‘Going Digital’ - Lessons for future coastal community engagement and climate change adaptation

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Highlights

- Explores impacts and adaptation in coastal community engagement as a result of COVID-19.
- Using four CCAT activities, a range of techniques, challenges and opportunities are discussed.
- 'Going digital' has a range of benefits but should not be viewed as a 'one size fits all' solution to engagement.
- Adaptation and resilience are supported by rapid response to change, adoption of diverse techniques, broadened participation and supported learning.

'Going Digital' - Lessons for future coastal community engagement and climate change adaptation

Abstract

Recent decades have witnessed a steady increase in efforts from a range of actors to facilitate and support meaningful and effective engagement with coastal communities and stakeholders. Indeed, this move towards improved participatory approaches are increasingly framed as being integral to successful and sustainable management of coastal resources and spaces. The effectiveness of the processes, structures and frameworks underpinning coastal community engagement has always been subject to external and internal drivers; however, the global threat posed by COVID-19 presented, and continues to present, an unexpected shift in approach, and the need for rapid adaptation by those of us working within these spheres. Using the Coastal Communities Adapting Together (CCAT) project as a case study, we explore how engagement with coastal communities and stakeholders in the project areas of Fingal, Ireland, and Pembrokeshire, Wales, has been impacted and forced to adapt as a result of COVID-19. Through a qualitative data collection process, we explore how project teams across different scales have rapidly adapted their models of community and stakeholder engagement, identify successes and failures, and explore challenges that have been faced. Finally, we consider if the legacy of COVID-19 has provided an opportunity for coastal community engagement approaches being used across the globe to become more diverse, adapting to new technologies and increasing accessibility and effectiveness. Insights identified as fundamental to successful adaptation and enhancing resilience include: a rapid response to change, adoption of a diversity of techniques, broadened participation and supported social learning and knowledge exchange.

1. Introduction and context

Engaging citizens and communities is considered a core element of coastal management processes (Ellsworth et al. 1997). The advent of more integrated approaches to coastal management (i.e. integrated coastal zone management/ integrated coastal management [ICZM/ICM]), particularly from the 1990s onwards resulted in multi-actor involvement and stakeholder engagement becoming common features in coastal management initiatives; to such an extent that "*the involvement of all parties*" was codified as a principle of good practice (Ballinger et al., 2010). Within Europe, the European Commission advocates the principle of subsidiarity whereby governments are urged to support the empowerment of local communities, including local government, to secure local sustainability of the coastal environment. Responding to growing calls for enhanced public participation (see for example, McKinley and Fletcher, 2012), coastal management processes in many European countries have typically adopted a "bottom-up" approach whereby local communities have engaged with other stakeholders to co-design and co-implement management of coastal areas and resources (O'Hagan and Ballinger, 2009; McKenna and Cooper, 2006). In the UK, this was perhaps best demonstrated by the roll-out of various coastal fora which operate partnership models to address the challenges of: policy coherence; balancing development and ecological needs; and multi-use in the coastal environment (see for example Pembrokeshire Coastal Forum, Severn Estuary Partnership, Devon Maritime Forum). In Ireland, the coastal partnership model was not as prevalent but instances of local communities progressing ICM were established in a number of locations (Ballinger and O'Hagan, 2010; Falaleeva et al., 2011). At an Irish Sea level, projects such as the Coastal Communities Network highlighted the breadth of practices and processes involving communities in the management of their coastal resources.

Despite these initiatives, engaging with coastal communities and stakeholders has had varying levels of success, with engagement with citizens and communities in coastal management processes ranging

from non-participatory levels (e.g. manipulation), intermediate levels (e.g. information and consultation), to being fully participative (from partnership to absolute citizen control) (as per the Ladder of Participation - Arnstein, 1969). For ICZM/ICM processes good practice calls for stakeholder participation throughout the iterative implementation cycles – from issue identification at the outset, to evaluation of outcomes towards the end of the management process (Olsen, 2003). Traditional approaches to stakeholder engagement include meetings, focus groups, community surveys and interviews which serve as a means to: facilitate dialogue between different stakeholders; build relationships through identification of mutual goals; capture tacit knowledge; and, engender buy-in to the process at hand. Historically, engagement has perhaps leant more towards the non-participatory approaches more commonly associated with consultations; however, as calls to improve public levels of ocean literacy and marine citizenship have continued to grow in recent years (UNDOS, 2020; McKinley et al., 2020; Jefferson et al., 2015; McKinley and Fletcher, 2010; 2012), the methodological toolbox being applied by these coastal fora and other organisations to support community engagement has diversified (see for example Burdon et al., 2019; Stori et al., 2019; Grilli et al., In press). Furthermore, recent work by McKinley and Jefferson (2020) sets out best practice principles of stakeholder and community engagement, which builds on internationally recognised standards to support effective engagement, including use of the emerging and innovative tools. The growth of citizen science has added to the value that individuals and communities can bring to coastal management, particularly important in relation to observation and monitoring data that can be collected at a scale which can inform decision-making, allowing for improved understanding of critical elements of coastal socio-ecological systems. As citizens and communities take on an increasingly participative role in the design and implementation of management processes, the opportunity increases to fully harness their capacity, agency, knowledge, and expertise to deliver sustainable and equitable management of marine and coastal spaces.

