Introduction

Ross S. Purves

Department of Geography; URPP Language and Space, University of Zurich, Switzerland

Olga Koblet

Department of Geography, University of Zurich, Switzerland

Benjamin Adams

Department of Computer Science and Software Engineering, University of Canterbury, Christchurch, New Zealand

> The beauty or excellence of the Scottish landscape, arises principally from the diversity of surface, its lakes and rivers; its defects arise from its sterility, its want of wood, and perhaps in no inconsiderable degree from the vitiated taste of great proprietors in improving their grounds.
>
> *Scots Magazine*, 1803

Environmental change is not new. Neither is writing about it. As seen in the above quote, more than 200 years ago the *Scots Magazine* argued for the beauty and the excellence of the Scottish landscape, emphasising the importance of

diversity and water bodies, concepts with enduring importance extending far beyond the study of landscape preference into the realm of environmental science and intergovernmental efforts to preserve biodiversity through policy and scientifically driven interventions (Díaz et al., 2015).

The author also bemoans the quality of the land and the lack of forest, and lays the blame squarely at the door of the owners of Scotland's great estates and their improvements. These ideas are familiar in current debates about the environment, as argued for in sustainable development goals that aim to improve food security (and thus agricultural productivity) and the sustainable management of forests. That a 200-year-old quote fits this argument so well is, of course, not coincidence – the way in which humans value and appreciate landscape has a history – in this case a profoundly Western one, which influences to this day relationships with the environment (Fletcher et al., 2021).

Understanding these relationships is central to many of the most pressing environmental challenges we face today. Beauty is not simply in the eye of the beholder, but neither are its manifestations universal, and this variation has profound policy implications if we wish to understand, preserve and enhance landscape quality. Reforestation and rewilding programs stand or fall not simply as the result of legislation promoting these practices and protecting environments, but also through an understanding of the relationship between those living in a region and its history (Root-Bernstein, Gooden, and Boyes, 2018). Environmental change occurs not in isolation, but as a complex interplay between humans and environmental consequences, manifested in processes such as climate change, agricultural improvement or urbanisation.

One rich source of material on the relationships between society, culture and the environment is natural language as recorded in written texts. How we perceive our environment, how we understand the relationships between the behavior of people and the landscape and how our conceptions and discourse about the environment in turn cause change is conveyed through natural language, or what we shall call in this book, *environmental narratives*.

We define environmental narratives broadly for our purpose, as written texts focusing on the environment, often describing events and experiences that took place at a particular location or in a particular type of location. These narratives can take many forms, ranging from non-fiction, through fictional accounts to poetry. As narratives, we explicitly embrace the idea that these texts reflect – often implicitly – a particular position. The extract from the *Scots Magazine* vividly reflects these ideas, describing as it does a particular place at a particular time with a very clear opinion. Combining this account, together with other contemporary accounts of life in Scotland, would reveal a complex synthesis of information containing competing, or even contradictory accounts of concerns about people and the environment in the same locations. Taken together such texts are a powerful way of creating bottom-up pictures of people, places and environments from multiple perspectives.

Environmental narratives have encoded potential answers to questions about the interactions of people and their surroundings for millennia and are as old as literature itself. The concerns of human societies that play out in the written record are set out in accounts of historical events and the settings in which they take place. Thus, when the Greek historian Thucydides wrote about the Peloponnesian War, the arrangement of objects in the landscape played a critical role in his explanation (Thucydides, 1998). The choice of objects made in these descriptions tells us something about what Thucydides, and by extension his audience, considered salient parts of the environment.

Traditionally, the reading and interpretation of such texts has been primarily the domain of interpretative, qualitative methods stemming from the social sciences. These approaches are incredibly powerful. For example, environmental historian William Cronon showed how narratives shape our understanding of the Dust Bowl, an event that had significant influences on policy in the United States and beyond for decades (Cronon, 1992). Interest in reading and interpreting environmental narratives is diverse, spanning areas of inquiry including landscape characterisation, environmental history, tourism studies and investigations of the links between climate and society.

We found the *Scots Magazine* text that opens this introduction using a search engine, and the use of such techniques lies at the core of this book. In the last 20 years academic research and society have been transformed by digital access to, and processing of, enormous volumes of data. Environmental science has been revolutionised by opportunities arising from terabytes of remotely sensed data capturing physically measurable properties. Such research is perhaps best exemplified by works measuring global forest cover and, taken to extremes, aiming to count the number of trees found on Earth (Crowther et al., 2015). But these remote sensing data can tell us nothing about what people call these trees, or how the ways in which trees are valued have and do change in time and space. Answering such questions about humans and their relationship with the environment is, we believe, a challenge to which environmental narratives are ideally suited and the subject of this book.

