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A Pilot Assessment of a ‘Plastic Free Community’ Initiative, Respective Community Actions and Residents’ Behavior

Anna MacDonald, Deonie Allen *  and Elsa João

Department of Civil and Environmental Engineering, University of Strathclyde, Glasgow G1 1XN, UK; anna.macdonald.2019@uni.strath.ac.uk (A.M.); elsa.joao@strath.ac.uk (E.J.)

* Correspondence: deonie.allen@strath.ac.uk

Abstract: The problems of plastic pollution are increasing and have been linked to sustainability efforts. Some communities have tried to tackle this issue by implementing ‘plastic free’ initiatives, such as the ‘Plastic Free Community’. Community initiatives foster change and encourage improved environmental outcomes; however, it is unclear if ‘plastic free’ initiatives have the capacity to ‘snowball’ into further sustainable behaviors or if they are a ‘distraction’ from more pressing environmental issues. This study presents the behavioral changes, snowball and distraction effects from the first Scottish mainland ‘plastic free community’ initiative. The pilot study of ‘Plastic Free Anstruther’ (Scotland) identifies self-transcending values and locus of control as important drivers for change, but adoption of single-use plastic alternatives and a ‘single use’ mindset resulted in a limited ‘snowball’ effect. Future ‘Plastic Free Community’ initiatives should focus on encouraging more circular approaches and individual behavior change to reduce waste and improve environmental outcomes. While the initiative resulted in greater awareness of wider environmental issues, additional incentives for individual and business pro-environmental behavior could further improve economic, social and environmental sustainability.



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Keywords: plastic free; community action; pollution; waste; pro-environmental behavior; environmental identity

1. Introduction

Tackling plastic pollution is an international problem and there are a growing number of policies and initiatives designed to address this issue [1]. Global plastic waste emissions are estimated to be 19–23 million metric tonnes in 2016, reaching 35–90 million metric tonnes by 2030 in a business-as-usual scenario [2]. Recycling has been identified as an end-of-life option for some single-polymer material products but there is limited multi-layer, multi-polymer product recycling capacity in many global communities [3,4], with approximately 9% of global plastic waste recycled [5]. In response to the more cautious approach from national governments, some communities have taken matters into their own hands. This paper examines a ‘Plastic Free Community’ in Scotland to see if community plastic initiatives can produce sustainable outcomes and influence further individual pro-environmental behaviors.

Community based approaches have been found to foster change in individual behavior and encourage environmental outcomes [6]. Movements such as ‘Break Free From Plastic’ [7] and ‘Plastic Free July’ [8] have grown in popularity in recent years. Research on ‘Plastic Free July’ showed the campaign significantly reduced participants’ single-use plastic consumption when compared to a control group [9]. Participants with low environmental identity were also noted to be more successful in reducing their plastic usage, suggesting that environmental identity displays a strong influence over individual behavior [10]. Environmental identity is described as individuals and community’s self-concept and sense of connection to some part of the natural environment, and the belief that the

environment is personally important and a part of who individuals and communities [11]. Community initiatives can implement changes faster than national governments due to their localized action and limited requirement for national-level policy development or change. For example, the town of Modbury in the UK banned plastic bags in 2007 [12], eight years before the nationwide charge for carrier bags came into place [13]. It has been said that Modbury's methods were a model approach of how small businesses and consumers can lead change in communities and encourage sustainable environmental behavior [14].

Although these approaches may encourage more sustainable habits, it is also argued that 'ditching' plastic altogether may not be the most sustainable option. There is a risk of replacing single-use plastic with an alternative single-use material, resulting in limited change in community or individual behavior away from a linear economy towards a more circular approach. Herberz, Barlow, and Finkbeiner (2020) suggest that a single-use plastics ban could decrease marine pollution (by up to 5.5% in the EU) but could also increase emissions if the 'single-use' behavior continued, resulting in marine aquatic toxicity [15]. Alternatives to plastic are becoming increasingly available and potentially problematic, for example biopolymers are growing in popularity but their biodegradability varies [16]. It is therefore important to examine just how sustainable the outcomes of these community plastic management initiatives are and their contribution to the shift in community and individual behavior from the classic linear to more circular approach to resources and plastic.

This research focuses on one community based initiative, the 'Plastic Free Communities' program. This was established by the British charity 'Surfer's Against Sewage' to minimize single-use plastic [17]. In order to achieve the 'Plastic Free Community' status, the following objectives must be met:

1. Community Action and Events—Communities need to hold to events organized by the 'Plastic Free Community' group.
2. Community Allies—The 'plastic free' group must demonstrate that they included as many groups and organizations as possible in their events and awareness raising activities, with the aim of collective community action. These community groups will then take on the 'Plastic Free Communities Pledge' (see Box 1).
3. Business Champions—The group must encourage a local business to become a 'Plastic Free Champion' and have a plan to encourage others to adopt this status and leadership.
4. Local Governance—The local council (who have direct access to running of schools, businesses, community organizations and waste management so can have a unified approach to reduce plastic) must pass a resolution to support the plastic free journey, to tackle action itself and to support plastic free initiatives within its catchment.
5. Plastic Free Steering Group—A local group of stakeholders should meet twice a year to discuss the progress of the 'Plastic Free Communities' initiative locally, set objectives and complete their application for approved status.

Box 1. The Plastic Free Community Pledge required by Surfers Against Sewage [18].

Plastic Free Community Pledge:

Work to remove at least three single-use plastic items from our day to day activities
 Commit to include our stance on single-use plastic in communications
 Raise awareness and support plastic free initiatives in the community

As of February 2021, 718 communities have this 'plastic free' status in the UK [17]; therefore, it is of interest to examine if these initiatives are reducing plastic use and waste, and producing more sustainable outcomes. By first examining what would displace plastic within these communities, it is possible to discern if more circular approaches are being adopted, or if one single-use product was being replaced with another.

It is generally assumed that sustainable approaches would employ elements of the circular economy, as is recommended by the European Commission plastic pollution

strategy [19]. The circular economy is a concept that aims to turn waste into resources and ‘close loops’ in industrial and commercial systems to reduce waste. This can be achieved through reuse, repair and remanufacturing and as a last resort, recycling [20]. Although the lines between sustainability and the circular economy are said to be blurred, it is simply a method to achieve greater sustainability [21]. To achieve a more circular plastics economy, closing or narrowing the plastic loops is recommended. This may involve designing products that have a longer life cycle, designing products to be used for other goods, improving the recyclability or biodegradability of products or designing products that use less resources (Bocken et al. 2016, in Hahladakis et al. 2020) [22]. Landfill is the least desirable option, with less than 9% of plastics recycled globally [22] and the environmental impact of ‘bioplastic’ polymers called into question [23], it seems necessary to find more effective alternatives to plastic and to circulate plastic already created and used (to keep them within the economy and out of our environment) [24]. Therefore, increased uptake of sustainable, long-life, repurposable and repairable plastic alternatives to single-use plastic are essential to shift human behavior towards a more circular approach, including innovations such as reusable plastic free beverage containers, long-life plastic or plastic free bags, reusable food containers (e.g., innovations such as Swapbox©) and zero-packaging or zero-waste stores. Furthermore, current theories on sustainability suggest such approaches should lead to improvements in all three sustainability ‘spheres’—economic, social and environmental [25].

