where I would have been in the world.

Thank you to David who has guided me through the thesis process, providing valuable feedback and encouragements along the way. And to my thesis group – Carlos, Lukas, Sandra and Lucy – you've all contributed towards me making it to the end.

To the people in Flåm who participated in my study: thank you so much for your time and effort in sharing your thoughts and perspectives. Without your contribution, this thesis would not have become a reality.

Anna and Halley; you've been by my side, during the ups and downs of writing this thesis. Anna – you've become my new best friend, thanks for all the conversations, spinning sessions, meals shared and beers cheered. Halley – your positive energy, endless love, crazy humour and constant happiness has been invaluable to me. Without you girls, my two years in Lund would not have been the same.

To my friends back home – Sara, Swing with the 60s, Emma, Stine, Helene, Maren, Kristin and the rest of Girlsa – you've been there since the beginning. Your thousands of Snapchats, texts and hours of phone calls have gotten me through my studies abroad. Knowing that you all wanted me back to Oslo has meant the world to me, and finally, with this thesis being done, I'm coming back!

And, lastly, but most importantly, the largest thank you ever goes to my extended family in Lund – my LUMES-family! I love you SO much! I literally have no words to express how much you all mean to me. You've made the past two years the best time of my life. Thanks for all the parties, hugs, heated discussions, life-changing conversations, laughter and cabin trips! I'm forever and always going to be your queen!

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1. Introduction

Cruise tourism is the fastest growing segment within the global tourism industry. Despite its relatively small share of the total tourism market - only 2% - the industry has grown from having approximately 18 million cruise tourists in 2009 to an expected 30 million cruise tourists in 2019 (CLIA, 2018). Yet, the growth is not unproblematic. Cruise tourism is the largest emitter of CO₂ from tourism activities globally and is further contributing to local air, water and noise pollution in host communities (Ruiz-Guerra, Molina-Moreno, Cortés-García and Núñez-Cacho, 2019; Caríc and Mackelworth, 2014). Past research thus concludes that cruise tourism generates a threat towards the carrying capacity of the local environment in host destinations (MacNeill and Wozniak, 2018; Caríc and Mackelworth, 2014).

On one hand, the business model of the global cruise tourism industry is dominated by a focus on economic growth and increased consumption (Ruiz-Guerra, Molina-Moreno, Cortés-García and Núñez-Cacho, 2019). This can at best be characterized as having a weak approach towards sustainability: an idea prevalent within environmental economics, suggesting that manmade capital, mainly goods and services produced by humans, can substitute natural capital (Solow, 1991). As long as the total stock of capital is maintained, there is no need to preserve natural capital per se as it can be replaced by other forms of capital and thus, sustainability can be achieved without putting a limit on our natural resource use (Stern, 1997).

On the other hand, it is hard to believe that cruise tourists would want to travel to polluted and degraded destinations. Clean, pure and untouched nature is today a scarce resource, yet, an attractive asset in the market for tourism (Walnum, 2019). As such destinations increase in popularity, so do the constraints on the natural capital of the tourism industry. The approach of strong sustainability thus implies that there is a complementary relationship between natural and manmade capital as the former is vital to economic production (Daly, 1995). Natural capital is further contributing to the level of utility of populations, which is understood as the well-being of humans (Daly and Farley, 2004). Thus, natural capital is important to keep intact in order to sustain both economic production and the level of utility among future generations (Daly and Farley, 2004).

The natural capital of the Norwegian tourism industry is the country's pure and untouched natural landscape. Every year, millions of tourists want to experience the Norwegian fjords and mountains, especially by cruise (Innovation Norway, 2018b). From 2016 to 2017, cruise tourism in Norway experienced a growth of 14%, in terms of calls and passengers, compared with only a 3% growth in foreign commercial overnight stays for the same period (Innovation Norway, 2018a). The majority of cruise tourists visited ports on the West Coast of Norway, which is characterized by having steep

mountains and deep fjords (Innovation Norway, 2018a). Here, you also find the UNESCO World Heritage Area of the Nærøyfjord, which hosts one of Norway's most popular cruise ports, Flåm.

The port of Flåm is located in the Aurlandsfjord, a fjord arm of the World Heritage Area of the Nærøyfjord. It is a small fjord community with only 400 inhabitants, but received a record high number of 257 998 cruise tourists in 2018 (data received from Aurland Port Authority, available in Appendix 1). This makes it Norway's fifth most popular cruise destination (Innovation Norway, 2018b). The tourism industry has generated economic development and resulted in an increased population over the past ten years (Åsnes, 2019). Yet, cruise tourism has enhanced the pressure on the natural environment in terms of air pollution (Norwegian Maritime Authority, 2017) and erosion of the shore lines (Lothe, Mathiesen and Heiberg-Andersen, 2016). Local discontent towards the negative environmental and social externalities of cruise tourism has also been reported in national media sources (Molstad 2016; Helseth, 2014).

1.1. Focus and aim

By applying the theoretical concepts of strong sustainability, this paper will offer a case study of cruise tourism in Flåm, analysing its environmental, economic and social impacts on the natural capital and its utility for local inhabitants. The research questions of the paper will thus be as follows:

RQ1. To what extent is a trade-off occurring in Flåm between the growth in cruise tourism and the utility of natural capital for its local population?

RQ1.1. How is cruise tourism enhancing the constraints on the natural capital it depends on in Flåm?

RQ1.2. What are the impacts of cruise tourism on the utility of natural capital for the local inhabitants in Flåm?

RQ2. What are the implications of the current state of the trade-off in Flåm for its future as a tourist destination?

Research question one and its sub-questions aim to identify whether cruise tourism is generating changes to the natural capital and its level of utility for local inhabitants in Flåm. To answer the questions, I aim to analyse the environmental, economic and social impacts of cruise tourism in Flåm by conducting a literature review and interview local inhabitants in Flåm. Research question two further elaborates on the implications of the possible trade-off between a growth in cruise tourism and the utility of natural capital in Flåm, with the aim of uncovering whether cruise tourism is compatible with a strong sustainability approach.

The paper concludes by arguing that a reduction in cruise would be beneficial for the cruise and tourism industry in Flåm, as it would reduce the pressure on its natural capital and strengthen the level of utility among local inhabitants in Flåm. Furthermore, by following a strong sustainability approach, which is in line with the sustainability vision of the Norwegian tourism industry, Flåm would accept that there are natural limits to growth and avoid a future where tourism impinges on its own economic foundation.

1.2. Outline of the paper

The paper will begin with a literature review on cruise tourism in Norway and in Flåm, which includes data on the environmental impacts of cruise tourism, both in Norway and abroad. Thereafter, I present a theoretical overview of strong sustainability, followed by a methodology section. I will then present the results of the literature review and the primary data from the interviews, covering how cruise tourism generates changes to the natural capital and utility in Flåm. The paper concludes with a discussion of the results and recommendations for future research.

1.3. Relevance for sustainability science

Sustainability science is concerned with understanding the interactions between nature and society with the aim of guiding those interactions towards a more sustainable trajectory (Kates et.al. 2001). Research within sustainability science is furthermore problem-driven with an end goal of making sustainability more operational, thus, it ought to lead to some kind of action, which enhances sustainability (Spangenberg, 2011). This study is therefore relevant to sustainability science due to its aim of understanding how cruise tourism affects the natural and social environment in Flåm. By further analysing the trade-offs cruise tourism enhances, between economic activity and the natural environment in Flåm, it additionally touches upon a classic sustainability challenge of how economic development impinges on our natural environment. The research design of the paper is clearly defined by the problem at hand, while the results points towards the actions needed in order to make cruise tourism in Flåm more sustainable.

2. Cruise tourism in Norway

The following section on cruise tourism in Norway presents an overview of the developments of cruise tourism over the past two decades, indicating a trend of growth. This is followed by an introduction to the case study of this paper, being the port of Flåm, elaborating on past and future developments. This is followed by a presentation of the fjord ecosystem in Flåm, relevant for the later analysis of how cruise impacts the natural environment in Flåm. The last part of the chapter presents an overview of the environmental impacts of cruise tourism in Norway, including research from other ports documenting local air pollution. The chapter concludes by presenting the

sustainability vision of the Norwegian tourism industry and how cruise tourism potentially threatens the industry's vision of becoming the most sustainable tourist destination in the world.

2.1. What is a cruise?

Vestlandsrådet (the political council of Western Norway) defines cruise as:

A cruise is a vacation on board in normally larger, non-charter passenger ships, with no cargo and a predetermined route, visiting at least three ports. A cruise can begin and end in the same port and in different ports. The passengers live on board the ship and are offered activities, entertainment and possibilities to buy excursions and tours ashore in the ports the ship visits.

(Vestlandsrådet, 2016)

2.2. A growing industry

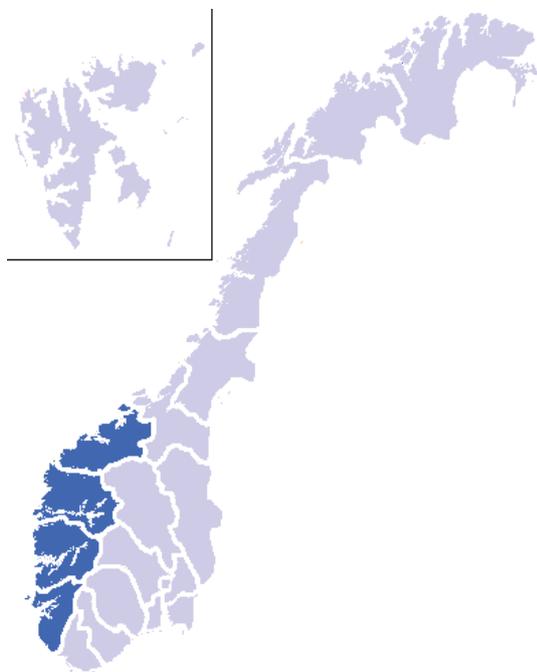


Figure 1. Map of Norway, including Svalbard, separated by counties. The dark blue part includes the four counties making up the West Coast. (Wiki/User:Sjoehest, 2006).

Due to its unique coastal environment, Norway is a popular cruise destination worldwide. Over the past years, the industry has experienced a growth in terms of both cruise calls and passengers, resulting in a record high number of 789.000 cruise tourists visiting Norway in 2018 (see figure 2) (Dybedal, 2018). The majority of cruise tourists visit ports on the West Coast of Norway (see map in figure 1), which is known for its unique fjord landscape. In 2018, the top six ports with the highest number of cruise calls, in addition to the top ten ports with the highest number of cruise passengers, were located on the West Coast, which equals a market share of 70% (Innovation Norway, 2018b). Consequently, this region has experienced 98% of the total growth in cruise tourism over the past four years (see Figure 3) (Dybedal, 2018). Dybedal (2018) further estimates a future growth in cruise tourism, resulting in 1, 6 million cruise tourists visiting Norway in 2060.

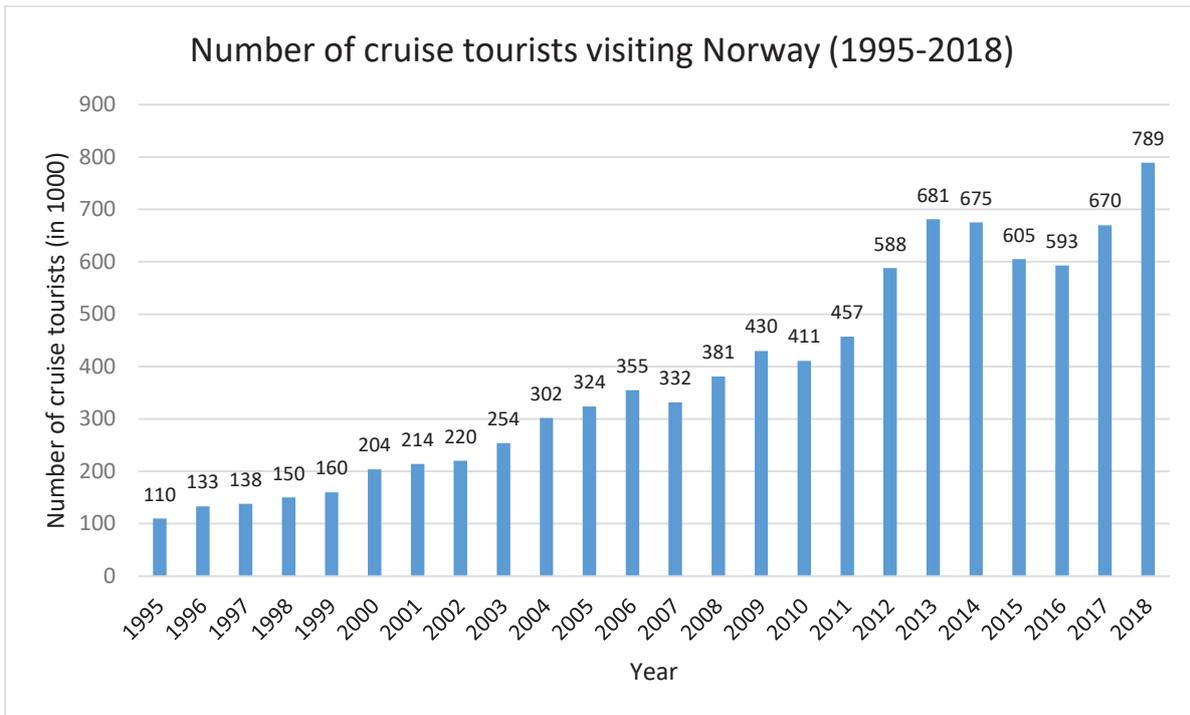


Figure 2. Number of cruise tourists visiting Norway from 1995 to 2018. Numbers are in 1000. (Dybedal, 2018.)

