

## Book Review

**The Coastal Atlas of Ireland** edited by Robert Devoy, Val Cummins, Barry Brunt, Darius Bartlett, and Sarah Kandrot, Cork University Press, 2021, 912 pp., £59.00 (hbk), ISBN 978-1-7820-5451-1.

Humans have been drawn to the liminal, open spaces of coastal fringes or the water courses that connect to them since the dawn of civilisation. On the isle of Ireland, these coastal fringes offer an incredible geological, bio-physical, social, and cultural diversity resulting in complex relationships between society and the ocean. Sedimentary features, hard rock coasts, fjords, estuaries, and embayments are ‘peppered’ around the Irish coast. This has meant that Irish settlers, communities, towns and cities, their economic, political, social, and cultural functioning have become intricately interwoven with the physical and biological functioning of these diverse spaces.

Over the past few decades, these varied coastal fringes have been the focus of more attention than ever before. Coastal erosion and flood risk have become key discussion topics over the past decade or so as the potential impacts of sea level rise and an altered climate have become increasingly evident (see, e.g., Coll and Sweeney, 2013; Desmond *et al.*, 2017; OPW, 2019; and Flood *et al.*, 2020). The importance of sustainable approaches to the management of the climate crisis has drawn our attention to the role of blue carbon stores and to new ways of mitigating coastal flood and erosion risks. As initiatives are under way across the globe to ensure that coastal ecosystems can fulfil important societal functions into the future, climate mitigation and adaptation plans have, in both Ireland and the UK, become key strategic national and regional policy foci.

The publication of the award-winning Coastal Atlas of Ireland (hereafter simply ‘the Atlas’) seems thus, on the one hand, long overdue and, on the other hand, incredibly timely.

The publication of the Atlas appears as a perfectly timed event on the time-line of the global Covid pandemic but also in connection with the most recent publication of the IPCC’s sixth assessment report on climate change, and, not least, my own professional career. When I arrived as a coastal geomorphologist to join the Irish coastal academic community in 2019, I had every intention to spend the following summer travelling the coast of Ireland. That a global pandemic would altogether prevent the planning of such a trip of extensive field excursions of course never crossed my mind and, aside from a short family holiday to west Cork, most of the summer of 2020 had to be spent in some sort of lockdown. The following two years brought the challenge that coastal regions will face over the next 100+ years into sharp focus through the publication of the IPCC’s

AR6 Working Group I report in August 2021, in time for the United Nations Climate Change Conference (COP26) in Glasgow, and then the IPCC's AR6 Working Group II and III reports released in quick succession in February and April 2022, respectively (IPCC, 2022a; IPCC, 2022b). To understand and ultimately overcome this challenge, an in-depth cross- and multi-disciplinary understanding of coastal areas is key. The publication of the Atlas in 2021 thus allowed me, as a relative newcomer, and many others, including our field-trip deprived students, to finally explore the Irish coast's unique dimensions from the relative Covid-safety of our home offices. Regarding the climate change related challenges that lie ahead, it also showcases that it is possible to address the fundamental challenge of understanding the past and present and imagining the future of the coast through a truly interdisciplinary, multi-faceted, and integrated lens.

The first thing that would strike anyone who is presented with the Atlas is the mere physical size of the book. A total of 893 pages (somewhat wider than A4 format) long, nearly 6 cm thick and weighing in at over 4.6 kg, with a stunning cover image of Valentia Island Lighthouse, the Atlas unmistakably makes a physical statement few other books make in today's digital and fast-paced publication world. The Atlas does not, however, 'feel' out of place in today's context. The 'physicality' of the volume rather compels anyone who encounters it to open the cover and leaf through the pages. As someone glued to their digital screens for the best part of their day, I found it a great relief to engage with such a well-produced printed item. Once opened, the reader is presented with such rich and professionally produced graphical material (maps, photos, graphs, images of artworks and paintings) that it is quite impossible to stop reading and turning the pages. A volume such as this must be savoured – its weight almost 'commands' the reader to sit by it, rather than carry it around, and that is not a bad thing.

For a volume such as this to be produced (there are 5 editors and 150 contributors) without differences in style and/or overly noticeable or distracting duplication of content emerging requires an immense degree of organisation, leadership, and coordination. The lead editor, Robert Devoy, alongside the co-editors (Val Cummins, Barry Brunt, Darius Bartlett and Sarah Kandrot) deserves particular credit for 'steering this ship'. The sad fact that five contributors (remembered on page ix) died between the first and last stages of the project is an indication of the length of the journey involved.

