EVAPORATING LEGACIES: INDUSTRIAL HERITAGE AND SALT IN CHESHIRE, UK

JONATHAN G.A. LAGEARD & IAN B. DREW

This paper examines the nature and legacies of the salt industry in Cheshire and recommends action to avoid losing an understanding of its fragmentary heritage. Brine and rock salt occurring in the natural environment has led to significant industrial development in Cheshire over the last two millennia. Technologies for salt exploitation have varied in scale and in location, and their ephemeral nature has often left few traces in the landscape. This industrial legacy contrasts with extractive industries such as coal which leave more tangible aftermaths — infrastructure and communities. Cheshire salt legacies include the unplanned consequences of subsidence, but also informal opportunities, for instance in nature conservation and recreation. Salt industry heritage in Cheshire is the central justification for the new Weaver Valley Regional Park which seeks to promote future social and economic well-being, but the salt legacies which delimit its area deserve sufficient recognition and wider communication.

KEYWORDS: *salt, mining, heritage, landscape, legacy, Cheshire*

INTRODUCTION

Cheshire has a long association with salt. This valuable raw material occurs as rock salt (Halite) in Triassic strata between 05–03m below the Cheshire Plain, but may also appear on the surface as brine springs. There is archaeological evidence for salt exploitation dating back over two millennia and the evolution of salt extraction technologies over time has left a rich industrial and environmental heritage, which today often remains hidden from view. The Cheshire salt industry is still economically important into the 21st century, overcoming technological shortcomings that have previously resulted in significant and uncontrolled alteration of the natural landscape. The salt industry therefore differs from other traditional mining industries such as coal, failing to conform easily to standard academic analyses that chart industrial decline, abandonment and then the potential panacea of heritage-based tourism. This uniqueness presents a series of challenges for those involved in utilising salt industry heritage as the lynch pin for regional planning/regeneration initiatives.

MINING HERITAGE VALUES

The growth of academic interest in industrial archaeology has been a relatively recent phenomenon and has paralleled late 20th-century decline of traditional industries associated with the Industrial Revolution. Coal in the UK typifies this decline, a large industry employing many thousands and of significance to whole communities and regions. Its failure to produce competitively on an increasingly global market led to a bitter struggle between workers, management and national government in the 1980s and 1990s, ultimately leading to widespread pit closures, social and economic hardship. This process does not immediately encourage a desire to conserve and appreciate industrial heritage, and indeed the opposite is often the case as moves are rapidly made to remove all traces of the past, a return to 'naturalness'.[1] In the post-abandonment phase people involved in the industry and the public at large have a period in which to come to terms with a troubled past, a 'period of acceptance and forgetfulness'.[2]

Since the 1980s there has been a growing appreciation of mining landscapes in terms of their beauty, as well as their historical and cultural significance, leading to a proliferation of museums celebrating industrial heritage. This rightly has provoked debates concerning the authenticity of the heritage that is conserved and its social and community legacy. Mining landscapes in the UK, in the cases of coal in south Wales and metal mining in Cornwall and Devon, now receive international recognition through UNESCO World Heritage status, with the aspiration of social and economic regeneration on the back of this shared identity.

Cheshire also has a long mining history, which has created a diverse heritage. Alderley Edge, a sandstone escarpment 19km to the south of Manchester, has been a focus for lead, cobalt, silver and iron mining, but is most famous for its copper. Between AD 1855 and 1878 it was one of the richest mines in Britain, and the discovery of primitive tools in the 1970s, supported by radiocarbon dating, places earlier mining in the Bronze Age *c.*1800 years BC.[3] Copper is no longer

mined in the county, but there is present-day extraction of glacial sands and gravels from a series of quarries such as the one at Chelford. These quarries have not yet been associated with significant mining heritage, but they are currently important in terms of educational visits and academic research (Chelford is notable in Quaternary studies as an inter-stadial 'type site') and in their post-mining amenity value.[4] This paper, however, concentrates on Cheshire's primary mineral resource, salt, and its extraction.

Salt Production and Heritage

The earliest archaeological evidence of salt exploitation dates from the Iron Age (500 BC–AD 50) and recent discoveries from the Roman period (1st–2nd centuries AD) have demonstrated increased technological sophistication in brine extraction.[5] An extensive Roman industrial site, Kingsley Fields, was found close to the present-day town centre of Nantwich in the south of the county whilst land was being prepared for a modern housing development in 2002. Archaeological excavations revealed evidence for leather and metal working, but also for salt production (Figure 1).[6] Two rectangular tanks surrounded by orange clay, lined with oak trunks and planks were uncovered and have been identified as reservoirs for brine (Figure 2). Following their abandonment the tanks had been used as rubbish pits and were filled with Roman waste, including glass, pottery, bones, mill stones, leather, a wooden spade and cooking utensils. A housing estate has now been built on Kingsley Fields and sadly not even present-day street names provide any tangible evidence for previous Roman salt production (Figure 3).

Brine stored in tanks such as the one illustrated in Figure 1 was transferred to lead salt pans such as those found at Shavington.[7] The dimensions of these Roman salt pans were variable, but a well preserved specimen found at Henhull (near Nantwich) measured 100 × 100 × 13cm, whilst the scraps of lead pan were discovered at Kingsley Fields during the excavations in 2002.[8] Fires set underneath these caused evaporation and the precipitation of salt crystals. Over 20 lead salt pans of Roman and medieval age have been discovered in Cheshire, the highest concentration by far in north-west Europe.[9]

Archaeological evidence for Roman salt production has also been discovered at Middlewich in the centre of the county. A saltworks found adjacent to the Roman fort suggests that salt production was under military control and a particularly significant industry between AD 150 and AD 250.[10] Middlewich is thought to have had the Roman place name Salinae (meaning saltworks), and the payment of salaries for work today references the payment made to Roman soldiers for the purchase of salt (rather than payment in the commodity itself, as is commonly believed). As at Nantwich, the transitory and relatively ephemeral nature of former salt-working sites has left little tangible evidence on the surface, but efforts have been made to rectify this deficiency with the development of the Roman Middlewich Trail funded by the Heritage Lottery Fund, which relates present-day sites to archaeological information through display boards at key locations, with an exhibition including artefacts in the local library. By the Middle Ages, salt was a major industry in Cheshire assuming national importance. In AD 1664 Nantwich had the second highest population in the county, behind Chester, the county's administrative centre since Roman times, reflecting Nantwich's position as the largest salt-producing town at that time.[11]

Today Nantwich has a small museum, once the town jail, which caters for general local history (Figure 4). As well as housing a Roman salt pan, the museum also contains part of a 'Salt Ship' which was excavated in 2003.[12] Salt ships, rather than being boats, are large hollowed-out tree trunks used to store brine before it was heated in either lead or iron shallow pans to produce salt crystals. Several such salt ships have now been discovered in Nantwich close to the River Weaver in former medieval 'wich' houses (dwellings in which salt making took place). The original Salt Ship was 7.5m long and 1.5t dry weight, too large for the limited space available in the museum, prompting the decision to display only about one-third of the conserved artefact. By the 19th century the towns of Middlewich, Winsford and particularly Northwich (see Figure 3) outstripped Nantwich's early dominance, benefiting from developments in pumping technologies, and also the burgeoning chemical industry.