It is important to acknowledge at the outset that COVID-19 is first and foremost a global public health crisis, which has resulted in tragic and devastating consequences for individuals, families, and their communities. While acknowledging the severity and seriousness of the pandemic on communities across the world, coastal communities have been recognised as one of the most vulnerable (Nothrop et al., 2020) – with pre-existing challenges including climate change, and its impacts, remaining one of the most significant threats facing these areas. These challenges require ongoing efforts to ensure meaningful and effective community and stakeholder engagement can continue to support coastal management, and indeed adaptation and resilience within these communities and spaces. There is, therefore, an opportunity to explore how the unprecedented shifts in ways of working (van Bodegom and Koopmanschap, 2020) and the sudden need for adaptation to a rapidly changing and unpredictable situation in response to the COVID-19 pandemic could contribute to and engender wider adaptive capacity to support future coastal management. A recent survey of 25,000 researchers found that approximately 80% reported that they have managed to adapt working practices to perform their role and maintain a level of continuity due to COVID-19 pandemic (Rijs and Fenter, 2020). Climate change and environmental concerns were mentioned by many respondents, with some drawing parallels between the immediate action taken to mitigate COVID-19 and the kind of action needed to tackle environmental threats. Using the Interreg Ireland-Wales funded Coastal Communities Adapting Together (CCAT) project's case study sites in Ireland and Wales as a lens to explore this (www.ccatproject.eu), we seek to understand how engaging with coastal communities and stakeholders has been impacted and adapted to the unprecedented disruption brought about by the COVID-19 pandemic. Drawing insights through a detailed survey, this paper investigates the implications for coastal community engagement and what this might mean for future coastal management, through the following key questions:

- What have the opportunities and challenges been for maintaining and continuing effective and meaningful community engagement in response to COVID-19?
- What do these experiences mean for community engagement in the future?
- How has this adaptation process contributed to the development of innovative social engagement methodologies to support adaptive capacity and resilience for coastal communities in the future?

2. Understanding adaptation to change: Methodological approach

2.1. Introduction to CCAT

CCAT sets out to build adaptive capacity to change and realise the potential of the Irish Sea region by (re)connecting coastal communities with their place, improve understanding of dynamic coastal systems and facilitate climate action. The project extends work carried out by the EU FP7 TURAS project (2012-16), where adaptive capacity was shown to relate to concepts within the community resilience literature (Crowe et al. 2016) such as social memory informed by past and present learning (Wilson 2012; Yorque et al. 2002); social networks that are key to information flow (Pelling et al. 2008); participatory processes that actively engage the community in solving problems and achieving objectives (Pelling 2003); and the import of utilizing human imagination and anticipation (Davidson 2010). CCAT recognises the potential of these concepts to inform decision-making and new ways of doing things, empower the community to act as agents of change (Cox and Johnson 2010; Pelling 2003), and generate a sense of belonging and attachment to place (Scannell and Gifford 2010; Wilson 2012).

CCAT considers the work of the Scottish biologist and town planner Patrick Geddes (1854-1932) to be an historical precedent for building adaptive capacity to change in communities. Geddes identified that in order to make a transition it is necessary to involve the entire community in identifying drivers of change over time, and that active participation, for example through participatory mapping, can provide a mechanism for civic engagement with local issues (Crowe and Foley 2017; Gray et al. 2014; Gray et al. 2019). The CCAT proposal brings these ideas from Geddes into the 21st century to build adaptive capacity and community resilience. The CCAT project focuses on two case study areas on either side of the Irish Sea (Figure 1):

- Portrane, Fingal, where coastal erosion and flooding in Natura 2000 sites are threatening coastal ecosystems and biodiversity, and destroying private homes and gardens. CCAT is working with Fingal County Council to respond to challenges such as a lack of policy on coastal management in Ireland; a lack of agency for local authorities to act; a disconnect with social-ecological systems; and unauthorized development and illegal dumping by property owners attempting to create localised sea defences.
- Pembroke Dock and Milford Haven, Pembrokeshire, where CCAT is working with the Port of Milford Haven on the transition from hydrocarbon industrial activities to renewable energy, responding to challenges such as a poor retention of young people in the area; the transformation of an historic dockyard for new uses; and a lack of awareness of the potential of marine renewables.