Currently, there is contention over whether ‘plastic free’ is a ‘distraction’ [26] or if it can ‘snowball’ [27] into other areas of sustainable behavior. Stafford and Jones argue that plastic pollution is a “convenient truth” to ‘distract’ society from the need to encourage more radical behavior changes ([26], p. 187). They suggest that issues such as biodiversity loss and climate change are being masked or ignored as a result of the plastic pollution discussion. This may be pessimistic but it can be seen that ‘plastic free’ is certainly becoming a trend which could potentially be used as a form of ‘greenwashing’ [28]. On the other hand, Villarrubia-Gómez et al. (2018) argue that plastic pollution is part of the bigger sustainability picture and can have beneficial knock-on ‘snowball’ effects. Individual or communities environmental beliefs have also been found to translate into responsible ‘green’ consumer behaviors [29]. At the time of this research, there was limited literature that focused on the efficacy of the ‘plastic free’ initiatives in creating environmental change or improving sustainability, and this is the focus of this paper.

An effective ‘plastic free’ initiative should result in successful ‘snowballing’ into individual and collective pro-environmental behavior. Many drivers for change in pro-environmental behavior have been identified, for example locus of control and aesthetic values [30], and commonality and individual norms [31,32]. Successful initiatives would also result in limited or no ‘distraction’ from other important environmental issues, but would instead compliment them. An example of this is ensuring plastic pollution prevention initiatives highlight plastic’s role in climate change and carbon footprint whilst supporting efforts to decrease overconsumption. This would complement the further environmental issues rather than distracting community or individual attention and efforts away from these inter-related issues [26].

The small, touristic fishing village of Anstruther in Scotland was chosen as a pilot case study to examine if their ‘plastic free community’ initiative was successful and effective, as this was the first initiative of this kind on mainland Scotland. Interviews and an anonymized survey were used to assess changes in plastic-related behavior resulting from the ‘Plastic Free Anstruther’ initiative. The aims of this study were: to identify what it means to be ‘plastic free’ in a ‘Plastic Free Community’; determine if becoming a ‘Plastic Free Community’ leads to improvements in all three spheres of sustainability (environmental, social and economic); identify if becoming a ‘Plastic Free Community’ creates a ‘snowball’ effect for environmental behaviors or if it is a ‘distraction’ from more pertinent changes; identify the drivers for change in environmental behaviors in a ‘Plastic Free Community’; identify barriers and incentives to becoming a ‘Plastic Free Community’.

2. Materials and Methods

The methods used to assess the effective approach to developing a sustainable ‘plastic free’ community were a semi-quantitative online survey completed by local residents and qualitative interviews with local stakeholders in the initiative and residents. As this research was conducted during the Coronavirus pandemic (2020) [33], all research was conducted remotely. Interviews took place over online communication platforms Skype or Zoom and the survey was completed through the online platform ‘Qualtrics’ [34]. Due to the remote methods used, only a small number of participants were able to participate in the research, resulting in a pilot study looking into behavioral changes due to the implementation of the ‘Plastic Free Community’ initiative. While this is a pilot study, it is representative of the initiatives of active participants and provides evidence of the influence of the ‘Plastic Free Community’ initiative has on community behavior and plastic waste pollution. However, the view of non-initiative participants may be under-represented and requires a much larger, multi-community study to assess. Therefore, it is recommended that this research form the basis of future extended studies which could be replicated for further research in this area. Participants in both interviews and survey were informed and consensual, and all participants were informed of their key rights and responsibilities prior to participating. The research followed ethical procedures approved by the University of Strathclyde.

2.1. Study Location: Anstruther, Scotland

The small coastal town of Anstruther on the East Coast of Scotland was the first Scottish mainland town to be awarded the title ‘Plastic Free Community’ by Surfer’s Against Sewage, in December 2019 [35]. The Isle of Arran was the first town with this status (an island community) and the villages of Patesmuir and Limekilns preceded Anstruther in achieving their ‘plastic free’ title [36,37]. Anstruther was chosen as the study site due to its moderate (larger) population (3446 people in 2011 census, estimated 3930 in 2020) compared to other ‘Plastic Free Communities’ [38,39].

Anstruther is located in an area of Scotland called the East Neuk, in Fife (Figure 1). With its two beaches and famous seafood, it is a popular tourist destination [40] and tourism forms a large part of the town’s economy [41]. In 2017, 8.5 million people visited the area of Fife [42] and the COVID-19 pandemic is thought to have cost the area £300 million in lost tourism revenue [43]. Anstruther’s main beach, Billowness, is part of the East Weyms to Anstruther coast Site of Special Scientific Interest (SSSI). From local media reports, it is evident that the town has a history of concerns over marine pollution, such as pollution from pre-production plastic pellets [44] and sewage spills [45]. As a result of this visible plastic pollution and its potential impact on the tourism economy (as well as local concern for their environment and living space), community members of Anstruther have become proactive about plastic pollution and have taken on the ‘Plastic Free Community’ initiative.

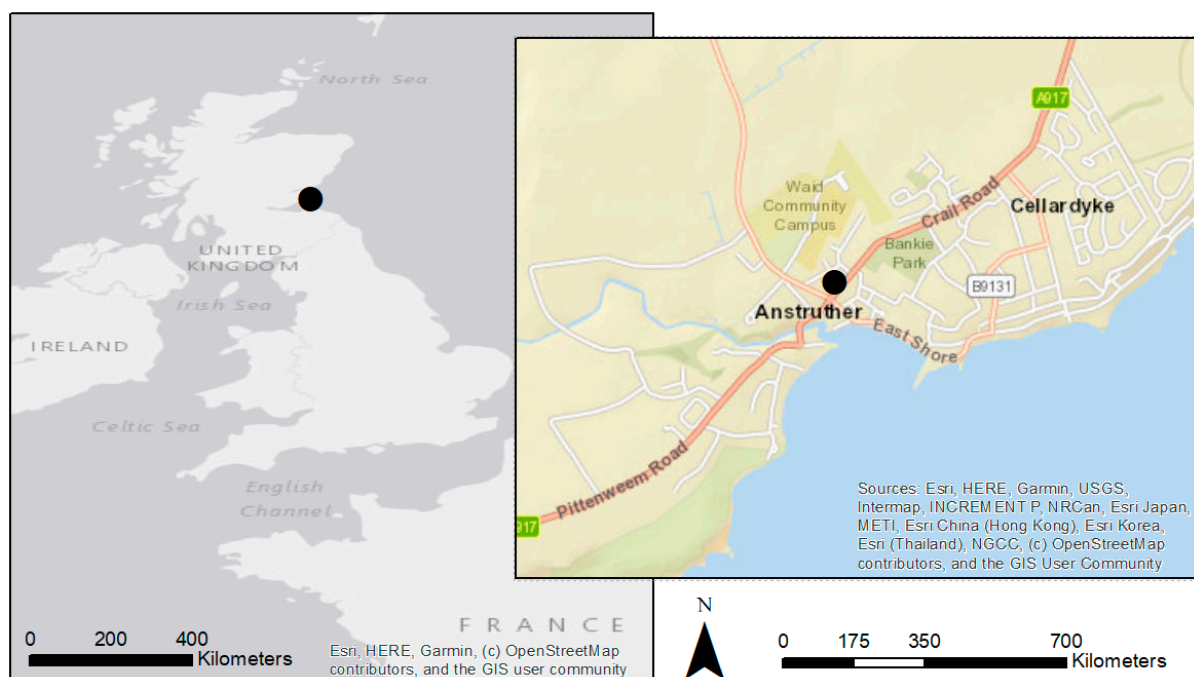


Figure 1. Location of the study site, Anstruther, Scotland.

