War & Peat

Ian D. Rotherham & Christine Handley (eds)
War & Peat

The remarkable impacts of conflicts on peatlands and of peatlands on conflicts - a military heritage of moors, heaths, bogs and fens.

Edited by Ian D. Rotherham and Christine Handley
German and Russian troops at the Battle of Tannenburg in 1914
## Contents

*An Introduction to War & Peat*  
Ian D. Rotherham  
1

*War & Peat: exploring interactions between people, human conflict, peatlands, and ecology*  
Ian D. Rotherham  
7

**Military Landscapes**

*Military pastoral and the military sublime in British army training landscapes*  
Rachel Woodward  
45

*Beyond the barbed wire: accessing Britain’s military training areas*  
Marianna Dudley  
57

*Saint Helena, an island of dry deserts and constant rain: conserving an unique military heritage in a changing climate*  
Edmund Simons  
65

*Cannock Chase: conserving the military heritage*  
Stephen Dean  
79

*Ashley Walk Bombing Range, New Forest, Hampshire*  
Richard Hall  
91

**Battles and Battlefields**

*Bogs as defence in the seventeenth century Dutch Republic*  
Michiel Gerding  
105

*The battlefield at Northampton (Wars of the Roses, 1460)*  
Peter Burley  
115

*In to the bog: ‘silently and in good order. German fashion…’*  
Chris Burgess  
135

*The effect of marsh, bog and moor environments on the execution of warfare, with particular reference to the Early Modern period in Britain and Europe*  
Sean Bell  
139
The Impacts of Conflict and War

*The impact of the Falklands War (1982) on the peatland ecosystem of the islands*
Jim McAdam

143

*Aviation archaeology: a legitimate branch of archaeology? Its development and path to professional standards*
Graham R. Chaters

163

*Radionuclide sorption on the peat*
Andris Abramenkovs, Maris Klavins, Janis Rudzitis and Andris Popelis

187

*War and forest*
Pekka Virtanen

195

*Sphagnum: the healing harvest*
Thelma Griffiths, Ian D. Rotherham and Christine Handley

201

War & Peat in the Peak District

*Impacts of conflict and war on peatland landscapes*
Paul A. Ardron

221

*Burbage and Houndkirk in the Second World War: defending Sheffield and training the liberators*
Bill Bevan

233

*Big Moor shadow woodland surveys World War Two field finds*
Andy Alder

237

*Langsett and Midhope at War 1939-1945*
Mike G. Kirby

241

*Local memories of military impacts on the Peak District: air crashes, defences and training areas*
Christine Handley

247

Non-military Campaigns

*The moorland access campaigns – (with some military interludes)*
Terence Howard

257

*Peat, politics and patrimonialism: back to the future on Thorne Moors*
Kieran Sheehan

273
An Introduction to War & Peat
Ian D. Rotherham
Sheffield Hallam University

A short introduction
As we approach the centenary of the commencement of World War One, matters of landscape, terrain, resources and strategies become increasingly topical and relevant. The themes of this book were addressed at a major international conference in 2013, and the expanded papers are presented here as chapters. The conference and book are mostly focused on temperate environments, but the interactions of peatlands and conflicts are more global. From the Second World War in for example the Philippines, to the British in Burma, and later the Americans in Vietnam, wetlands have been hugely influential in tropical conflicts too.

The relationships of people and landscapes, of economies and conflicts, and ecology and history, are complex and multi-faceted. For peatlands, including bogs, fens, moors, and heaths, the interactions of people and nature in relation to history and conflicts, are both significant and surprising. The idea of ‘War & Peat’ in fact emerged from long-term studies of peatlands, their histories of utilisation, and the impacts on ecologies. In particular, it became clear that conflicts and strife such as war, political and economic unrest, or extreme weather for example, had had great impacts of peatlands. Furthermore, peat landscapes of various sorts had not only affected regional economics, but had been hugely influential in the theatre of war. It was these wide-ranging and varied issues, which we set out to address under the banner of ‘War & Peat’.