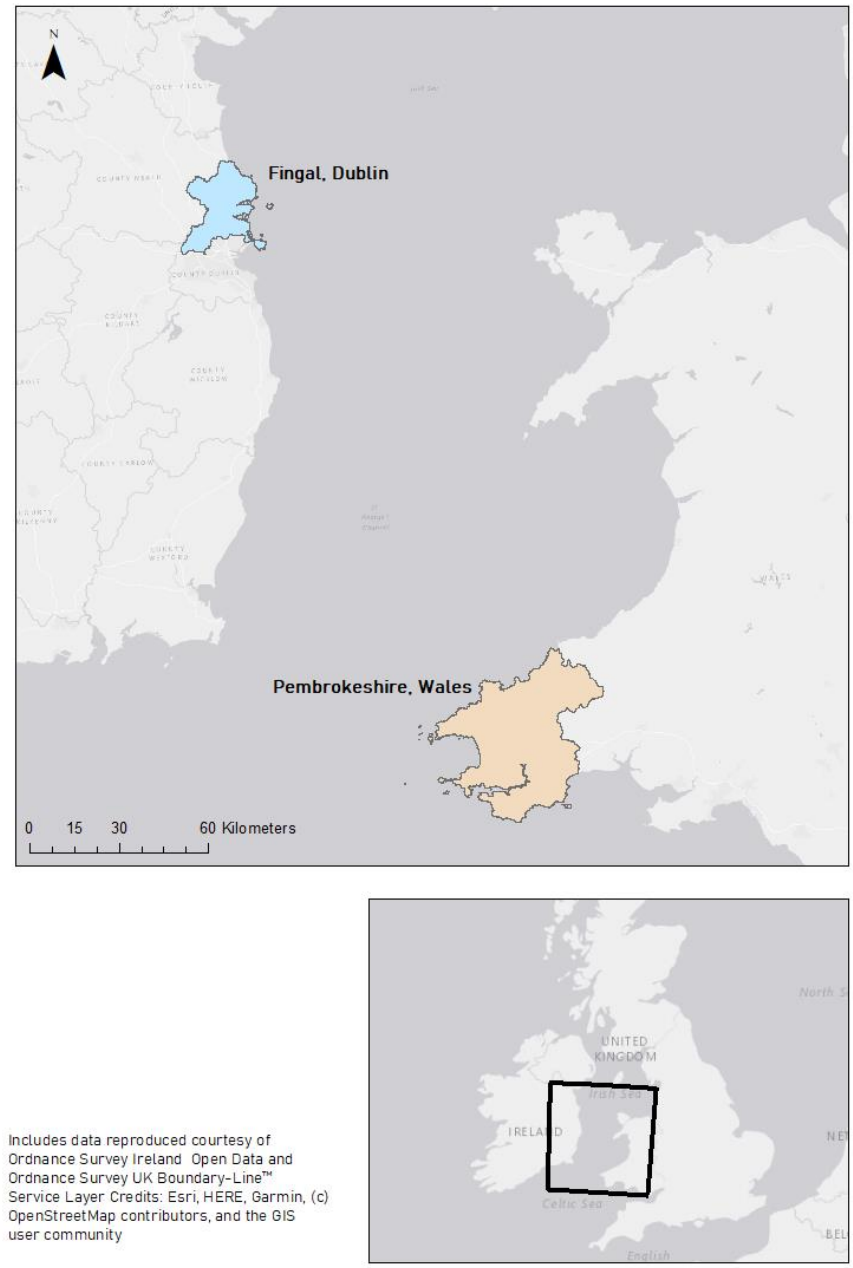

Figure 1: Map of CCAT project case study communities of Fingal, Ireland and Pembrokeshire, Wales.

The project aims to engage a broad cross-section of the community with change; build support for climate adaptation; generate a renewed sense of belonging and pride in the two case study areas; and facilitate cross-border understanding and collaboration with coastal change.