Upon opening the cover, the Atlas greets the reader with a poem, 'Voisinage Arrangement', by Pàdraig Ó Tuama, that aptly weaves together the physical, social, cultural, and political context of the isle of Ireland. Following the front pages including a dedication, list of contributors, and wonderfully written forewords of the Chair of the Commission on Coastal Systems of the International Geographical Union, Colin Woodroffe, and the Former Norwegian Ambassador to Ireland, Else Berit Eikeland, the Atlas is then divided into six main sections, taking the reader from coastal 'settings' (physical, biological, and human) in section 1 to 'natural coastal environments' (section 2), 'people and the coast' (section 3), 'resources' (section 4), 'management' (section 5), and finally 'future coasts' (section 6). Each of the main sections contains between 1 and 9 Chapters, leading to 33 Chapters in total. There is a helpful list of acronyms to refer to

up front and a Chapter by Chapter set of up to 48 references each listed as endnotes at the end of the volume, before a comprehensive index.

There is little if anything that those who turn to the Atlas for information and knowledge will not find somewhere within its pages. Where they will find it, however, may be not entirely straightforward to establish. Thus, if one was searching for information on coastal spits around Ireland, for example, one might turn to Chapter 11 ('Beaches and Barriers') – but a quick look at the index reveals that, for completeness on this topic, one must turn to a number of other sections, including 'Ancient Shorelines and Sea-Level Changes' (Chapter 7) and 'Engineering for Vulnerable Coastlines' (Chapter 30). The fact that the individual chapters in the main body of the Atlas are not numbered (Chapter titles only are given on the first page of each Chapter), makes it more difficult to locate oneself in the overall structure of the Atlas at any one time. The running heads at the top of each page are helpful to an extent but numbering them according to section and chapter would have been useful.

Overall, the volume provides so much more than might be expected of a merely *coastal* Atlas (see e.g. the detail provided by way of background to the evolution of the Irish land use system from the 18<sup>th</sup> to the 20<sup>th</sup> Century on page 80). In terms of illustrations, it is hard to find fault with the Atlas. Maps, diagrams, photographs, and drawings are beautifully presented with informative captions. At times, the captions seem excessively long – but this is an *Atlas* and the detail within the captions makes it possible to draw meaningful, comprehensive information solely from the illustrations. In most sections and Chapters, careful referencing allows the reader to consult key readings for further information but there are only occasional lapses in this (I noted them particularly in Section 2) with claims made that remained unsubstantiated (e.g. I would have very much liked to know the source for the claim that *Spartina* plants enhance sediment deposition 'in some coastal locations in Ireland by several centimetres of sediment per year' (p. 258)). Very occasionally I came across very small inaccurate descriptions (e.g. on page 353, where  $\delta^{13}\text{C}$  is described as a carbon *isotope* when it is, strictly speaking, an *isotope ratio* (of  $^{13}\text{C}$  to  $^{12}\text{C}$ )), but these lapses are easily forgiven and perhaps unavoidable in a project that has achieved such an accessible format and language and such a comprehensive and wide-ranging scope.

The overall structure of the Atlas, despite its uneven length of sections, makes intuitive sense when reading the book cover to cover and I found that each section contained an element of unexpected, novel, and uniquely interesting content:

Section 1 leads the reader into a wonderfully written and illustrated insight into the many different coastal types and histories around the isle of Ireland. I found the writing here incredibly accessible and engaging; a kind of natural science 'storytelling' that conveys the authors' enthusiasm for the workings of the natural and human world of the coastal realm. The multitude of time-scales on which ice, water, and atmosphere have crafted the land into what we now see are laid out in great clarity. As is the case throughout the Atlas, case studies and examples are included in differently coloured text boxes and effectively break up the main text, providing a rich and colourful reading experience.