However, the theme of this research is not restricted to the conflicts described above. Throughout history, peatlands have been contested landscapes and resources. These ‘battles’, such as the ‘Peat Campaign’ of the 1980s and 1990s, to save the last remaining lowland raised mires in England, are one such example. Without the campaign, sites like Thorne Moors and the Humberhead Levels would now be landfill, mineral extraction landscapes, or perhaps intensive farming. From the 1920s and 1930s, the access campaigns grew in cities like Sheffield and Manchester, to claim back access rights to moors and bogs lost under enclosures in the 1700s and 1800s. By the early millennium, access to the wider countryside in England was finally given back as a legal right; another battle won.

These peat-based landscapes have been radically affected by human history and human utilisation. Important to realise too, is that the major effect of historic usage has been a reduction in extent of peatlands which is almost beyond imagination. To understand more fully the roles of peatlands in
times of conflicts and stresses, you must firstly appreciate just how widespread they were. Additionally, the nature and condition of pre-industrial sites were dramatically different from the sites that remain today. Bogs for example, were wetter and deeper, and more abundant and widespread in the landscape, and so their influence on people was much greater.

**An approach to the subject**
The approach we have developed to the subject is to consider both the integrated whole in terms of peatlands and people, but also the component elements separately. This allows us to separate out the individual stories but then to bring together the overall context and description of the relationships between war & peat.

1. Peatlands influence war and conflict through topography and nature, often being of critical significance to strategy and outcome.

2. Heaths and moors were often used as military training grounds, from early times up to the present day.

3. Peatlands were used as wartime bases especially during World War 2 when they were brought into usage as airfields and similar facilities.

4. Bogs and moors especially, had unplanned and passive roles in warfare such being the last resting places for stricken or lost bombers of both sides during World War 2.

5. Peatlands, especially bogs and fens, provided materials of immense value to wartime efforts such as supplying horse litter, sphagnum moss, alder buckthorn or peat fuel.

6. Conflicts, socio-economic stresses or extreme weather all influenced fuel use and competition and therefore peat exploitation.

7. Fens and bogs as places of sanctuary, of non-conformism, and independence.

**Some final points**
Most of the uses noted above had impacts on the peatlands and these vary from complete removal, to drainage, to modification and perhaps recovery. Some, such as the strategic significance in battlefields left relatively little evidence of a perhaps pivotal role.

However, many wartime or conflict uses have left a visible heritage such as the pockmarked boulders of the Peak District moors, scarred by wartime bullets and mortar blasts. Other activities such as *Sphagnum* moss harvesting left little visible record and indeed, only a tenuous documentation or oral history; so much more remains to be found out and recorded.

Many of the uses, through alteration to sites, drainage and even topography itself, had far-reaching consequences for the resource. This is perhaps the story of this conference.

With the 2014 anniversary of the start of the First World War, the major conference at Sheffield Hallam
Figure 1. Durham Light Infantry

Figure 2. Control Stirling Castle and with the River Forth and Flanders Moss, then you control Scotland
Figure 3. WW1 Belgium battlefield

Figure 4. WW2 USA Army in the Philippines
University, and now this book are called fittingly, ‘War & Peat’. Involving not only researchers and academics, but ordinary local people too, this addresses impacts of conflicts on peatlands and their usage and products. The subjects range from battlefields and strategic impacts of peatlands and wetlands in conflicts, harvesting Sphagnum moss, peat as horse litter, and as fuel, use for military training, and the battles for access, for conservation and more. Along with recollections, we also have photographs of people involved and this formed the basis of an exhibition at the September 2013 Conference.

