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The Potential Impacts of Climate Change on Avitourism to Islands: the Example of Fair Isle, Scotland

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This paper discusses the potential impact of climate change upon a specific form of tourism, avitourism (birdwatching), and the resulting effects upon islands dependent upon this form of tourism. Bird populations, distributions and migratory patterns are all vulnerable to the impacts of global warming, extreme weather events and changes in the marine environment, as are the islands which provide their habitat. Avitourism is a lucrative and non-consumptive form of tourism that is of major importance to some small islands, particularly those that have unique indigenous breeding species and/or are visited by migrating species on a regular basis. A number of such islands have bird observatories whose visitors contribute significantly to the small local economies. The implications of climate change on avitourism are identified and summarised, and then discussed in the context of potential impacts on the well-being of island communities. While most climate change predictions are generalised and incapable of being applied to specific locations such as a small island, or particular species of birds, a recent development has provided an opportunity to explore what the impacts might be in some detail. The paper uses the case of Fair Isle (Scotland) to illustrate the effects of a sudden loss of avitourism to that island's residents. The accidental destruction of the Fair Isle Bird Observatory in 2019 meant the cessation of avitourism to that island by removing the accommodation used by such visitors since the 1950s, depriving the island economy of tourist expenditure and employment, a potential source of new residents, as well as threatening the viability of other island services, including its access by air. This local catastrophe thus provided a unique opportunity to identify what might happen to other islands if the avian attractions for tourists were to disappear or be changed radically by climate change.

Key Words: avitourism, islands, birds, climate change, impacts

Introduction

The traditional view of the impacts of climate change focuses very much on issues such as rises in sea level from melting icecaps, higher temperatures, and increasing numbers of extreme weather events. Such issues clearly affect islands as much or in some cases, much more than, mainland locations, as being islands they are more exposed to the direct impact of sea level changes and marine weather patterns. Islands are particularly susceptible to the effects of climate change through those impacts on vegetation and wildlife (terrestrial and marine). The vulnerability of island economies in general is well known and long reported, reflecting the unique problems posed for islands because of limited resources such as land and fresh water and often relatively inaccessible locations (e.g., Lockhart & Drakakis-Smith, 1997; Scheyvens & Momsen, 2008). Thus islands,

particularly small islands, represent locations that are likely to suffer more than most areas from climate change because of their inherent limited scale and attributes, and being highly exposed to many of the direct impacts of climate change. These impacts can be expected to affect tourism to islands as much or more than other economic activities, both directly and indirectly.

This paper focuses on one specific aspect of island tourism that is potentially prone to being significantly impacted by climate change in both positive and negative ways, namely avitourism, or more colloquially, bird watching tourism. Islands represent a wide variety of settings at different scales, from Greenland in the Arctic to Pitcairn island in the Pacific, and their tourism industries reflect these differences. The popular image of islands in a tourism context is somewhat distorted, particularly in the media, as they are generally portrayed as sun-kissed, warm, tropical or sub-tropical small islands, frequently

with a distinctive culture and sometimes unique natural environment, where tourism is often the major economic activity. In reality, there are many more islands that do not fit that image than do, but in the academic tourism literature, most of the published work has been on islands in the Mediterranean, the Caribbean or the South Pacific (see for example Briguglio *et al.*, 1996). Tourism to cold-water islands is less documented and far less studied, although publications on cold water destinations (e.g., Baldachinno, 2006) illustrate the very different influences and characteristics in these situations, which provide the setting for this paper.

Avitourism is a form of niche tourism (Butler, 2018) and involves the visiting of specific locations in order to observe (and sometimes photograph, paint, or study) different species of birds. It can take a number of different forms, including: focusing on breeding birds in their habitats, e.g. penguins in Antarctica, Boobies in Galapagos, or Puffins in western European islands; seeking the maximum number of species in a given time, e.g. year lists (Obmascik, 2004); increasing one's life list of species seen, often involving visiting a large number of locations purely to add another species identified; and observing the migration of birds, particularly at bird observatories (Butler, 2018). As discussed below, all forms of avitourism are likely to be affected by climate change, and because of that, tourism to those islands which rely on avitourism will also be affected and may be changed significantly temporally, economically and in scale. The primary focus in this paper is on avitourism for migratory bird observation on islands, but the impacts of climate change on avian tourism to islands in general will be reviewed briefly to provide a context.