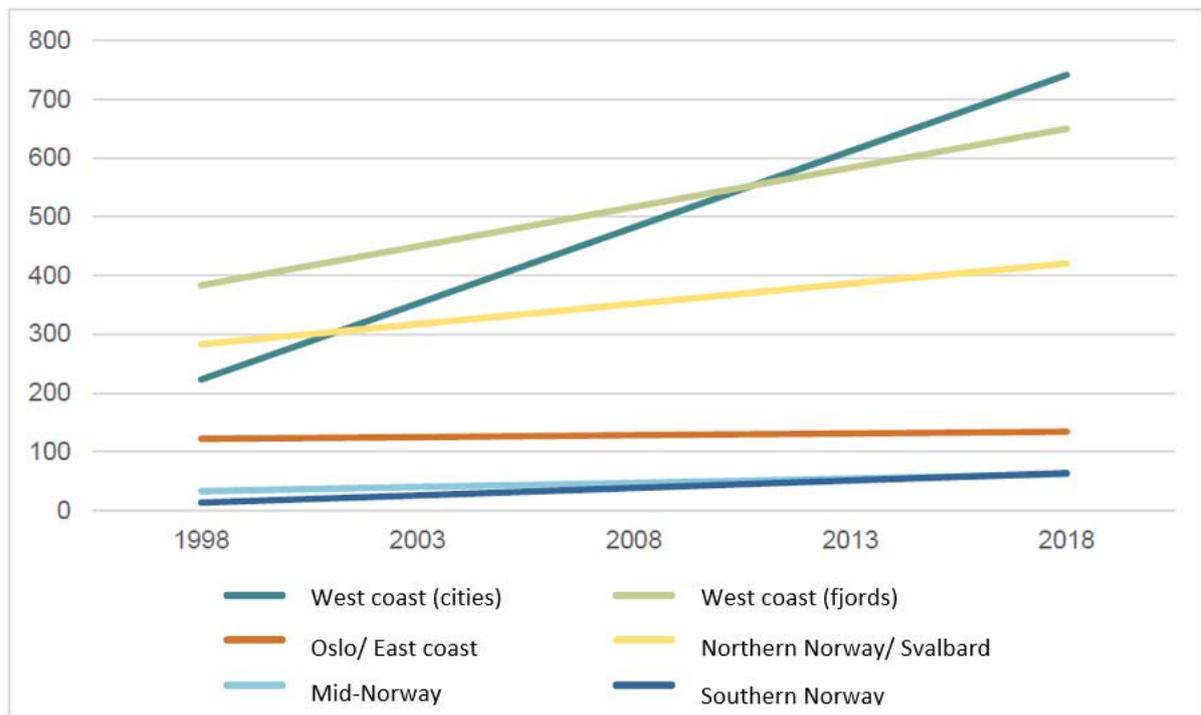


Figure 3. Number of cruise calls for different regions in Norway from 1998-2018 (linear regression). (Dybedal, 2018).

2.3. Cruise tourism in Flåm



Flåm is a small fjord community located in the Aurlandsfjord, a fjord arm of the Sognefjord, which is the world's second largest fjord and Norway's longest and deepest fjord, reaching 1308 meters below sea level and 205 kilometres into the land (see Figure 4 and 5) (Manzetti and Stenersen, 2010). The Aurlandsfjord is a part of the UNESCO World Heritage Area surrounding the Nærøyfjord, which is one of the narrowest fjords in the world (Fjord Norway, n.d.). Its unique fjord landscape has made Flåm into the fifth most popular cruise destination in the country, in terms of both cruise calls and passengers (Innovation Norway, 2018b).

Figure 4. The red circle marks the Sognefjord, in the county of Sogn og Fjordane. Edits by author. (Wiki/User:Sjoehest, 2006).



Figure 5. A satellite image of the Sognefjord. The red point shows the location of Flåm. The fjord arm leading into Flåm is the Aurlandsfjord, which, together with the fjord arm on the left, make up the area of the Nærøyfjord. Edits by author. (Dale, 2014).

The unique natural landscape surrounding Flåm (see Figure 6) has made it into a popular tourist destination among both cruise and land-based tourists, creating the foundation of a flourishing tourism industry, which provides jobs and a livelihood for locals (Løge and Dombu, 2017). The Flåm Railway has further been an important trade-mark and selling-point for Flåm (Bårdstu, 2016). It is particularly an ideal attraction for the cruise lines as it is a product capable of accommodating a large volume of tourists. Consequently, the cruise lines are attracted to Flåm not only because of its natural scenery, but more importantly due to the economic possibilities of earning money on ticket-sales for the Flåm Railway (Bårdstu, 2016). For the cruise tourist, however, nature experiences, which includes seeing the fjords, is among their top preferred activities while traveling in Norway (Innovation Norway, 2018c).



Figure 6. Image of Flåm, located at the very end of the Aurlandsfjord (Valderhaug, n.d.).

In 1999, Flåm got its deep water harbour, making the port able to accommodate larger cruise ships (see Figure 7) (Bårdstu, 2016). The port can accommodate three cruise ships per day, with two ships being on anchor in the fjord. Due to its increased popularity, the number of cruise calls has increased from 62 in 1999 to a record high 170 in 2013 (see Figure 8) (data received from Aurland Port Authority, available in Appendix 2). This record is expected to be exceeded in 2020 as preliminary booking numbers indicates 175 cruise calls this year. Figure 9 further shows a steady increase in cruise tourists from 1999, with a peak being reached in 2018 when a total of 257 998 cruise tourists visited the port (data received from Aurland Port Authority, available in Appendix 3). This excludes the crew on the ships, which adds an additional number of 101 717 visitors.



Figure 7. The deep water harbour in Flåm. February 20, 2019.

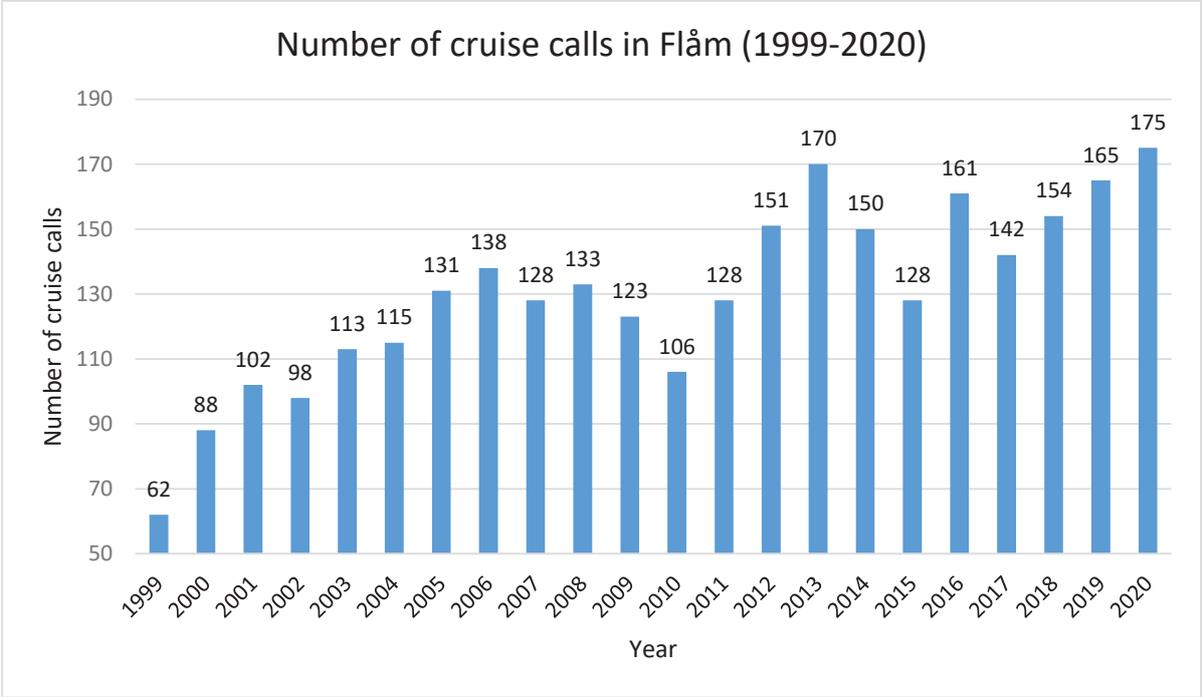


Figure 8. Number of cruise calls in Flåm, 1999-2020. Numbers for 2019 and 2020 are preliminary bookings. (Numbers from Appendix 2).

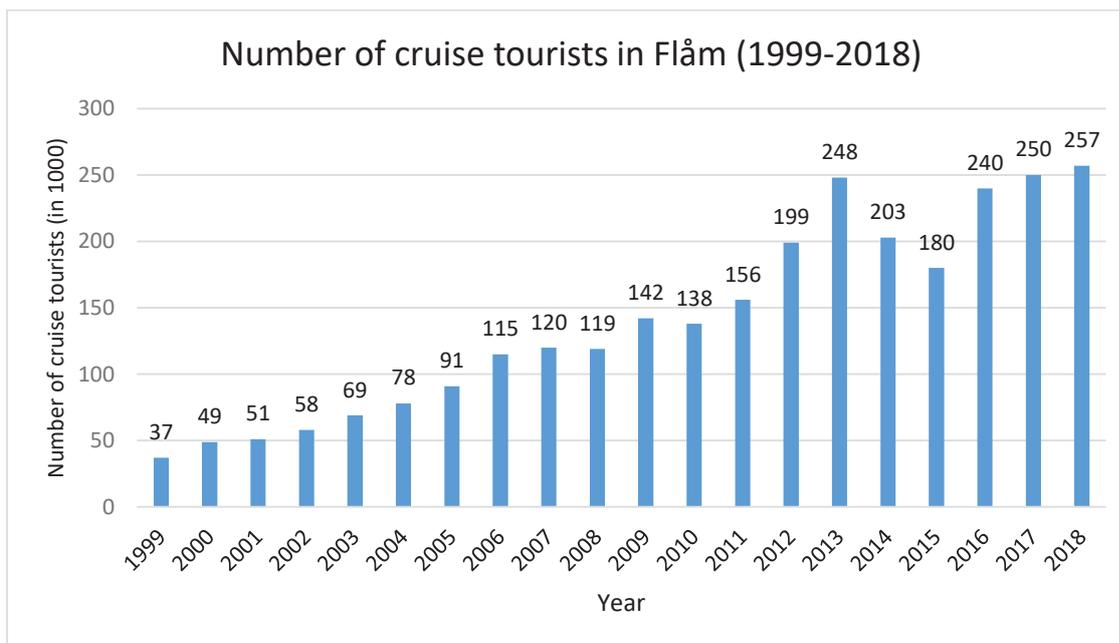


Figure 9. Number of cruise tourists visiting Flåm, 1999-2018. Numbers are in 1000. (Numbers from Appendix 3).

In addition to the cruise tourists, Flåm receives the majority of guests from land-based tourism. In 2017, Flåm received 990.000 tourists (“Knalltall i Flåm, 2018), and it is estimated that cruise tourists account for 25% of the total number of tourists visiting Flåm annually (data received from Aurland Port Authority, available in Appendix 1). Table 1, further shows the number of cruise calls per month from 2009 to 2020 (numbers received from Aurland Port Authority, available in Appendix 2). The numbers reveal a peak in cruise calls during the summer and a future trend of an extended cruise season. Preliminary numbers for 2019-20 further indicates an increase in cruise calls during the summer months, which comes in addition to more cruise calls during the off-peak season.

Table 1. Number of cruise calls per month in Flåm between 2009-2020. Numbers for January, November and December are not added as there are no cruise calls for these months. The numbers for 2019-2020 are preliminary. (Numbers from Appendix 2).