In the Northwich area the salt industry was based on highly productive rock salt mines (first discovered in 1670 at Marbury, to the north of Northwich), as well as on brine-pumping activities. In 1889 Cheshire's first museum dedicated to salt opened in Northwich (see Table 1) by John Tomlinson Brunner (1842–1919) a salt proprietor, industrialist and also local Member of Parliament between 1885 and 1910. The first Salt Museum was purpose-built in Northwich, combining a museum and a library, and was based on the salt samples and research of Thomas Ward. The original building itself ironically succumbed to salt-related subsidence in 1907, to be replaced by a new building in 1909; this building remains to this day the town library, but in 1981 the Salt Museum moved out to the former Northwich Union Workhouse on London Road, Leftwich. In 2010 this site became the Weaver Hall Museum and Workhouse, with the expectation that the salt exhibits were to be moved to a new home at the Lion Saltworks to the north-east of the town (Figure 5).

Above-ground mining (and salt-processing) structures built in the 19th century were practical, but not necessarily built for permanence, particularly in land subsequently made unstable often by their own

FIG. 1. Outline and internal structure of a Roman brine tank discovered at Kingsley Fields, Nantwich in 2002 and excavated by the University of Manchester Archaeology Unit. Also shown are a wooden spade and a cooking pot both discarded in the tank when it fell into disuse.

FIG. 2. Roman brine tank number one after full excavation at the Kingsley Fields Roman salt making site in 2002. Image courtesy of Dr Michael Nevell, University of Salford.

FIG. 3. Kingsley Fields in May 2011: a new housing development with street names unconnected to Roman salt-making heritage.

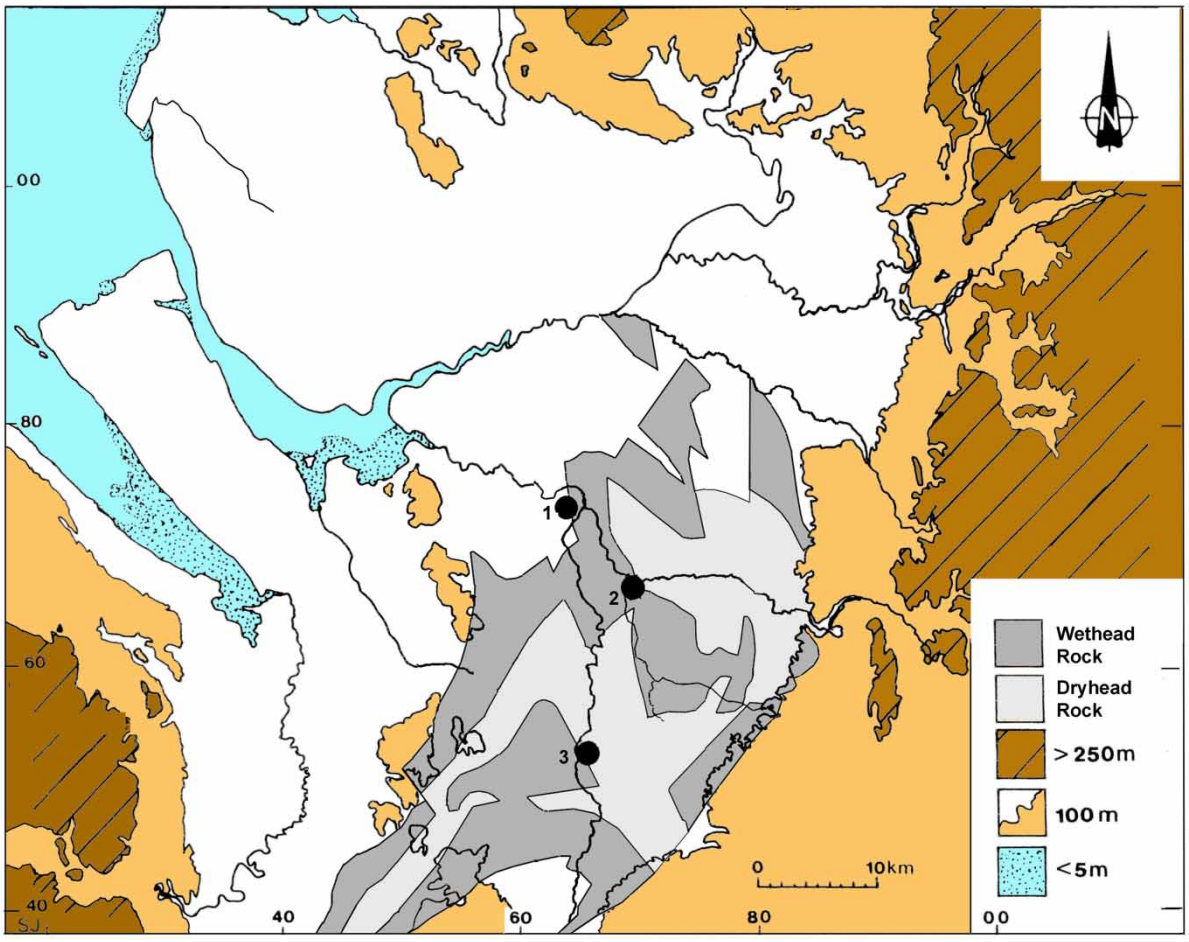

FIG. 4. The location of the 'wet rock head' area in Cheshire. This is the zone where surface-derived groundwater is in contact with the salt beds, thereby creating brine. This is thus the area where natural brine springs occur. Key: 1 = Northwich; 2 = Middlewich; 3 = Nantwich. Map courtesy of Dr Michael Nevell, University of Salford.