Avitourism

Avitourism, is one form of special-interest or niche tourism (Weiler & Hall, 1992) which has links to ecotourism, in that the purpose of the activity is to observe a range of bird species in a non-consumptive manner. While many birdwatchers have a competitive aspect to their activities, in that increasing their life list of species seen is often pursued to 'outscore' fellow participants, in general it is a co-operative activity in the sense of assisting other birdwatchers to see new species, and the activity is often pursued in groups, particularly on vacation trips.

Organised tours to areas such as Galapagos, Borneo and other destinations well known for a large variety of indigenous species not found elsewhere have become important segments of the international tourist market. Such excursions fall into two types, one is trips to observe indigenous species in their home environments, which generally have a high chance of success measured in terms of breeding species seen, particularly when local guides are used. The other form is to observe birds on migration, which is much less reliable in terms of guaranteed success in seeing any specific species at all. This is because a great deal depends on weather conditions, in the nesting areas which birds are leaving at the end of the summer, in the wintering regions from which they are flying to summer breeding locations, and over the flight paths of the flocks of birds during migration. Bad weather during migration can result in high fatality figures as birds may become exhausted and fail to find land when migrating over water. Fog and strong winds can cause birds to lose direction and fail to find their anticipated landfall, or land far from their original destination. Depending on the location they are visiting, bird watchers may suddenly be delighted by seeing a species rarely, or never previously, recorded before in a particular location. Certain locations have records of a large number of such occurrences and are, therefore, particularly popular with birdwatchers. These include in particular, islands that lie on the main migratory flightpaths, for example the west coasts of Europe, and in the Gulf and eastern states of the United States.

The avitourism segment, like much of the tourism market, ranges in intensity, in patterns, in commitment, in expenditure and in the personal characteristics of the participants. It ranges from occasional participants, who perhaps watch birds while engaged in other forms of tourism, but do not consider bird watching to be the main purpose of their tourist trip, to those individuals whose sole purpose on a holiday is birdwatching, and who also engage in this activity at other times as well as holidays. This latter segment not only visits specific locations but often limits the time of visit to specific periods of the year (either breeding or migratory seasons), and also participates on cruises and expeditions specifically focused on birds. This group is generally well received at the destinations which they visit, for they represent the high spending, low impacting, long staying, environmentally

friendly tourist that almost every destination desires. Those pursuing migratory species often return regularly to the same location, another favoured characteristic of tourists at most destinations. Clearly, any factor, such as climate change, which may threaten this segment of the tourist market, is of great concern to those destinations involved in avitourism and the enterprises there which are dependent on these visitors, particularly so in the case of small islands which may have few other attractions than birdlife or few economic alternatives to tourism.

There is a growing literature on avitourism, partially summarised by Steven *et al.* (2014) who examined 66 research studies published between 1989 and 2014 related to the topic. Most of those studies focused on the participants, including their economic impacts, their motivations and market characteristics, but other aspects included specific events, the types of birds sought, and any negative impacts of the activity. The last topic of this list, the negative impacts, referred mostly to crowding at specific sightings, inappropriate behaviour towards rarities, such as pursuing a bird to flush it from cover, and the common aspects of overtourism at a micro-level - garbage, vegetation trampling and residential disturbance. Biggs (2013) reviewed birdwatching from an ecotourism perspective with similar conclusions, although noting that while at one scale the activity qualifies as a form of ecotourism, with the impact of the activity generally being supportive of birds and their habitat (through funding and conservation measures), at the other extreme, the competitive 'twitcher' may behave in an almost consumptive manner, where a desire to 'tick' a species in a life list may take priority over the well-being of the individual bird or its surroundings. Much of the academic literature on avitourism has discussed the growth of the activity and its economic benefits to popular birding locations (Biggs *et al.*, 2011; Carver, 2011; Dickie *et al.*, 2006; Isaacs & Chi, 2005; Steven *et al.*, 2014), but research also examined the relationship between avitourism and the management of the areas visited for this purpose. Hvenegaard (2002) was one of the first researchers to explore avitourism's links with conservation, and Şekercioğlu (2002) also examined its impacts on both human and avian residents of visited areas, while Steven *et al.* (2015) conducted a similar study in Australia's significant bird and biodiversity areas. Moss (2005) explored the origins and