The text occasionally hints at the potential futures that lie ahead for these diverse coastal environments (for me, one of the more notable such occasions was the mention of the ‘worst-case, climate endgame scenario’ (p. 19) within the ‘cold-water coral’ case study box, that would mean that the West coast of Ireland could act as the last refuge for cold water corals). This section also introduces the human relationships at, with, and to the coast and it does that extremely well in a non-compartmentalised, inclusive, and holistic fashion (particularly in the Chapter on ‘People, Agriculture, and the Coast’). It is worth highlighting particularly Chapter 6 in this section, with its focus on the arctic inheritance of specific coastal environments, that provides a superb introduction into the history of glaciations and transported me back to my undergraduate degree experience and all that fascinated me about geography. This is followed by Chapter 7 and (around page 137) contains an excellently critical discussion around the principle of uniformitarianism and its problems in relation to the interpretation of raised shorelines that ought to be a ‘must read’ for any geography student. I found the creative intersections in Chapter 8 of this section particularly impressive, with, e.g., a case study on ‘Textual and Photographic Descriptions of the Coast’ (on page 162-163) sparking off numerous ideas for future research. This section excels in terms of what I would describe as quirky new insights and left-field case study boxes – perfectly exemplified by Linda Fitzpatrick’s section on Elfordstown Earthstation and its strategic importance as a satellite communication hub (p. 172). Similarly impressive is the Chapter that follows on ‘Underwater Surveys’ which contains one of the best explanations of the ‘white ribbon’ effect (the lack of shallow water survey data) I have come across – although an opportunity has been somewhat missed in further illustrating, in Figure 9.1, the principle that sonar beams widen with depth.

Section 2 consists of only four Chapters, respectively, on ‘Rocky Coasts’, ‘Beaches and Barriers’, ‘Coastal Wetlands’, and ‘Estuaries and Lagoons’, whereby the latter two include key sub-sections on ‘Saltmarshes’ and ‘The Ecology of Mudflats: Clonakilty Harbour’. As with Section 1, the quality of writing here is excellent and consistently so, as are the graphical illustrations, and text box explanations (e.g. of ‘Shore Platforms’ on page 205). It would have been helpful to highlight a little more at the start of the first Chapter within this section the importance of varying tidal range (rather than merely tidal limits) on rocky shores by way of affecting the spatial manifestation of rocky shore ecology and biophysical weathering. The section contains an excellent exposé of erosional features on hard rock cliffs and ecology more generally, however, with only some repetition (relative to Section 1) around the general energy / climatic conditions that distinguish the various types of coasts described here. Arguable, such repetition is inevitable in a volume of this size and on account of allowing the reader to read individual sections in isolation. I was particularly pleased to see the recommendation for the future management actions by government agencies included here (in the context of the Lough Hyne case study). Later in this section, the discussion around the need to maintain accommodation space under sea level rise in the case of beaches and their associated management continues in this critical vein, which is great to see. It would have been useful here, too, however, to see

a mention of the need to better understand coastal sediment transport and circulation systems. The case study on saltmarshes within this section is welcome, particularly in light of the recent recognition of the many ecosystem services these types of coastal systems provide to the Irish and, through carbon storage, the global society and economy. The statement that ‘marsh surfaces are flooded regularly (generally twice daily) by the tide’ (p. 251), however, is one of the few statements in the Atlas I came across that became too simplified in the attempt to make the text accessible (as is stated here, the lower limit of marsh surfaces is rarely below the Mean High Water Neap (MHWN) level, thus surfaces are often **not** flooded for several days or weeks in between spring tide periods).

Section 3 is, understandably, given that it deals with ‘People and the Coast’, the most extensive section of the Atlas, containing 10 Chapters. It introduces the reader to the intricate relationship between people and the coast, and particularly the long history thereof, dating back to the first hunter gatherer communities of which we have been able to find traces in numerous forms of archaeological evidence, such as ‘shell middens’ and bones. To those readers more familiar with the physical aspects of the coast (and I include myself in that group), this section will be utterly fascinating and illuminating in the way in which it narrates the ‘story’ of human occupation and the human quest of using and ‘making sense’ of the coastal space. I was fascinated to see the description (including the predominant monthly wind directions accompanying the various stages) of the voyage of St Brendan, who in the mid-6<sup>th</sup> Century AD sailed for seven years to reach Newfoundland and return to Ireland. I was equally intrigued to see the description of the early medieval tidal mills that allowed these early coastal communities to harness the power of the ocean in a way that we no longer do – but perhaps should, given the energy challenges we are now facing. The section continues with unexpected case studies and text boxes: from the Norse place name origins to a wonderful description of the expansion of Dublin port in the 12<sup>th</sup> to 13<sup>th</sup> Centuries, the history of piracy and smuggling, the seafaring family and story of Grace O’Malley, the ‘bittersweet’ (p. 422) connections to the slave trade, and to the rise of various fortifications, plantations, and country houses around the coast. The Chapter on ‘Changing Coastal Landscapes’ contains a wonderful description of the growth of Dublin and its port, beautifully illustrated with historic maps and paintings, and followed by an equally intriguing history of shipbuilding and port development in Belfast, Limerick, and Waterford. No coastal development prior to the widespread use of the car would have been possible without the railways and it seems fitting to be introduced to the importance of the Irish railway network in this context before the development of coastal tourism. The role of the coast as a ‘holding place’ for food relief during the Irish Famine is probably little known and the Atlas remedies this by including a detailed map of depot sites and shipping connections that played a key role in alleviating the food shortages. The geographically uneven suffering during the famine is illustrated by way of several impactful maps here (mortality, reliance on public works, relative decrease in population size, etc).