2.2. Local Resident Online Survey

To capture the changes resulting from the Anstruther ‘Plastic Free Community’ initiative, an online survey was created using the online survey platform ‘Qualtrics’ [34]. The survey was designed to answer the following research aims: (a) Are improvements enjoyed in all three spheres of sustainability? (b) Have ‘snowball’ or ‘distraction’ effects occurred? (c) What are the drivers for change? and (d) What are the barriers and incentives to change? This approach was similar to other studies on pro-environmental behavior which rely on self-reporting surveys to assess changes in behaviors [46,47].

To begin the survey, awareness of both ‘Plastic Free Anstruther’ and the charity ‘Surfer’s Against Sewage’ was considered. Residents were asked of any changes in environmental behavior ranging from those directly related to plastic (e.g., using a reusable water bottle), to other sustainable behaviors not directly related to plastic (e.g., conserving energy or reducing food waste) by using multiple choice questions. Possible drivers for change, as suggested by the literature on pro-environmental behavior, were assessed using a five-point Likert scale of ‘Unimportant’ to ‘Important’. When asked about attitudes towards litter and recycling, a five-point Likert scale was also used, from ‘Strongly Disagree’ to ‘Strongly Agree’, to ensure consistency (see Supplementary Material for full survey guide and questions).

The survey was piloted to test for any misunderstandings and complications. After suggested changes were made to the survey to ensure accessibility and clarity, the survey was made available online between 16th and 31st of July 2020. The link for the survey was distributed to interview participants and was shared on local social media pages—‘Protecting Anstruther, Cellardyke & Kilrenny’ [48], ‘East Neuk Community information & chat group’ [49] and ‘Plastic Free Anstruther’ [50]. This ensured that a wider, more representative sample was possible. A total of 61 respondents were counted but only 49 were recorded responses. This was due to ten respondents choosing the option that they did not live in Anstruther which guided them out of the survey. This case study focused on Anstruther and this exclusion was designed to prevent any false responses being recorded. Future research may want to consider less exclusion criteria to encourage more responses.

2.3. Key Stakeholders and Local Resident Interviews

To complement the survey, between the 6th and 24th of July 2020, four key stakeholders (including the two organizers of the 'Plastic Free Anstruther' initiative) and one resident took part in in-depth semi-structured interviews (referred to participants A–E in this paper) to ascertain in greater detail the impact of becoming a 'Plastic Free Community' has had on Anstruther individuals. The semi-structured interview approach allowed for the research aims to be covered but provided the opportunity for new themes and discussions to arise. A 'snowball sampling' or 'chain referral sampling' approach was used to recruit participants [51,52] which is often recommended in research where probability sampling is not possible [53].

Stakeholders were asked of their motivations and involvement in the initiative to more fully understand the history and motivations behind 'Plastic Free Anstruther' and to help identify any drivers of behavioral change. To investigate the impact of this initiative on individuals and businesses of Anstruther, local residents were also interviewed. Residents were asked about the level of litter and of other environmental consequences that may have resulted from the campaign. This would indicate if this approach had encouraged sustainability in all three 'spheres'—economic, social and environmental [25]. Participants were also asked how confident they felt discussing environmental issues and if they had adopted more or other environmental behaviors to assess whether the initiative had caused a 'snowball' or 'distraction' (interview questions provided in the Supplementary Material).

All interviews took place remotely as per health and safety recommendations during this time. It was not possible to have a presence within the town and the pandemic was effecting the livelihoods and lives of many people, resulting in challenges in encouraging participation in the research.

3. Results

In terms of demographics, all the interview participants self-described themselves as female, which is noteworthy as both organizers of the 'Plastic Free Anstruther' initiative are female but may potentially include some unintended bias in the results. The majority of survey respondents described themselves as female (86%) (Anstruther population demographics ~48% female, 52% male [39]). Research suggests that women are more likely to feel strongly about the environment and social change [54]. This gender relationship could be an interesting avenue for future research in relation to 'plastic free' initiatives. The majority of survey respondents were 46–59 years old. It is unclear if this is truly representative of the population due to a lack of similar demographic information [55]. However, participants from a full spectrum of adult ages participated in the research (18–65+ years of age).

3.1. 'Plastic Free Anstruther'—Impact on Pro-Environmental Behaviour and Sustainability

The 49 participants' answers that were valid and complete were used in the analysis of pro-environmental behavioral change and increased actions towards sustainability. The majority of the participants (75%) were aware that Anstruther have been awarded the title of 'Plastic Free Community' in December 2019. Furthermore, 75% of the respondents were also aware of the organization 'Surfers Against Sewage'.

Respondents considered that, since Anstruther was awarded 'Plastic Free Community' status, there had been a positive impact on the quantity of litter in the town (Likert mean 2.9 ± 0.9), that the participants personally had become more aware of their plastic use, had chosen to use less single-use plastic (Likert mean 3.8 ± 0.9), were more aware of environmental issues (Likert mean 3.5 ± 0.9) and that the award inspired personal changes towards more sustainable behavior (Likert mean 3.8 ± 0.9) in the local community (Figure 2).