TABLE 1

Triassic:	220 million years ago salt deposits created in a dessert environment
Prehistoric:	Brine springs, Northwich
Romans:	Condate settlement (Northwich) 1st century AD: salt pans and brine kilns
13th century:	100 wich houses in Middlewich and 8 in Nantwich
1670:	Rock salt discovered at Marbury
1682:	First salt mine sunk in Cheshire
1732:	Weaver Valley Navigation completed
1777:	Trent & Mersey Canal opened
19th century:	Brine pumping and open pan production
1830s:	Salt production centre moves to Winsford due to subsidence in Northwich
1844:	Winsford Rock Salt Mine opened (still operational)
1852:	Sandbach & Wheelock branchline (Salt Line) opened
1873:	Neumann's Flash subsidence (the Great Subsidence)
1875:	Anderton Boat Lift opened
1880:	Northwich Great Subsidence (including Ashton Flash)
1889:	Salt Museum & John Brunner Library opened (Northwich)
1891:	Brine Pumping (Compensation for Subsidence) Act
1894:	Lion Salt Works Northwich opens
1905:	Vacuum salt production method developed
1930s:	Controlled brine pumping begins
1952:	Northwich flashes filled with chemical industry lime waste
1963:	Sandbach Flashes designated SSSI (Site of Special Scientific Interest)
1970:	Sandbach Salt Line closed
1983:	Anderton Boat Lift closed
1986:	Lion Salt Works Northwich closes
1993:	Lion Salt Works Trust established
2001:	Ashton & Neuman's Flashes nature park
2002:	Anderton Boat Lift re-opened
2003:	Salt Line re-launched as walking route
2010:	Winsford salt mine used to store archives
2015:	Lion Salt Works visitor attraction opens

brine-extracting activities. The Lion Salt Works 2.5km to the north-east of Northwich was opened in 1894 by the Thompson family who had been involved in salt production since 1842 in the Northwich area. It used a large iron pan for brine evaporation and continued in operation until 1986, long after the introduction of more efficient salt-producing technologies (the vacuum evaporation technique was introduced in Cheshire in the early part of the 20th century).[13] The site was purchased by Vale Royal District Council to prevent demolition and it gained Grade II Listed Building and Scheduled Ancient Monument status. One of the buildings, the former Red Lion Inn, became the offices and a small visitor centre for the Lion Salt Works Trust (established in 1993).

Land instability at the Lion Salt Works threatened the future of the site and several of the buildings were in danger of collapse. In an attempt to save the site as a rare example of salt industry heritage, it was nominated in the 2004 BBC TV series *Restoration* as one of three candidates for renovation in the north of England. During the broadcasts 21 UK sites in immediate need of remedial works competed for funding in a public vote. Although the Lion Salt Works was unsuccessful, this endeavour reinforced the link between the salt industry and Cheshire for a local, as well as national audience.

Subsequently, funding was obtained from the Department for the Environment Food and Rural Affairs, English Heritage, Cheshire Rural Recovery and the North West Regional Development Agency, which permitted survey work to be undertaken at the site and a conservation plan formulated. The site is currently being restored with further funding from the Heritage Lottery Fund (awards in 2006 and 2008), Vale Royal District Council (now a part of the Cheshire West and Chester local authority — following another round of local government re-organisation in 2009)

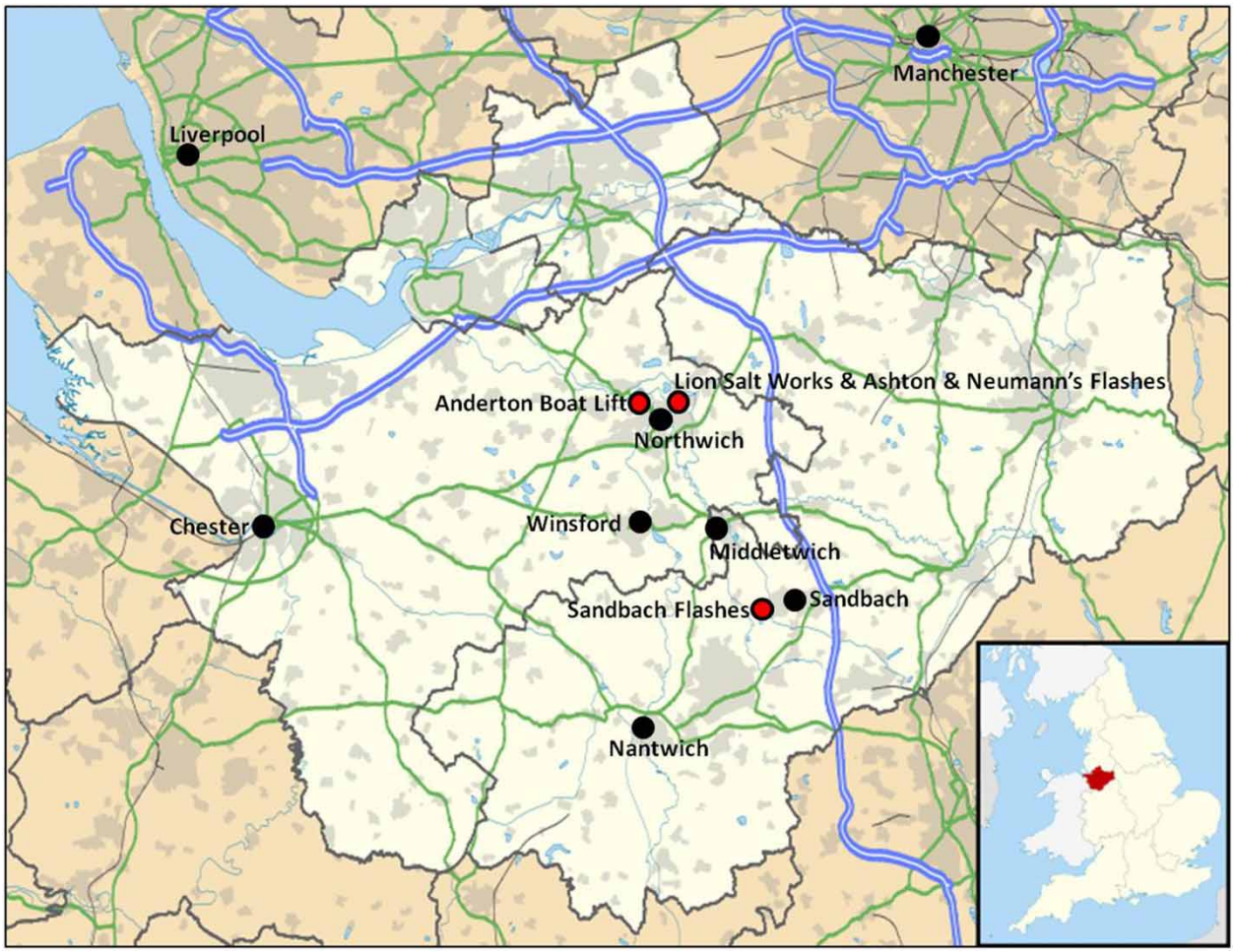

FIG. 5. Key locations relating to the salt industry in Cheshire mentioned in text.