This section also contains a Chapter on ‘Ireland’s Islands’ with an impressive map and A4-sized key showing the location of all 280 islands around the coast of Ireland. What

follows is a striking account of life in these often incredibly remote places, conveying a sense of cultural attachment and 'hardiness' along with its decline through emigration to the surrounding mainland over recent centuries and decades (with stark graphics illustrating the decline from over 200 to fewer than 70 inhabited islands in 1861 and 2016 respectively (p. 491)), and the recovery of some of the economic foundations of islands in recent years – not least on account of the tourism industry.

From islands to underwater evidence of human society is a relatively small step but the fact that around 18,000 shipwrecks lie off the coast of Ireland is staggering. Their location and history are perfectly illustrated in the last but one chapter of this section, with the last chapter charting the history of the Irish maritime institutions that eventually led, amongst others, to the Irish Naval Service, the National Maritime College of Ireland, and the Marine Institute.

Section 4 focuses on what has played a key role in maintaining the foundations of the Irish economy through the ages: maritime trade. Having visited West Cork during the lockdown in 2020, I found it incredible to discover the importance of Bantry Bay, with its population of only 97 in 1966, as key crude oil terminal for European refineries. Information is presented in several bar charts highlighting exports and imports via the key ports of the East, South, and West coast of Ireland, alongside Belfast in the North. Much of the data presented here, particularly freight and passenger transfers to/from Britain and Europe will likely have been affected by Brexit and the global pandemic (the authors acknowledge this likely future change) but the Atlas serves as an important historic summary and benchmark. Many of the themes of Section 3 re-occur in another guise in this section, as the urbanisation of Ireland's coast is described with a series of eye-catching national maps in Chapter 25, starkly illustrating the rise in the urban population of Dublin, but also Dundalk and other East coast towns, alongside the cities and towns of Cork, Galway, Limerick, and Tralee against a relatively stable (or declining) population of Belfast. A chapter on the fishing industry of Ireland follows neatly from this focus on population patterns but illustrates the disconnect between the recent picture of urbanisation and the location of the most important fishing ports (with Killybegs in Donegal leading by several orders of magnitude in terms of pelagic fish landings relative to any other fishing port). Overfishing issues are discussed and clearly highlighted with reference to the Celtic Sea Herring, which has undergone not only periodic decline in catch numbers, but also a steady decline in biomass over the second half of the 20<sup>th</sup> and into the first decade of the 21<sup>st</sup> Century. The link between ocean currents and species blooms (including certain jellyfish) is explored here, too, as is the commercialisation of seaweed harvesting and the unregulated harvesting of the edible periwinkle. The authors recognise and discuss the recent introduction of uncertainty into much of the fishing industry's future due to Brexit with a final page on this topic prior to the next chapter on 'blue growth' in coastal and marine tourism. This encompasses a map of Ireland's Blue Flag beaches, the surfing culture, and the Wild Atlantic Way, amongst other topics. The fact that Ireland's coastal and marine tourism was valued at €2 billion by Fáilte Ireland, as illustrated here, provides an interesting benchmark for future comparison as the



impact of Brexit and Covid-19 becomes clearer. As in other Chapters within this section, interesting case studies, e.g., on Dingle and Kinsale Harbours, the Causeway coast of Northern Ireland, and the Burren coast, provide a clear sense of the place-specificity of tourist development. The short text box on 'Coastal Food' felt a little 'lost' in this chapter and I could not help but feel that it might have fitted better elsewhere within the Atlas or perhaps warranted a wider discussion of the Irish culture of seafood. But the case study of coastal golf tourism with its map and illustration of golf courses, alongside the discussion of their future in light of coastal erosion, provides interesting context and connection to the earlier and later Chapters in the Atlas on coastal processes (Section 1) and the possible coastal future (Section 6).