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Feb | | | | | | | | | | | | 1 |
| March | | 1 | | 1 | 1 | 2 | 1 | 2 | | 1 | | 1 |
| April | 3 | 3 | 2 | 4 | 6 | 6 | 7 | 8 | 4 | 3 | 4 | 9 |
| May | 21 | 17 | 25 | 28 | 30 | 23 | 19 | 25 | 26 | 28 | 28 | 25 |
| June | 31 | 29 | 39 | 39 | 43 | 36 | 27 | 39 | 37 | 36 | 39 | 41 |
| July | 31 | 29 | 30 | 38 | 41 | 40 | 35 | 37 | 29 | 38 | 36 | 43 |
| Aug | 28 | 23 | 24 | 26 | 36 | 33 | 31 | 38 | 30 | 33 | 37 | 35 |
| Sept | 9 | 5 | 8 | 15 | 13 | 10 | 8 | 12 | 15 | 13 | 17 | 17 |
| Oct | | | | | | | | | 1 | 2 | 4 | 3 |

2.3.1. The fjord ecosystem in Flåm

The Norwegian fjords are recognized by being unique ecosystems with special current and temperature characteristics creating the foundation for a flourishing marine life (Manzetti and Stenersen, 2010). The Sognefjord can be characterized as an open ecosystem, interacting with the ecosystem found at sea outside of the Norwegian coast (Dale, 2014). This creates large in- and outflows of water bodies in the fjord, creating a mix between coastal waters and fresh water (Dale, 2014). It also affects the biology and ecosystems in the fjord, which results in a large variety of marine species, such as cod, herring, paddock and crab, to mention a few (Dale, 2014). Consequently, the Sognefjord is a complex ecosystem with complicated physical and biological conditions making it difficult to understand whether environmental changes are based on natural variations or human causes.

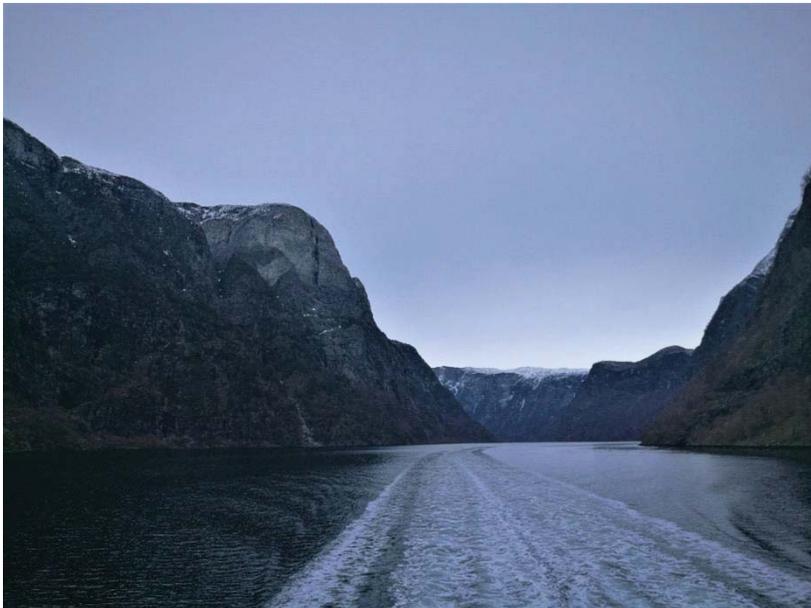


Figure 10. The Aurlandsfjord. February 20, 2019.

Narrow fjords, such as the Aurlandsfjord (see Figure 10), is further characterized as “pollution pockets” (Manzetti and Stenersen, 2010). Its steep mountains, reaching as high as 1800 meter, and narrow landscape, results in minimal air circulation, making it vulnerable to air pollution from traffic and industry (Manzetti and Stenersen, 2010). Noise from boat traffic also has the

potential to affect marine life. The narrow and deep characteristic of the Aurlandfjord present extremely sensitive geophysical formations, where hydro-acoustic noise transmittance may affect spawning, migration patterns and nutrient searching by marine species (Manzetti and Stenersen, 2010). Changes to the sea-bed chemistry, for example by dumping of waste, infrastructure construction, or toxins from ships, are further assumed to affect fish spawning cycles (Manzetti and Stenersen, 2010). Consequently, the geographical formation of this fjord, and its vulnerable ecosystem, makes it particularly sensitive to environmental impacts (Manzetti and Stenersen, 2010).

2.4. The environmental impact of cruise tourism in Norway

In Norway, cruise tourism is found to be the most polluting form of tourist transportation. Walnum (2019) finds that a travel from Northern Germany to Bergen with cruise has an energy consumption that is 4.9 times higher when compared with a flight and a one-night hotel stay in Bergen (see Figure 11). Furthermore, Walnum (2011) finds that the CO₂-emissions of a cruise ship in Norway vary from a minimum of 198 tons CO₂ per passenger kilometre to 1,314 tons CO₂. The oldest ships tend to have the highest CO₂-emissions, yet, given the increased level of comfort and services on board new cruise ships (produced in the 2000s), the CO₂-emissions of these ships could reach the level of less energy-efficient ships from the '80s and the '90s (Walnum, 2011).

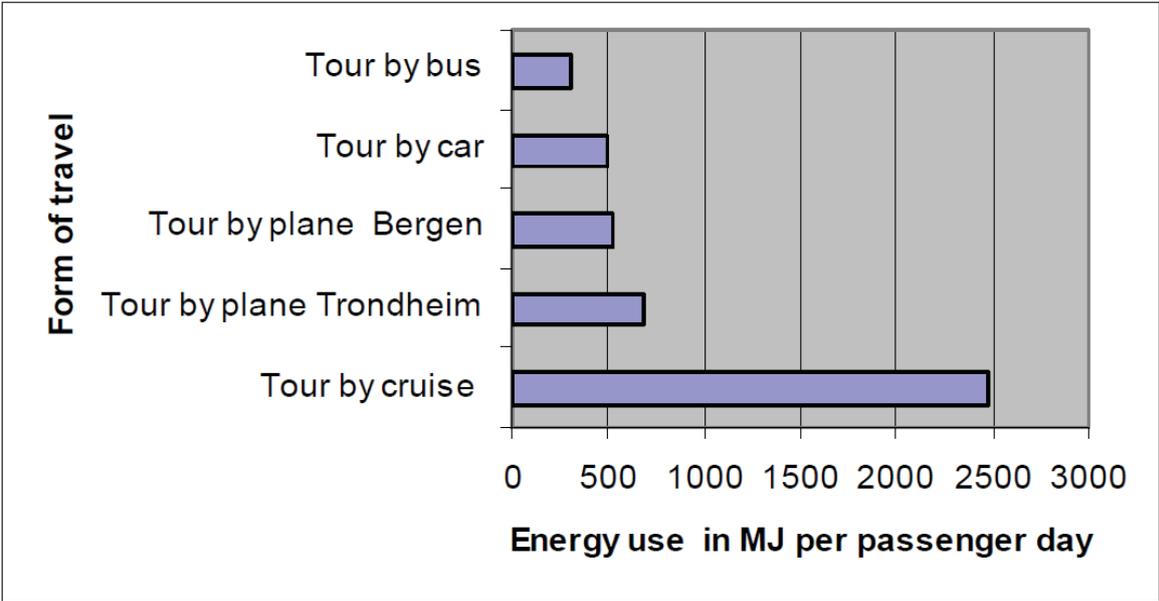


Figure 11. Energy use (in MJ) per passenger day for different forms of tourist travels from Germany to Norway. (Walnum, 2011).

Cruise ships further enhance local air pollution due to their use of heavy fuels, which contains high levels of sulphur, nitrogen oxides (NO_x) and particular matter (PM), damaging to both local environments and people’s health (Ruiz-Guerra, Molina-Moreno, Cortés-Garcia and Núñez-Cacho, 2019). Local air pollution in cruise ports has been documented in the ports of Dubrovnik and Kotor (Dragovic, Tzannatos, Tselentis, Mestrovic and Skuric, 2019), in Svalbard (Eckhardt et al., 2013), the Adriatic Sea (Caric, 2010), and Barcelona (Ruiz-Guerra, Molina-Moreno, Cortés-Garcia and Núñez-Cacho, 2019). The latter showed a significant correlation between an increased number of cruise passengers and reduced air quality, while a study from Greece concluded that the local air pollution while cruise ships are in port outweigh the pollution at sea, which is an increasing problem as the cruise season extends into the off-peak season (Papaefthimiou, Maragkogianni and Andriosopoulos, 2016). In Norway, the Norwegian Maritime Authority (2017) has documented high levels of air

pollution in the UNESCO-fjords on the West Coast. As this study covers the port of Flåm, the details of this report is elaborated on in the result section.

Given its environmental impact of cruise, which also includes waste water and toxic pollutants from the ships, affecting the marine life in ports (Caríc and Mackelworth, 2014), previous research has found that the environmental costs exceed the financial benefits in host destinations. In his study on cruise tourism in the Adriatic Sea, Caríc (2010) concludes that the environmental costs of cruise are eight times higher than the financial contribution. Such a study has not been done in Norway, yet, there is an increasing opposition in Norwegian cruise ports regarding the environmental costs that cruise is generating to local communities (Fuglehaug, 2018; Molstad, 2016; Helseth, 2014). These environmental costs include enhanced degradation, littering, reduced air quality, increased traffic and “people-pollution”, as cruise brings a large amount of people to port at the same time (Molstad, 2016). A worry regarding the massive impact cruise tourism has on Norwegian nature, and the natural product that the industry relies on, has also been emphasized by national tourism actors. They call it a “mismatch” between what Norway sells and what they actually provide, which in the long run will harm Norway as a tourist destination (Molstad, 2016).

2.5. The industry’s position

The increasing pressure on Norwegian nature and host destinations, not only from cruise tourism, but from all types of tourism, has called for a greater focus on preserving the natural environment and limiting the negative impact on local communities. In the newly published roadmap for a sustainable tourism industry in Norway, the vision is to make Norway into one of the most sustainable tourist destinations in the world (Norwegian Trade Organization, 2017). The strategy is to strengthen the quality of the tourism product by limiting its negative impact on natural and social environments (Norwegian Trade Organization, 2017). Consequently, the Norwegian tourism industry admits to follow the United Nations World Tourism Organization’s (UNWTO) principles for sustainable tourism. Principle four and five, which concerns itself with maintaining a clean environment and strengthening the quality of life in local communities, are outlined below.

Principle 4: “To minimize the pollution to air, water and land (including noise) from tourism businesses and tourists, and minimize the generation of their waste and consumption of scarce and non-renewable resources.” (Norwegian Trade Organization, 2017, p. 11).

Principle 5: “To preserve and strengthen the quality of life in local communities, including social structures, access to resources, facilities and common goods, in addition to avoid any form of social degradation or exploitation.” (Norwegian Trade Organization, 2017, p. 11).

However, given its environmental impact, and other negative externalities it is generating in host destinations, cruise tourism is posing a threat towards the success of these principles, particularly as cruise tourism is expected to grow in the coming years. Furthermore, as increased environmental consciousness amongst tourists are believed to make landscapes with minimal human interference more attractive in the future, the resistance towards cruise could potentially increase due to its immense environmental impact (Walnum, 2019). The risk is thus that “profit-oriented, tourism development policies fail to account for the negative externalities, such as social and ecological consequences, which ultimately could undermine tourism itself” (Caríc and Mackelworth, 2014, p. 352).

3. Theory

If the Earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a happier or better population, I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it.”

John Stuart Mill (as cited in Daly and Farley, 2004)

3.1. The capital theory approach and sustainability

Sustainable development is by The Brundtland Report understood as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 37). Rather than having a focus on enhanced growth and consumption, a sustainable future would entail preservation of the biophysical and social conditions necessary to maintain economic activity and human flourishing (Howarth, 2012). The focus is thus on issues of intergenerational equity, which entails a fair distribution of resources and assets between generations (Stern, 1997). Such resources and assets are by the capital theory approach normally divided into two types of capital, being natural and manmade capital stocks (Stern, 1997).

Consequently, to achieve intergenerational equity, the capital stocks has to be sustained in order to support the needs of future generations.

As regards to sustainable development, the capital theory approach has been applied in two different approaches: weak and strong sustainability. The main difference between the two is their opposing views on the substitutability of different capital stocks (Stern, 1997). A capital stock is defined as a productive asset available to the economy, and is, as mentioned, generally divided between natural and manmade capital (Stern, 1997). Natural capital refers to “a stock that yields a flow of natural services and tangible natural resources” (Daly and Farley, 2004, p.17), while the latter

includes “our bodies and minds, the artifacts we create, and our social structures” (Daly and Farley, 2004, p. 17). They are both vital sources of human welfare, yet, there is a dispute between whether they are in a substitutable or complementary relationship.