This book takes advantage of two key developments. Firstly, vastly more texts are openly available and searchable online (Michel et al., 2011). This access to text provides us with an opportunity – it is, at least if we are in need of an apposite quote, much easier to browse huge volumes of text and identify those fitting our needs. But with this opportunity comes a challenge – the identification and interpretation of the quote as being relevant to those needs remains an interpretative task. Given the vast volumes of text available, how can we move beyond identifying single quotes to synthesising environmental narratives so that we can really understand the competing stories about a place?

The second development concerns the development of methods to computationally process text. Many of us use search engines as digital assistants, helping us to find and filter information with regard to not just research, but also

making choices in our everyday lives. We have a subjective idea about what sorts of information such systems seem well suited to dealing with (locations of nearby furniture stores) and where they more often fall down (differentiating between song titles preferred by a 7-year-old using their parent's Spotify account and those favoured by the parent). We use natural language, most often in the form of typed words and phrases, but increasingly through the spoken word to interact with such systems, and it just seems to work.

Much of this magic concerns the development of methods in natural language processing. These techniques are concerned with developing tools which allow us to process and extract information from text. It consists of a very large variety of challenges, ranging from the seemingly simple (e.g., dividing a sentence into its constituent words) through the ubiquitous (automatically translating text from one language to another) to the incredibly challenging (doing such translations in such a way that a native speaker does not notice). These tools have moved from being the preserve of a small number of specialists to building blocks for research across a wide range of scientific areas, and their availability and relative ease of use is central to the digital analysis of text.

The astute reader will have noticed that a great deal of the proceeding argument seems somewhat familiar. It reflects many developments in what have been termed the Digital Humanities, fueled by methods and their application across a wide array of traditionally qualitative and interpretative research fields as digital data have become available (Berry, 2012). However, the focus on methods and computation in the Digital Humanities also marks the point of departure of this book. Our starting point is our observation that written text can tell us much about interactions between humans and the environment. Taking as read that sources and methods are available, we argue that the first task in developing approaches to the computational analysis of environmental narratives is to explore how different disciplines can read and interpret such texts. Only by understanding this, can we develop research questions with real relevance not only within, but also across disciplines. At the heart of the book lies therefore not primarily methods and data, but rather a simple question: How can we take advantage of progress in computational methods analysing text to better understand human interactions with the environment, through approaches which foreground the analysis of multiple narratives and interdisciplinary interpretations of such texts?

How can we best explore such a question? Interdisciplinarity, in its most effective form, requires a bringing together of scholars with diverse backgrounds, who together can make a contribution which is more than simply the sum of the parts. In our view, at the heart of truly successful research that spans and brings together disciplines lie theoretically and societally relevant questions, answered by bringing to bear appropriate methods. Our approach to discussing and identifying such questions took as a jumping off point a workshop, attended by scholars from the humanities, social, computational and natural sciences. The themes of the workshop were threefold, and laid the foundations for this book.

- The first theme was concerned with (re)identifying recurrent themes related to understanding environments from multiple disciplinary perspectives which give rise to questions with the potential to be explored through text.
- The second theme set out to identify both resources (in the form of textual corpora) and methods which could be used to explore such questions from multiple perspectives.
- The third theme, focused on developing a set of case studies illustrating how a holistic approach, based on joint work by participants, could propose novel ways of understanding and exploring environmental narratives.

In the text which follows we address these themes using three different approaches. Firstly, the core team of authors worked together on material introducing key themes and linking contributions from the other workshop attendees. Secondly, workshop attendees wrote specific short vignettes answering questions we posed and developed in the workshop, setting out their individual perspectives on the analysis and interpretation of environmental narratives. Thirdly, groups of workshop attendees worked together to author individual chapters exploring specific research questions through a broad range of methods.

The book is designed to provide newcomers as well as experienced researchers with a holistic and interdisciplinary foundation to research with environmental narratives. By mixing vignettes and case studies with an introduction to resources and methods, we provide graduate level students with a set of potential questions that can be addressed by exploring environmental narratives, and a toolbox of potential methods. For experienced researchers, we bring together a diverse set of potential research questions and methods focused around using text to better understand the environment, and provide a jumping off point for future research.