social characteristics of British birdwatchers in detail, while Green and Jones (2010), Kim *et al.* (2010) and Glowinski and Moore (2014) also focused attention on the recreational motivations and market aspects of birdwatchers, particularly in Australia.

Birdwatching and avitourism have grown dramatically in scale in recent decades which has meant that the value of the activity has become considerable and can be of great importance to a local economy. For example, an economic survey (Bird Guides, 2016) found that between 2004 and 2015 a nature trail in southern Scotland attracted more than 100,000 visitors. That study claimed that £8.2m of spending was directly attributable to people who came to the region to see breeding Red Kites (a bird of prey) and that the trail supported the equivalent of 19 full-time jobs each year of that period. In the case of an extremely rare sighting, large numbers of visitors may travel considerable distances to see an individual bird, and Callaghan *et al.* (2017:77) estimated that a Black-backed Oriole (a possible first sighting in the United States) added US\$223,851 to the economy of rural Pennsylvania, having attracted over 1800 birders from the USA and Canada over a three-week period. They noted that at a larger scale

Birding is big business in the United States, Europe, Australia and around the world. According to the United States Fish and Wildlife Service, up to \$40 billion is spent on the hobby in the US alone each year.

While a good proportion of that amount is spent on equipment such as binoculars, cameras and clothing, the activity can generate income and employment, often in rural areas, where other forms of employment may be limited, as in the case of islands. Connell (2009:203) noted.

*Birdwatching has been particularly significant in more remote places including deserts and wetlands, but **particularly offshore islands** [emphasis added], where more unusual and rare species are to be found. It has contributed to the economic development and environmental management of rural and remote areas.*

In the context of this paper, it is important to consider how climate change may affect the appeal of islands to avitourists in particular, more specifically, the nature of

the impacts on the species which birdwatchers travel to observe. These islands are essentially the setting for the activity rather than the attractions in themselves, although personal communications suggest that for many birdwatchers the sites visited have considerable appeal in themselves, and birdwatchers, rather like anglers, will often return to such sites even if a previous visit had been unsuccessful in terms of birds observed, or fish caught.

Climate Change and Avitourism

The impact of climate change is a major research topic at the global scale, but only a few papers have explored the impact of climate change on islands specifically (e.g., Mimura *et al.*, 2007) and even fewer have examined impacts on tourism and bird populations in islands. Uyarra *et al.* (2005:11) noted that

Climate change may affect important environmental components of holiday destinations, which might have repercussions for tourism-dependent economies.

In their examination of two Caribbean islands, they found that tourists expressed preferences for specific attractions that would be vulnerable to climate change such as warm temperatures and clean warm sea water. They noted however, that,

tourists in Bonaire thereafter prioritized marine wildlife attributes (i.e. coral and fish diversity and abundance) over other environmental features (p. 11).

Several papers have reviewed the nature and probability of changes in bird populations and distributions as a result of climate change (Jetz *et al.*, 2007; Lindstrom *et al.*, 2013; Massimo *et al.*, 2015, 2017; Pearce-Higgins *et al.*, 2015), but most such papers deal with general forecasts, reflecting the broad nature of most climate change models and the impossibility of predicting precise levels of change at specific locations such as individual islands or individual species of birds. The paper by Massimo *et al.* (2017) is one which did deal specifically with 124 bird species and noted (p.117) that,

Future climate change was projected to result in significant population increases for 55 species and significant population declines for 11 species by 2080.

