Translating geoarchaeology into geo-itineraries

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Translating Geoarchaeology into Geo-itineraries

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Abstract

Martin Bell writes that: "Human agents had a significant effect on geomorphic agents – making patterns of movement entrenched in a way influencing future patterns of movement, land-use and the perspective from which perceptions are formed" (Bell 2020: 249). In effect, the creation of tourist trails and geo-educational itineraries can utilise patterns of movement made by historic agents for current and future movement. This paper explores ways in which to translate the important role that geoarchaeology plays in understanding past landscapes into heritage and tourist trails in relation to frontier landscapes in the Middle Ages with reference to 'castlescapes' (Banerjea *et al.* 2021).

UNESCO Global Geoparks and National Parks provide an ideal setting to use geoarchaeology to synergise the presentation of cultural and natural heritage in their past landscapes. This is currently done to some extent with researchers in Italy looking for new ways to link and present the cultural and geoscientific data (Brandolini *et al.* 2019; Giodarno *et al.* 2016). Giodarno *et al.* (2016) examine the 'Franks Trail', a route crossing 60 km the Susa Valley territory that follows the path blazed by Charlemagne in A. D. 773 as he attempted to avoid the Longobardian army, which is located within the 'Cottian Alps Geopark'. They reconsider the 'Franks trail' as a geo-itinerary due to the presence along the path of many interesting sites both from the geological and the cultural point of view, which include abbeys, moraines, quarries, mines, museums and natural protected areas; the geo-itinerary itself is developed to improve tourism and scientific knowledge and in this example showcases the formation of landforms and their fragility at the geosites and cultural sites along its route.

This paper proposes to enhance heritage routeways, such as the 'Franks trail' and hiking trails in castle landscapes (Pluskowski *et al.* 2021), by using geoarchaeological and other environmental data to educate visitors as to not only how castle life and the landscape looked at the time, but also how scientific data are collected and analysed to reach conclusions. The 'castlescape' is an abstract concept, not a physical dimension, and in essence is the cultural landscape associated with the biography of the castle, the boundaries of which can be fluid. The paper explores how these data can be presented effectively in trails through the 'castlescape', drawing on ideas from eno-tourism, where soil profiles are regularly presented (Schneider 2013), the focus on peat in whisky tourism, and visualisations such as augmented reality (Unger & Kvetina 2017).

Introduction

Cultural routes and trails are increasingly commonplace tourism products (MacLeod 2017) and important aspects of tourism in Geoparks, National Parks, the Council of Europe's Cultural Routes programme and regional branding such as *Le Pays Cathare* (or Cathar Country) in France, the Lucchesia 'District of Taste' in Italy, and the Wild Atlantic Way in Ireland (Bedini 2004; Giodarno *et al.* 2016; Hanrahan *et al.* 2017; Pluskowski *et al.* 2021). However, trails are multi-faceted constructs that would benefit from more scholarly attention to their socio-cultural significance for tourism and wider society, and further research on their rationales, development and management (MacLeod 2017). This paper proposes to enhance heritage routeways

by using geoarchaeological and other environmental data not only how daily life and the landscape looked at the time, but also on how scientific data are collected and analysed to reach conclusions, to avoid a 'a static and sanitised version of culture' (MacLeod 2017), which could be the end-product of a linear trail that simply linked cultural points of interest. This paper provides ways to translate the important role that geoarchaeology plays in understanding past landscapes and daily life within and around a fortification into heritage and tourist trails in relation to frontier landscapes in the Middle Ages with reference to 'castlescapes' (Banerjea *et al.* 2021).

Martin Bell writes that: "Human agents had a significant effect on geomorphic agents − making patterns of movement entrenched in a way influencing future patterns of movement, land-use and the perspective from which perceptions are formed" (Bell 2020: 249). In effect, the creation of tourist trails and geo-educational itineraries can utilise patterns of movement made by historic agents for current and future movement. The bodily engagement of movement is central to the way we structure space and understand our identify and place in the world (Bell 2020; Bell and Leary 2020). Landscapes, routeways and tourist trails can be strongly linked to identity and embedded within a range of social, political and cultural aspects of movement along them (Bell and Leary 2020; Bender, Winer 2001; Santos 2002; Hanrahan *et al.* 2017; Holley-Kline and Papzian 2020; MacLeod 2017), and 'castlescapes' can be equally evocative and contested, and conflicts of the Middle Ages can still resonate in present day politics and recent conflicts (Banerjea *et al.* 2021; Harrison 2013; Link 2015; Pluskowski 2012; Vandekerckhove 2020, xi). Equally, tourist trails can be experienced simply for the pleasure of walking and engagement with the contemporary landscape (Mentzel 2017).