3.2. Strong sustainability

Strong sustainability assumes that natural and manmade capital is complementary, rather than substitutable, and that we need to maintain a certain level of natural capital intact in order to sustain future generations capacity to produce (Daly, 2005). Herman Daly (1995) provides the example of fish stocks and fishing boats. The limiting factor is not the fish boats, but the fish stocks that are reduced due to overfishing. More fish boats will not increase the stocks; it will only reduce them further, rendering the fish boats useless. Hence, to produce more of the manmade capital as a substitute for the natural capital lost will only enhance the demand for the very thing being substituted, namely natural capital (Daly, 1995). Consequently, the depletion of natural capital cannot be substituted by additional manufactured capital to uphold the total capital stock as, without the natural capital, the manufactured capital has no value (Faran, 2010).

Thus, a complementary relationship implies that both stocks of capital has to be maintained separately in order to continue the production of useful goods (Daly, 1995). If one capital stock is limited, the production of goods will either decline or stop. In today’s “full world”, production is dependent upon the scarce and limited stock of natural capital (Daly and Farley, 2004).

Consequently, our economic system is working within a finite ecosystem, which implies that there are natural limits to growth. Continued growth in economic production will thus enhance the constraints on the natural resources of which it depends (Daly, 2005). Hence, if the natural capital stock does not remain constant, the risk is that “we will begin to sacrifice natural capital that is worth more than the man-made capital added by the growth” (Daly, 2005, p. 100).

Consequently, it is current generations obligation to ensure that the limiting factor – natural capital – remains intact. Daly (1995) suggests three strategies to achieve this, termed the output and the input rule. The output rule is about ensuring that the waste from resource use can be absorbed by the ecosystem, while the input rule is to make sure the exploitation of resources is happening at a rate that sustains the ecosystems ability to regenerate the resource. Additionally, renewable substitutes to non-renewable resources has to be developed at a faster rate than the non-renewable resource is depleted. A renewable substitute is required to be a real rather than a financial substitute (Daly, 1995). The revenue from fossil fuel production, for example, should be re-invested into new energy sources, not in other material artifacts such as restaurants. Thus, strong sustainability does not argue for leaving non-renewable resources in the ground, but that they are substituted at a rate that keeps the natural capital intact over time.

Accordingly, strong sustainability is about sustaining certain properties of the physical environment, not only to ensure continued economic activity, but moreover to preserve the overall integrity of ecosystems (Hediger, 2006). This implies that economic production ought not to reduce the quality of the environment and that we need to protect the natural environment for what it is: our life-support system (Hediger, 1999). This is referred to as the ecological value principle, or the concept of environmental quality, “which measures the total stock of natural capital from an ecosystem perspective” (Hediger, 2006, p. 363). Such measurements are based on “the stocks of biological resources, ecosystem space, nutrients available, and other environmental assets that are essential for the integrity of ecosystems, and provide use and non-use value to society” (Hediger, 2006, p. 363). Thus, in order to sustain the integrity of ecosystems, we do not need to preserve every single natural asset, but ensure that the overall environmental quality remains intact (Hediger, 1999).

3.3. Utility and disutility

In addition to its vital ecological and economic role, natural capital further has a direct non-consumptive value for human well-being, also termed *utility*. Daly (2005) defines utility as the level of satisfaction of wants, or simply, the level of well-being of a population. The level of utility is measured by our ability to consume, yet, Daly argues there are more to utility than our access to material products and goods. Utility is also about the direct services that natural capital provides for human well-being by, for example, providing us with clean air and water (Daly and Farley, 2004). More specifically, the direct service of natural capital refers to “the basic fitness of our environment to our organism that supports our life, and consequently supports our consumption and want satisfaction from commodities” (Daly and Farley, 2004, p. 153). Thus, the relationship between the fitness of the environment and humans imply a relation of complementarity where our purchase of commodities relies on keeping natural capital intact.

Therefore, consuming more of accessible products and goods does not promise increased utility, or personal well-being. Economic growth is good when it covers people’s basic needs and increase living standards. Yet, surveys on life satisfaction in more affluent countries reveal that, despite an increase in production and consumption in industrial societies since World War II, life satisfaction has remained mostly unchanged (Howarth, 2012). Daly (2005) argues that this is due to the various social and environmental costs, or sacrifices, that growth brings with it. Such sacrifices can be loss of leisure, increased use of labour, depletion of resources or exposure to pollution. Thus, if the level of sacrifices extends the utility of consuming, we reach a level of *disutility* where we produce more bads than goods (Daly and Farley, 2004). At this point, we reach a state of uneconomic growth where the costs of consuming are higher than the benefits (Daly, 2005).

According to Daly, uneconomic growth is economic growth that reduce people's well-being by generating larger environmental and social costs than the value of the products made (Daly, 2005). This is what Daly argues has happened with various industrial countries after WWII. Thus, the optimal scale of economic production and consumption is when utility and disutility are equal, reaching a balance between the satisfaction of wants and sacrifices made to satisfy the wants (Daly, 2005). Consequently, a way to achieve this is to ensure that the economic development is happening within the limitation of the natural system (Daly and Farley, 2004).

In order for society to avoid uneconomic growth, Daly propose an alternative economic system, a steady state economy. Within such an economy, the stock of populations and wealth are maintained at levels that ensure a good and long life (Daly and Farley, 2004). By acknowledging that the economy is a subsystem of the greater system, being the Earth's natural environment, one admits to the fact that there are limits to growth, but one does not give up the possibility to develop (Daly and Farley, 2004). Compared with today's economic system, the focus is rather on getting better, not bigger, by enhancing the quality of our products, not its quantity (Faran, 2010). Thus, by dismissing our need to grow, it allows for the sustainable use of our natural resources, which ensures that the well-being of both current and future generations are sustained within the limits of the system.

4. Methodology

4.1. Choice of methodology

In my research, I am using a qualitative methodology to analyse the phenomenon of cruise tourism. According to David Silverman (2014), "qualitative research involves verbal description of real-life situations" (p. 4). Qualitative research is useful to describe a phenomenon in context, interpret processes or meanings, apply theoretically based concepts and seek understanding (Silverman, 2014). A qualitative study is thus relevant for my research as I am applying theoretical concepts from strong sustainability in order to understand the phenomenon of cruise tourism in a context-specific situation.

To understand both the causes behind, and the consequences of, cruise tourism, I chose a case-based methodology. A case study can simply be defined as an in-depth study of a phenomenon (Silverman, 2014). It provides a closer look at real-life situations, with a focus on details in order to come closer to a nuanced view of reality (Flyvbjerg, 2006). Furthermore, to fully understand the problem at hand, it is beneficial for the researcher to place herself within the context of study. Thus, to provide an in-depth and case-based study of cruise tourism, I chose the port of Flåm in Norway to analyse the impacts this phenomenon has on its natural and social environment.

4.2. Justification of choice of case

My choice of case was based on three criteria: size of community (in terms of population), popularity (in terms of number of calls and tourists) and available data. I assumed that the smaller the size of the host destination, coupled with high popularity, would mean greater impacts. Statistics from Innovation Norway allowed me to identify such destinations, which left me with a choice among four cruise destinations: Flåm, Geiranger, Eidfjord and Olden. The last determining factor was access to data on the environmental impact of cruise tourism in these communities, as I would not be able to document such impacts myself. Such a strategy of case selection is by Flyvbjerg (2006) defined as choosing a critical case that has a “strategic importance in relation to the general problem” (p. 229). Flyvbjerg explains it as choosing a case that either most likely or least likely confirm or falsify your propositions. Access to research on the environmental impact of cruise tourism was available for Flåm and Geiranger. A final decision was made on Flåm, based on practicalities and a personal wish to study this particular community.

4.3. Methods and sampling strategy

To answer my research questions, I decided to use semi-structured interviews and secondary data collection attained through a literature review on cruise tourism in Norway and in Flåm. The most important findings from this review was the secondary data on the fjord ecosystem in Flåm and the environmental impacts of cruise tourism in Norway and Flåm specifically. The interviews are further used to document the environmental and socio-economic impacts of cruise, and how these impacts affect people’s well-being and the tourism industry in Flåm.

4.3.1. Literature review

The secondary data derived from the literature review was identified by researching international and Norwegian sources on the environmental and socio-economic impacts of cruise tourism. The majority of Norwegian sources was published by Norwegian research institutes, Norwegian tourism organizations, and the Norwegian media, covering past and current trends in cruise tourism, in addition to its various impacts in host destinations. The international sources mainly documented the environmental impacts of cruise tourism globally and in other ports. As there were minimal sources on the environmental impacts of cruise in Flåm, which mainly consisted of two reports documenting air pollution and erosion, I further relied on academic sources documenting the environmental vulnerability and ecological state of the Sognefjord. Yet, I cannot confirm that I have covered all past research on the environmental impacts of cruise tourism in the Sognefjord as there might be sources I have not gained access to during my research, which was mainly done through Google-searches and the LUB portal. Such obstacles can for example be that I did not have access to research engines that covered research published by Norwegian universities or colleges

4.3.2. Semi-structured interviews

To gather my qualitative data, I decided to spend three weeks in Flåm to conduct interviews with local inhabitants who live and/or work in Flåm. The aim was to interview people from different segments of the population, including a variety of gender, age and years lived in Flåm. Further, I aimed to interview people who worked in the tourism industry, both with and not with cruise, in addition to people who worked elsewhere. This would provide me with a balanced share of data.

4.3.3. Choosing interviewees

In order to choose candidates to interview, I decided to rely on snowball sampling. This is a strategy that “allows the researcher to enter into networks of individuals and identify respondents that they might not otherwise be able to identify” (Silverman, 2014). As I had no contacts in Flåm, I saw this as a preferred strategy. I initiated contact with people by approaching people who worked in local tourism businesses. I also identified two interviewees through media sources. I further wrote notes that I put in people’s mail boxes, telling them about my research, that I was interested in interviewing them and provided my contact information. Overall, this resulted in a total of 10 interviews.

4.4. Conducting interviews

I wrote an interview guide to use for my interviews (see Appendix 4). The same interview guide was used for all the interviews, except for the interview with the Assistant Port Manager, which had a different aim than the remaining nine interviews (see Appendix 5). This interview was conducted in order to gather additional information about the development of cruise tourism in Flåm. The Assistant Port Manager did not request to be anonymized. The remaining interviewees are anonymized, only providing approximate age, years lived in Flåm and work title. Seven out of nine lived in Flåm, while the remaining two lived in Aurland – a neighbouring town located eight kilometres further into the fjord – while working in Flåm. All interviewees were told about the aim of the research project and that participation was voluntary and anonymous. All interviewees agreed to record the interview and the interviews were transcribed. A list of the interviewees is provided in Table 2.

Table 2. List of interviewees. I did not ask for the specific age of people I interviewed. Young refers to the age between 20-40, middle-aged between 40-70, while old is from 70 and older.

| Interviewee | Age | Years in Flåm | Work |
|------------------|-------------|--|---------------------------------------|
| Interviewee 1 | Young | 10 months (from France) | Tourism with cruise |
| Interviewee 2 | Old | Whole life | Retiree (no previous work in tourism) |
| Interviewee 3 | Young | Whole life (except elsewhere for studies) | Tourism with cruise |
| Interviewee 4 | Middle-aged | Whole life (except elsewhere for studies) | Tourism, not with cruise |
| Interviewee 5 | Young | Worked in Flåm for three years. Grew up and live in Aurland. | Tourism with cruise |
| Interviewee 6 | Middle-aged | 25 years | Retiree (no previous work in tourism) |
| Interviewee 7 | Middle-aged | Whole life | Tourism, not with cruise, and farming |
| Interviewee 8 | Young | Work in Flåm. Grew up and live in Aurland. | Tourism, not with cruise |
| Interviewee 9 | Middle-aged | 14 years | Health sector |
| John Olav Stedje | Middle-aged | Work in Flåm. Live in Aurland. | Assistant Port Manager |

4.5. Data construction and interpretation

The theoretical framework of my research is strong sustainability, which provides a set of concepts relevant for analysing how cruise tourism impacts the natural environment in Flåm and what kind of implications this has for the society in general. Thus, I am using concepts such as natural capital, utility/disutility and uneconomic growth to interpret the findings of my research. The natural capital of the cruise industry in Flåm is defined as the fjord ecosystem, which includes particular air-, water-, and landscape- features and qualities. As cruise lines are attracted to Flåm due to the unique natural environment of this ecosystem, it is thus identified as complementary to the manmade capital used in the tourism industry, such as the ships. Maintaining a certain level of natural capital intact is thus important for sustaining continued economic activity from cruise tourism in Flåm. Consequently, when analysing the environmental impacts of cruise tourism and their causes in Flåm, I will use the concepts of Daly's strong sustainability to interpret my data.