They go on to conclude,

Climate matching provides a relatively poor indication of the extent of current and future suitable areas because species can adapt to new climates or other factors constrain the native range and many climatically suitable areas are currently unoccupied. Improvements to climate matching techniques and ongoing surveillance are required to refine predictions to support effective management policies.

McDermott and DeGroot (2016) also explored the long-term impacts of climate change on specific species in parts of the United States but such papers are rare and do not focus on either islands or avitourism in particular.

It is clear that it is extremely difficult to predict with confidence the implications of climate change on a particular species in a specific location, let alone the effects on migratory species on individual islands, as Border *et al.* (2018) point out. Becken and Hay (2007) reviewed the relationship between climate change and tourism from the context of risks and opportunities, and Becken *et al.* (2011) examined the likely impacts of climate change on tourism to the Maldives, while Belle and Bramwell (2005) explored the impacts of climate change on small island tourism in general. The almost non-existent literature on the likely effects of climate change on the combination of birds, islands and avitourism together means that discussing such implications, for island destinations, for the bird populations and migrants, and for birdwatching there, is essentially a process of linking likely changes in climate and wildlife biology to reactive changes in human behaviour. Specific projections and predictions are impossible under such constraints and the following discussion is inevitably limited to an interpretation of likely events and responses.

One of the expected results of global warming is an increased occurrence of extreme climate events such as storms, sea surges, heat waves, droughts and floods (Becken & Hay 2007). Of these, most will have few direct effects on tourist visitation to islands, except during the specific occurrence of such events. Even during the hurricane season tourists still visit Caribbean islands, and heat waves, floods and droughts tend to have little long-term or major impacts on tourist flows in general. Storms and sea surges can severely restrict access to islands for

tourists and residents alike, however, and storms may delay or prevent sailings and landings at least for the duration of such events. They may also cause damage to ports and landing areas and prevent the transfer of passengers from large ships to small boats, as required, for instance of visitors to Pitcairn Island (Amoamo, 2017) and other isolated small islands. A significant increase in the number of such extreme events could result in a loss of visitors on a permanent basis. Storms and cyclones can prevent flights from arriving and departing from island and other airports, and in some locations, the proportion of flights affected by negative weather conditions can be significant. Visitors to such locations are vulnerable to unavoidable changes in schedules and services, additional

charges relating to unexpected stays at connecting stops and changing other transport links. While they may be able to make alternative arrangements for connecting flights and sailings, to have to do so on an increasingly frequent basis, as well as dealing with late returns to work etc. would become even more unattractive and might decrease visitation permanently. Isolated islands such as those in the South Pacific or the North Atlantic would be particularly vulnerable to any reduction in access services or reduced reliability of those services. Islands that attract avitourists in the spring and autumn seasons, are more vulnerable to extreme events as shoulder seasons are less reliable for calm weather, and sudden storms then are not uncommon, and unpredictable.

Table 1: Potential Climate Change Related Events, Impacts, And Results for Avitourism on Islands