To illustrate why we believe environmental narratives are a potentially rich source of material, we now turn to a second example from Scotland, a short newspaper article discussing the building of a new road across Rannoch Moor in the late 1920s. The moor itself is, by international standards small, covering some 130 km² and designated as a protected area for both its habitats and scenic beauty. But, equally importantly, Rannoch Moor has been the subject of a rich set of narratives over the years. It forms a backdrop for Alan Breck Stewart's flight in the 19th-century historical novel *Kidnapped* by Robert Louis Stevenson, is traversed by new nature writer Robert Macfarlane in his book *The Wild Places*, and features as a location in the film of the book *Trainspotting* by Irvine Welsh, documenting the lives of those involved in Edinburgh's nineties drug scene. Two important transport links bound the moor, to the east a railway built in the late 19th century, and to the west a road built in the 1930s which broadly follows the path of traditional routes to the south. The article was published on Saturday, 5th of November 1927 in a Scottish newspaper, *The Courier and Advertiser*, without a byline, that is to say we do not know who wrote it.

The Glencoe Road

There are signs that the Ministry of Transport is in for a hot time when Parliament meets over its plans for constructing a great motor highway through the Moor of Rannoch and Glencoe. There is, so far, complete unanimity among those who have written and spoken on the subject that the plan is an outrage on sentiment and good taste. It will ruin the scenery and character of a route which is hardly ever traversed save for the sake of its scenery and character. But the case against the Ministry's plans on the ground of common sense is at least equally strong. Sir John Stirling Maxwell, who probably knows the West Highlands as well as anybody in Scotland, declares in a letter to the *Times* that the present road could have been made good for the traffic that uses it for the sum spent by the Ministry in surveying and designing the new road. That on such a road the Ministry should propose to spend half a million at the time when it has in effect stopped the work on the three-quarters completed West Highland road from Glasgow to Inverness because of shortage of funds is the crowning wonder. A feeling is taking hold that the Ministry is not to be trusted where, as is frequently the case in road-making, good taste is involved. It has irretrievably ruined the beauty of many parts of the Great North road, and its concrete bridges are everywhere blots on the landscape and eyesores.

Courier and Advertiser, 5th November 1927

Having read this text, we can answer some simple questions. Something, a road, is to be built somewhere – through the Moor of Rannoch and Glencoe. Someone, Sir John Stirling Maxwell has a strong opinion about the plans of a faceless Ministry, and it appears that the road will be built soon. The reason for the road building is unclear, since no explanation is given as to its purpose. The tone of the article, and by extension its anonymous author, is indignant. What though do scholars from different backgrounds read from this article, and how do they contextualise it? To find out we asked six attendees at our workshop with backgrounds in environmental history, literature, digital humanities, landscape studies and tourism research to interpret the piece briefly in writing. To do so, they were provided with a digital copy of the original newspaper article on the page, giving extra context to which some chose to refer. The individual interpretations are found at the end of this chapter, and in what follows we summarise key themes identified by this interdisciplinary group.

The first two pieces from Sarah Luria and Flurina Wartmann (with backgrounds in English and geography with a focus on landscape research, respectively) focus their interpretations on a more or less direct reading of the article. Flurina points to the article's implicit argument against change, and for preservation of beauty and brings to the fore the unheard voices of those who

may travel this route for more utilitarian purposes. Sarah identifies a villain (the government) and the same utilitarian need for rapid travel. She points out two ways in which the author argues – through rationalist and romantic discourses, and suggests ways in which the article's tone reflects (typical) British notions of class. Already, in these first two pieces we see how important different actors, arguments and perspectives are in readings of the piece.

Environmental historian Karen Jones and digital humanities scholar Joanna Taylor both explicitly bring historical context to their interpretations. Karen talks to the Highland Clearances and colonialism more generally, while Joanna places the road firmly in its historical context, linking its predecessor to road building after to the Jacobite rebellion of 1745. Joanna also talks to the changing voices used in the article, pointing out the deliberate use of the passive as a means of (re)claiming objectivity. Like Flurina before her, Karen reminds us of all of the voices not heard or considered in the article and points out the ways in which progress (in terms of modernisation) is seen as something to resist.

Graham Fairclough, a practitioner with a long career at English Heritage and Katrín Lund, a human geographer with a focus on tourism both emphasise identity. In Katrín's case through the landscape's contribution to being Scottish, while Graham explores Scotland's position within an Empire for which the Ministry is a proxy. Both also point to the importance in the article of one man, Sir John Stirling Maxwell, with Graham pointing to his leading role in founding organisations concerned with conservation in Scotland. Once again, the underlying move to modernise and the growth of car use, are given as underlying reasons for the building of the road, and both identify the use of sentimental and rational arguments against change.