The research continues and people across Yorkshire or beyond, may still remember the Sphagnum harvests or maybe their parents or grandparents were involved. If so, then we need to hear from you to record and celebrate this remarkable tale of the healing harvest of the peat bogs. Photographs or other memorabilia would be hugely interesting too. Additionally, other memories or information on uses of heaths, moors, bogs, fens, Sphagnum moss, or related matters, from the Home Guard to the RAF, would be very useful to our studies. The event was organised with Sheffield Hallam University by the South Yorkshire Biodiversity Research Group, the Biodiversity & Landscape History Research Institute, The Landscape Conservation Forum, the British Ecological Society, and the International Peat Society, and we are grateful for their support. Wildtrack Publishing published the book on their behalf.

**Bibliography & References**


Figure 5. Tolstoy and our apologies to the great man

Figure 6. *War & Peace* as published by Penguin and based on the colossal BBC dramatization
Summary
This chapter addresses the issues of people, peatlands, conflict and ecology. It does so by considering seven main interactions and presents pertinent examples to illustrate these.

1. Peatlands influence war and conflict through topography and nature, often being of critical significance to strategy and outcome.

2. Heaths and moors were often used as military training grounds, from early times up to the present day.

3. Peatlands were used as wartime bases especially during World War 2 when they were brought into usage as airfields and similar facilities.

4. Bogs and moors especially, had unplanned and passive roles in warfare such as being the last resting places for stricken or lost bombers of both sides during World War 2.

5. Peatlands, especially bogs and fens, provided materials of immense value to wartime efforts such as supplying horse litter, *Sphagnum* moss, alder buckthorn or peat fuel.

6. Conflicts, socio-economic stresses or extreme weather all influenced fuel use and competition and therefore peat exploitation.

7. Fens & Bogs as places of sanctuary, of non-conformism, and independence.

The central argument is that peatlands of varying sorts have been hugely important to people in times of conflict or stress, and that the resulting interactions have had major impacts on the ecology and landscapes we see today. In addition, it is suggested, that most of these complex phenomena have been largely overlooked or at least forgotten.

Introduction
Peatlands such as heaths, moors, bogs and fens have all been of importance and significance in the landscape and to people in many parts of the world and throughout many centuries. In terms of the land areas covered, *sphagnum* moss itself must rate as one of the most abundant plants on Earth. This scale of significance and the nature of these landscapes have led to a remarkable relationship throughout the history of human conflicts and stresses and peatlands, especially in times of war.
Some of the issues and observations are discussed in my three books, *Peat & Peat Cutting* (Rotherham, 2009), *Yorkshire’s Forgotten Fenlands* (Rotherham, 2010), and the *Lost Fens* (Rotherham, 2013). However, whilst issues of landscapes and conflict, and especially ‘landscapes of conflict’ have received attention in recent years (e.g. Pearson, 2008, 2012; Cole, Coates, & Pearson, 2010), the roles of wetlands generally, and peatlands specifically, have for the most part, been ignored. Academic authors have begun to address these issues for example in relation to broader matters of terrain and warfare (e.g. Doyle & Bennett, 2002), and in relation to environmental factors (e.g. Tucker & Russell, 2004).

For moors, bogs, heaths and fens, conflict does not just mean battlefields for conventional warfare, but for contested spaces. From the battles for Kinder Scout and access to the moors, to saving Thorne Moors and Hatfield Chase, peat bogs and moors have been evocative places for the region’s people. Not only this, but they played a major role in the war effort of two World Wars too. Forgotten wartime aspects of peat bog and fen were things like the supply of vital horse-litter (cut peat turf) from sites such as Thorne Moors in South Yorkshire. Conflicts over the proposed drainage of the Fenlands were even a key factor in triggering the English Civil War in the 1600s. It is clear that people and peatlands interact in many complex and complicated ways. Furthermore, human conflicts affect and are influenced by these once vast landscapes.

I suggest there are perhaps seven main ways in which people and peatlands have interacted in times of conflict or other stresses, and I present examples below. Some of the uses and interactions are developed further later in the paper.