The natural capital in Flåm is further generating consumptive and non-consumptive values for the local inhabitants. These values contribute towards human well-being, defined as the level of utility of a population. The consumptive value is normally measured by people's ability to consume. Thus, if cruise tourism contributes towards enhanced economic production and consumption in Flåm, it is contributing towards an enhanced level of utility among the local population. The non-consumptive

values, on the other hand, refers to the direct services of natural capital, which in the case of Flåm, is identified as the natural services of the fjord ecosystem, being clean air and water, a peaceful environment and an intact marine ecosystem. To sustain the direct services thus contributes towards maintaining or enhancing the utility of the natural capital for the local population. Consequently, in order to understand how cruise tourism affects the utility of the fjord ecosystem in Flåm, I am analysing its economic contribution based on data derived from a literature review and from the perception of local inhabitant's, which also includes their lived experience of the environmental impacts of cruise tourism in Flåm.

To interpret the data in the literature review, I rely on the following strategy. First, I aim to identify the impacts that tourism has on natural capital in Flåm. If cruise tourism enhances the constraints on the natural environment in Flåm, it is thus interpreted as enhancing the constraints on the natural capital of which the industry depends, and further reduce the utility of the fjord ecosystem in Flåm. Secondly, by analysing how cruise tourism contributes to the consumptive value of utility in Flåm, I will include data on the industry's economic contribution. Thirdly, the literature review also covers various social impacts, such as local conflict – perceived as an indirect cause of the industry's environmental impacts and lack of economic contribution – or people-pollution, impinging on the utility of the fjord ecosystem by fostering chaos and crowds. The presence of such impacts is thus interpreted as contributing to disutility in Flåm, which refers to the environmental and social costs that society has to make in order to support continued economic growth. If such costs exceed the benefits, however, society will be in a situation of uneconomic growth.

The concepts of disutility and uneconomic growth are applied in order to analyse whether there is a trade-off between the growth in cruise tourism and the utility of natural capital for local inhabitants in Flåm. This analysis is complemented by the data derived from the interviews, interpreted by using the following strategy. If the interviewees deem the economic activity of cruise important to maintain a livelihood, for example, it is interpreted as contributing towards enhanced utility in Flåm. Additionally, if the environmental impacts of cruise are not considered a problem for the interviewee, both in terms of its personal and societal impact, the level of utility is sustained. Yet, if cruise tourism is identified as generating environmental and social costs in Flåm, cruise tourism is interpreted as contributing towards enhanced levels of disutility, impinging on both the well-being of local inhabitants and the utility of the fjord ecosystem.

To categorize and identify relevant data from the interviews, I went through two processes of coding. I divided the data into two categories, being environmental and socio-economic impacts. Most of the interviewees were explicit in terms of what they considered as the positive and negative impacts of

cruise, both in terms of its environmental, economic and social impacts, but not always explicit in terms of whether the economic contribution outweighed the negative impacts. Consequently, when analysing the interviews, there was a level of interpretation from the researcher involved, which affects the results.

4.6. Limitations

4.6.1. Representativeness

The representativeness of my data is mainly influenced by the number of interviews I had. I conducted nine interviews with local inhabitants, yet, knowing that Flåm has 400 inhabitants, this does not provide a complete picture of how the impacts of cruise tourism is perceived and experienced in Flåm. The aim was to provide a variety of respondents, representing different segments of the population, to get a diverse set of data. How cruise tourism affects people's level of utility in Flåm is however a subjective opinion. Thus, it is not given that everyone within the same population segments would share the same experience. Consequently, to improve the data sampling, I could have spent longer time in Flåm to conduct more interviews, or I could have returned at a later stage for a second round of interviews. This would have given me time to identify data that was lacking and improved my final results.

Who I ended up interviewing is further having an influence on how representative my data is. People in the tourism industry was easy to get in contact with as I could approach them at work. The same goes for people who had voiced their opinion about cruise in the media. Their willingness to participate in my study are most likely influenced by their strong opinion or personal relation to cruise tourism in Flåm. Thus, my strategies to reach out to people in Flåm, and lack of so, is a factor that have influenced my final data collection. Factors such as time and interest to participate are also factors influencing my final sample of interviews.

4.6.2. Generalization

My case is highly context-dependent, and what is found in Flåm is not said to be found elsewhere. This goes for both national and international cruise ports. My research is specifically about how cruise tourism impacts the natural and social environment in Flåm, thus, my findings is only representing its impact on this particular community. Yet, my research offers useful insights into how cruise tourism potentially could affect ports with similar ecological and social characteristics, thus, making it relevant for other popular cruise ports in the fjords of Norway.

5. Results

The results section is divided into two parts. Part 5.1. presents the findings from the literature review, which begins with a brief elaboration on how the theoretical concepts of natural capital and utility applies to cruise tourism in Norway and in Flåm. This is followed by the findings on how cruise tourism impacts the natural capital and the level of utility in Flåm, which includes environmental and socio-economic impacts. This is complimented by the findings of the interviews, which are presented in part 5.2. This covers the lived experiences and perceptions among the locals regarding the impact of cruise tourism on natural capital and its utility in Flåm.

5.1. Literature review

5.1.1. The natural capital and utility of the cruise industry in Norway and Flåm

In chapter 2, I showed that the cruise industry in Norway is dependent on an intact natural capital stock to sustain continued economic production and consumption. In Flåm, the natural capital stock of the cruise industry is identified as the fjord ecosystem, which is an important market value for the whole tourism industry. Thus, the fjord ecosystem is contributing towards the level of utility among local inhabitants in Flåm by providing a consumptive value, improving people's well-being. The fjord ecosystem is further generating non-consumptive values, additionally important to maintain the level of utility in Flåm. Yet, past research on the environmental impacts of cruise tourism in other ports shows that the cruise industry is enhancing the constraints on, and reducing the utility of, its natural capital, particularly by being a source of local air pollution. Consequently, the cruise industry is not acting as if there is a complementary relationship between its manmade and natural capital stocks.

5.1.2. The effects of cruise tourism on natural capital and utility in Flåm

5.1.2.1. Fuel combustion and emissions

In 2017, the Norwegian Maritime Authority published a report on air and water pollution in fjords with extensive cruise traffic (Norwegian Maritime Authority, 2017). The report covered the UNESCO-fjords on the West Coast, including the Aurlandsfjord and Flåm. The study found that on days with cruise in port, level of NO_x and PM exceeded values damaging to people's health. Visual air pollution from NO_x, grime and water vapour was also documented (see Figure 12), which was argued to be incompatible with the status this fjord has as a World Heritage area. Cruise were however not found to be the source of water pollution. Grey water emitted in the fjord was mostly stemming from smaller tourist ships.



Figure 12. Visual air pollution from a cruise ship in Flåm. (Hommedal, n.d.).

The old cruise ships traveling in the fjords – 17 years or older – were found to be a particular problem as they lack modern cleaning technology, such as scrubbers, which reduces the levels of sulphur in their emissions (Norwegian Maritime Authority, 2017). Levels of sulphur were however not found to exceed the recommended values in the World Heritage fjords as there still was a majority of the ships who used air pollution control devices and fuels with low sulphur-levels. The Aurlandsfjord is covered by an Emission Control Area where ships are not allowed to exceed a value of 0,1% sulphur in their emissions, which explains these results (Norwegian Maritime Authority, 2017).

In response to the findings of the Norwegian Maritime Authority, the Norwegian government has adopted a regulation for the World Heritage fjords on the West Coast, which includes the port of Flåm. This regulation, adopted in May 2018, aims to make the UNESCO-fjords emission-free by 2026 (Innovation Norway, 2018b). This will happen gradually and the main aim is to reduce the emissions of sulphur and NOx. How this will affect the cruise tourism is uncertain as it is difficult to know whether the cruise lines will adapt to the new regulations or travel to other destinations without such restrictions (Walnum, 2019).

5.1.2.2. Water traffic and erosion

Cruise ships are further found to have an impact on the fjord. Lothe, Mathiesen and Heiberg-Andersen (2016) found that the extensive traffic on the Nærøyfjord, including cruise ships, enhance erosion and washout the walls and shoreline along the fjord. This is mainly due to the boats not following the speed limit, causing unnatural waves on the fjord, changing the landscape and ecosystems along the coast line (Lothe, Mathiesen and Heiberg-Andersen, 2016). The traffic on the

fjord is further hypothesized by Manzetti and Stenersen (2010) to have an impact on the fish stocks in the fjord, causing a reduction in marine species. Yet, a causal relationship has not been proven.

5.1.2.3. Concerns of reduction in fish stocks

People living in the Sognefjord and Aurlandsfjord has reported that there has been a reduction in fish stocks in the fjord (Dale, 2014; Manzetti and Stenersen, 2010). Together with the traffic on the fjord, the construction of hydroelectric plants and increased tourism activities are further hypothesized to be among the causes of such a reduction (Manzetti and Stenersen, 2010). They further hypothesise that waste dumping from tunnel building, together with the construction of a cruise pier in Flåm, has affected the sea-bed chemistry and the fish spawning cycles negatively, causing a reduction in fish stocks. The impact of noise on the marine life lacks scientific research. Consequently, together with air pollution, shore erosion creates visual changes to the natural capital, which are found to reduce the level of utility of the fjord ecosystem in Flåm.

5.1.2.4. Economic utility of cruise tourism

The revenue from cruise tourism has three sources. Expenditures by cruise tourists while in port, purchase of goods and services by the cruise lines in port, and fees paid by the cruise lines to the local Port Authority and the Norwegian government (Innovation Norway, 2018b). In Flåm, Walnum (2019) finds that cruise tourists spend on average 263 NOK, which is a rather low number as the same study concludes that the average consumption of cruise tourists in the port of Bergen spends 652 NOK. Yet, studies on the consumption of cruise tourists in Norway vary greatly, due to various methodological choices. Another study from Bergen, for example, concludes that the average consumption of a cruise tourist while in port is 1060 NOK (Seeberg, Haugland, Løge, Aalen and Jakobsen, 2018). The same study further finds that the cruise lines pay 154 NOK per cruise passengers in fees, goods and services while in port. The numbers are however more uncertain for small ports like Flåm due to the low number of respondents and fewer purchase opportunities compared with larger ports, such as Bergen (Walnum, 2019).

Walnum (2019) further concludes that 41% of the cruise tourists visiting Flåm spends nothing in port, while 3% of the respondents make up one third of the total consumption, spending on average 2000 NOK in port. The same conclusion is reached in Bergen. Walnum (2019) subsequently provides a meta-analysis of past research on the consumption of cruise tourists in Norwegian ports, which concludes that a small number of cruise tourists spends a lot in port, while the majority spends little to nothing. The revenue earned from cruise tourism is further found to benefit businesses offering activities and excursions, while hotels and camping businesses earn little on this type of tourism (Walnum, 2019). Thus, a few actors in Flåm are economically benefitting from cruise tourism, while others experience a lack of so. Yet, tourism is still a source of economic growth in Flåm, despite the

low contribution from cruise tourists. In 2017, all operating tourism businesses in Flåm experienced economic growth, resulting in a total revenue creation of 425 million NOK, a 45 million NOK increase from the year before (“Knalltall i Flåm, 2018). The growth is explained by an increase in tourists and their expenditures, in addition to an expanded tourism season (“Knalltall i Flåm, 2018).

5.1.2.5. Local conflicts

The environmental and economic impacts of cruise tourism in Flåm is further documented by the national media as being a source of local conflict in various ports (Molstad, 2016; Helseth, 2014). The conflict is generally between the local Port Authority, souvenir shops and excursion businesses on one side and local hotels, local population and environmentalists on the other (Molstad, 2016). The former group emphasize the economic contribution of cruise tourism, while the latter group complains about air and noise pollution, in addition to large crowds and chaotic situations when cruise ships are in port (Helseth, 2014). Furthermore, tourists in Flåm have reported that it is too crowded, which reduces the tourist’s comfort and increases stress due to the lack of space (Walnum, 2019). To control the number of tourists visiting Flåm on a daily basis, the Port Authority has implemented a limitation of a maximum of 5000 cruise tourists per day, but limitations are not implemented for other types of tourists. Consequently, cruise tourism is identified as generating various environmental and social costs that contributes towards increased disutility in Flåm.

5.1.2.6. Summary

To summarize, cruise tourism involves two main mechanisms that generate environmental impacts in Flåm, the first being fuel combustion, causing local air pollution, while the second is water traffic, causing erosion of the shore lines in Flåm. These environmental impacts are thus found to enhance the constraints on the natural capital in Flåm. Furthermore, exact information regarding the economic contribution of cruise tourism in Flåm is lacking, yet, the findings reveal a low economic contribution from this type of tourism, particularly as a large number of the cruise tourists spends nothing while in port. Yet, those who do spend money are contributing towards enhanced utility among a few tourism actors in Flåm. The environmental and social costs of cruise tourism is further fostering a conflict between opponents and proponents in Flåm, pointing towards a situation of enhanced disutility due to the presence of cruise tourism.