and other sponsors and will re-open as an educational visitor attraction, also housing the artefacts from the previous Northwich Salt Museum in 2015.[14] It is also highly likely that the re-opened Lion Salt Works will feature in the route of the ECOSAL UK network of sites, which are intended to promote salt making and its cultural associations in the UK for research, education, interpretation, tourism and international cooperation.[15] The international flavour of salt heritage celebration is reflected well by the European ECOSAL Atlantis initiative which is involved in recording and promoting the heritage of salt production around the Atlantic Coasts of the UK, France, Spain and Portugal.[16]

In another conservation/heritage initiative Heritage Works in association with the local town council and English Heritage have undertaken a conservation management plan for the scheduled ancient monument site of Murgatroyd's No. 1 Brine Pump, Middlewich, in order to identify opportunities for varying levels of development as an educational resource and visitor attraction.[17] This site of salt production from 1890 to 1968 was largely demolished in 1968, but still includes the only surviving timber-lined brine extraction shaft, as well as pump houses including a header tank and brick base, pumps, transformer, and part of the transfer pipes. Unfortunately the very poor/derelict condition of this site would require large-scale funding in order to achieve restoration and conservation.

In the Elton area, to the west of Sandbach (Figure 5), salt strata occur between 12 and 55m depth. Here groundwater dissolves the rock salt, creating natural brine which was formerly pumped directly to the surface through a series boreholes, as in other salt-mining districts of Cheshire.[18] This method is referred to as 'wild' or 'uncontrolled' brine pumping and had significant landscape consequences, see the landscape legacies section below. Between 1919 and 1923 three large saltworks were built in this area using open pan and vacuum production techniques. In the 1960s and 1970s these individual companies were taken over by the larger British Salt, and their works were demolished. Brine continued to be pumped from the area and was piped to the British Salt works at Cledford, 5.5km to the north. Pumping from Elton ceased in 1977.

Today 'controlled pumping' from underground cavities of pre-determined size occurs in areas at Warmingham to the north of Sandbach and at Holford to the north-east of Northwich. Once the

brine has been exhausted, the cavity is filled with saturated brine and waste material, and to date none of the problems related to older brine pumping techniques have been encountered.[19] Other potential uses include the previously proposed sale by British Salt of cavities for the storage of natural gas at Warmingham and the similar INEOS/GDF Stublach project at Holford.

The Winsford Rock Salt Mine, formerly the Meadowbank Mine, remains in production as the only surviving dedicated rock salt mine on the UK mainland and its crushed rock salt product is distributed to gritting depots throughout the UK to combat snow and ice on the road network in winter. Originally the mine was owned by the Salt Union cooperative; it was then taken over by ICI, and when it transferred to American ownership in 1992 it became Salt Union and most recently Compass Minerals UK. Compass Minerals UK have provided information and exhibits to the Salt Museum in Northwich and still accommodate specialist academic visits. Currently their online resources explain production methods and celebrate salt industry heritage.[20]

The industrial heritage of the salt towns of Cheshire is also recognised by present-day chemical companies using Cheshire salt as a raw material such as Tata Europe.[21] Tata Europe traces its history back through ICI and Brunner Mond, and it staged an exhibition with an accompanying historical brochure entitled 'River Weaver at the Heart of Manufacturing' to accompany the celebration of the Weaver Festival in 2012. The publication reflected on the importance of the river as a resource and a transport link for the soda ash and sodium bicarbonate industry, which grew as a result of the local salt industry.

It is evident from this section that the salt industry has, and continues to play, a significant role in shaping both the economy and landscape of Cheshire. Given this importance, both local and national funding has been directed to a key industrial heritage project the Lion Salt Works and its new heritage centre format.

Landscape Legacy

The landscape legacy of salt in Cheshire can be divided into two broad categories based on: i) direct results of mining dereliction/abandonment and ii) on adaptive uses of salt/salt infrastructure.

i) direct results of dereliction

One of the legacies of salt mining is subsidence, and this has been encountered at all inland locations in the UK that exploited salt on a large scale. Most dramatic events have occurred in the Northwich area, where salt strata were mined at depth with pillars of salt left at intervals to support the roof.[22] In the 19th century pillars were, with hindsight, too small, which led to collapses of interlinked rock salt mines, particularly in the 1880s, with significant and sudden alteration of above ground topography (see Figure 6). Today Northwich town centre is remarkable as none of its buildings exceed two storeys in height due to the legacies of past and present land instability.

The Elton area mentioned previously is also known as the Sandbach Flashes. 'Flashes' are subsidence-related lakes which have developed and enlarged, particularly since the 1950s. These, together with other subsidence-related geomorphological features such as erosion scars and depressions, can have a significant effect on landscape. This is exemplified by a field-based practical exercise undertaken by geography and environmental students based at Manchester Metropolitan University. A map of the Elton area from the 1950s is compared to one from the 1990s to demonstrate geomorphological change caused by uncontrolled brine pumping (see Figure 7).

Tree-rings can also document environmental changes caused by brine pumping. Trees at Elton were initially the focus of an undergraduate dissertation which hoped to establish a connection between tree growth and the impacts on local hydrology resulting from brine extraction. Initial results confirmed the possibility of such a link, leading to later in-depth research published in the journal *Geomorphology*.[23] The concentration of boreholes at Elton caused artificial drought conditions and trees with insufficient water grew very poorly, only recovering after the pumping ended in 1977 and water levels rose.