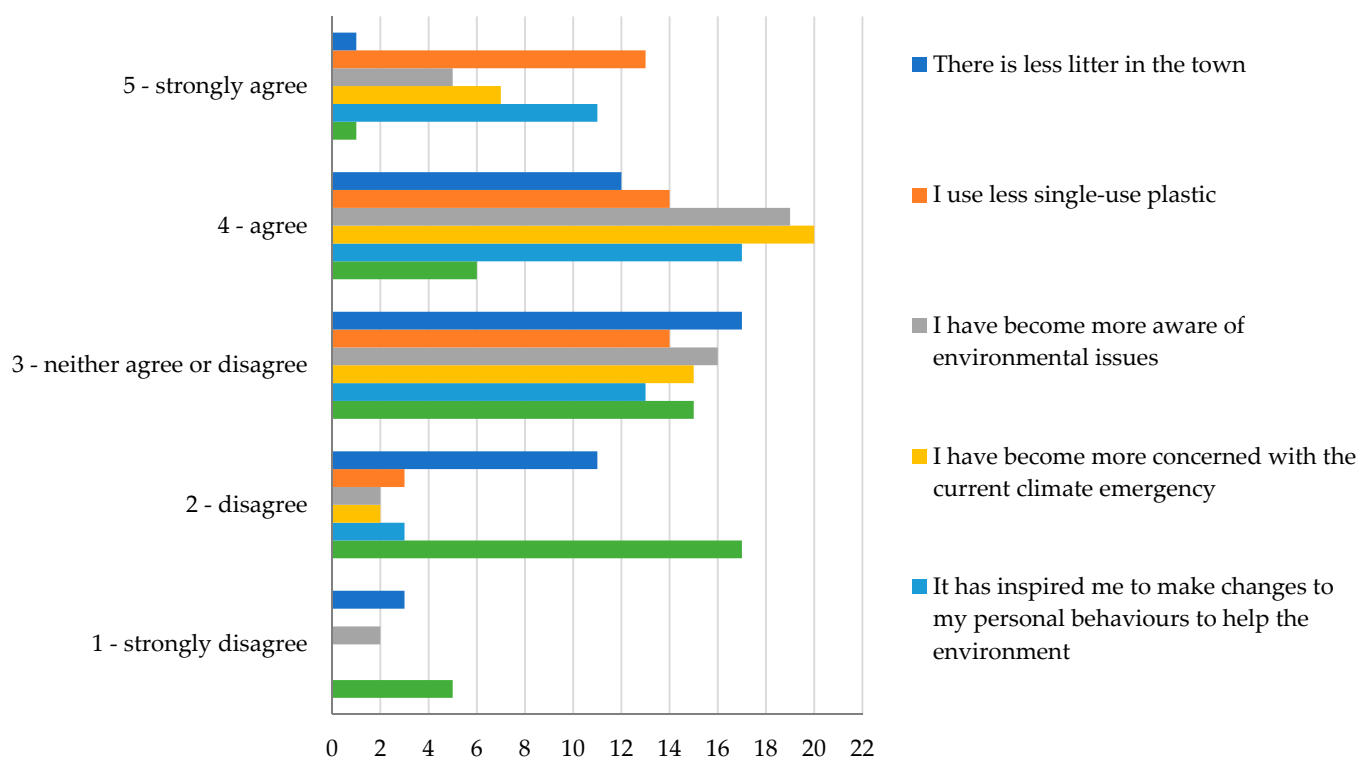


Figure 2. Likert scale responses in July 2020 to the question “how much do you agree with the following statements, since Anstruther became a ‘Plastic Free Community’ in December 2019” ($n = 49$). Likert scale of 1 to 5 was used in this and all other questions.

Within Anstruther, 100% of participants stated they have recycling facilities available to them, either through home collection (24%), taking their recycling to a local recycling station (14%) or both (62%). However, the majority of participants did not think recycling facilities enabled them to recycle all the products they used (Likert mean 2.9 ± 1.3) or that the ‘Plastic Free Community’ initiative resulted in greater personal recycling activity (Likert mean 2.4 ± 0.9). Despite this, the participants indicated that the initiative to make Anstruther ‘Plastic Free’ had a negligible to very positive impact on the local community (8-point Likert Scale, Likert mean 6.9 ± 0.8 , see Supplementary Material for full survey results). The most important outcome from the initiative was identified as environmental (33%) followed almost equally by financial and social benefits (27%, 20%, respectively) (Figure 3). The phrasing of this question could have prompted bias in respondents’ answers, but this was countered by the opportunity to select multiple answers therefore discourage any bias. These results are based on a proportion of residents so may not be definitive of the whole town. Finally, it was also noted that the COVID-19 pandemic shutdowns and precautions occurring during the study period had a negative impact on the ease of avoiding single-use-plastic use (Likert mean 3.7 ± 1.2).

Participants were asked to identify what changes in behavior have occurred as a result of the Anstruther ‘Plastic Free Community’ initiative. Participants identified use of local shops to support local businesses as the greatest change resulting from the ‘Plastic Free Community’ initiative (16.5%). This was followed by the change in behavior to avoiding fast fashion brands (9.9%) and use of pedestrian transport (walking, cycling) (8.8%). Limited change in air travel (<2%), participation in the ‘Mass Unwrap’ initiative (<3%) or energy conservation practices (<4%) were noted (Figure 4). ‘Mass Unwrap’ is an event where participating customers return the plastic packaging from their shopping to a group of volunteers. This plastic is placed into empty shopping trollies to help visualize the vast quantities of plastic produced (SAS, 2019). As of 2019, there had been 33 of these

events across the UK but are currently not permitted in line with COVID-19 restrictions (SAS, 2021).

Question: What do you think is the most important outcome of Anstruther going 'Plastic Free'? Social, Financial or Environmental?

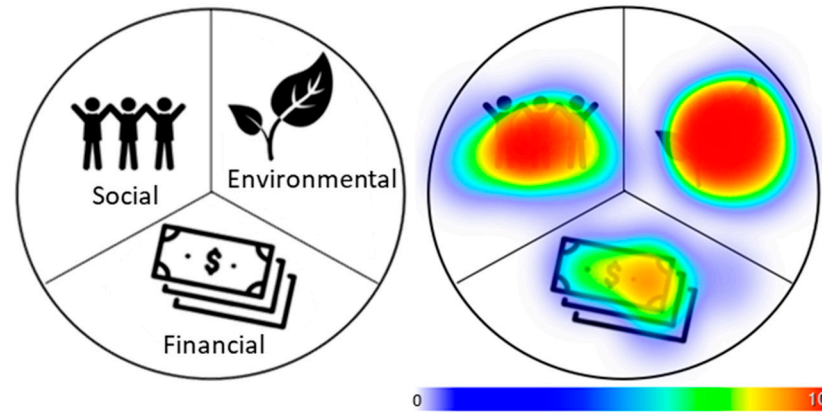


Figure 3. Heat map responses to the question “What do you think will be the most important outcome of Anstruther going ‘Plastic Free?’” ($n = 19$).