Project activities fall under 3 key pillars: Observation, Sense-making and Co-creation. Building on earlier concepts of environmental and marine citizenship (Hawthorne and Alabaster, 1999; Fletcher and Potts, 2007; McKinley and Fletcher, 2010; 2012) the activities contribute to, or inform, the concept of coastal climate citizenship (Marshall et al., 2017; McNeal et al., 2014; Ostrom, 2000), developing initiatives that might be education resources, behaviour change initiatives and/or memorable experiences (Figure 2). Activities include participatory mapping, augmented reality, virtual reality, animation, GeoDesign and GeoGames. The project also exchanges knowledge and experience across the Irish Sea border, for example in relation to attitudes to climate change or coastal management

policy and practice. In addition, the project has operated according to an eco-code from its inception, which includes the prioritisation of sustainable modes of transport and dominantly plant-based eating options for consortium events.

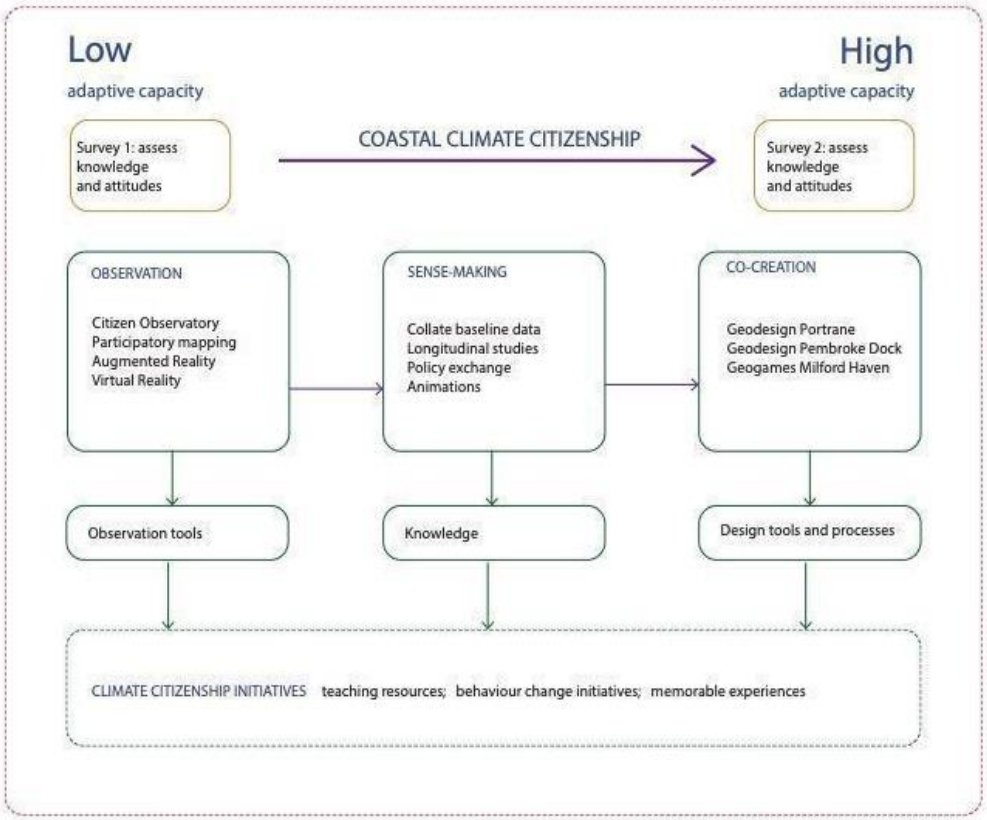

Figure 2: CCAT operational framework for delivery of coastal climate citizenship.

2.2. Case Study Activities

To gather insight into the adaptive process that the CCAT project partners have undertaken since March 2020, a proforma template was produced for all partners to complete. The proforma included questions covering a range of themes: 1) name and location of the CCAT engagement activity, 2) description of the CCAT engagement activity, 3) description of how the activity has evolved and adapted in response to COVID-19 restrictions, and finally, 4) the challenges and opportunities for coastal community engagement in coastal management, both immediately and in the future. Questions posed to participants were open to allow in-depth exploration of these topics (proforma is available in the Supplementary Material). Where required, supplementary interviews were conducted to gather additional insight or clarification of the points made by participants.