The Brine Pumping (Compensation for Subsidence) Act was passed in 1891 by the UK national parliament in Westminster (London) to compensate those most seriously affected by the effects of brine-related subsidence, and the work of the Brine Compensation Board, which the Act instigated, continues to the present day. The problems caused by the rock salt mines under Northwich have been so severe that funding has been sought from additional sources, requiring £32 million funding to stabilise these abandoned rock salt mines.[24]

Other landscape legacies are related to enhanced biodiversity and geodiversity. Saline surface waters are rare due to the geological separation of salt strata and the surface by other Triassic rocks and later glacial deposits. They do, however, occur in areas such as the Sandbach Flashes where uncontrolled brine pumping was located between 1920s and the late 1970s. In these areas agriculture is now problematic due to soil and water contamination from industrial waste and flooding. Areas thus marginalised have become by default important wildlife refuges, contrasting with wastelands created by other types of mining (discussed later). Due to the unusual characteristics of Cheshire's salt-related landscape legacy it has attracted unusual flora and fauna which have been the subject of academic research that has documented enhanced biodiversity.[25] Examples of rare species found in brackish waters and on saline soil in Cheshire include: the Water

FIG. 6. The impact of salt-related subsidence on buildings and infrastructure in Northwich.
Images © Northwich Salt Museum

Boatman *Sigara stagnalis*; brackish water shrimp *Gammarus duebeni*; Lesser Sea Spurrey, *Spergularia marina*.

Cheshire has over 300ha of limebeds at 16 sites, created from salt-related chemical waste, which are now considered of great wildlife importance and they have been identified as a key habitat by the Cheshire Region Biodiversity Partnership.[26] Some sites have gained statutory and also non-statutory conservation designations (Sandbach Flashes Site of Special Scientific Interest — notified in 1963; Ashton and Neumann's Flashes; Marston Flashes Sites of Biological Interest). The two main salt flash localities (the Sandbach Flashes and the Anderton area of Northwich) have also been highlighted as one of 20 key landscape character areas in Cheshire.[27] A recently published guide produced by the Cheshire RIGS Group (involved in identifying regionally important geological and geomorphological sites) and Natural England identified the Sandbach Flashes as one of the key geological sites to visit in Cheshire.[28]

Management issues identified by Cheshire County Council for the salt subsidence flashes include: visitor pressure, car parks and demand for other facilities, inappropriate informal recreation, for example, motorcycling (all ironic indicators of the popularity of these sites); land lost to industrial and residential developments; lack of appropriate management (calcareous habitats lost to dense scrub); lime beds, once considered polluted wastelands, are now seen as a finite habitat resource (due to new underground disposal methods).[29]

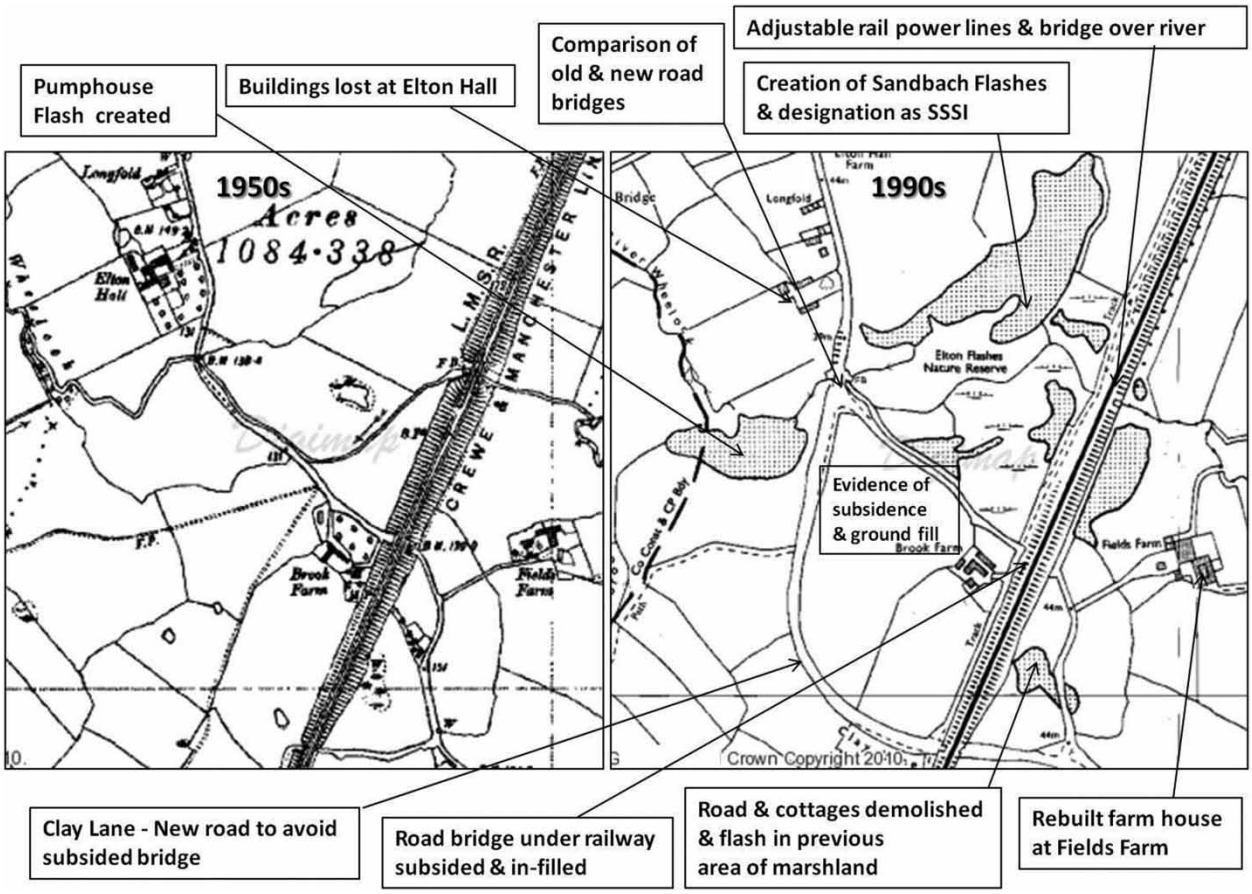

FIG. 7. Comparison of Ordnance Survey maps of Sandbach Flashes at Elton from the 1950s and 1990s. In a field-based exercise students would be given blank copies of each map to identify evidence for subsidence such as creation of flashes, demolished buildings, diverted roads and unique engineering solutions such as adjustable railway gantries and bridges.