On-site and off-site geoarchaeological heritage and nature-culture entanglements
Nature-culture entanglements concerning land-use history, cultural history, human experience, political territory, and current environmental issues (Bartolini 2020; Butzer 2008; Katić *et al.* 2017) can be integrated and translated into geo-educational itineraries for visitors within the 'castlescape' and, where feasible, heritage trails could retrace routeways of the past. Geoarchaeological and palaeoenvironmental research add colour not only to stories about contested pasts within the soil history (Banerjea *et al.* 2021), but also to other aspects of cultural identity such as food and wine tourism (Metro-Roland and Soica 2019), where soils play a fundamental role in past, present and future production (eg. Bevan and Connolly 2011; Brown *et al.* 2021; Goodman-Elgar 2008; Lal 2009; Lang and Stump 2017; Stanchi 2012; Stump 2010; Turner *et al.* 2021). Mentzel (2017) reports that that the hikers or tourists resist the dominant heritage agenda inscribed in the tourist guides of the Cathar trail, favouring scenic views of the contemporary landscape over immersion in the medieval history of castles of the Cathar Country, with hikers articulating ideas reflecting their experience of natural (vegetation and climate) rather than built heritage that they did not have time to visit. Arguably, GPS-activated digital presentation of geoarchaeological data can add chronological depth their experience of natural heritage to what was "contemporary chronological time, where the passing of time was carefully measured and the distance to be covered during this time was charted by their maps" (Menzel 2017: 113-114), and synergise it with built heritage.

During the COVID-19 pandemic, in 2020 and 2021, an increase in walking and recreational use of outdoor spaces has stimulated discussion on sustainable environmental recovery post-pandemic and the mental and physical health benefits of walking. For example, the "Walk 1000 Miles in 2021" (Country Walking Magazine 2021) is supported by organisations such as Ordnance Survey and Forestry England. This challenge in particular

promotes a range of different types of walking activities to meet the 1000 mile target. Activities such as geo-educational itineraries around heritage sites could be integrated into such future endeavours. Despite this current surge in interest, the cultural and value of walking is well established (as outlined in Bell 2020); however, it is timely for reinvigorating heritage landscapes in national parks, geoparks and trails to provide a more holistic understanding of archaeological sites in their landscapes, not only bringing to life how the landscape looked at the time and, in this case study, castle life, but also integrating the scientific process into visuals and information to demonstrate how conclusions were reached.

The timeliness of this paper is enhanced further by the support for an 'International Geodiversity Day', the proposal for which will be submitted to the 41st session of the UNESCO General Conference that will held in November 2021.This day marks a celebration of all aspects of geodiversity (the earth's minerals, rocks, fossils, soils, sediments, landforms, topography, geological and morphogenetic processes, and hydrological features such as rivers and lakes) and coordinate educational, awareness raising, and public and policy engagement activities (Brilha *et al.* 2021). Hiking trails that showcase the geoheritage are common-place features in UNESCO Global geoparks and National Parks with considerable thought put into the production of information for visitors to meet the UNESCO requirements for education, geoconservation and local development (Carcavilla 2007). The objectives of the administrative protection of a UNESCO Global Geoparks further seeks to provides a wider context in the ethnographies of particular heritage and/or tourism sites, or for particular countries' or regions' tourism development endeavours linking both natural and cultural values (Di Giovine 2009). In the province of Guadalajara, Spain, where the Molina and Alto-Tajo UNESCO Global Geopark is located, García-Quintana *et al.* (2004) stated that greater attention has been paid to the biological and human history than to the geological history, with the social and historical development of a territory reflected in the quantity and range of its anthropogenic elements (Roman roads, bridges and medieval castles, railroads and highways, airports, etc.). Following the designation of the Molina and Alto-Tajo UNESCO Global Geopark in 2015, the geological history of the is now disseminated (Saiz *et al.* 2015). However, the cultural and geoheritage within the Geopark still require further integration in a landscape archaeological context (Banerjea *et al.* 2021).

Research in Italy has taken important steps to integrate cultural heritage, geoscience, and landscape archaeology in tourist trails (Giordano *et al.* 2016; Brandolini *et al.* 2019); the geomorphological focus to the interpretation of heritage sites provides foundations that can be built on to integrate on-site with off-site geoarchaeological data for translation into the visitor experience (Banerjea *et al.* 2021).