5.2. Findings from the interviews

5.2.1. Changes in natural capital

The environmental impacts of cruise tourism in Flåm, identified by the interviewees, were air pollution and shore erosion. Interviewees further elaborated on changes to the marine life and landscape in Flåm, in addition to increased litter. The findings are presented below.

5.2.1.1. Air pollution

Air pollution from the cruise ships was mentioned by multiple interviewees as a problem in Flåm. They reported on visual air pollution and a bad smell, particularly on hot summer days. They also reported on increased grime on outdoor facilities, furniture and food that they grow, such as fruit trees. Indirect air pollution from the tender boats that transport cruise passengers from the cruise ships to port was further mentioned as a problem around the harbour area, where the majority of tourism businesses are located. Interviewee 5, who works at the harbour, explained the air pollution from the tender boats as “burning in the throat”, while interviewee 4 and 7 told that they felt nauseous by the gas at the harbour on the worst days. Interviewees further revealed personal knowledge about how much cruise ships pollute, which made them aware of the problem even on days without visual pollution. Interviewee 3, on the other hand, revealed lack of knowledge regarding the air pollution and claimed that the problem was exaggerated. Interviewee 8 further said:

No, I don't notice any air pollution. [...] I believe that a lot of the issues surrounding cruise are the visual problems and that you judge by what you see in the air.

5.2.1.2. Erosion and impacts on the fjord ecosystem

Some interviewees emphasized the changes on the fjord due to increased boat traffic. Erosion, disruptions and changes to the marine life, toxins and grey water was among the impacts mentioned. Interviewee 7 said:

The mass on the fjord is enormous [refers to boat traffic]. [...] it erodes the shoreline here, it gets washed out under walls and everything that has been lying here for hundreds of years.

Interviewee 4 referred to a study in Flåm on pollution of toxins to the water from ships:

[The cruise ships] have a massive loss of toxins to the local environment, and to the marine environment [...] and when such a ship is in the harbour for 12 hours of the day and you have 158 ships during the year, it's obvious that when the researcher says that I wouldn't have eaten the fish or wouldn't serve the crab to my worst enemy, then it obviously affects you.

The impact of cruise on the marine life was further mentioned as a worry. Interviewee 2, who has lived his/her whole life in Flåm, believed cruise contributed to reduced fish stocks in the fjord, which has decreased drastically since he/she was a child. The lack of fish in the fjord was also mentioned by interviewee 6 and 7, yet, interviewee 7 believed the hydro-electric plants were a greater cause than the cruise ships.

5.2.1.3. Other environmental impacts

Tourism in general was further identified as changing the landscape in Flåm by increasing land use for new infrastructure, reducing green areas and enhancing degradation (wear and tear). Litter from tourists and problems with human excrements due to a lack of toilet facilities was also mentioned as environmental problems.

5.2.1.4. Summary

To summarize, the interviewees mostly confirmed that air pollution from cruise ships enhanced the constraints on the natural capital in Flåm. Yet, a few doubted the impact of the air pollution, and deemed the problem an exaggeration. Erosion was further pointed towards as a problem by interviewee 7, which also was found in the literature review, yet, this was not mentioned by other interviewees. Other environmental impacts mentioned are based on peoples own lived experience in Flåm and cannot be confirmed by the findings of the literature review.

5.2.2. Changes in utility

The findings from the interviews, regarding changes to utility caused by cruise tourism, are divided into three categories, being environmental, economic and social impacts. The findings are presented in the following order.

5.2.2.1. Environmental impacts

Air pollution was identified as reducing people's level of utility. The smell from air pollution was mentioned by multiple interviewees as reducing their quality of life. Interviewee 2 characterized it as "a living hell during the summer" while some expressed a feeling of relief when the high season was over. Multiple respondents were further worried about the health impacts of air pollution, in addition to its effects on the local and global environment. Interviewee 2, who live close to the harbour, explained the situation in these words:

Last year, when it was such a great summer and quiet weather, we've never had it so bad. We could not sit outside because of the gas.

Noise pollution from the cruise ships was further identified as reducing people's level of utility. The noise was at times perceived as exhausting and unnecessary, creating an un-peaceful environment in Flåm. The noise included engine noise, honking, calling service and sound from music and quiz-activities taking place on board. Interviewee 2 explained the situation as follows:

It's so much noise and fuss [...] I thought they were coming to enjoy the nature and everything, but on the top deck, they put up such horrible speakers and runs a quiz [...] so we can solve the quiz, we sit here and get the same questions [...] and blasting music. It's like it vibrates between the mountains. It's not possible to have peace.

Interviewee 8 recognized that there is unnecessary honking from a few ships, but perceived it as hyped:

It has become very hyped. Because the way it is, is that it's one ship that may make a lot of noise and then you go around talking about it all summer. [...] those who try to talk down cruise, they use it for what it's worth.

Yet, the personal experience among some of the interviewees indicated that the environmental impacts were intolerable. Interviewee 4 exemplified this by saying:

...when it [the cruise traffic] alone makes me think that I would sell the farm and find another place to live [...] I realize that it's not good thoughts and I know exactly why I get these thoughts and then I will absolutely say that the cruise traffic affects me psychologically or mentally.

Air and noise pollution from the cruise ships were further identified as reducing the attractiveness of Flåm as a tourist destination. Interviewee 4 and 7, who both work in the tourism industry, said it affected the experience of their guests negatively and that the length of their stays has shortened from several weeks to only a couple of days. Interviewee 8 further expressed a worry about the visual air pollution from the oldest ships:

Then you see it visually and it's damaging both to our guests who come here, it's damaging for the cruise guests who feel they leave the smoke, and it's damaging for the environment.

The environmental impacts of cruise tourism were further mentioned as contradicting the marketing of Flåm as a sustainable tourist destination with clean and pure nature. Interviewee 7 pointed towards this by saying:

There is no industry where the distance between the illusion and the reality is greater than in the cruise industry. The illusion is that it's pure and nice and it's adorable here, while the reality is shitty as fuck.

The Assistant Port Manager emphasized, however, that reduced air pollution was among the priorities of the Port Authority, but further emphasized that sustainability for the Port Authority was additionally about ensuring economic sustainability by, for example, extending the cruise season. The increased environmental impacts of such a development were a source of worry among some interviewees. Interviewee 7 said:

And they are going to extend the season. [...] It is absolutely terrible that they are going to start taking ships in earlier and continue far into the fall, until October. It is terrible that they are allowed to do so.

Interviewee 4 expressed a frustration with how the Port Authority only cared for economic sustainability, while the constant aim for new records and economic growth was identified as a paradox by interviewee 1:

Because if they really wanted to be super ecological, they would say no to all of this. It would tell those old boats from the '70s and '80s to stop running, they would invest a lot of money in the green and they will accept to earn less money, to have less workers and be less exposed.

5.2.2.2. Summary

To summarize, the environmental impacts from cruise are identified by the majority of the interviewees as reducing the utility of the fjord ecosystem in Flåm, which impacts the well-being of people in Flåm and the utility of the tourism industry. The impacts of noise were a new finding, not documented in previous research. The personal experience of the environmental impacts of cruise was, however, mostly felt by those living close to the harbour. Concerns about how a growth in cruise tourism would lead to enhanced impacts on the natural capital in Flåm was also identified in the interviews, yet, not everyone expressed such worries.

5.2.2.3. Economic impacts

Cruise tourism was identified by multiple interviewees as sustaining a livelihood in Flåm. A common phrase used was that it “made Flåm alive”, allowing people to have a thriving life, both in terms of work and more activities happening in the community. Interviewee 5 highlighted how a thriving community is an important trade-mark for Flåm as a tourist destination:

...that is one of the reasons why [...] tourists come here. Because people live in Norwegian fjords. [...] Here, the community is flourishing. And its people's daily lives. And that is pretty unique about the Norwegian fjord landscape.

Cruise was further identified as sustaining economic development in Flåm by contributing to increased revenue among tourism businesses, higher employment and full-time jobs. The Assistant Port Manager perceived cruise as fostering new business opportunities due to cruise ship's longer stays in port. Interviewee 3 further said:

In Flåm, most people create a livelihood from tourism and if you say cruise is a fourth or a fifth of the customer base of all businesses, then it's obvious that it has great importance for them. Both for employment, but also to make it possible for people to live here.

The main contribution to people's level of utility was thus employment opportunities. Interviewee 1 said he/she would not have a job if it was not for cruise tourism while interviewee 9 perceived the

tourism industry as vital to sustain the population. However, interviewee 5 was unsure about how many jobs cruise tourism actually contributed to:

They [the cruise tourists] come for a short time in the middle of the day. I look at people who travel individually, they have more time, they stay for longer, they use more services. So it's perhaps those who generates the most jobs.

Subsequently, not everyone perceived the economic benefits as fairly distributed in Flåm.

Interviewee 9 believed the economic benefits were greatest for those working in the tourism industry and that the economic growth should result in lower public taxes, for example. Interviewee 2 further expressed frustration about how locals have to pay for the services of the cruise lines.

Interviewee 6 said:

...a lot of the money that comes into tourism does not go to the locals. It doesn't, right. So it's a little unfair, I think.

The perceptions about the economic contribution of cruise was however divided. Interviewee 8 believed cruise lines provided an “enormous amount of money” in terms of taxes and fees to the municipality, while interviewee 7 had an opposite perception:

The cruise ship pays absolutely nothing other than a small harbour fee, a small fee to the cash register of the port. He [the cruise line] barely pays any taxes anywhere in the world. [...] it's scary that we allow it. [...] We are giving away Norway as a nation.

5.2.2.4. Summary

To summarize, the majority of the interviewees identified cruise tourism as contributing towards enhanced economic activity in Flåm, mainly by sustaining a livelihood. Yet, in line with the findings of the literature review, there were doubts about how much cruise actually contributed in terms of revenue to local businesses and the community.

5.2.2.5. Social impacts

The large amount of cruise tourists coming at the same time was mentioned as having an impact on people's utility by causing chaos and being a source of frustration. This would make them avoid Flåm and the harbour area when cruise ships were in port. Interviewee 4 said:

...because it is so vibrant, there are so many coming at the same time [with the cruise ship], instead of people being more individualists in a way and... you set that kind of mark when a group of 5000 people come at once. Then it's not good.

The large amount of cruise tourists was further identified as impinging on the tourist experience by resulting in overbooked trains, long queues and lack of tourist activities to offer for the tourists.

Interviewee 5 said:

...they come to experience good nature, beautiful nature. But if you are pushed around down here, like a herd of penguins, then they don't get the peaceful nature experience that I think many wants.

Yet, some interviewees expressed frustration with how one only blamed cruise for this problem.

Interviewee 3 said:

There are as many people here when there are no cruise ships. [...] you don't notice a difference on how many people who are in town.

The Assistant Port Manager, however, perceived the current limit of 5000 cruise passengers per day as an important limit to maintain as an uncontrolled amount of cruise passengers would only enhance the resistance towards cruise in the local community. Yet, he expressed a feeling of frustration regarding how one only speaks of a reduction in cruise tourists and not in land-based tourism, as the latter is what increases the most in Flåm. Multiple interviewees, however, identified the capacity of Flåm to be surpassed in regards to all types of tourists. Interviewee 5 expressed this by saying:

You cannot just increase the numbers all the time. You have to assure the quality of what you produce because it impairs on itself.

The growth in cruise, and tourism in general, was further identified as a threat to local identity and values. Interviewee 6 said:

...I think what we feel here in Flåm, many of us, we know we must have tourism, then we at least have a lively town, but what we feel now is that the local values are pushed away. We are less and less important. I think we are getting a little worried about our identity.

This worry speaks to a general remark that was made by many interviewees regarding the constant growth in tourism in Flåm. "It is a mass industry" was a common phrase mentioned by multiple interviewees, one of them being interviewee 6 who said tourism was more "cozy" before when it was less tourists. Interviewee 1 further elaborated on how the aim is to make Flåm into a "Disneyland for tourists", referring to how the Disney-movie Frozen, and the history of Vikings, is a part of the storytelling in Flåm, attracting more and more tourists to the fjords. Other characteristics

like “Banana republic” and “fake” was also used about Flåm. Interviewee 5 was concerned about how this affected the tourism industry:

...you read on TripAdvisor that it is too busy in Flåm during the summer, “go somewhere else”. So I think Flåm is starting to lose what they had a little. By receiving so many travellers in the high season.

Interviewee 3 expressed similar concerns with the negative reputation of cruise tourism:

The way people generally, not just Norwegians, but humans view cruise tourism and the cruise ships can give negative associations. [...] that is something to be aware of in regards to the reputation of the destination.