Flashes not only enhance wildlife and geological interest, they have also opened many opportunities for local leisure and recreation. Notable present-day activities that utilise these water bodies include fishing, sailing and birdwatching (Figure 8), which can be seen as both direct and adaptive uses of dereliction.

II) ADAPTIVE USES OF SALT/SALT INFRASTRUCTURE

An interesting legacy of the salt industry is the adaptive use of brine for leisure purposes. Brine baths or swimming pools were, until the late 20th century, familiar and much-frequented public facilities. Northwich Brine Baths (1915–91) were supplied by 45,000l of brine per week by the Brunner Mond chemical company.[30] The outdoor summer brine pool in Nantwich was opened in 1934 and is supplied from an adjacent underground source, maintained at 23°C. In 2009 this lido, the last surviving inland brine pool in the country, was listed by the *Daily Telegraph* newspaper as one of the best places to swim outdoors in the UK.[31]

One of the rapidly growing leisure industries which has been built on the backbone of salt infrastructure is centred on the waterways network, including the Trent and Mersey Canal and the River Weaver Navigation. These were once crucial for transportation related to the salt and chemical industries, and now a wide range of visitors are attracted to canal paths, riverbanks and also to boating holidays. The Cheshire East Visitor Economy Strategy 2011 reports that boating has increased by an average of 2.6% every year over the last 15 years and is expected to continue to grow over the next 10 years. Events such as the Middlewich Folk and Boat Festival, which attracts an estimated 30,000 visitors and 400 boats annually, emphasise the link between industrial/cultural heritage and leisure.[32] Boating holidays often by preference also take in the famous Cheshire Ring section of the canal network, and many holidaymakers are now keen not only to view, but also to use a unique piece of hydraulic engineering/waterways heritage that has recently been restored following advice from English Heritage and funding from a range of sources, including the Heritage Lottery Fund. The Anderton Boat Lift (Figure 9) completed in 1875 was designed to transfer boats the 15m height difference between the lower Weaver Navigation and the higher elevation of the Trent and Mersey Canal,

FIG. 8. A birdwatcher at Elton looking out on to the Elton Flashes Nature Reserve in April 2011.

ending the economic rivalry between the two waterways. It is now managed as a working cultural heritage site by British Waterways (now the Canal and River Trust).[33]

Other transport-related legacies include former railways such as the Salt Line, previously the Sandbach and Wheelock branch of the North Staffordshire Railway, which was opened in 1852. Its primary role was transporting goods such as coal and limestone to local salt and chemical works, and exporting salt from Cheshire to the Potteries (Stoke-on-Trent). The line closed in 1970 and remained derelict for some time. Since 2000 it has been developed by the County Council, working with the community through the Wheelock Rail Trail Association. Partial regeneration funding has come from WREN (Waste Recycling Environmental Network) using the Landfill Tax credits of the Waste Recycling Group plc. It is now part of the National Cycle Network (Route 55) linking Middlewich with Alsager, and comprises a series of short green routes offering a range of leisure activities including walking, running, horse riding and cycling (Figure 10).

The mining of rock salt, as has been mentioned previously, leaves a series of underground chambers supported by un-mined rock salt pillars (the Winsford Mine currently contains *c.*150 miles of void space/roadways).[34] In 1998 Compass Minerals set up Deepstore to utilise some of these redundant voids.[35] The underground conditions of constant temperature (15°C) and humidity, and lack of ultraviolet light make these areas ideal for document storage/archive management, and recent clients have included Manchester and Liverpool Libraries, and the National Archive.[36]

The nature/development of salt mining in Cheshire has left a legacy of wildlife and leisure/recreation resources which have been exploited often with minimal effort/need for adaptation. Other legacies have required significant financial inputs in terms of mitigation measures both above and below ground.

Salt Heritage and Regional Planning

Planning and policy imperatives in the last five decades have been increasingly been influenced by environmental agendas. A recent response to these has been the adoption of the regional park in the UK as a key vehicle for economic regeneration and environmental improvement.[37] The Weaver Valley Regional Park is one of eight currently being planned in north-west England following the success of the Mersey Waterfront Regional Park which came in to being in 2002. The proposed park boundary encompasses 352km^2 and over 300,000 people, accounting for 40% of Cheshire's population in 2005.[38] At the heart of regional parks are both the dereliction and also the heritage associated with past industrial activities, primarily in the Weaver Valley salt:

> The scale and history of Cheshire's salt industry and 'wich' towns is unique in Britain and its legacy includes nationally important Roman and medieval waterlogged deposits and industrial sites such as the Lion Salt Works. Salt gave rise to the internationally important chemical industry centred upon Northwich and was also the catalyst for the development of the pioneering canal engineering projects. This rich salt, industrial and waterways heritage will be protected, developed and help change the image of the area.[39]

The Weaver Valley Regional Park aims, amongst economic, social and cultural goals to radically

FIG. 9. The Anderton Boat Lift opened in 1875 to link the Weaver Navigation with the higher elevation of the Trent and Mersey Canal.

change the image of the area and provide a high quality of life for all (see Table 2). The current Weaver Valley Regional Park initiative is commendable in putting the salt industry at the heart of a meaningful region to provide a regeneration impetus.[40] There is, however, a pressing need to understand and publicise the fragmentary nature of salt industry heritage in Cheshire where many landscapes have already been effectively reclaimed from their industrial past.

In this respect it is instructive to make comparisons with recent use of industrial heritage in Europe where politicians and planners have addressed significant challenges in dealing with decline in former industrial heartlands. One answer has been to consider brownfield regeneration on a regional scale. The IBA (International Building Exhibition) Emscher Park is an 80km long, 800km^2 region centred on the River Emscher in Germany. The ten-year project commencing in 1989 aimed to assist the regeneration of a significant part of the Ruhr/Emscher region, turning industrial wastelands, related to coal mining and associated steelworks, into a regional network of open/green space, recreation and cultural resources.[41]

Amongst Emscher's successes have been the engagement of a large number of players through a public participatory approach, the development of cultural routes (based on industry, culture, nature,

FIG. 10. Recreational use of the Salt Line, March 2011.

landmarks and art), the retention and re-use of industrial buildings 'showing off new forms of public space and retaining important monuments to the history of the region', and, in doing so, the promotion of industrial tourism.[42] Shortfalls include insufficient employment generation and failure in achieving sustainability related to transport, waste management and agriculture.