Science communication in public archaeology
In 2009, Karl Butzer reflected on 35 years of the *Journal of Archaeological Science* as an explicitly interdisciplinary medium, linking archaeology with the natural sciences, and one that emphasizes methodological innovation (Butzer 2009). He notes that during this period the journal steadily grew from 400 to 3200 print pages per annum, and from a small to a large, double-column format and the impact factor increased until it became the leading archaeological journal overall. This growth in archaeological science research is not only represented in the expansion of *Journal of Archaeological Science* and the addition of *Journal of Archaeological Science: reports* in 2015, but also sees this research published in other journals such as *Archaeological and Anthropological Sciences*, *Archaeometry, Environmental archaeology, Geoarchaeology, Heritage Science*, *Open Quaternary* and *Quaternary International.* Despite this vast and growing body of

archaeological science research, the translation of the collection and range of scientific data from archaeological sites, the preparation processes of samples, and the explanation of results in general remains superficially explained to visitors to a heritage site or museum, if at all.

A study by Copley (2010), targeted 100 randomly selected curators of archaeology in museums in the UK (or other professionals in smaller museums) with a short questionnaire (62 returned) which posed eight questions to understand the respondents' backgrounds and attitudes to science in a museum setting, the current coverage of science in their museum, what they would like from future coverage, and any further comments. The study hypothesised that the majority of curators of archaeology exhibits do not possess scientific backgrounds and this was shown to be true; however, it was noted that many current archaeology degrees do have scientific components. Despite this, the respondents did not think that "science" or "scientific enquiry" was difficult to understand. On presenting science in archaeology museums, they considered that the translation of science into accessible language is important and that it would be useful to have guidelines to integrate science into archaeology displays. It is of note that "geoarchaeology" did not feature in the comprehensive list of sixteen scientific topics (Copley 2010: 391) that were put to the respondents to describe how they were put incorporated into museum displays. The topic "stratigraphy and the excavation process" was reported to be the joint top topic most likely to be currently incorporated into archaeology museum displays, which could provide geoarchaeologists with a foundation to build on to include more of their research in exhibitions. "Palaeoecology" was also absent from the list of topics, but it can be assumed that techniques such as palynology were considered part of "archaeobotany", which is included, but would exclude entomology and molluscan analysis. Despite these omissions on the questionnaire, the respondents reported that "environmental reconstructions" are the most likely to be granted space with a dedicated panel (Copley 2010: 392), which can certainly be argued for the exhibition in the Ceide Fields Interpretative Centre, County Mayo, Ireland, a heritage centre situated on the "Wild Atlantic Way" tourist trail.

Currently, there is an anecdotally perceived trend of presentation of archaeological scientific results and its dissemination being focussed on research relating to human and faunal remains and material culture, which are arguably the most captivating sources of scientific evident (Conforti *et al.* 2013); however, this requires further Europe-wide, semi-quantitative research developing on that conducted by Copley (2010), who's research is now eleven years old. Copley's study reports that the respondents (comprising curators of archaeology), after wanting to include more information on dating techniques other than radiocarbon dating in their displays, 55% of respondents wanted to include more human osteology and palaeopathology (Copley 2010), which might be a contributing factor to this anecdotal observation. A study in the UK by Dawson (2018) found that participation in science communication and museums operated as a form of "cultural capital" (Bourdieu 1984) for dominant groups in society, and these were seen as Eurocentric; however, engagement with science from marginalised social groups is more likely to be though digital media rather than a museum visit (Dawson 2018). Some respondents to Copley's questionnaire replied to say that they thought that archaeological science too complex to permanent exhibitions and therefore, it was more suited to temporary exhibitions and supporting web-based material to enhance visitor experience (Copley 2010). Museums may not be best suited for learning complex scientific facts and details (Copley 2010: 385) and citizen science projects (eg. Brown *et al.* 2004; Milek 2018)

and experimental archaeology centres (Bell 2009) maybe more effective for engaging non-specialists with scientific research practices and processes, particularly now with the increased range of portable instruments available to geoarchaeological practice (Milek 2018).