Event	Impacts	Possible Results	
		Negative	Possible Results Positive
Rise in sea level	Loss of wetlands, coastal erosion, increased salinity	Loss of breeding species, reduction in stop-over of migrants, reduced avitourism appeal, loss or damage to access (piers, moorings etc.)	
Storm surges	Flooding, coastal erosion, loss of beaches	Loss of beach nesting species, interference in access, loss of general tourist appeal	
Increase in storms	Changes in journey times, increased hazards	Interference in access, particularly for small vessels and planes, increase in bird mortality	Possible increase in extreme rarities and change in migration patterns
Warming of sea water	Changes in fish habitats and populations, coral loss	Significant threat to specific breeding species	Slight chance of appearance of new breeding species
Changes in currents	Changes in fish habitat, nutrients	Significant threat to specific breeding species	May attract new marine mammals, and increase general appeal
Atmospheric Events			
Warmer air/fog	Loss of habitat, insect movements, heat stress, loss of star visibility	May result in loss of breeding species, higher mortality of migratory species, loss of more common migrants, change in timing of migration	May result in increase of extreme rarities
Stronger winds/storms	Wind damage, loss of tree and vegetation cover and habitat	Threat to breeding species, higher mortality of migrant species, interference with access, damage to facilities, increased delays and costs	May result in increase of migrant species
Changes in wind directions	Impacts on bird migration and human travel	Increased costs in time and travel	Decreased costs in time and travel
Other Events			
Increased rainfall	Flooding, landslips, changes in vegetation	Threat to breeding species, damage to facilities.	New breeding species habitat created
Floods	Vegetation change and loss, habitat change	Threat to breeding species if in nesting periods.	

Source: Author based on literature survey.

Another way in which tourists could be affected would be by changes in the avian population of islands, both breeding and migratory species. Islands are generally small in extent with a limited range of ecosystems and potential habitats, and limited resources that serve as bird food sources. Such conditions mean that there are few, if any, alternative habitats for wildlife there if climate change makes current habits unusable, and the alternative is for species to leave an island for a more viable location or die out on the island. If breeding species are the attraction for tourists to an island or an archipelago, such as albatrosses in the southern hemisphere, or thousands of auks in the northern oceans, then if those species should leave those islands, tourists will cease to visit and go elsewhere in pursuit of those species. It is appropriate therefore, to summarise the nature and implications of climate change on avitourism and the islands that market visits, and these are illustrated in Table 1. It has to be noted that despite the overall negative implications of climate change for the planet and for mankind, there are some limited possible positive impacts for avitourism in the context particularly of migratory species and the potential rise in occurrences of extreme rarities at some locations.

The Impact of The Loss of Avitourism on a Small Island: The Case of Fair Isle, Scotland

The preceding discussion has noted the broad scale and generality at which climate change impacts in general are predicted, and the fact that very little research has been done on the likely effects of climate change on islands specifically, and on avitourism to islands in particular. To speculate on the impact of the loss or significant reduction of avitourism to islands dependent on that form of tourism would normally be even more imprecise and vague. However, one case exists in which avitourism has suddenly been curtailed and remained absent from an island for over a year and it is possible to illustrate in some detail how the loss of this form of tourism has affected the island community and its way of life. There are 20 bird observatories in the British Isles, 8 of which are on islands off the coast and for all of these isles, avian tourism makes up the largest segment of the tourism that is attracted to these islands. The best known of these islands is Fair Isle, which is the most remote of the inhabited British Isles (lying 40 kilometres from the Shetland