The final two chapters of Section 4 might have arguably more sensibly been reversed in order, such that the renewable energies chapter precedes Section 5 on coastal management, but either way, they provide an interesting picture of the wind, wave, and tidal energy potential and relative degree of 'harvesting' of these energy sources around Ireland relative to other European nations. Wind farms emerge as the clear focus of the Irish government at present, but the high potential for wave energy is not lost on the reader. The complexity around such developments is made clear, not least by a figure illustrating the supply chain for an offshore wind project (Figure 28.18), with all its 55 sub-components from the preliminary scoping to procurement, installation, and operation. Finally in Section 4, a Chapter on 'Coastal Mining, Quarrying and Hydrocarbons' takes the reader on a journey from the early 19<sup>th</sup> Century copper mines to rock and aggregate mining, and then hydrocarbon oil and gas exploration, in recognition of the fact that Ireland still imports the vast majority of its energy needs. This story, as many of the others outlined in this section, is clearly likely to be shaped by rapid change over the next decades as the Irish Government positions itself to meet its carbon targets. Again, the sense is one of the Atlas as a key benchmarking document at this critical time.

The penultimate section (Section 5) of the Atlas addresses the important topic of coastal and marine management. As such, this section 'loops back' to Section 1 and 2 and begins with an outline of the challenge at hand, due to the rise in population density, climatic and associated sea level changes, as well as the existence of coastal protection structures that are no longer fit for purpose. As is the case in many parts of the world, coastal management in Ireland is described here also as 'reactive in character' (p. 737). The Chapter thus picks up on the need for monitoring and information gathering, as well as presenting information on the location of eroding, stable, or aggrading coastal locations (presenting this information at a national scale, as it is in Figure 30.7, however, is often of limited value as coastal processes can lead to highly localised change). The chapter covers a range of hard structures, their applications, examples of locations, and lifespans. The case study of Rosslare illustrates the difficulty of applying localised construction approaches to a system where the individual sedimentary units may act as intricately connected sources and sinks and interference in one part of the system can easily lead to unintended consequences in another. The question asked in the case study ('an architect's view' on page 761) seems pertinent here: 'Do we continue to permit the

building status quo and continue to develop areas vulnerable to coastal inundation? Or do we begin to really acknowledge the flowing materiality of the coast?'. And it is welcome to see the chapter end with a series of recommendations for future planning, including more 'innovative options for managing and protecting the coastline' (p. 764).

The final two section chapters cover pollution and coastal management. Once again well-illustrated, the former includes some very informative examples of improvements achieved through technological innovation and political/legal mechanisms in the reduction of, for example, eutrophication, microplastics, oil spills and TBT contamination. In keeping with the Atlas as a whole, data on pollution is clearly visualised in maps and graphs and each pollution issue is accompanied by at least one case study or further detail in helpful, highlighted, text boxes. Last, but not least, in this section sits Chapter 32 on 'coastal management and planning'. There is some (helpful) linkage here with the first Chapter in the Atlas around the spatial definitions of the coast. The challenges around the need for landward and seaward definition of legislative, planning and management zones is amply illustrated as are the various international and national policy drivers. The reader is left with a sense of progress (e.g., towards a more integrated spatial planning framework and ecosystem based management), but also clear challenges remaining – not least the transboundary issues that have recently come to the fore on account of Brexit.

The editors sensibly reserved the final section containing a single, final chapter, for their authorship. In this they explore 'climate change and coastal futures' and do so by first addressing the reader directly: raising their hopes around the impact the reading of the Atlas might have had and recalling the intention behind the Atlas' publication. The coast is described here as a 'living laboratory' under immense (human) pressure (both globally and locally within Ireland). These pressures (demographic, resource, climate, and land management related) are all introduced and discussed in some depth, alongside interesting interventions (in the form of case studies) – although the example of the small island nation of Palau takes the reader by surprise here. Palau is used here to illustrate the need to act with greater urgency on climate change, the safeguarding of marine and coastal ecosystems, and thus by implication also the sustainable safeguarding of Irish socio-economic needs.

The final pages of the Atlas in which the authors call for both 'top down' and 'bottom up' approaches to resolving the many remaining coastal challenges around the Irish coast resonate particularly strongly with me. As someone who moved to Ireland just before the pandemic and has experienced the 'spirit' of the Irish people throughout the difficult time of these past two and a half years, the Atlas captures the essence of many of my encounters with people in Ireland: well-informed, creative, open, genuinely interested in, and hopeful that we can be, finding the best way forward for all.

In summary, even if the Atlas appears overbearing and verging on unmanageable in terms of its physical presence (not least its sheer weight), it unquestionably makes a statement that weighs as heavily as the past, present, and future importance of Ireland's coastal zone itself. The growing accompanying digital resources to the Atlas (which were not fully developed yet when I began the review) and the work of future generations of



coastal scientists, artists, residents, and communities now must rise to the challenge to keep the Atlas, and all it stands for, alive.

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