Presenting the 'Castlescape' (2250 words max)

A recent special issue in the journal *Landscapes* entitled "Forgotten Castle Landscapes: Connecting Monuments and Landscapes through Heritage and Research" (Pluskowski *et al.* 2021), building on the observation by Hingham (2010) and others that castles are prime resources for the heritage and tourism sectors with how they are preserved and presented to the public at the heart of this issue, the special issue focussed on the lack of connection between castles, landscapes and heritage and how these aspects can be more comprehensively presented and understood. Collectively, the papers in the special issue present many case studies for integrating palaeoenvironmental data with survey and museum engagement to bring castle landscapes to life for a wider audience. These range from embedded, active museum engagement with a range of research strands (Runge 2021), to castles at risk from climate change (Kerr 2021), to the challenges of presenting castle landscapes to the public (Bizri *et al*. 2021), to the challenges of conducting landscape research on urban fortifications (Borderie *et al*. 2021), and the application of geoarchaeology to synergise and illuminate diachronic biographies of on-site and off-site activities associated with castles and cultural and natural heritage (Banerjea *et al.* 2021).

Ways to interpret and present geoarchaeology to visitors to heritage sites are explored here in relation to castles and their landscapes, "castlescapes". Geoarchaeology in its essence is cross-disciplinary. Soils and sediments are the backbone of the archaeological record (Goldberg 2008) and their analysis is pivotal in providing a micro-contextual and micro-stratigraphic understanding for the interpretation of a range of other proxies such as archaeobotanical remains (Banerjea, Barnett *et al.* 2020), the depositional and post-depositional processes that form and alter the archaeological record (eg. Banerjea *et al.* 2015; Banerjea, Morandi *et al.* 2020), in underpinning palaeoecological studies of landuse around archaeological sites (eg. Brown *et al.* 2015; Brown *et al.* 2020; French 2003), and in understanding site geomorphology (eg. Marini *et al.* 2019) and resource exploitation (eg. Hayward 2019). In effect, geoarchaeology links and provides cohesion for all these aspects of the "castlescape", linking the activities taking place at the monument, illuminated through the buried archaeology, and its construction materials, with agricultural activities, vegetation change, and the sourcing of materials (Banerjea *et al.* 2021).

Banerjea *et al.* (2021) argue that the "castlescape" of Molina de Aragón, Spain, situated within the Molina and Alto Tajo UNESCO Global Geopark, provides an ideal administrative and educational setting to create models for "geo-educational itineraries" (Brandolini *et al.* 2019), which can be borrowed by castle museums and visitor centres outside of a Geopark context. Brandolini *et al.* (2019) propose four "geo-educational itineraries" for the Central Po Plain, Italy, (Protohistory, Roman, Medieval and Post-Medieval) that link archaeo-historical sites, human-induced landscape transformation, and the main environmental, historical phases of the study area with geomorphosites to promote future geotourism projects of the area; the trails can be travelled on foot, by bike or car. This concept is explored in relation to the diachronic biography of the "castlescape" of Molina de Aragón, with the intention of focussing on how geoarchaeologial data are integrated into the visitor experience, from

using it, in conjunction with GIS to identify ancient routesystems that can form part of the narrative and trail, to the integral role that museums and digital technology play.

Wilkinson *et al.* (2010) use three scales of analysis in the region of Tell Brak in northern Syria to identify hollow ways and date them with a ceramic typological chronology. They identify macroscopic features in the landscape using satellite imagery, then conduct a normal field investigation, and soil micromorphology, coupled with the ceramic chronology, is used to reconstruct the abrasion and infilling processes of the hollow way, its wetting and drying cycles and surface and basal palaeosols. The focus of their study was on the early Bronze Age features and hollow ways around Tell Brak; however, a second set of narrower tracks were identified using satellite imagery appear closely associated with a 14-ha settlement of the early Islamic period (*ca.* A.D. 700–900) that grew around an earlier Castellum at the north-eastern corner of the site. The dating of such trackways poses similar dating challenges to those of agricultural features such as constructed terraces and lynchets, which require multi-method solutions to establish their chronology (Bell *et al.* 2020; Brown *et al.* 2021; Turner *et al.* 2021; Vervust *et al.* 2020). Identifying and using ancient trackways in the landscape, where feasible, can embed visitors within the historic landscape and act as a conduit to show how it has been transformed. However, this is not without issue as tensions can arise between "new" versus "old" paths (Bartolini *et al.* 2020) and the framing or imposition of signage (DeSilvey *et al.* 2020).