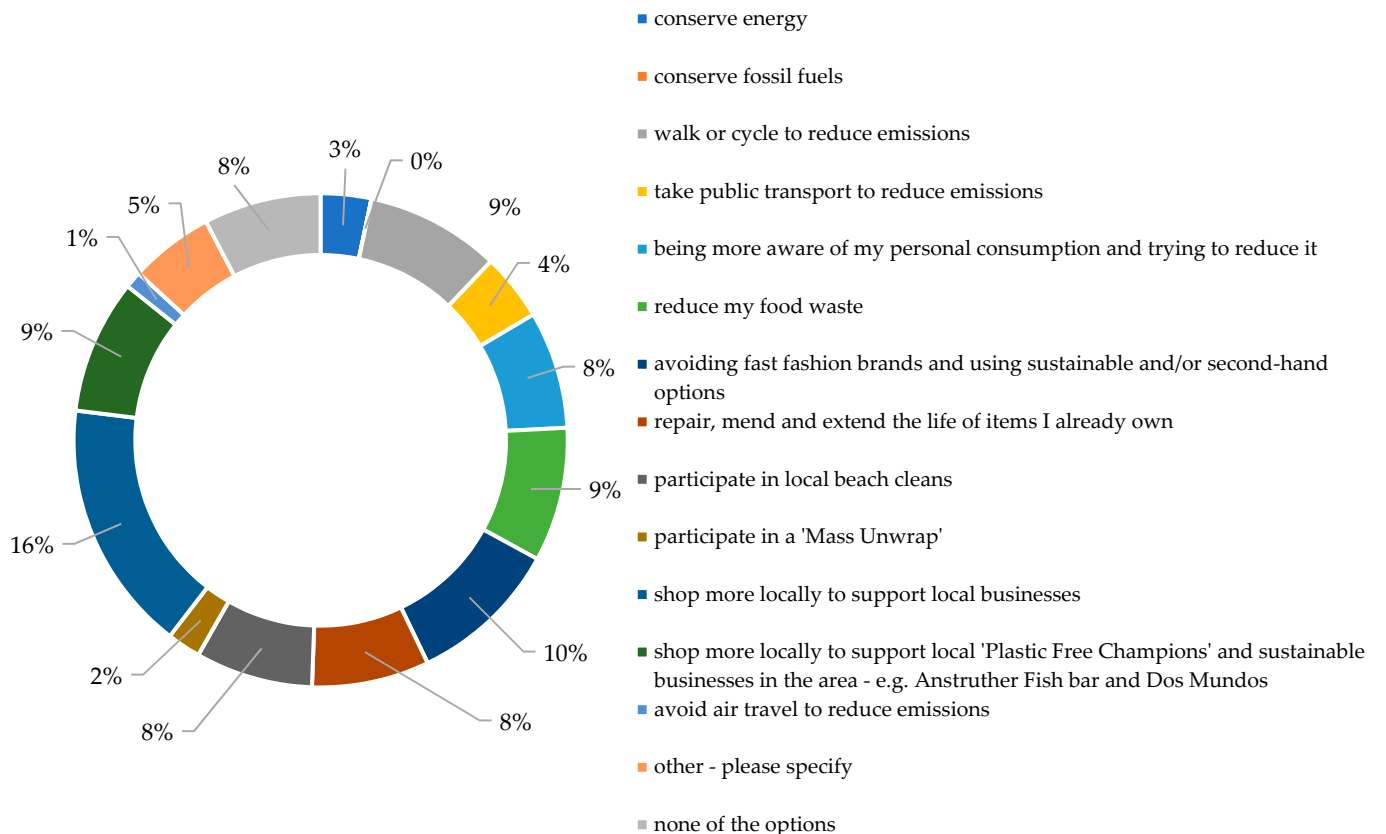


Figure 4. Participant responses in July 2020 to the question “which behaviors do you now make a more conscious effort to improve on as a result of the Anstruther ‘Plastic Free Community’ status?” ($n = 49$).

3.2. Drivers for Change in 'Plastic Free Anstruther'

With regard to motivations for these activity changes, participants identified the possible beneficial impact on the climate crisis, benefit to local environment and pollution reduction as their main drivers for behavior change (>57%). This was followed by acknowledgment of benefits to the next generation (46%), local aesthetics, community wellbeing and media attention on environmental issues (15–30%). Financial incentives, business benefits and social or peer pressure were not considered significant drivers in behavior change (<5%).

3.3. What Does It Mean for a Community to Be 'Plastic Free'?

It became clear at an early stage in the research that 'plastic free' in this context was not definitive. To earn the 'plastic free' title from Surfer's Against Sewage, communities must meet the plastic free community objectives. In the words of the founder of 'Plastic Free Anstruther': "plastic free is at many levels" reflecting these objectives.

'Plastic free' in this case describes the collective action of community organizers to meet the objectives of a 'Plastic Free Community'. These actions have been summarized in Table 1.

Table 1. Anstruther's Fulfilment of 'Plastic Free Community' Objectives.

Objective	Requirements (Taken from Community Toolkit, SAS, N.D)	How Objective Was Met	Reference
1. Community Action and Events	Communities should hold events organized by the 'plastic free' group which are open to the whole community in one year.	Regular beach cleans and litter picks. Community Events.	(Participant A and B Interview); Social Media (Pearson, 2020) (Participant D)
2. Community Allies	The 'plastic free' Group should include as many groups and organizations in their events and awareness raising by hosting events, talks and workshops.	Hosting community events; Events with Scottish Fisheries Museum.	Social Media (Pearson, 2020); (Participant D Interview)
3. Business Champions	Encouraging three local businesses to replace three single-use plastic items with alternatives and become a 'Plastic Free Champion'.	Convinced six local businesses to join the initiative and have two more businesses working towards their 'plastic free' status.	(Participant A and B Interview); Email correspondence with 'Plastic Free Anstruther' organizers. (Pearson, A; and Patterson, A, personal communication, 31st July 2020)
4. Local Governance	The local council must pass a resolution to support the 'plastic free' journey and 'plastic free' local initiatives and to tackle action themselves.	This requirement had already been met by 'another group in this council district.	(Participant A and B Interview)
5. Plastic Free Steering Group	A local group of stakeholders should meet twice in a year to discuss progress and set objectives.	Holds meetings regularly to discuss approaching new businesses, organizing events and progress.	(Participant A and B Interview)

It was found that by working towards these objectives, there were many obstacles, but also opportunities, for the initiative to provide benefits beyond the remits of the environment. For example, an obstacle noted during the survey and interviews was opposition from the local fishing and other coastal communities to becoming a 'Plastic Free Community' (Participants A and B). An interview with a local resident and fish merchant discussed the need for single-use plastic in terms of hygiene when working with fish (Participant D). However, they also discussed their content in seeing an increase in customers bringing their own containers for purchasing of products. This indicates that circular approaches may be increasing and that although some barriers exist, residents and business are willing to adapt and learn.

It was also found that the community action and engagement element of the initiative (Table 1—Objective 2) provided further benefits to the local community than simply environmental change. For example, an interview with Participant D discussed an event which allows “disadvantaged families” to get involved in activities centered on environmental protection whilst also receiving free food. Although ‘plastic free’ is not definitive here, it is notable to observe that ‘Plastic Free Anstruther’ is engaging with the community and making sustainability more accessible to the general public. It can be said this initiative is encouraging more equal sustainability within the three pillars of sustainability: environmental, economic and social [25]. This could be cited as a possible incentive to achieving the ‘Plastic Free Communities’ status.

Participants responses highlighted that a large part of the ‘plastic free’ initiative is providing alternatives to businesses for single-use plastic items that they produce or distribute (Participants A and B). Objective 3 (Table 1) requires three businesses to become ‘Plastic Free Champions’ to receive the award. Anstruther now has six businesses, as of August 2020 [50]. The Anstruther initiative also wants to progress further in this regard, illustrating the increasing support in the community for ‘plastic free’ actions.

A further obstacle highlighted is the involvement and action of the local government towards plastic free achievements (Objective 4). Another ‘Plastic Free Community’ in the area had persuaded the local council to pass a resolution to reduce plastic in August 2018 [56]. Although progress had been reported in Anstruther [57], it was stated that plastic is still available in most schools and the new school in Anstruther does not have the capacity to seat all the students during lunch nor does it have crockery (Participant E). This encourages takeaway lunches and thus more single-use culture. The European Commission’s plastic pollution strategy acknowledges this ‘on-the-go’ food and drinks culture as one of the main challenges in reducing plastic [19]. Consequently, it appears that although efforts have been made to tackle single-use plastic in Fife Council within Anstruther, is not yet close to achieving ‘plastic free’.