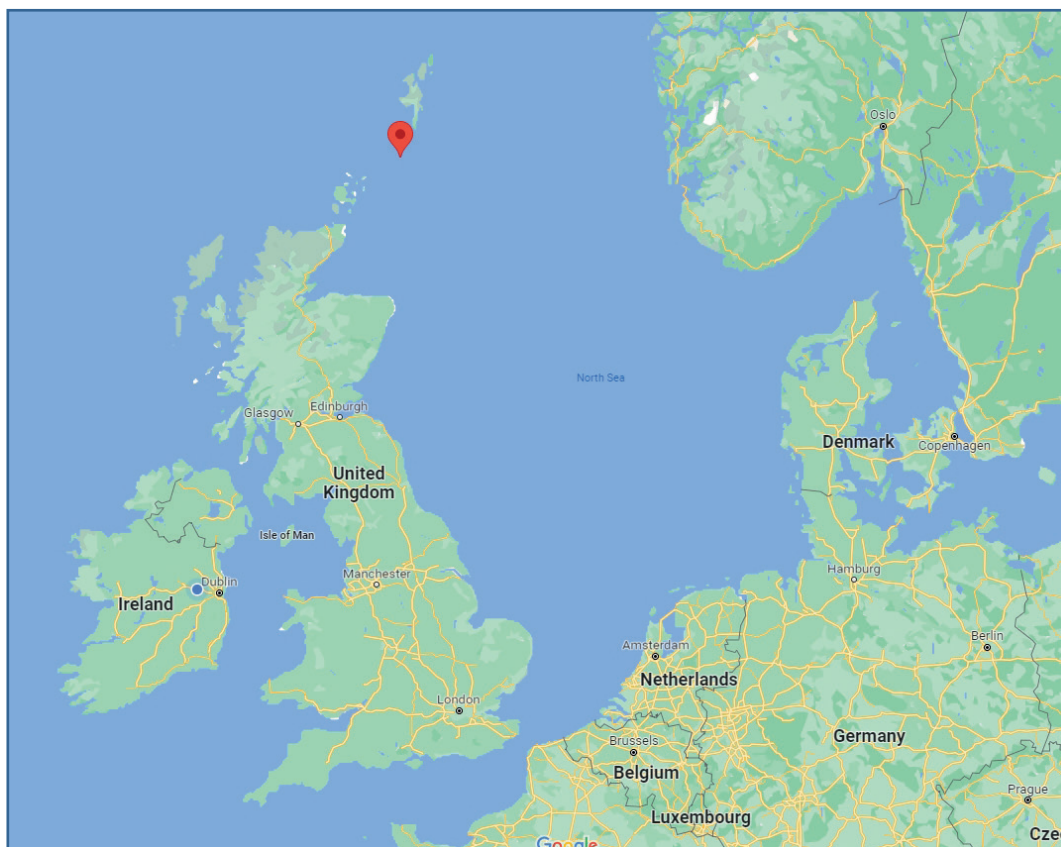
mainland, and an equal distance from the Orkney islands (Figure 1), off the north coast of Scotland), giving it 'novelty' appeal (Baldachinno 2007). It is well known for two additional reasons, one being the internationally recognized style of knitting which bears its name, and the other, because of its claim to have more 'first records' of species not seen before in the United Kingdom than any comparably sized location, making it highly attractive to avitourists.

Fair Isle has become one of the great migration hotspots in the whole of Europe ... Fair Isle has developed an extraordinary reputation for 'firsts' for Great Britain (and Scotland). Since 1900, the island has been responsible for no fewer than 35 additions to the British List (www.fairislebirdobs.co.uk).

In addition, Fair Isle has one unique indigenous species of the bird, the Fair Isle wren and 391 different species have been recorded on the island, the vast majority of which are migrants species. The island is home to around 60 residents, a proportion of whom owe their residency to the Bird Observatory located there. The island has been well known in ornithological circles from the beginning of the 20th century, and the first observatory (Figure 2) was established in 1954 (Butler, 2019). Since then, there has been an observatory offering accommodation to birdwatchers, recording a steadily increasing number of staying visitors (from 2610 bednights in 2006 to 3165 in 2017 (Butler, 2018)) each year until March 10, 2019, when a fire completely destroyed the Observatory in March of that year (www.fairlebirdobservatory.co.uk). Plans to rebuild the fifth observatory are underway and it is planned to reopen in 2023. The importance of the observatory to the island has been discussed elsewhere (Butler, 2016, 2019), but its significance is relevant to any discussion on the impact of climate change on tourism to the island, as its sudden closure allows one to identify some potential implications of changes to the island which could occur if avitourism on Fair Isle were to disappear on a permanent basis.