Interviewee 8 further identified cruise as a source of conflict in Flåm:

The biggest downside for us with cruise tourism is not really the ships and the emissions. It’s actually the conflict that cruise tourism creates. It creates a division between some parts of the local population and nationally. It creates environmental problems that are actually much larger than the emissions. It creates conflict simply.

A reduction in cruise calls in Flåm was thus emphasized by the majority of interviewees as beneficial for the tourism industry, people’s personal well-being and the local environment. Limits on the number of cruise calls were by interviewee 8 further identified as going more “hand in hand with the local population”, while interviewee 4 identified benefits for the cruise industry itself:

...I think that the quality for everyone, even the cruise passengers, will be better if there were less calls. Even the [cruise] industry itself says that.

The Assistant Port Manager had a strong feeling that a reduction in cruise calls would happen in the future due to the new regulations for the Nærøyfjord. He was however not particularly worried about any negative impacts of this as long as one ensured that the tourists were still willing to pay for services in Flåm. Economic activity could thus be sustained even with less cruise calls.

5.2.2.6. Summary

To summarize, cruise was identified by some interviewees as resulting in chaos and crowds in Flåm, yet, some believed land-based tourism contributed as much to this situation as the cruise tourists. Furthermore, the interviewees referred to worries regarding the growth in cruise tourism, and tourism in general, which resulted in enhanced environmental and social externalities, impinging on the tourist experience and the reputation of Flåm as a tourist destination. A reduction in cruise

tourism was further argued by the majority of the interviewees as a benefit to Flåm, either environmentally, economically or socially.

6. Discussion

The discussion of the findings will begin with answering the research questions of this paper. The first part of the discussion relates to RQ1 and sub-questions, concerning whether a trade-off is occurring in Flåm between a growth in cruise tourism and the utility of natural capital for its local population. The findings points towards a trade-off that affects Flåm to a varying extent. A growth in cruise tourism has resulted in enhanced constraints on the natural capital, through air pollution and erosion of the shoreline, yet, its impact on the utility of natural capital for the local population is not extensive. Further, part two of the discussion will elaborate on how the state of the current trade-off is affecting Flåm as a tourist destination. The enhanced constraints on the natural capital caused by a growth in cruise tourism is identified as threatening the future state of Flåm as a tourist destination as it impinges on the tourist experience and the economic foundation of the tourism industry. Lastly, the discussion will recommend areas for future research.

6.1. The current state of trade-off

The findings on how cruise tourism changes natural capital and utility in Flåm points towards a current state where cruise tourism is generating various environmental and socio-economic impacts that affects the utility of the local population. The findings considering its impacts on the natural capital in Flåm points towards two main mechanisms, being fuel combustion and erosion of the shore line. Fuel combustion is mainly causing increased levels of NO_x and PM in Flåm, while the levels of sulphur are not exceeding recommended limits as there are regulations in place. Additionally, the air pollution is a seasonal problem, and only documented as a problem during the summer. Furthermore, the cruise ships are contributing towards enhanced erosion, yet, they are only a part of the problem as it is caused by water traffic in general. Consequently, cruise tourism is, to a certain extent, enhancing the constraints on the natural capital in Flåm, but not extensively.

The impacts of cruise tourism on the utility of natural capital for the local population in Flåm is further found to generate a diverse level of impact. People living close to the harbour experience the air and noise pollution as unbearable during the summer months. Yet, their experience is defined by their location, as those living further away from the harbour experience little to no impact from air and noise pollution. Furthermore, people-pollution was identified as a source of personal frustration, yet, the experience among interviewees varied. People-pollution in Flåm is also caused by all types of tourists, not only cruise tourists, yet, the large crowds coming with the ships at the same time was identified by many interviewees as a particular negative impact of cruise tourism.

The economic utility of cruise is further identified as contributing towards a livelihood in Flåm by generating jobs and business development. This was mentioned by the majority of interviewees, even those who were critical of the environmental and social impacts. Exact numbers on the economic contribution of cruise in Flåm is lacking, yet, the research of Walnum (2019) reveal a low revenue per cruise tourist. The interviewees subsequently express varied opinions on how valuable cruise is to Flåm economically, some doubting its economic importance, while others considered it an important tourist segment for local businesses. Consequently, one cannot argue that cruise tourism is generating a trade-off between its growth and the utility of the natural capital for *everyone* living in Flåm, yet, *for some*, it is clear that cruise is causing an increased level of disutility as it leads to more personal sacrifices than benefits.

The uneven impact of cruise tourism on the utility of natural capital for local inhabitants in Flåm provides evidence for the presence of a local conflict in Flåm between opponents and proponents of cruise. This was highlighted by interviewee 8 as causing greater problems for Flåm than the emissions from the cruise ships. The conflict is however not following the anticipated division between those earning money on cruise tourism and those who do not (to put it simply). Interviewee 1 and 5, for example, work directly with cruise tourists, yet, they both expressed concerns about the environmental and social implications of a future growth in cruise tourism. Consequently, the costs with cruise tourism were identified even by those who personally benefited from the economic utility of cruise in Flåm. Yet, the greatest concerns regarding a growth in cruise tourism were related to its impact on Flåm as a tourist destination, which is elaborated on next.

6.2. Implications for Flåm as a tourist destination

The current state of the trade-off between a growth in cruise tourism and the utility of natural capital for the local population in Flåm is generating various implications for the future of Flåm as a tourist destination. The main implication is the enhanced constraints on the natural capital of which not only the cruise industry, but the whole tourism industry in Flåm depends. As Flåm is selling clean and pure nature experiences to tourists, it is vital for the tourism industry to reduce its impact on the natural capital as it is a part of the total capital stock ensuring continued economic activity from tourism in Flåm. Air, noise and people-pollution were identified by many of the interviewees as impinging on the tourist experience. This was exemplified by increased complains from tourists regarding pollution and crowds, in addition to shorter stays among the tourists. It was thus a worry among some interviewees that the reputation of Flåm as a tourist destination was losing its value due to the negative externalities of cruise tourism.

The constant aim for records and growth in Flåm was further identified by many interviewees as not being compatible with a sustainable development of tourism in Flåm. This is particularly evident

given the lack of consideration for the enhanced environmental costs of an extended cruise season. An extended cruise season was argued by the Assistant Port Manager, and other interviewees, as a positive future development in Flåm, generating economic activity all year round. Yet, in Greece, an extended cruise season has resulted in increased air pollution in the off-peak season (Papaefthimiou, Maragkogianni and Andriosopoulos, 2016) and there is no reason to believe this is unique to Greek ports. Given the anticipated increase in cruise calls to Flåm in the coming years, both in the high and off-peak season, there is a risk that the environmental impacts in Flåm will continue to increase, enhancing the trade-off between the economic utility of cruise tourism and its impact on the natural capital and utility of local inhabitants in Flåm.

The tourism industry in Flåm can thus be characterized as a “profit-oriented” industry as there is a lack of limitations on continued growth, especially in terms of future cruise calls and an extended tourism season. Caríc and Mackelworth (2014) points towards how such a development increases environmental and social externalities, which, in the long run, could undermine tourism itself. In Flåm, many interviewees were already worried about how such externalities would escalate if cruise tourism would continue to grow. Characteristics like Flåm is “fake”, a mass industry, and a Disneyland for tourists, exemplifies this by pointing towards a development where growth is favoured over authenticity. As the tourism industry in Flåm markets itself on selling pure and peaceful nature experiences to tourists, this is not a favourable development. Consequently, to avoid a future where tourism increasingly impinges on its own reputation and economic foundation, one should accept to slow down the growth by reducing number of cruise calls and passengers.

No one of the interviewees expressed a wish to fully prohibit cruise tourism, but strong arguments were made for the benefits of a reduction in cruise calls and passengers, especially during the summer. A reduction in cruise tourism would limit the constraints on the fjord ecosystem while enhancing the quality of the product being sold in Flåm, strengthening the natural capital and utility of the tourism industry. Furthermore, an extended cruise season could be favourable if calls were divided throughout the year, reducing the extensive air pollution during the high season, and avoiding multiple cruise calls at the same time. Such initiatives would simultaneously preserve both the integrity of the fjord ecosystem and the economic production of cruise tourism without impinging on the natural capital and utility of the tourism industry.

Initiatives to reduce the growth in cruise tourism in Flåm is currently lacking, yet, regulations are implemented to reduce its environmental impacts in terms of air pollution, both on a national and local level. The Norwegian government has declared that the Nærøyfjord ought to be emission-free by 2026, as emissions from the cruise ships are incompatible with the status this fjord has as a

UNESCO World Heritage Area. The Port Authority in Flåm is further implementing an Environmental Port Index, which is a polluter-pays scheme, charging ships for their pollution while in port and rewarding those ships who take environmental initiatives to reduce their emissions (Lange, 2018). This could potentially avoid situations where old ships, who lack modern cleaning technology, visit the port of Flåm. Yet, cruise lines are perceived to do little in the field of air pollution reduction. To date, there are no emission-free technology for cruise ships, and the majority of ships on the market continues to use heavy fuels, with only one using liquefied natural gas (LNG) (NABU, n.d.). LNG has the potential of reducing local air pollution, the same with on-shore power. Yet, the latter is a big financial investment, and Flåm does not have this in present yet. Thus, it is difficult to know how the cruise industry and Flåm will respond to the future regulations of the Nærøysfjord.

As a final note, the current situation in Flåm shows that there is a compromise involved with cruise tourism as it is difficult to avoid impacts on natural capital and utility. This points towards a risk of uneconomic growth, where the costs of sustaining economic growth exceed the benefits. An argument cannot be made for a situation of uneconomic growth in Flåm, yet, if cruise tourism continues to grow without limitations, there is a risk that its negative externalities will increase along with it. Such risks are however acknowledged by the Norwegian tourism industry in their roadmap for a sustainable development of tourism in Norway. Yet, given the findings in Flåm, it is questionable whether cruise tourism is in line with their aims of reducing pollution from tourism activities and enhancing the quality of life in local communities. Consequently, a tourism industry that includes cruise has to acknowledge that a constant growth of the latter is a threat towards the economic foundation of the whole industry.

6.3. Future research

The research of this paper provides evidence for how cruise tourism enhance the constraints on the natural capital of which the tourism industry in Flåm depends. Yet, the consequences of such enhanced constraints cannot fully be understood without including the perception of the tourists themselves. The argument made so far is that enhanced constraints on the natural capital in Flåm is not sustainable as continued economic production from tourism relies on keeping the natural capital intact. Yet, as the cruise industry mainly responds to the demand among tourists to travel to Flåm, the study would have benefitted from an analysis of whether this demand is reduced due to the environmental impacts of cruise tourism. Consequently, future research should include data on how the tourists in Flåm perceive and experience the environmental impacts of cruise tourism. This would either support or discredit the argument that economic activity from cruise tourism is under threat due to the enhanced constraints on its natural capital stock.

7. Conclusion

Based on the findings of this paper, cruise tourism in Flåm is partly contributing towards a trade-off between its growth and the utility of natural capital for its local population. The trade-off is however found to have larger impacts on the economic foundation of the tourism industry than the utility levels of the local inhabitants, particularly as the industry relies on selling clean and pure nature experiences to tourists. Consequently, a reduction in cruise tourism in Flåm is identified as beneficial in order to sustain the economic activity of the whole tourism industry. Yet, whether there is a will to reduce the number of cruise calls in Flåm is questionable as preliminary numbers for 2019-20 reveal increased calls during both the high and off-peak season. Thus, as the environmental and social costs of cruise tourism is a second priority in Flåm, the tourism industry is in risk of impinging on its own economic foundation unless action is taken to keep both the natural capital and utility of the local population intact.