The final objective of a ‘Plastic Free Community’ is to establish a group of local volunteers to meet, discuss progress and plan for the future [18]. One barrier to achieving this may be that progress is reliant on the good will of individuals to dedicate their free time to further the cause. However, it can also be seen as an opportunity to unite the community and thus an incentive. During the COVID-19 pandemic and consequent lockdown(s), ‘plastic free’ initiatives that encourage collective action could be used to prevent or minimize social isolation and encourage community solutions. It is therefore argued that a more collective approach to becoming a ‘Plastic Free Community’ is encouraged.

Overall, it is evident that ‘plastic free’ in ‘Plastic Free Anstruther’ is about providing businesses and local residents with alternatives to plastic that are accessible. Furthermore, it is clear that engaging the community and uniting against plastic pollution is also a main focus. The environmental motivations are not stated outright and in interviews the issue of litter was discussed more in terms of the aesthetic rather than environmental values. However, this is not to say that the environmental roots of this issue have been forgotten. As Anstruther is a “proud” community (Participant C) it can be argued that by leading with the aesthetic, commercial and social benefits the plastic free initiative appeals to a greater majority of the residents than when lead by environmental values alone. An effective approach to becoming a ‘Plastic Free Community’ should note the social and economic benefits alongside the emphasis on the environmental aspects to ensure a more sustainable and inclusive approach.

3.4. What Replaces Plastic in a ‘Plastic Free Community’?

To discern what is being used instead of plastic, interviewees were asked directly and replacements were raised through the course of discussion on other matters. The ‘Plastic Free Anstruther’ leaders were also able to provide the applications that the ‘Plastic Free Champions’ in the town had used to achieve their status (Participant A). These applications detail what alternatives are provided instead of plastic.

It was found that most 'Plastic Free Champions' are providing 'Vegware©' as an alternative to plastic. This is a product produced in Scotland that claims to be a "commercially compostable" alternative to food and drink packaging [58]. This product consists of materials such as paper, card and polylactic acid (PLA) [58]. It was remarked in one of the interviews that the 'Vegware' distributed at the 'Anstruther Fish Bar' is deposited into landfill (Participant E). Research has shown that landfills do not provide the correct conditions for PLA to degrade [59,60] and it is acknowledged that PLA is a form of plastic. It is also noted that recent research found PLA plastics to be potentially as toxic as traditional plastics [23]. If this material has the same potential to persist in the environment and cause damaging effects as traditional plastics, this is not a sustainable alternative.

A range of other materials including paper, card and hessian were also found to be displacing plastic. These alternatives also have their own associated waste management and environmental complications, especially when used in food outlets. More measures are needed to ensure the materials used here are managed effectively. Full life cycle assessments on all materials would be advantageous to understand the true impact of displacing plastic. It appears the best approach to developing a 'Plastic Free Community' should include more emphasis on circular behaviors amongst local residents or even tourists to help reduce waste. 'On-the-go' behaviors may be more prevalent with tourists but a sustainable approach should focus on tackling the linear, single-use mindset within the communities. Simply providing a 'biopolymer' or non-plastic single-use alternative continues to encourage this linear mindset and does not result in effective long term pro-environmental behavioral change. Other towns hoping to become 'plastic free' should be aware of the difficulties that arise from the waste management of alternatives and focus on encouraging circular behaviors. Examples of possible plastic alternatives that follow a more circular economy mindset include providing a discount or loyalty scheme to those who bring their own containers and deposit-return schemes where durable containers are returned and cleaned when consumers are finished may provide a solution to the takeaway culture surrounding tourism.

3.5. Sustainability of Benefits Enjoyed by 'Plastic Free Communities'

The three 'spheres' of sustainability are environmental, social and economic [25]. Research on pro-environmental behavior suggests that more socially acceptable behaviors are where the more easily change occurs [30]. Thus, it was of interest which spheres of sustainability were benefitting as a result of the initiative. So far it has been established that the proud nature of the Anstruther community and the appeal of the social and commercial benefits has meant the social and economic spheres have been emphasized. It was found that respondents identified the environmental benefits to be most salient, followed by social benefits (Figure 3). It can therefore be argued that an incentive that tackles environmental pollution can also lead to benefits in the local community. Although not based on physical scientific evidence, the responses to this question are promising. The premonition that the emphasis placed on commercial and economic motivations detracts from the environmental origins on the initiative have been discouraged. Therefore, the best approach to becoming a 'Plastic Free Community' should take note of how this initiative can improve environmental and social outcomes whilst also providing financial incentive.

3.6. The 'Plastic Free' Initiative: 'Distraction or Snowball'

There are two opposing stances on the crusade on plastic: it is either a 'distraction' from more pressing environmental issues [26] or it has beneficial knock on effects [27]—a 'snowball'. It was therefore of interest which was true of communities which aim to become 'plastic free'.

Residents were asked how much they agreed with statements relating to changes either within Anstruther or in their own lives since the start of the initiative. The option, 'I use less single-use plastic' was met mostly with agreement (Likert mean = 3.8. This is encouraging given that this is the aim of 'plastic free' initiatives. In terms of a 'snowball'

effect, respondents mostly agreed that they are more aware of environmental issues and more concerned with the climate emergency. Despite the gap between awareness and behavior, here the respondents mostly agree that the 'plastic free' initiative has inspired them to change their personal behaviors to help the environment (Likert mean = 3.8). Although they may be small majorities, it is promising that this initiative has encouraged a self-reported increase in environmental awareness and behaviors. This could indicate 'plastic free' has the potential to 'snowball' and encourage beneficial environmental behaviors and outcomes beyond its remit. However, it could be due to respondents wanting to provide the 'correct answer', especially if they are supporters of 'Plastic Free Anstruther'. Additionally, approximately 34% of respondents neither agreed or disagreed with these statements. This could suggest that the respondents were unsure of the question or that residents are not in agreement about the impact of the initiative. There is also a tendency in research for Likert scale questions to encourage respondents to choose the 'middle ground' [61], which could explain these results. It is therefore unclear if the 'snowball' effect has occurred at this point.

Respondents did not agree that there is less litter since the town became 'plastic free' (Likert mean = 2.93). This is consistent with the interviews. A resident remarked that although they were a "proud" town that litter was still a problem (Participant C). This is primarily due to fishing, tourism and local school children (Participants A, B, C, E, F). The proliferation of litter could indicate that a slight 'distraction' effect may have occurred. Although local businesses offer plastic alternatives, there is still a linear 'single-use' and 'throwaway' mindset. This may be true of society today [62] but in order to encourage a 'snowball' effect this topic should not be overlooked, both for Anstruther and other towns looking to go 'plastic free'.

The three most popular daily behaviors that respondents engaged with since the start of the 'plastic free' initiative were using reusable bags and water bottles and avoiding single-use plastic in general. This suggests that the initiative has encouraged behavioral changes within the remit of its objectives. However, options such as bringing your own food container, refusing all carriers bags and avoiding all single-use items were not as popular. This indicates that respondents have made changes in-line with the condemnation of plastic but have not been as quick to adopt changes that would tackle the 'single-use' mindset and move away from linear behaviors. By only reducing single-use plastic and not single-use items in general, there is a risk of replacing one waste problem with another. This may also suggest that perhaps the 'plastic free' initiative has been a 'distraction' from challenging wasteful behaviors and encouraging more circular and sustainable habits.