**Impacts, utilisation and examples**

1. Peatlands influence war and conflict through topography and nature, often being of critical significance to strategy and outcome

**Examples:** The military significance and use of moors, heaths, fens and bogs, extends over millennia. The moors and bogs around the western edge of Sheffield with their Iron Age hillforts can trace a military presence across millennia. In modern times, they were not only used as military training grounds, but also during WW2 as a decoy area to protect the vital steel industry to the east of Sheffield. Moors and heaths also provided the sites for airfields for the Battle of Britain and the strikes against Nazi Germany.

However, there is more. Wetlands, especially peat bogs, fens and moors were of huge significance to military campaigns. In the landscape, these treacherous areas of neither firm ground nor navigable water were a serious problem for soldiers or warriors, most of who could not swim anyway. Furthermore, slip into a fen or bog when wearing armour and you sink slowly to a very unpleasant death. The
Saxon troops of Hereward the Wake, holding out on the Isle of Ely in Cambridgeshire, drove the Norman invaders off the fragile causeways by firing the reeds. The Normans in their chainmail sank deep into the quagmire. The battle of Stamford Bridge had earlier been settled in a vast wetland landscape in which the one river crossing was vital strategic key. This aspect of wetlands in the landscape was used to great effect by the Scots against the English at the battles of Stirling Bridge and of Bannockburn. Battles such as Solway Moss, Culloden, and Flodden all turned on the impact of a bog or wet moor, in these cases with catastrophic consequences for the Scots.

Flanders Moss and the River Forth were of huge strategic significance in Scotland, and it was said that he who controlled Stirling Castle, the gateway to the Highlands, controlled Scotland. In England, many of the battles of the civil wars such as the Wars of the Roses, and of the English Civil War, were acted out on heath, moor, and bog. The Battle of Sedgemoor itself was a tragedy played out in a foggy, dank marshland, and earlier, Alfred the Great had sought refuge in the nearby wetlands of Athelney.

In the European arena of the two World Wars, peat bogs and fens played a major strategic role, with the Dutch for example, flooding the former peat cuttings to halt the German advance as they retreated. The Somme and other catastrophic campaigns were fought in vast wetlands and peat bogs.

2. Heaths and moors were often used as military training grounds, from early times up to the present day

Examples: Around Sherwood, the famous heaths of old Sherwood Forest became military training grounds, and in WW2, Clumber Park was a transit and camouflaged storage site for tanks. Dartmoor, Cannock Chase and other heath and bog sites were used for military manoeuvres probably as far back as the Crimean War.
Figure 2. Cannock Chase 1873

Figure 3. Dartmoor 1870

Figure 4. Hampstead Heath August 1860
3. Peatlands were used as wartime bases especially during World War 2 when they were brought into usage as airfields and similar facilities
Examples: In Nottinghamshire and Lincolnshire, commons, heaths, and fens were turned to use as airfields; some still surviving today. Moors and heaths provided the sites for airfields for the Battle of Britain and the strikes against Nazi Germany.

4. Bogs and moors especially, had unplanned and passive roles in warfare such being the last resting places for stricken or lost bombers of both sides during WW2
Examples: In Roman times, the fens and bogs were brought under varying degrees of control through ambitious drainage schemes, but the primary function of these waterways was probably military in moving men, animals and supplies speedily through otherwise difficult terrain.

These landscapes also became the last resting places of aircraft and crews that crashed on Kinder Scout and Bleaklow in the uplands, and Thorne Moors in the lowlands. This is a tragic history, which should not be forgotten.

5. Peatlands, especially bogs and fens, provided materials of immense value to wartime efforts such as supplying horse litter, Sphagnum moss, alder buckthorn or peat fuel
Examples: Early twentieth century wartime aspects of peat bog and fen such as the supply of vital horse-litter (cut peat turf) from sites like Thorne Moors in South Yorkshire, or the harvesting of sphagnum for wound dressings, are now almost forgotten.