There are, however, some key lessons that may be applicable elsewhere: the importance of retaining the past, 'for its own sake and also to achieve new and beneficial uses', and that retention of monuments can provide a refreshing approach compared with the standard museum–visitor centre–cafe heritage tourism culture in the UK.[43]

Although IBA Emscher and the Weaver Valley Regional Park differ in many ways, particularly in scale, there are some striking similarities in terms of geography. Both regions are relatively flat topographically and their primary mining products (salt and coal) have fuelled spin-off secondary industries (chemical and steel) which have coexisted spatially, contributing in tandem to industrial heritage and landscape legacies.

The Emscher model of a regional park is based on the retention rather than demolition approach to

TABLE 2

Strategic Aims
1. To act as a significant economic driver for the region
2. To provide growth for the region's tourism sector and cultural economy
3. To establish awareness, pride, ownership and use of the Weaver Valley as an exceptional amenity for residents, visitors and business
4. To radically change the image of the area and provide a high quality of life and environment for residents, visitors and business.
Objectives
1. Developing a collaborative approach with private enterprise
2. Establishing a network of linked open spaces, waterways, woodlands, heritage sites, countryside and leisure opportunities
3. Renaissance of key towns
4. Reclaiming and creatively reusing derelict land
5. Providing for outdoor recreation and participative sporting opportunities
6. Protecting, promoting and developing the Valley's outstanding historic and natural environment
7. A comprehensive international, national, regional and local marketing and communications programme

industrial buildings, and the Ruhr/Emscher area conforms to traditional academic analyses whereby industrial decline is followed by abandonment and post-abandonment celebration of tangible industrial heritage. Although the Weaver Valley Regional Park and others like it in the UK hope to follow and build upon successes such as those of Emscher, this paper has demonstrated that in Cheshire salt, the *raison d'être* for the Weaver Valley Regional Park, has left a more intangible heritage.

Conclusion

Within Cheshire, knowledge of salt industry history, its geographical relocations and the nature of its associated heritage is confined to a relatively small number of enthusiasts. This situation will improve in 2015 with the opening of the new Salt Museum at the site of the former Lion Salt Works, but this is just one location, and to properly understand salt heritage there needs to be spatial connectivity in explanations and interpretations. One positive step in this direction is the linking of the Lion Salt Works to European industrial heritage as it is an 'anchor point' for the European Route of Industrial Heritage (ERIH), the tourism information network developed with support from the EU between 2003 and 2008.[44]

This international connectivity is all well and good, but there is still significant work to be done at a local regional scale. In localities such as the Sandbach Flashes little remains of the above ground mining heritage and it is vital that informed landscape interpretation is disseminated more widely through information boards and heritage trails following best practice at Emscher and elsewhere, and better spatial coordination of industrial/landscape heritage.[45]

The Weaver Valley Regional Park is seen as the most distinctive of recent regional park proposals in the UK, yet the salt heritage on which it is based is currently poorly communicated to regional and wider audiences. An instructive approach to rectify this situation would be to us the ideas of Garfield who counsels that industrial heritage sites should be seen as just one phase in landscape evolution, and he proposes expanding tourism 'offerings' from individual point locations to more meaningful heritage corridors.[46] Much tangible industrial heritage has been lost in Cheshire. What remains is a mosaic of landscapes documenting the evolution of salt exploitation — technological change, shifting geographical locations, continued operation and relevance today. Those selling salt heritage as a 21st-century regeneration fix have a duty to ensure that the past is fully and accurately celebrated.

Acknowledgements

With grateful thanks to Dr Sabiha Lageard and Annelise Fielding for assistance in improving the manuscript and helpful comments, Tim Turner for site access at the Anderton Boat Lift, and Gary Neiles and Compass Minerals UK for information relating to the Winsford Rock Salt Mine.

Notes and References

1. Cole, D., 'Exploring the Sustainability of Mining Heritage Tourism', *Journal of Sustainable Tourism*, 12 (2004), 480–94.
2. Orange, H., 'Industrial Archaeology: its Place within the Academic Discipline, the Public Realm and the Heritage Industry', *Industrial Archaeology Review*, 30 (2008), 83–95.
3. O'Brien, W., *Bronze Age Copper Mining in Britain and Ireland* (Shire Publications, 1996).
4. Cheshire County Council, Cheshire Replacement Local Minerals Plan, Environmental Planning, Cheshire County Council, 1999. Nevell, M. & D. George, *A Guide to the Industrial Archaeology of Cheshire* (Penhryn: Association for Industrial Archaeology, 2014), 36–40.
5. Nevell, M., 'Salt Making in Cheshire: the Iron Age Background', in *Archaeology North West*, 7 (2005), 9–14; Dodds, L.J., 'Salt Making in Roman Middlewich: Part 2. Discovery and Rediscovery, Excavations along King Street 2001–02', *Archaeology North West*, 7 (2005), 25–30; Garner, D., 'Salt Making in Roman Middlewich: Part 1. Discoveries before 2000', *Archaeology North West*, 7 (2005), 25–30.
6. Connelly, P. & D. Power, 'Salt Making in Roman Nantwich: Recent Discoveries at Kingsley Fields, Welsh Row', *Archaeology North West*, 7 (2005), 31–40; Arrowsmith, P. & D. Power, *Roman Nantwich: a Salt-Making Settlement. Excavations at Kingsley Fields 2002*, BAR British Series 557, (Oxford: Archaeopress, 2012).
7. Penny, S. & D.C.A. Shotter, 'Further Inscribed Roman Salt Pans from Shavington, Cheshire', *Chester Archaeological Journal*, 76 (2001), 53–61.
8. Jülich, S., 'Catalogue of Lead Salt Pans from Switzerland, Germany and Britain' unpublished gazetteer, Ruhr University, Bochum (no date).
9. Fielding, A.M. & A.P. Fielding, *The Salt Industry* (Shire Publications, 2006).
10. Strickland, T., *Roman Middlewich: a Story of Roman and Briton in Mid-Cheshire* (Printfine/The Roman Middlewich Project, 2001).
11. Phillips, A.D.M. & C.B. Phillips, *A New Historical Atlas of Cheshire* (Cheshire County Council and Cheshire Community Council Publications Trust, 2002).
12. Nantwich Museum online, <http://freespace.virgin.net/nantwich.museum/saltship.htm> [accessed 1 August 2014].
13. Lion Salt Works, 'Homepage', <http://lionsaltworks.org/> [accessed 13 August 2014].
14. Lion Salt Works, ref. 13.
15. ECOSAL UK: Preserving the History and Heritage of Traditional Salt Making, <http://ecosal-uk.org.uk> [accessed 13 August 2014].