Across the CCAT project, four engagement activities were selected as case study activities (summarised in Table 1). These represent a range of approaches, target audiences, and focus, and were used as test cases to explore how the CCATs' planned community and stakeholder engagement initiatives evolved in response to COVID-19, and how this adaptation could be beneficial for future coastal management. Qualitative data collected through the proforma was analysed using standard qualitative analytical processes, including repeated reviews of the text, with an emergent thematic coding process used to highlight common themes. Where appropriate, quotes are presented in italics to support the presentation of the results.

Table 1: Summary of CCAT case study activities and their adaptation to COVID-19.

Partner	Activity	Location	Type of community engagement activity	Target Audience	Pre-COVID approach	Adapted approach
Local Authority (FCC)*	Managing a community consultation on coastal defences	Fingal, Ireland	Public consultation event	Residents and local community members	An in-person information session to share: i) recommendations from a specially commissioned report on the available options for mitigating coastal erosion for the Portrane area and ii) the rationale for the preferred coastal defence option identified by consultants.	Initial consultation was delay months, and moved to an onl consultation platform, includi digital consultation room to p attendees with access to requ information, as well as utilisin online meeting platforms, suc Microsoft Teams.
3rd level (UCD)*	Engaging students with systems thinking using Geodesign	Fingal, Ireland	Pilot study to support further public engagement events using Geodesign techniques	University students	Initially planned as an in-person Geodesign event, with each group of participants using a laptop to enter their proposals.	The planned multi-session wo transferred online. A compar GeoDesign Hub was engaged the software and support for workshop.
Coastal Forum (PCF)*	Climate change game	Pembroke shire, Wales	Interactive card game to raise awareness and stimulate discussion relating to climate change and impacts for local areas.	Local community members, residents, local interest groups, digital communities of interest groups (e.g. Facebook groups)	An hour-long climate change themed workshop using a card-based tool taking participants through a thought process to identify, prioritise and discuss any extreme weather effects seen in their communities, the impacts of these locally and actions that can be taken in response to the weather changes and to minimise identified impacts. Climate data is taken from the most recent IPCC (2013; 2019) and Met Office (2019) reports and actions are taken from existing adaptation plans written by Fingal County Council (2019) and the Welsh Government (2019).	Only one in-person event was COVID-19 restrictions were in in Wales. In response, the PC explored online tools and pla move the game to a digital fo Mural, an online platform wh real-time visualisation and co between participants. Partici each workshop are invited to Zoom/Microsoft Teams call a given a URL to their unique M These platforms are used sim to stimulate dialogue and cor between participants.
Industry Stakeholder (POMH)*	Creation of an Augmented Reality Heritage App.	Pembroke shire, Wales	Public engagement tool designed to explore and celebrate cultural	Local community members, residents, local	An in-person participatory mapping exercise, involving participants marking points and places of interest on physical, printed maps	The in-person activity has evo entirely digital process, using participatory mapping tool to

			heritage of Pembroke Dock telling the story of its various uses over time, on the eve of its latest proposed adaptation.	interest groups, digital communities of interest groups (e.g. Facebook groups)	and engaging in discussion during the process.	communities' data. This tool i a GeoSurvey platform.

*CCAT Project partners: FCC – Fingal County Council; UCD – University College Dublin; PCF – Pembrokeshire Coastal Forum; POMH – Port of Milford Haven

3. Results and discussion

With participatory approaches a fundamental aspect of the programme of work set out by the CCAT project team, the implications of COVID-19 restrictions had the potential to derail the engagement activities envisaged. One of the most immediately felt impacts was the cancellation and delay of in-person events, workshops, and data collection processes across the project (summarised in Table 1). Given the complexity, sensitivity and, indeed sometimes scepticism, that can be commonly associated with topics linked to climate change (McNally 2020, Shi et al., 2016; Capstick et al., 2015), there were concerns that a move to a wholly digital approach would limit opportunities for inclusive, meaningful and effective public engagement in the CCAT project areas. This section explores the impacts of COVID-19 experienced across these four case study activities, highlighting adaptation from the project team and opportunities for improved coastal community engagement, while recognising a range of challenges which we must remain cognisant of as we look to a future post COVID-19. While there was a diverse breadth of information garnered from CCAT partners, the themes most commonly identified by the team are discussed below.

Adapting to the impacts COVID-19: the opportunities

While it should be noted that the four case study activities represent a diverse range of characteristics, including differing target audiences, approaches and rationales, adaptation to COVID-19 was commonly characterised by a move to an online, digital approach to activity delivery. Through analysis of the proformas, insight was gathered as to the adaptation process undertaken through each activity, and the implications for both community engagement and the CCAT project partner. A number of common themes were identified by partners, discussed below.