What becomes very clear on reading these pieces is the importance of additional contextual knowledge in interpreting the article, and how varied the interpretations are, despite relative unanimity on the key messages. One way of summarising the answers of our experts is to categorise them. In Table 1.1 we do this using the 5Ws & H (what, why, when, where, who and how), a set of questions which have been used to explore and discuss texts since antiquity. This simple structure is a powerful way of summarising the arguments put forward by our team. What is telling are the rich variety of themes identified, not only with respect to the objects described in the article (the landscape, scenery etc.), but also the locations and actors, as well as the influence of historic events on the debate about modernisation. Equally important for our work are the ways in which arguments are advanced – through the use of different forms of language and argument, and by using particular and emotive choices of words.

This example shows vividly the potential of interpreting a single environmental narrative. Those familiar with the computational analysis of text, will see some possible avenues for using such methods to analyse multiple texts describing this location. For example, using named entity recognition it might

Question	Selected answers
What	Landscape Scenery Romantic wild nature Landscape transformation Military roads and droving Bridges
Where	Moor of Rannoch and Glencoe Scotland Scottish North Periphery of the Empire Modern A82
Who	Urban-based intellectual The author (identified as male) The Ministry Modernising national government Sir John Stirling Maxwell Cultivated elite Major William Caulfeild Ordinary folk, women, non-humans Local people Association for the Preservation of Rural Scotland National Trust for Scotland
When	Jacobite Rebellion Highland Clearances Increasing presence of motor car Birth of countryside conservation movement
Why	Modernisation Conservation
How	Passive voice Colloquial language Sentimental Rational Conservative Clichés

Table 1.1: Interpretation of the text Glencoe Road.

be possible to identify the locations and actors explicitly referred to. Of course, much of the interpretation – for example, the lists of missing voices – cannot be extracted computationally. But, and this idea is at the heart of this book, the process of interpreting the texts with experts from diverse backgrounds allows us to identify relevant questions, for which we can then consider potential

approaches to analysing text. This example provides us with a jumping off point for the rest of the book and our argument. In the first part of the book, made up of this chapter together with Chapters 2 and 3 we focus on exploring firstly, what environmental narratives can tell us (our first theme) (Chapters 1 and 2). In Chapter 3, we introduce both resources (collections of text and associated data) and simple methods for text analysis that might be appropriate to analyse some of the questions we posed above. Chapter 3 is designed to give those new to text analysis an insight into possible approaches, and could be skipped by those familiar with such methods.

In the second part of the book, we focus on case studies developed by the attendees of our workshop. Each case study team (with one exception) was interdisciplinary, and the resulting examples illustrate how a diverse range of questions, collections and methods can help us to explore environmental narratives. The book concludes with a list of key lessons and sets out an interdisciplinary research agenda for future work.

Interpretations of the Glencoe Road text

Walking the Glencoe Road as an environmental historian the signposts are many. Here we detect a long story of landscape transformation, from the Highland clearances to the construction of a colonial landscape of romantic wild nature. Movement and mapping are strong themes in this place – from military roads and droving to modern auto tourism. Axioms of progress courtesy of industrial technology are embedded in the text – the motorway as a beacon of modernism – along with a critical inflection that sees the 'machine in the garden' as bureaucratic invader and aesthetic polluter. What is missing, of course, from the Courier's report are the other voices – the ordinary folk, the women, the non-humans – important, hidden, historical actors in this story.

Karen Jones
School of History, University of Kent, UK

The Glencoe Road – the modern A82 – is composed of a series of historic routes which have been in use since at least the 18th century. Like several parts of this road, the section which runs by Rannoch Moor formed part of the way constructed under the leadership of Major William Caulfeild, who was Inspector of

Roads for Scotland from 1732 until his death in 1767. He was thus in charge of Scottish transport links when the second Jacobean War was underway in 1745. The Dundee Courier and Advertiser registers something of this historical antagonism against English administration in Scotland. The author's opinion that the Ministry is 'in for a hot time' indicates a muted delight at this outcome; the colloquial language with which the article opens is at odds with the spitting fury later on, when the author bemoans a plan which is little more than 'an outrage to sentiment and good taste', and which, furthermore, is barely defensible on practical grounds. The passive voice which opens the final paragraph ('a feeling is taking hold') attempts to reclaim a sense of objectivity – but the paper's stance is clear. Its position is reinforced by the placement of this article on the broadsheet: this is a central story, positioned in the middle of a page dominated by international news of places from Abyssinia, to Egypt, to Hollywood. As both the article itself and its location on the page indicate, though, this issue is no less significant for either newspaper, author or reader because it is a local concern. The 'scenery and character' of the landscape through which the road will pass stands in for complex concerns around Scottish heritage and identity. Both, the article fears, will be significantly harms if the Ministry gets its way.