The Bird Observatory normally accommodates visitors from April to the end of October each year, with a permanent warden (and family) staying in the building throughout the year to continue research. The Observatory employed four to five full-time staff during that period (cook, assistant wardens) all of whom are from off the

Figure 1: Location of Fair Isle



Source: Google Maps

Figure 2: First Observatory and North Haven, 1963



Source: Author

island, and also a varying number (around three or four) island residents as part-time staff, involved in cleaning, repair, monitoring facilities, and general assistance. As with many small islands, such part time employment is crucial to economic survival, as full-time jobs on small islands are rare, and in Scotland at least, many island residents need multiple part time jobs to maintain their standard of living. Therefore, any reduction in employment opportunities is a serious matter. Of more significance to Fair Isle perhaps, is the fact that in recent years the Fair Isle Bird Observatory Trust (the charity which owns and operates the Observatory) had made arrangements with the only shop on the island to supply the basic food supplies for the observatory, and the operator of the shop had stated that such an arrangement was essential for the viability of the shop (personal communication, 2012). How much longer it will be able to operate without the custom provided by the Observatory and its visitors because of the fire is uncertain.

The Observatory has been important to the island community and its viability in other ways. The wardens' families over the past sixty years have provided between a quarter and a third of the elementary school enrolment and their impending departure from the island is a loss and a threat to the ongoing viability of the school. The last Observatory was the only facility on the island that would provide meals for locals when desired and was also the only licensed bar on the island. It served as a social centre by providing those services, also by holding musical evenings once every two weeks during the open period at which many islanders participated and attended, and by encouraging several islanders to give demonstrations of traditional crafts including knitting, traditional chair making and spinning wheel production (Butler, 2017). The observatory also provided services to visiting private yachts and sold some of the island knitting produce to visitors. Lastly, at least three of the eighteen residences on the island have housed former wardens of the Observatory and their families who chose to stay on the island after concluding their terms as warden. To a small population, this source of new permanent residents is a key factor in the survival of the community, not only by bringing in new blood and ideas to the island, but also by providing new knitting and other entrepreneurs and crucially by providing potential replacement members for the crew of the ferry boat.

While avian tourists visited the island in considerable numbers relative to the permanent population (48 being accommodated in the last observatory), the name of the island also served to attract other visitors, nearly all of whom stayed at the Observatory (flight schedules made day trips from Shetland next to impossible). The only other accommodation on the island for visitors was one self-catering unit accommodating 4 people, and two other premises offering accommodation for another 4 people in total. These premises are often booked by Shetland island Council staff and other officials on specific business to the island as well as the visiting medical staff on their occasional visits and not always available for tourists. The Observatory had been attracting an increasing number of short-term general tourists in recent years, a reflection of the improved quality of accommodation offered at the Observatory which had developed from accommodation in huts of old naval war-time premises to the last building (Figures 3 & 4), which offered *en suite* accommodation at a 3-star hotel standard (Butler, 2019). The fire at the Observatory has meant that almost no tourist has visited the island since March 2020, as the warden and family has been accommodated in one of the other premises offering accommodation and the smaller number of assistant wardens in the other units.

The loss of tourist traffic has had other implications. Access to the island is by its own boat, a specially built vessel which can transport up to 12 people, but which is much more of a lifeline for the island in terms of carrying virtually all goods coming to the island. It operates twice a week in the summer and weekly between November and April, always weather permitting. The other public means of access is by air, a regular service financially supported by Shetland Island Council - a seven seat plane flies twice daily six days a week during the summer period, again weather permitting, with a reduced schedule outside that time. The Observatory website notes

Travelling to and from an island such as Fair Isle is totally reliant on the weather. Travel plans can be disrupted by poor visibility and/or strong or gusting winds and visitors should be aware that their plans may be affected even at short notice, especially when considering onward travel immediately after a trip to Fair Isle (www.fairislebirdobs.co.uk).

Figure 3: Last Observatory - destroyed by fire March 2019



Source: Author

Figure 4: Last Observatory (destroyed by fire March 2019) and North Haven 2013



Source: Author

While the sailings of the Good Shepherd IV have not been significantly affected by the absence of tourist traffic (no charge was made for visitors coming to stay at the Observatory, so no income has been lost), the air service is facing more difficulty as the subsidy paid per passenger is now considerably more with the absence of staying tourists. A few private yachts call at the island occasionally, and day visitors arrive (except during the current COVID 19 pandemic) on a number of small cruise ships which visit each year. These carry from 50 to 300 passengers and around twelve visit annually. They are an important market for the island craft industry production (Butler, 2017) and displays are arranged of local products to coincide with visits. The loss of the avian tourist market has made this segment of tourists more important than before, both in keeping the island name in the tourist gaze and in providing a face-to-face market for island produce, particularly knitting.