The survey questions expanded to include other elements of pro-environmental behavior. It was found that the most popular behaviors were options such as: avoiding fast fashion, walking or cycling to reduce emissions, reducing food waste and shopping locally. These are all important behaviors that can considerably reduce an individual and communities' negative environmental impact [63]. Respondents remarked that support for local businesses was partially due to COVID-19, suggesting that 'Plastic Free Anstruther' was not the sole driver. Options such as repairing items you already own, participating in local beach cleans were also popular, suggesting that circular behaviors and local conservation efforts have also been encouraged by the initiative. It is encouraging that other habits have been adopted beyond reducing plastic which could suggest a 'possible' snowball. Less popular options were conserving energy and fossil fuels, and avoiding air travel. This supports Reese and Junge's (2017) argument that 'plastic free' initiatives struggle to influence more difficult behavioral changes [64]. This is also consistent with current thinking on pro-environmental behavior which suggests that the difficulty of behavioral change will influence its popularity [31,32]. This could indicate that this initiative is a possible 'distraction' from more pressing environmental behaviors.

3.7. What Are the Drivers for Change in a 'Plastic Free Community'?

Survey participants were asked to rank their motivations for changing their personal behaviors to be more environmentally friendly from unimportant to important on a 5-point Likert scale. Motivations such as 'financial incentive' and 'it's good for my business' were ranked as 'Unimportant' by over half of respondents. This could indicate that self-interest is not the strongest driver for change. This is consistent with Evans et al. (2013) research which argues that self-transcending values are more salient [65]. Other motivations such as 'pressure from family and friends' and 'everyone else is doing it' were also found to be largely unimportant. This may suggest that social norms are not as relevant or impactful within this community on this topic.

Charity and NGO campaigns, as well as increased media and political attention, were found to generally be 'Somewhat Unimportant'. Most respondents also found educational information and political attention to be 'Neither Important or Unimportant'. This indifference to educational information is consistent with the 'gap' between environmental awareness and behavioral change within the literature [30,66]. However, it is noteworthy that the 'Plastic Free Anstruther' campaign was also met with some indifference.

Drivers such as 'it improves how the local beaches look', 'it reduces pollution' and 'increased media attention on the environmental and climate crisis' were found to be generally 'Somewhat Important'. This suggests that aesthetic and environmental values are important and may influence behavioral change. These could also be important for tourism, which is central to the towns' economy. 'The Attenborough Effect' on the importance to reduce plastic pollution was also found to be important and was specifically raised by a local resident during an interview (Participant C). The lack of consensus on media attention suggests that individual norms are also important drivers for change. The 'Attenborough Effect' is a term to describe the effect of celebrity attention given to the climate crisis, on the environmental behavior of the general population. Named after the well-known British wildlife documentary maker, David Attenborough, it is thought there has been a fall in the use of plastic due to these documentaries (McCarthy and Sanchez, 2019).

Motivations associated with environmental benefits were found to be generally 'Important', indicating that environmental and altruistic values are important drivers. This is consistent with current literature [30,65]. The option 'I know it will make a difference to the current climate crisis' was popular, suggesting that respondents feel a locus of control over climate change. This is also consistent with current academic thinking on this topic [30,32,67]. Finally, 'It benefits the next generation' was also listed as important. This is consistent with the motivations of one of the interview participants (Participant F). The respondents were mostly 46–59 years old, which could explain why this was one of the more popular motivations. However, this could also suggest more self-transcending values being salient here. Lack of consensus on the importance of drivers could be due to the multiplicity of options within the question response. One respondent also remarked that they found it difficult to rank their motivations. However, it could also suggest that drivers for change are also influenced by individual norms and motivations.

The survey assessed if there had been an uptake in recycling in spite of any potential 'barriers', such as lack of direct access to recycling facilities. This was aimed to evaluate if self-transcending values such as benefitting the environment are more salient than the personal cost from travelling further to recycle [65]. The majority of residents had access to both a curbside collection scheme and the use of a communal recycling station. No trends were observed between access to recycling facilities and an increase in recycling. Six respondents that had access to both recycling facilities did not recycle more. This may be because they already recycled as much as possible. Most residents either disagreed or strongly disagreed that the facilities available recycled all the products that they used. This indicates that respondents would like to recycle more of their products but are not provided with the necessary facilities but it is unclear if this has led to some respondents stating that they do not recycle more.

The hypothetical question ‘If Anstruther had not started the ‘plastic free’ initiative, it would have been less likely that I changed my personal behaviors to help the environment’ was met with overall disagreement but with a small margin (Likert mean = 2.57). This could indicate that other drivers for change have also motivated people to change their behaviors, or this could be due to the format of the question. It has been argued that hypothetical questions are to be avoided in this form of survey [68]. This question was designed to make respondents question and fully consider their true motivations. However, it could have caused confusion leading to a lack of true consensus. On the other hand, most respondents found the survey to be easily understood (Question 18). It is therefore unclear whether the initiative has been the sole driver for change.

3.8. What Are the ‘Barriers’ and ‘Incentives’ to Becoming a ‘Plastic Free Community’?

It was found that the cost of alternatives can prohibit businesses and individuals from reducing single-use plastic. This resonates with the argument that discussions on sustainability can be centered on the middle-class [69]. Limitations in waste management—both in recycling and appropriately managing alternatives to plastic—are also a significant barrier. It is suggested that the focus should be on improving access to reusable items and encouraging circular behaviors. This has the potential to improve the accessibility of ‘plastic free’ for both small businesses and for sections of society where alternatives can be out of reach. Discounts offered to customers who bring their own containers, or return schemes, could improve this accessibility even further. Supermarkets could also make their approach more circular and encourage more refill options (Participant E). This could reduce waste and discourage the ‘single-use’ mindset.

Although it is encouraging that businesses are interested in using more sustainable alternatives, the focus on using alternative products rather than tackling linear behaviors is creating another single-use problem. As the town is popular with visitors, encouraging circular approaches may be difficult but as mentioned previously incentives or deposit-return schemes could be utilized to address this. If other towns are looking to go ‘plastic free’, this is an area that requires attention.

Another important barrier is the limited effect that the ‘plastic free’ initiative can have on individual behaviors not directly associated with plastic, and this is consistent with Reese and Junge (2017) research. Although some circular behaviors have been adopted, this ‘distraction’ could be a barrier to achieving additional sustainable outcomes. One of the organizers of ‘Plastic Free Anstruther’ remarked that the problem of plastic is ‘tangible’ (Participant A). Residents can easily associate less plastic use with less litter and less pollution. It is argued that this could be a ‘stepping stone’ to encourage more environmental good if the ‘snowball’ effect is emphasized. One of the barriers was that the initiative can be reliant on the goodwill of volunteers. Therefore, the ability to emphasize behaviors needed to further the ‘snowball’ effect may be limited.

Lack of communication between community groups, stakeholders and other ‘Plastic Free Communities’ (Participant E) is also an important barrier. If there were improved linkages between these groups, their combined resources and capacity building could help further the ‘snowball’ effect and lead to more sustainable outcomes.