Joanna E. Taylor
Art History and Cultural Practices, University of Manchester, UK

The Ministry of Transport is going to have some trouble initiating the construction of a new road through Glencoe. This is not because of some sentimental voices that have frequently been expressed in writing, which talk about the scenery that will be ruined but rather because a man of knowledge and reason, Sir John Stirling Maxwell, has put forward rational arguments against it.

Whilst the Ministry seems to want to head into modernity with the road construction the voices against, both sentimental and rational, are conservative and seek to protect the landscape in as original shape as possible for the sake of its beauty, which in my interpretation seems to be a landscape that represent what it means to be Scottish, at least for some.

Katrín Anna Lund
Institute of Life and Environmental Sciences,
University of Iceland, Iceland

The text provides a viewpoint of a (presumably) urban-based intellectual and his peers that the Scottish North, and particularly Rannoch Moor, should be preserved in its current state for the appreciation of people such as the author. Landscape is seen as a scenery to be driven through and taken in with people of 'good taste'. What is interesting is that the historic significance of the landscape is not mentioned, which could also have been presented as a reason against road development. Furthermore, concrete bridges are portrayed as 'blots on the landscape and eyesores', rather than as a necessity to connect settlements. The views of local people who may use the road and bridges not for sightseeing but more pragmatic needs such as transport of people and goods are not mentioned at all.

Flurina Wartmann
University of Aberdeen, UK

The villain in this editorial is a modernising national government, whose 'great motor highways' destroy landscapes by treating rural space as something to traverse as quickly as possible, presumably to get from one important (urban) center to another. According to the author, the proposed road will blanket the current smaller route and 'ruin' a landscape whose use value is precisely 'its scenery and character'. To persuade the reader of his superior view, the author invokes a rationalist discourse of 'common sense', and a romantic discourse that prioritises 'sentiment', 'scenery', and 'beauty'. This is further augmented through the author's intimidating quasi-upper class tone of outrage at the assault of 'good taste' by the 'blots' and 'eyesores' introduced by modernity onto a landscape best suited for romantic leisurely perambulation and aesthetic appreciation. These rhetorical coercions aside, the author correctly points to the fundamental connection between routes and landscapes: the bigger the road the more impacted the surrounding landscape. Eight-lane highways create backbones for sprawl. Thus, road design and building should continue to be 'hotly' debated.

Sarah Luria
Environmental Studies/English Dept., College of the Holy Cross,
Worcester, MA

This article from a Scottish newspaper only has two arguments explicitly against the road, neither strong: damage to good taste and waste of public money. It is not fully anti-road but it does envisage the 'ruination' of scenery and character. The case against the roads construction however barely goes beyond a few charged, and even in 1927 clichéd, terms, e.g., 'blots on the landscape,' 'eyesores', and the road is to be built 'through' Rannoch Moor and Glencoe rather than (less dramatically) 'across and along'.

In contrast, the article's principal criticism of the planned road is that it is an outrage on 'sentiment and good taste' (which are essentially the preserve of a cultivated elite). The 'complete unanimity' which (of course) those terms frame is concretely symbolised by the authority of the 10th Baronet of Pollok, Sir John Stirling Maxwell (1866–1956), the man lauded by the Courier's journalist as the person who knows as much as anyone. A sense of value is only evident in money terms, through the 'common sense' opinion that public spending can be cut by a cheaper improvement of the existing Old Glencoe Road to make it just sufficient 'for the traffic that uses it' (there is little understanding yet that roads create demand).

This is a political narrative, close to the heart of the article, from the first sentence's finger-pointing to London to the closing paragraph's delicate sarcasm of 'A feeling is taking hold that the Ministry is not to be trusted….' and its negative comparison with the Great North Road. Spatially, we are in the periphery of a distrusted Empire, not in the wilderness of Rannoch, and politically we are in a conservative narrative (ironically an editorially critical immediately adjacent column in the newspaper is headed 'What is Socialism?').

Temporally, 1927 places us at two slow turning points. First, is the increasing presence of the motor car (which is visible at the top of the same page of the Courier in the contents box advertising the 'Scottish Motor Show') with growing worries about how to exploit, regulate, facilitate and control it. Second, is the birth of the countryside conservation movement: in 1926 the Association for the Preservation of Rural Scotland (APRS) was founded and in 1931 the National Trust for Scotland (NTS), both co-founded by Sir John Stirling Maxwell.

Graham Fairclough
School of History, Classics and Archaeology,
Newcastle University, UK

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