16. ECOSAL Atlantis: A Strategy for Integral and Sustainable Development, <http://ecosal-atlantis.ua.pt> [accessed 13 August 2014].
17. Heritage Works Buildings Preservation Trust Ltd 2011. Murgatroyd's Brine Pump No 1: Conservation Management Plan and Options Study, http://www.heritageworks.co.uk/resources.htm [accessed 13 August 2014].
18. Lageard, J.G.A. & I.B. Drew, 'Hydrogeomorphic Control on Tree Growth Responses in the Elton Area of the Cheshire Saltfield, UK', in *Geomorphology,* 95 (2008), 158–71.
19. Brooks, T.G., N.J. O'Riordan, J.F. Bird, D. Stirling & D. Billington, 'Stabilisation of Abandoned Salt Mines in North West England', *IAEG 2006 Paper Number 781* (The Geological Society of London, 2006).
20. Compass Minerals UK, Welcome to Winsford Rock Salt Mine, <http://www.winsfordrocksaltmine.co.uk> [accessed 26 September 2014].
21. Tata Chemicals Europe, River Weaver at the heart of manufacturing (2012) <http://www.tatachemicals.com/europe/media_centre/pdf/river_weaver_story.pdf> [accessed 12 August 2014].
22. Fielding & Fielding. ref 9.
23. Lageard & Drew, ref. 18.
24. Brooks *et al*, ref. 19.
25. Holland, D.G., 'The Inland Distribution of Brackish-Water Gammarus Species in the Area of the Mersey and Weaver River Authority', in *Freshwater Biology,* 6 (1976), 277–85.
26. Cheshire Region Biodiversity Partnership, 'Limebeds Local Biodiversity Action Plan', <http://www.cheshire-biodiversity.org.uk/action-plans/listing.php?id=30> [accessed 28 September 2014].
27. Cheshire County Council, 'The Cheshire Landscape Assessment: Landscape Character Type 11 – Salt Flashes', <http://www.cheshireeast.gov.uk/environment_and_planning/planning/heritage_natural_environment/landscape/landscape_policy/landscape_character_assessment.aspx> [accessed 28 September 2014].
28. Cheshire RIGS (Regionally Important Geological and Geomorphological Sites), 'Geological Sites to Visit in Cheshire', Cheshire RIGS/Natural England (2011).
29. Cheshire County Council, ref. 27.
30. Northwich Brine Baths, 'Northwich Brine Baths 1915–91', <http://www.northwichbrinebaths.co.uk/Northwich%20Brine%20Baths%201915%20-%201991> [accessed 25 March 2011].
31. 'Top 50 Places to Swim Outdoors', *Daily Telegraph*, <http://www.telegraph.co.uk/news/features/3637639/Top-50-places-to-swim-outdoors.html> [accessed 28 September 2014].
32. Middlewich Folk and Boat Festival, 'Homepage', <www.midfest.org> [accessed 18 March 2011].
33. British Waterways 'Anderton', <http://www.britishwaterways.co.uk/wales-and-border-counties/events-and-attractions/anderton> [accessed 16 May 2011].
34. Gary Neiles, pers. comm.
35. Deepstore, 'Welcome to Deepstore', <http://www.deepstore.com/about-us.aspx> [accessed 16 May 2011].
36. 'Salted Away: Cheshire Salt Mine to Store National Archives', *Guardian*, 13 August 2010, <http://www.guardian.co.uk/uk/gallery/2010/aug/10/cheshire-salt-mine-national-archive> [accessed 16 May 2011].
37. Chadwick, G., 'Park Life: the Northwest's Nine Regional Parks are a Test Bed for New Approaches to the Environment and the Economy', *Source* (Mersey Basin Campaign), 18 (2008), 12–15.
38. Weaver Valley Partnership, 'Homepage', <http://www.weavervalley.org.uk> [accessed 14 February 2011].
39. Weaver Valley Partnership, ref. 38.
40. Gopal, K., 'German for Inspiration', *Source* (Mersey Basin Campaign), 8 (2005), 23–5; Nevell & George, ref. 4, 51–2.
41. LaBelle, J.M., 'Emscher Park, Germany — Expanding the Definition of a "park"', in D. Harmon (ed.), *Crossing Boundaries in Park Management, Proceedings of the 11th Conference on Research and Resource Management in Parks and on Public Lands* (Michigan: The George Wright Society, Hancock, 2001), 222–7.
42. Shaw, R., 'The International Building Exhibition (IBA) Emscher Park, Germany: a Model for Sustainable Restructuring?', *European Planning Studies*, 10 (2002), 77–97.
43. Shaw, ref. 42.
44. European Route of Industrial Heritage, 'Homepage', <www.erih.net> [accessed 13 March 2011].
45. Lageard & Drew, ref. 18; Wallwork, K.L., 'Subsidence in the Mid-Cheshire Industrial Area', *The Geographical Journal*, 122 (1956), 40–53; Wallwork, K.L., 'Some Problems of Subsidence and Land Use in the Mid-Cheshire Industrial Area', *The Geographical Journal*, 126 (1960), 191–9.
46. Cole, ref. 1.

Notes on Contributors

Jonathan Lageard is a Senior Lecturer in Environmental Studies in the Division of Geography and Environmental Management at Manchester Metropolitan University. His PhD research focused on reconstructing prehistoric woodlands that once grew on peat bogs in Cheshire, and more recently he has applied techniques such as pollen analysis and dendrochronology to further his interests in environmental and industrial archaeology in the UK.

Correspondence to: Jonathan Lageard.
Email: j.a.lageard@mmu.ac.uk

Ian Drew is also a Senior Lecturer in the Division of Geography and Environmental Management at Manchester Metropolitan University. He is a fluvial geomorphologist, having undertaken PhD research on gravel bed rivers in Scotland, and his geological expertise not only inform teaching and research, but he also is an active member of the Cheshire RIGS Group which pays a key role in designating sites of regional geological and geomorphological importance.