Finally, a considerable barrier is the impact of COVID-19 on the ability to limit single-use plastic usage as noted in both the survey and interviews. It is important to acknowledge both the necessity of personal protective equipment (PPE) during the COVID-19 pandemic and the mismanagement of this material, especially single-use plastics [70]. The COVID-19 pandemic has resulted in an increase in medical and PPE waste and a notable rise in COVID-19-related plastic waste mismanagement, with 1% of face mask waste mismanagement equating to more than 10 million items [71,72]. For example, in Saudi Arabia, this mismanagement has been calculated to result in 32,235 thousand tons per year of plastic entering the environment [73]. While the impact of mismanaged PPE is relatively unquantified in Europe to date, disposable gowns have resulted in a 450,000 ton solid waste increase in 2020 [74]. In the words of the founder of ‘Plastic Free Anstruther’, “We must

not go back” (Participant A), and any progress in reducing single-use plastic will need to be carefully maintained in this new climate. Increased hygiene concerns and limited waste management resources pose a significant challenge to individuals and communities trying to reduce their single-use plastic use and to the environment as a consequence.

In terms of incentives, respondents made positive comments about the initiative, its organizers and that it can be beneficial in general. The majority of individuals who were asked about the ‘plastic free’ initiative agreed that it was a force for good. This is true not only for environmental outcomes, but to help improve social issues and the ability to unite a community. This is particularly important during a time of pandemic which has been unjust [75] and led to social isolation for many [76].

Most residents felt that they were more aware of environmental issues and the climate emergency. Participant E remarked that the initiative has instigated important discussions about the environment and the challenges it faces. Although some circular approaches have been adopted, in order for this incentive to be furthered, attention to more sustainable behaviors is essential to enhance the ‘snowball’ effect.

4. Discussion

The case study of Anstruther, the first mainland Scottish community to achieve the ‘plastic free community’ status, can have important learnings to expand plastic free initiatives at both national and international levels. This case illustrates that community plastic free initiatives can result in positive community and individual change. The initiative was found to result in a positive impact on the quantity of litter in the town. Participants generally stated they had a greater awareness of their plastic use and that the initiative had resulted in a decrease in their use of single-use plastic. The initiative resulted in a greater awareness of environmental issues (beyond plastic pollution) and greater inspiration towards more sustainable behavior.

The ‘Plastic Free Anstruther’ initiative could therefore be considered successful and effective in encouraging the study’s participants in a change to more sustainable and environmentally conscious behavior. It is clear that ‘plastic free’ in a ‘Plastic Free Community’ is the commitment to reducing single-use plastics by providing alternatives and uniting the community to improve the local environment. In Anstruther, this may not result in ‘plastic free’ activities in the strictest sense (some single-use plastic alternatives are a form of plastic), however there is evidence of a positive shift towards a reduction in (single-use) plastic use. The benefits of the initiative are also acknowledged beyond environmental sustainability, with both motivations for change and community benefits identified within the social and economic sustainability spheres.

Although there was an uptake in reusables, the fact that plastic alternatives, such as PLA and paper, were popular within the town it means that there is the continuation of the ‘single-use’ mindset and these plastic alternatives can introduce their own waste management complications. This indicates a lack of success in behavioral change away from a linear economy approach and limited uptake of the circular economy approach to material use and waste management. The ‘plastic free community’ initiative needs to evolve to incorporate greater emphasis on circular behavioral adoption, for plastic and other resources. Possible methods to achieve this could be through loyalty schemes for reusable beverage and food containers, community support for retail of ‘packaging free’ products, and sponsorship of non-plastic utensils and dishes for the local schools.

It appears that in terms of ‘snowballing’ into pro-environmental behaviors, it is most evident in actions directly associated with plastic, however it is clear that other sustainable behaviors have been adopted as a result of the ‘plastic free community’ initiative. The ‘single-use’ mentality is still prevalent, and this may be limiting the ‘snowball’ effect. Even where modified behaviors are not considered popular, progress in the uptake of individual pro-environmental behaviors should be acknowledged and applauded. While pro-environmental behavioral change is difficult to measure with regards to environmental benefit, the benefit may still occur (e.g., as a reduction in waste, energy use and material

use). Greater emphasis could be placed on more difficult environmental behaviors to limit this 'distraction', improve sustainability outcomes and reduce waste.

Self-transcending motivations appear to be important drivers for change and social norms do not appear to be as important within this case study location as suggested in the literature. Furthermore, it is clear that most respondents are aware of how their individual actions impact the environment and feel a degree of locus of control over the climate emergency. The empowerment residents feel to change their behaviors for the benefit of the environment and the younger generation suggests that altruistic motivations are strong drivers for change. Whether these are the sole drivers for change is unclear. The lack of consensus should be noted, acknowledging the influence of individual motivations on behavioral change. It is unclear if this initiative has led to changes in recycling behaviors but there is no relationship between access to facilities and recycling habits illustrated through the Anstruther study. This again suggests that altruistic drivers are strong.

'Plastic Free Communities' face barriers and challenges to implementation, many of which are individual to each community. However, the incentive to tackling environmental issues whilst uniting communities and addressing social issues is a strong and effective instigator of change. Where appropriate incentives are employed to address specific barriers (e.g., provision of discounts to customers who provide their own containers to alleviate the provision of costly plastic free alternative containers), the resulting environmental, social and economic beneficial outcomes can help create a more sustainable community in every sense of the word.

Recommendations for Future Research

Despite the in-depth data gathering involving active participants in the 'Plastic Free Anstruther' initiative, it can be argued that the data gathered may not accurately reflect the whole town and in particular the views of non-initiative participants may be under-represented. It is therefore recommended that this methodology and approach be used as a pilot study in assessing the sustainability outcomes of 'plastic free' initiatives. With the growth in the 'plastic free' movement it is important that there is the capacity to analyze the environmental outcomes of these initiatives. Furthermore, it is vital that other groups, both nationally and internationally, can learn from the incentives and barriers experienced by 'Plastic Free Communities' in order to enhance future outcomes.

Future research into 'plastic free communities' should seek to carry out a much larger, multi-community study to assess both participants and non-participants. Future work can also assess any physical changes in the environment or conduct life cycle assessments in any materials used to displace plastic, both of which would prove insightful into the true impact of 'plastic free' on the environment and sustainability. On a larger scale, waste management data could also be utilized to assess changes in recycling.

5. Conclusions

The Plastic Free Anstruther action has resulted in pro-environmental behavior and greater awareness of the environmental issue associated with plastic pollution. This pilot study found a decrease in single-use plastic use within the first mainland Scottish 'Plastic Free Community'. However, the benefit of this was diminished by the use of alternative single-use materials, illustrating that the single-use mentality is a continuing challenge individually and within the community. Snowballing effects resulting from the 'Plastic free' initiatives include greater environmental awareness and stewardship, but these appear constrained by limited uptake of circular economy practices (beyond recycling). This pilot study highlights the positive benefits and behavioral drivers of a plastic free initiative such as the 'Plastic Free Community' and illustrates the need for greater research into the individual and community level behavioral drivers and challenges in future sustainable plastic use and management.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/microplastics1010004/s1>, Table S1: Survey Guide. Table S2: Survey Questions. Form S3: Key Stakeholder Interview Guide. Repot S4: Survey Data.

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