Improving access and opportunities to engage

While moving to digital platforms was thought to pose a number of challenges for community engagement (these will be discussed later in the paper), overall, there was evidence that delivering events and activities through digital platforms can improve community engagement, broadening accessibility for some groups within the community. This improved access to engagement opportunities for some segments of the community was noted in all four case study activities, with examples including increase in online attendance at related events by the Port of Milford Haven. This was commented on particularly by UCD, who stated that "*hosting the workshop online [provided] more opportunity for more people from local communities to attend…from the comfort of their own home",* while others suggested that a move online could facilitate more engagement from younger members of the community, who are often difficult to engage through in-person events. Furthermore, it was also noted that some of the challenges often experienced during traditional, in-person stakeholder events, such as managing the 'loudest voice', maintaining and ensuring confidentiality of responses and so on, can be less of a concern through online workshops/ events. As a result, there was a feeling that use of digital platforms can lead to more equitable and inclusive engagement, with participants able to access information at a time convenient to them (seen through the FCC public consultation event), or provide their own input into a participatory mapping process (as evidenced by the POMH Heritage App) and have been shown to facilitate participants' visualisation of a range of emotions, roles and scenarios (Wu and Lee, 2015). These benefits were further emphasised by PCF, who commented that while their online workshops were smaller than originally planned, "*the benefit of running smaller workshops is that the workshops feel more personal and tailored to the [attendees], and facilitators have more time to respond…and help".* There was a feeling that this, along with the other benefits of working in a digital environment, led to "*higher quality engagement and group discussions*", with opportunities to share resources that attendees can access straight away via online

platform 'chat' functions. This kind of immediate, real-time peer-to-peer knowledge sharing and social learning has been shown to play an important role in climate change related behaviour change (Rumore et al., 2016), and is perhaps something that would not have been experienced in the original in-person workshop.

Building capacity and transferable skills

In particular, having to adapt to COVID-19 through a move to digital platforms has resulted in an expansion of the suite of tools being used by project partners as part of their community engagement activities. The additional learning and training that has been carried out across the project team has facilitated an increase in capacity and individual learning, allowing individuals and teams to develop new skills which can be applied across CCAT, as well as in other areas of their work. One respondent stated that this has *"expanded our expertise and allowed us to become more flexible with how we deliver our [activities]".* This adoption of technology and new skills was not a benefit only experienced by the project team – "*community awareness of various digital communication platforms has significantly increased; digital skills have increased. People have had no alternative but to explore and embrace digital communications…[with] benefits realised more widely".* Of course, it should be noted that this has not been driven solely by engagement with CCAT activities, rather this illustrates the widespread move to communicating and, indeed, living through online platforms is one of the everyday transformations that have been experienced as a result of COVID-19 restrictions.

Lowering costs of community engagement

While analysis of the CCAT activities highlighted some unexpected costs associated with moving to a wholly digital project, overall, it was felt that online events reduced costs for both organisations and event attendees, which was viewed as a significant benefit by most. This was particularly mentioned by PCF, who stated that "*once staff time has been accounted for, the actual cost of running the workshops online is negligible as we do not have travel costs and we don't have to rent a room…to run the workshop in…we have secured a Mural account for educators, which is free of charge for a year".*

In a wider context, it must be noted that the economic implications of COVID-19 and the associated restrictions are being keenly felt by communities, organisations, and local authorities, and the long-term impacts will perhaps not be fully realised for some time. These challenges, while exacerbated by COVID-19, are not new – many of the organisations involved in coastal management across the Irish Sea have experienced funding cuts in recent years (BBC, 2019; McKinley and Ballinger, 2018) and opportunities to recoup or reduce costs will be well received.

Reduced carbon footprint

The CO2 emissions reduction in 2020 has been unprecedented, a median estimate of –8% compared to 2019 levels (Dafnomilis et al., 2020); however, it should be noted that a consistent similar rate of decrease would need to be maintained for decades in order to achieve the global goal of 1.5 °C warming limit. From project initiation, the CCAT project team have adhered to a strict eco-code built into project design and delivery. While it is crucial to recognise that online tools and working digitally are not zero carbon (Lean ICT, 2019), as a result of the travel restrictions and limitations placed on in-person meetings, the overall carbon footprint of CCAT and its activities developed has been significantly reduced with no travel, no printing of materials (such as the maps for the GeoDesign workshop [as described by UCD], or the climate change card game [highlighted by PCF]).