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9. Appendices

Appendix 1: Total number of tourists in Flåm (cruise, Flåm Railway, local traffic) 2007-2018

| | Mars: | April: | Mai: | Juni: | Juli: | August: | September: | Oktober: | Total Cruise: | Flåmsbana: | Lokaltrafikk: |
|------|-------|--------|-------|-------|-------|---------|------------|----------|---------------|---------------|---------------|
| 2007 | | | | | | | | | 120756 | 582826 | 225076 |
| 2008 | | | | | | | | | 119684 | 544108 | 211459 |
| 2009 | | | | | | | | | 142608 | 516180 | 194940 |
| 2010 | | | | | | | | | 138859 | 547000 | 220855 |
| 2011 | | 883 | 26210 | 45697 | 41680 | 35525 | 6912 | | 156907 | 618557 | 251939 |
| 2012 | 429 | 1892 | 36993 | 52398 | 48056 | 39491 | 20616 | | 199875 | 635368 | 250029 |
| 2013 | | 5572 | 46372 | 58623 | 55102 | 60296 | 22313 | | 248278 | 718195 | 302474 |
| 2014 | 790 | 5681 | 35736 | 46604 | 51729 | 49635 | 13707 | | 203882 | 704478 | 297735 |
| 2015 | 435 | 9236 | 27048 | 38074 | 43968 | 55761 | 10984 | | 185506 | 781427 | 349438 |
| 2016 | 3139 | 9856 | 36001 | 56807 | 48994 | 67531 | 18061 | | 240389 | 926532 | 423572 |
| 2017 | | 3687 | 37218 | 57986 | 58922 | 67661 | 24254 | 1233 | 250961 | 990337 | 497752 |
| 2018 | 402 | 3126 | 43583 | 59932 | 60958 | 63879 | 22950 | 3158 | <u>257988</u> | <u>971899</u> | <u>520196</u> |
| 2019 | | | | | | | | | 0 | | |

Data received from John Olav Stedje, Assistant Port Manager of Aurland Port Authority, on February 12th, 2019

Appendix 2: Number of cruise calls per month 1999-2023

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|
| Januar | | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| Februar | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Mars | | | | | | | | | | | | 1 | | 1 | 1 | 2 | 1 | 2 | | 1 | | | | 1 | | 1 |
| April | | | | | 2 | 3 | 1 | | 1 | 2 | 3 | 3 | 2 | 4 | 6 | 6 | 7 | 8 | 4 | 3 | 4 | 9 | 3 | | | |
| Mai | 4 | 5 | 15 | 13 | 9 | 11 | 22 | 30 | 17 | 18 | 21 | 17 | 25 | 28 | 30 | 23 | 19 | 25 | 26 | 28 | 28 | 25 | 12 | 5 | 4 | |
| Juni | 22 | 29 | 29 | 33 | 36 | 41 | 39 | 35 | 41 | 41 | 31 | 29 | 39 | 39 | 43 | 36 | 27 | 39 | 37 | 36 | 39 | 41 | 21 | 7 | 5 | |
| Juli | 25 | 28 | 30 | 26 | 37 | 27 | 31 | 34 | 39 | 32 | 31 | 29 | 30 | 38 | 41 | 40 | 35 | 37 | 29 | 38 | 36 | 43 | 20 | 6 | 5 | |
| August | 11 | 25 | 23 | 22 | 24 | 25 | 31 | 28 | 27 | 31 | 28 | 23 | 24 | 26 | 36 | 33 | 31 | 38 | 30 | 33 | 37 | 35 | 17 | 4 | 4 | |
| September | | 1 | 5 | 4 | 5 | 8 | 7 | 11 | 3 | 9 | 9 | 5 | 8 | 15 | 13 | 10 | 8 | 12 | 15 | 13 | 17 | 17 | 7 | 1 | | |
| Oktober | | | | | | | | | | | | | | | | | | | 1 | 2 | 4 | 3 | 2 | | | |
| November | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Desember | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Totalt | 62 | 88 | 102 | 98 | 113 | 115 | 131 | 138 | 128 | 133 | 123 | 106 | 128 | 151 | 170 | 150 | 128 | 161 | 142 | 154 | 165 | 175 | 83 | 23 | 18 | |

Data received from John Olav Stedje, Assistant Port Manager of Aurland Port Authority, on February 12th, 2019

Appendix 3: Number of cruise passengers and cruise calls in Flåm 1999-2018

| | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999 |
|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| England | 90392 | 83270 | 70888 | 43653 | 68943 | 97624 | 76298 | 42828 | 45508 | 43640 | 46991 | 40644 | 42551 | 33204 | 20817 | 17079 | 15809 | 10168 | 8074 | 7742 |
| Tyskland | 38136 | 47522 | 36948 | 27493 | 27946 | 30189 | 25625 | 31371 | 23824 | 28936 | 26249 | 24261 | 30872 | 22374 | 16348 | 21596 | 15016 | 17244 | 14308 | 9860 |
| Spania | 29739 | 26545 | 20516 | 15291 | 17619 | 26952 | 30945 | 14017 | 16518 | 18003 | 12230 | 11128 | 8622 | 6786 | 5764 | 5329 | 2997 | 2494 | 4382 | 1303 |
| Italia | 17184 | 12507 | 11206 | 13314 | 11098 | 12441 | 11321 | 16465 | 17922 | 18864 | 8816 | 12481 | 11582 | 9282 | 11935 | 6770 | 8631 | 8118 | 8900 | 7753 |
| USA | 21408 | 19212 | 23842 | 13614 | 11319 | 16154 | 11010 | 8526 | 5019 | 6495 | 8903 | 7992 | 7419 | 7861 | 9200 | 4763 | 5960 | 3795 | 5016 | 3490 |
| Frankrike | 8291 | 7490 | 25713 | 17971 | 19125 | 8596 | 8203 | 7272 | 6146 | 5891 | 3235 | 3998 | 3375 | 3163 | 4854 | 4737 | 3313 | 4895 | 4606 | 3671 |
| Nederland | 7936 | 8638 | 10477 | 9882 | 6948 | 9328 | 7690 | 7585 | 2743 | 3828 | 1121 | 5077 | 985 | 1124 | | | | | | |
| Russland | 2271 | 2145 | 1626 | 1329 | 3046 | 4088 | 1890 | 3906 | 2804 | 2098 | 1401 | 1304 | | | 1196 | | | | | |
| Østerrike | 2171 | 2450 | 1878 | 5442 | 1961 | 2094 | 1955 | | 2041 | 1715 | 916 | 1073 | 890 | 430 | 894 | 1479 | 660 | 544 | 857 | 739 |
| Belgia | 6610 | 7654 | 7569 | 6412 | 5287 | 5196 | 2587 | 3247 | 1449 | 1586 | 838 | 1665 | 1087 | 834 | 720 | 920 | 379 | 677 | 359 | 406 |
| Sveits | 2433 | 3809 | 3393 | 2569 | 1795 | 2358 | 2128 | | 1324 | 1174 | 763 | 667 | 641 | 585 | 344 | | 540 | 355 | 639 | 387 |
| Canada | 3354 | 3332 | 3238 | 2141 | 2053 | 3617 | 2054 | | 621 | 958 | 1011 | 827 | 1080 | 631 | 786 | 799 | 949 | 454 | 1464 | 766 |
| Australia | 4742 | 4342 | 4455 | 2672 | 2783 | 2688 | 1743 | 1202 | 749 | 733 | 621 | 606 | 616 | 398 | 429 | 389 | 342 | 818 | 992 | 309 |
| Japan | 378 | 1498 | 517 | 1398 | 313 | 1095 | 973 | | 225 | 217 | 1155 | 229 | 210 | 128 | 446 | 606 | 192 | 211 | 132 | 79 |
| Kina | 979 | 863 | 822 | 1110 | 474 | | | | | | | | | | | | | | | |
| Sve/Dan/Nor | 2384 | 1562 | 1976 | 1169 | 5029 | 6319 | 3387 | | | | | | | | | | | | | |
| Totalt antall: | 257988 | 250961 | 240389 | 180196 | 203882 | 248945 | 199875 | 156907 | 138859 | 142608 | 119684 | 120756 | 115342 | 91506 | 78283 | 69735 | 58576 | 51522 | 49841 | 37771 |
| Total Crew: | 101717 | 98546 | 96637 | 73919 | 84113 | 100348 | 85589 | 65646 | 58328 | 59442 | 53641 | 53907 | 50720 | 43525 | 38751 | | | | | |
| Totalt ant. Anløp: | 153 | 142 | 161 | 129 | 149 | 170 | 151 | 128 | 106 | 127 | 133 | 128 | 138 | 131 | 115 | 113 | 98 | 102 | 88 | 62 |

Data received from John Olav Stedje, Assistant Port Manager of Aurland Port Authority, on February 12th, 2019

Appendix 4: Interview guide for local inhabitants

Introduction

Present myself, what I study and what my thesis covers in terms of topic and focus. Inform the interviewee about the purpose of their participation and why I have chosen to interview them. Ask about permission to do a sound recording of the interview and explain that the recording will be transcribed and deleted after the thesis has been finalized. Inform the interviewee about the possibility to end the interview at any time and that the permission to use the material from the interview can at any time be withdrawn without any consequences.

Numbered questions are considered the main questions and the sub-questions are guiding questions or follow-up questions.

Introductory questions

1. For how long have you been living in Flåm?
 - a. *Follow-up question if interviewee has been living in Flåm their whole life or a large proportion of their life: Why did you choose to stay in Flåm?*
 - b. *Follow-up question if interviewee has moved to Flåm recently/lived a large proportion of their life outside of Flåm: where do you come from? Why did you choose to move to Flåm?*
2. What kind of job do you have?
 - a. Do you work in Flåm or do you commute elsewhere?
 - b. Is your work connected with cruise tourism?
3. Do you feel a strong affiliation to Flåm?

Questions regarding personal relationship with the natural environment

4. What is your relationship with the natural environment in Flåm?
 - a. Do you rely on the natural environment in your work? *(depends on what is answered on the question regarding work in the previous section)*
 - b. Do you spend time outdoors in nature on your leisure time?
 - c. Do you perceive the nature here in Flåm as an important reason why you live here?

General questions about cruise tourism in Flåm

5. What are the benefits with having cruise tourism in Flåm?
6. What are the disadvantages with having cruise tourism in Flåm?
7. Do you consider cruise tourism as an important part of the tourism industry here in Flåm?

Questions regarding the environmental impact of cruise tourism in Flåm

8. What impacts do you experience cruise ships, and cruise tourism in general, have on the natural environment in Flåm?
 - a. Is it some environmental impacts that worries you?
9. How do you experience the air pollution from the cruise ships during the summer?
 - a. Do you notice the air pollution in your daily life? Is it a problem for you or not?
 - b. Do you consider the air pollution a problem/challenge for the local community in Flåm? If so, in what way?
 - c. Do you consider the air pollution a problem/challenge for the tourism sector in Flåm? If so, in what way?
10. Do you perceive cruise tourism as a threat towards the local environment in Flåm?

The impact of cruise tourism on the quality of life in Flåm

11. Does cruise tourism affect your quality of life in any way, both positive or negative?
12. Do you feel that tourism in Flåm is giving something back to you?
 - a. *E.g. generating economic gain through work, improved infrastructure, better services (health, culture, retail stores etc.), personal meetings with tourists etc.*
13. Would a reduction in the numbers of cruise ships and cruise tourists have an impact on your quality of life?
 - a. Has the limit of 5000 cruise passenger per day had any effect on your life in Flåm? Do you consider this limit low enough or would you prefer an even lower number of cruise passengers? How would this (potentially) affect your quality of life?

General questions about mass tourism in Flåm

1. Do you feel that there is a limit when it comes to the impact cruise tourism should be allowed to have on the local community and the natural environment in Flåm?
2. What is your opinion about the role cruise tourism should have in Flåm in the future?
3. How do you picture the future of tourism in Flåm?

Concluding remarks

4. Do you have any questions or comments to add?

Appendix 5: Interview guide for John Olav Stedje, Assistant Port Manager of Aurland Port Authority

Introduction

Present myself, what I study and what my thesis covers in terms of topic and focus. Inform the interviewee about the purpose of their participation and why I have chosen to interview them. Ask about permission to do a sound recording of the interview and explain that the recording will be transcribed and deleted after the thesis has been finalized. Inform the interviewee about the possibility to end the interview at any time and that the permission to use the material from the interview can at any time be withdrawn without any consequences.

Introductory questions

1. What kind of work and responsibility are connected with the title «Assistant Port Manager»?
2. How much do you work with cruise tourism?

Historical outlook on cruise tourism in Flåm

3. What was the reason a deep water harbour was built in Flåm in 1999?
4. What importance has cruise tourism had for the development of Flåm as a tourist destination?
5. What importance has cruise tourism for the tourism industry in Flåm today?

Development

6. What does the statistic show when it comes to the number of cruise calls and cruise passengers in Flåm since 1999? Has there been an annual growth?
 - a. Can I get access to such data?
7. How many cruise tourists are normally visiting Flåm on a “normal” day?
8. What is the reason behind the limit of 5000 cruise passengers per day?
 - a. Have you noticed any effects of this limit?
 - b. Is this a limit you will continue to stick to?

Economy

9. What is the role of cruise tourism when it comes to maintaining a livelihood in Flåm, e.g. regarding employment, local business development?

About cruise tourism and tourism in general

10. Why are cruise tourists visiting Flåm?
 - a. What are they seeking? What are their main attractions?
11. What role does the nature/environment/landscape have for cruise tourism and the tourism industry in Flåm?

Thoughts on the future of cruise tourism

12. Are you working with sustainability in Flåm?
13. What kind of thoughts have you made yourself about the report from the Norwegian Maritime Authority, documenting high levels of air pollution from cruise ships in Flåm?
 - a. Have you considered shore power in Flåm?
 - b. Have you considered a reduction in cruise calls?
14. How do you picture the future development of cruise tourism in Flåm?