The loss of the Bird Observatory on Fair Isle illustrates the implications of a loss or major reduction in avitourism for such small islands and their economies. At this micro scale, even minor fluctuations in the purchase of products, of services shared by islanders and visitors, and critically of part time employment opportunities generated by tourism, can have severe effects in locations where alternative sources of income, employment, and services are next to impossible to replace. Without avitourism, the Bird Observatory would not be able to continue to operate, as evidenced by the fact that following the destruction of the Observatory, the charity that operates it (FIBO Trust) has had to terminate the employment of the warden and his assistant because of the lack of income from staying guests at the Observatory (www.fairlebirdobs.co.uk).

The initial impacts of climate change have already been recorded on Fair Isle,

Migrant birds have been intensively censused on Fair Isle by staff of the Bird Observatory every year since 1948. The daily spring and autumn migration census was initiated by George Waterson and Ken Williamson and a standard methodology has been in place since 1955 ... Overall, this new analysis of FIBO census data revealed patterns of simultaneous advancement, stability and delay in the spring and autumn migration timing of long-distance migrants. These patterns were unexpectedly complex and for several species included substantial changes

in migration timing in both seasons (Miles et al., 2017:1400, 1410).

Such changes can be expected to continue, perhaps with a greater magnitude and effect on migratory species recorded on the island, thus affecting its appeal to avitourists. If these visitors cease to visit Fair Isle because of the disappearance of migratory species and the loss of some breeding species (auks such as Puffins are becoming vulnerable to changing locations of sand eels with changing water temperatures), then the next Observatory may not be able to operate in a commercially viable manner. General tourists, while increasing in numbers, represent only a small proportion of total staying guests, for while Fair Isle has spectacular cliff scenery like much of the rest of Shetland, it has few other attractions which would draw tourists, even those already in Shetland.

Conclusions

As has been emphasised in this paper, drawing conclusions about the possible impacts of climate change in any form at any location is extremely difficult because of the aggregated nature of the data and the interpretations which can be drawn from them. It is clear however, that bird species, both breeding and migratory, will be affected by climate change, and the opportunity to visit islands to observe these species, avitourism, will also be affected, with results for the economies of the islands depending on this type of tourists. While a few locations and the bird species recorded there may benefit from climate change, the overall effects are likely to be more negative than positive, resulting in a decline in visitation by avitourists, and it is unlikely that they will be replaced with other types of tourists to those islands for which birds are the main attraction. The impacts on island communities will range from minor economic losses to effects as dramatic as the possible abandonment of islands by their populations because of the inability to maintain a viable economy and standard of living. The example of Fair Isle is one case in point, where the island's overall social and economic well-being is unavoidably linked to avitourism, and which has already become vulnerable because of the destruction of the Bird Observatory there. Unlike other locations which have suffered catastrophic declines in tourism, to such islands, there is no obvious mitigating measures that can be taken if climate change continues to occur.

Figure 5: Last Observatory - destroyed by fire March 2019



Source: Author

Figure 6: Fair Isle, North Haven



Source: https://commons.wikimedia.org/wiki/File:Fair_Isle,_North_Haven.jpg

Figure 7: Fair Isle, South Harbour



Source: Author

Figure 8: Tourists at Local Craft Display



Source: Author

Figure 9: Heligoland Trap on Fair Isle



Source: Author

Figure 10: Shetland Times October 2021 News Story about Rebuilding of Observatory



Source: <https://www.shetlandtimes.co.uk/2021/10/11/highlands-and-islands-enterprise-pledge-2-35-million-to-fair-isle-observatory-rebuild>

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