Navigating the impacts COVID-19: The Challenges

Digital literacy and access

Although there have been clear benefits of moving public engagement activities to an online format (summarised in Table 1), the CCAT team expressed concern that this evolution may have resulted in segments of the community becoming more excluded from digital engagement as the transition to digital engagement tools prioritises access to broadband and marginalises those who lack confidence or experience of working online. All four projects highlighted this as a significant challenge of working in a solely online format, with POMH stating that *"many of the residents we are hoping to reach are traditionally harder to reach in this format".* Organisations working in community engagement have historically turned to online platforms, particularly social media, as a way of enhancing their repertoire of in-person events and activities, with many benefits (Mosconi et al., 2017); however, it is of note that working solely in this way may potentially result in some members of the community becoming more alienated from the process and disengaging. Exploring this from a different angle, UCD's case study activity led them to comment on the need for appropriate broadband connection, stating that "*some students have poor broadband [which] can be very frustrating and can cause them to disengage or fall behind with the process".* Broadband provision is not consistent, with many coastal and rural communities experiencing poor connectivity (The Telegraph, 2019; Bashyal, 2020), emphasising the need for ongoing in-person activities and initiatives to ensure these communities are not excluded from opportunities to engage in the future. Furthermore, while there was a feeling that most of the project teams had migrated successfully to online working, there were a number of comments regarding managing 'technology glitches' (i.e. broken links, attendees lack of knowledge about certain platforms or tools), and the need for organisations to ensure there is adequate provision within the selected platform to appropriately support their community engagement activities (e.g. as mentioned by FCC who highlighted the need for an appropriate license to facilitate the use of breakout room functionality).

Restricted engagement

While across the CCAT project there was a general feeling that online engagement activities can facilitate meaningful and effective opportunities for engagement (as discussed in the sections above), it should be noted that a number of limitations associated with online meeting platforms were also mentioned by the team. There was a feeling from some that the digital engagement process can actually restrict effective consultation and meaningful engagement (as discussed by Rumore et al., 2016 for example), due to the need for more rigid planning, leading to reduced opportunities for in-depth discussion and the development of organic conversation (noted by POMH). Others mentioned that '*body language is missing online'* (noted by UCD), which can make it harder to read a room and respond to the attendees' needs. Other challenges relating to restricted engagement were associated with instances where individuals required more support and guidance during the process – in the case of the UCD project (see Table 1), this required the presence of an experienced facilitator. Other comments from UCD highlighted a number of potential issues, such as attendees multi-tasking during an online event, or the lack of opportunity for critical reflection and clarification, among other challenges. It was thought that these could lead to increased risk of disengagement during online sessions, reducing learning and limiting the insight which can be gleaned through effective community engagement activities.

Resource intensive

Overall, there was a feeling that the move to an online format across CCAT projects required more planning and was often more resource intensive, requiring additional staff members to support event/ activity delivery. This was commented on through all four of the case study activities, with PCF stating that "*The main challenge [was] that converting the workshops to an online format initially required more staff time and resource*", while insight from the UCD project suggested that *"more preparation*

time was needed to set up and manage the multi-session online workshop" with more staff required to support and manage various aspects of the task. Providing detailed joining instructions for attendees and facilitators (PCF explained about developing a facilitator guide to support the climate change card game, for example) prior to activities taking place was also highlighted by all groups – it was also mentioned by FCC that there was a need to run "*multiple consultation events online, compared to a one-off community hall meeting".* While the overall running costs were considered to be much lower for 'going digital', the additional staff costs required need to be accounted for. This included time required to develop new skills, investigate appropriate digital tools and platforms to deliver adapted activities, develop digital competencies, train additional team members to support activities, and additional time planned into activities to ensure all attendees can interact with the selected digital platform to ensure equal opportunities for engagement. These must be taken into account when considering the role of online tools in future coastal community engagement.