The importance of the connecting museums with heritage trails and wider archaeological landscapes cannot be under-estimated and particularly their role in fostering a digital narrative for which the widespread use of the internet has created new opportunities (Swensen and Nomeikaite 2019; Runge 2021). Three aspects of Copley's study (2010) are relevant here: 1. The comment that archaeological science is too complex to permanent exhibitions and therefore, it is more suited to temporary exhibitions and supporting web-based material to enhance visitor experience; 2. That "environmental reconstructions" are the most likely to be granted museum space with a dedicated panel; and 3. That "stratigraphy and the excavation process" was reported to be the joint top topic most likely to be currently incorporated into archaeology museum displays. New opportunities in digital media enable these issues to be capitalised on and used to present and interpret geoarchaeological research in a way that departs from applying digital technologies simply as a supplement to existing practices, on to more integrative approaches of communication, interaction and exchange that exceed the physical boundaries of a museum (Swensen and Nomeikaite 2019).

Lodwick (2019) discusses digital archaeobotany which has, so far, focused on static websites and databases, with a growing number of blogs, and highlights the role of archaeobotanical data in creating visualisations reconstructing daily life on a settlement. The Stonehenge website also uses palaeoenvironmental data in this way to show reconstructions of landscape with two lines mentioning that pollen, charcoal and molluscan evidence was used for this (English Heritage 2021a); the information about activities that took place is more comprehensive in showing how different scientific analyses can inform (English Heritage 2021b). The Stonehenge website contains interactive, clickable figures, whereby a smaller box shows additional information and further windows of detail. Reconstructions play an important and popular role in this mental journey from

artefact to historical image, but they can reduce visitors or viewers to passive consumers rather than interactive participants (Colomer 2002).

A map of the "castlescape" can be hosted on a museum website, whereby these additional windows of detail can be used not only to present information about the castle life and its landscape (in a way that the Stonehenge website is used), but also to show scientific process such as sampling in action during the excavation process, laboratory preparations, and photomicrographs of interesting features to contribute to the "public understanding of research" (see Copley 2010 for discussion of this issue). This information about scientific process can also be integrated into heritage trails around the "castlescape", which at Molina de Aragón not only includes the castle and nearby towers and mill, but also associated agricultural terraces and irrigation systems. In November 2018, UNESCO added the dry-stone walling associated with terraces in Croatia, Spain and Greece to its list of Intangible Cultural Heritage (Turner *et al*. 2021), which provides an opportunity, particularly in a geopark context to showcase soil profiles and associated scientific analyses associated with these features (Figures 1 and 2). Ways in which to present soil profiles can be sought from wine tourism, where soils play an important role in wine production and are regularly showcased (Schneider 2013), similarly the importance of peat in Whiskey production and tourism, and Conway (2010) shows a model for a soil trail through the landscape to highlight its role in geodiversity.

Insert Figure 1

Insert Figure 2

The available range of digital media is growing. On a journey through the "castlescape" QR codes on information boards have multiple opportunities for visitors to find out further information such as from visualisations such as augmented reality and 3D visualisations (Unger & Kvetina 2017). Visualisations showing past landscapes, particularly while walking in the landscape, can be used as a way of showing visitors adapting and coping strategies to challenges brought by climate and the scale of change through processes such as urbanisation. Within the monument itself, digital media presented through QR codes or GPS activation can bring to life "blank canvasses", which are areas with no standing remains, but that have buried archaeology. Photogrammetry models that show sample collection in action (eg. Aspöck and Banerjea 2016) make a valuable contribution to presenting the scientific research process, which can then be followed by short explanations of results and photomicrographs such as those on analysis of sediments from Cártama, Malaga, Spain, that were keenly shared on social media by the local excavator and association of friends of the museum (Figure 3). These elements of the scientific process can not only be accessed through QR codes on information boards, but also though apps for a heritage site such as that which is being developed for the "Landscapes of (Re)Conquest" project for use at Molina de Aragón (Halfman 2021).

Insert figure 3

Conclusion

Martin's pioneering research on routeways of the past provided a perspective through which to develop ideas about communicating geoarchaeological data through heritage trails. It allows us to consider how the creation of tourist trails and geo-educational itineraries can utilise patterns of movement made by historic agents for current

and future movement, and how landscapes, routeways and tourist trails can be strongly linked to identity and embedded within a range of social, political and cultural aspects of movement along them, which is particularly relevant for some European castle landscapes. Nature-culture entanglements concerning land-use history, cultural history, human experience, political territory, and current environmental issues can be integrated and translated into geo-educational itineraries for visitors within the 'castlescape', not only to highlight the cultural aspects of the heritage site, but also as a way of showing visitors adapting and coping strategies to challenges brought by climate and the scale of change through processes such as urbanisation. Advances in digital technologies enable researchers to collaborate with museums to provide layers of detail to their research and results that can be accessed by visitors in a future-proof way with museums playing a pivotal role in hosting the narrative.

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