4. Concluding Comments

Prior to March 2020, there was already increasing evidence of a growing suite of innovative digital tools, methods, and approaches being used to support meaningful community and stakeholder engagement in a range of contexts (Metscher et al., 2020; Roberts and Jones, 2013; Foth et al., 2008), including aspects of coastal management and climate change. The most common response to COVID-19 within all areas of community engagement was to 'go digital'; CCAT exhibited a reticence for the project team to cancel activities entirely, as was initially seen in the earlier days of the pandemic, with a number of large public events being cancelled or postponed. However, the COVID-19 pandemic is a rapidly changing situation, and access to communities may continue to be influenced by restrictive measures (OXFAM, 2020). While there were clearly challenges to 'going digital', there are a diverse range of benefits and opportunities that could be further harnessed to improve coastal community engagement in the future. For example, making resources and activities available online could result in those people who are traditionally not considered to be coastal stakeholders engaging remotely, such as those who live further inland and therefore may not always be able to attend events/ meetings, or those who have been marginalised from marine and coastal issues. This could expand the definition of who should be considered a coastal citizen and foster a wider feeling of connection to the coast and ocean. As the project works to develop a model for coastal climate citizenship, and how it can be applied to support climate resilience and adaptive capacity across the coastal communities of the Irish Sea, this widening of the definition of what it means to be a 'coastal community' is of interest.

Evidently, this adaptive capacity exhibited by the CCAT project has, for the most part, increased accessibility and opportunity for meaningful engagement with coastal communities through the use of a range of innovative digital tools. However, challenges remain. There is a need to consider that the experiences of 2020 are a snapshot in time, and would perhaps not be mirrored in other coastal communities, or indeed at another point in time when developing digital competencies was not as essential to everyday life - with challenges in terms of digital literacy, limited desire for online engagement and lack of provision of high-speed internet connection in many coastal communities, particularly rural coastal communities (Bashyal, 2020). While using online tools is not new, 2020 has witnessed a much rapid and widespread adoption of online tools and digital platforms. There are clear benefits in working in this way, and there is therefore an opportunity for the tools showcased through the CCAT project to be explored further, particularly as mechanisms for increasing access and a sense of ownership and agency, enhancing ocean literacy and engender connection between communities and their coast. Looking to the future, there is an opportunity for us to draw on the successes of this period, learn from the rapid migration to online working, and explore more opportunities for coastal

community engagement to become more inclusive and accessible, through hybrid and multi-modal engagement materials and tools. For this to be successful, however, appropriate resource, funding, and capacity building opportunities will need to be available to those working within the wider field of coastal community engagement.

Researchers stressed the importance of learning from the COVID-19 pandemic and apply those lessons to climate change action, allowing us to become more resilient in the future (Rijs and Fenter, 2020). The COVID-19 crisis has convincingly demonstrated that societies can adapt quickly and individuals can change aspects of their lifestyles, if an imminent threat occurs. Hence, achieving behavioural changes that mitigate climate change might be more within reach than previously thought (Botzen et al. 2021). This paper emphasises the role and responsibility for research projects to 'practice what they preach' in terms of climate change adaptation and low carbon targets. COVID-19 represents a significant hurdle for the project team; however, it has highlighted the capacity to adapt to successfully working online, with only limited impacts on collaboration and engagement across the project team. While there is clearly an environmental benefit to 'going digital', it is important to note that it may come at a cost if some members of the community become disenfranchised with issues relating to their coastal area and its management. Additionally, there remains a need for more research to explore the effectiveness of these digital tools and platforms in raising awareness, enhancing climate literacy and adaptive capacity and fostering behaviour change.

Looking to the future, and drawing on current thinking about the impacts of COVID-19 for social change, Howarth et al. (2020) discuss how COVID-19 has demonstrated that behaviours can change abruptly, that these changes come at a cost, that we need a 'social mandate' to ensure these changes remain in the long-term, and that science plays an important role in informing this process. The authors state that the COVID-19 response might not be a suitable model for climate action and advocate that climate change requires a more carefully planned and calibrated, inclusive, less disruptive and more sustained response. What is clear from this study, however, is, that when pressed, adaptation can be fast-tracked, responsive and viewed as positive action – there is perhaps a need for governments to act on the climate emergency, and much needed climate change adaptation in coastal communities, with the same urgency and energy as has been fundamental to the response to COVID-19. Recent months have illustrated how we can adapt to drastic changing situations and how to build resilience in the midst of chaos. The CCAT project adaptation mechanisms verified in this study, such as quick response to change, employment of a diversity of digital tools for learning and community engagement, opportunity to broaden participation, and the encouragement of social learning even in extreme situations, are recognised features of social-ecological resilience and can support future climate change adaptation in coastal communities. Furthermore, as stated and recommended by Ruiu et al. (2020), there is clearly an urgent need for multi-level, systemic and synergic action involving both collective and individual actions, alongside scientific/policy efforts towards ensuring coastal communities are adaptive and resilient in the face of ongoing, and future, change.

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