One of the main uses of peat in the late 1800s and early 1900s was litter for animal bedding. With huge numbers of animals powering farms, towns and cities, there was a big demand for material to keep things clean, and peat was ideal. Once soiled, its nutritive qualities enhanced, it went on the land as fertiliser. At Thorne Moors in South Yorkshire, the English Moss Litter company extracted peat moss up to the 1960s, and from 1923 to 1962, the Midland Litter Company took moss from Fenn’s Moss near Wrexham. Although raw peat was widely used as litter by farmers and peasants, wider usage took off in the early 1900s. Processed and packaged as a commercial product, during the First World War with its absorbent and fibrous combined with antiseptic properties it was used extensively as horse bedding for the military.

It was also used as animal feed, mixed with green fodder and perhaps molasses. Again its antibacterial properties may have a therapeutic effect and it was used either coarse or as a powder mixed into a cattle cake.

To give some indication of the emerging demands for peat moss litter, there was now nationally an increase of
around 98,353 working horses between 1901 and 1906. These were employed by railways, tramways, omnibus companies, various local authority undertakings and of course many other businesses. Peat moss litter (dried peat) made an ideal bedding material for them. By the late 1890s, at Thorne Moors, the British Moss Litter Company was formed and took over a number of established peat works across the region between the Rivers Don and Trent. Alongside the system of canals and boats there developed a network of narrow gauge railways and connections beyond to the wide rail network. A new ‘pressing mill’ still known as the ‘Paraffin Mill’ or the ‘Paraffin Works’ was being built in 1895. This was to produce gas for fuel, ammonia water, paraffin, creosote, methyl alcohol, tar and even alcohol for motorcars. Peat dust was used to pack fruit and peat was even fed to cattle. However, these diversifications did not last long and the mill closed in 1922. With declining use of horses for industry and transport, the moss litter business also collapsed.

Established as a major centre for moss litter production, and employing at its peak around 350 men, Thorne Moors in South Yorkshire produced vast quantities of peat litter for the horses sent to the World War 1 front line. In the First World War, many horses were despatched to war zones and they had to be catered for. Horticultural use of peat was a much later afterthought that brought catastrophe to the region’s peat moors and bogs, triggering the battles by ‘Bunting’s Beavers’ and others to save the last remnants of the once vast South Yorkshire moors. The region’s moors and bogs were also used to harvest sphagnum moss for wartime medical uses. (See Griffiths, Rotherham & Handley, this volume).

6. Conflicts, socio-economic stresses or extreme weather all influenced fuel use and competition and therefore peat exploitation

Examples: Often forgotten, are the effects of post-conflict scenarios such as after WW2 in Britain and the resulting energy crisis for domestic and industrial fuels. At Holme Moss, in the south Pennines, one of England’s last community turbaries (legal peat cuts for domestic fuel), two discharged soldiers arrived after the Second World War to set up business. Recently discharged from the army, they used their money to set up a peat fuel business and for several years, in the post-war energy crisis, they supplied peat fuel to factories as far away as Sheffield and Leeds. Similar exploitation affected the post-WW2 blanket peats of the south-west Pennines as large areas were cut for peat fuel to supply Pilkington Glass.

War also meant on the one hand intensification of land use and WW2 brought about the final demise of the remaining Southern Fens of eastern England. On the other hand, conflict could lead to the abandonment of for example, drainage schemes. At Walberswick in Suffolk, marshland drainage was unmaintained and this allowed reversion to fen and marsh. Around Leighton Moss, the long-
standing peat cuttings were abandoned as the site re-wetted due to neglect of drainage. The ultimate result in both cases has been the development of major nature conservation sites by the twenty-first century.

7. Fens & Bogs as places of sanctuary, of non-conformism, and independence

Throughout history, peat bog and fen have provided sanctuary for people in times of conflict or oppression, and for non-conformists and others seeking to distance themselves from the law or the church. Rich in natural resources for those who knew and understood their ways, but difficult to enter or transverse if you did not, these were ideal hideaways from the time of Alfred the Great to Hereward the Wake, and from the nineteenth-century French forces in the Franco-German war, to the Marsh Arabs of Iraq seeking protection from Saddam Hussein. One consequence of the sanctuary that wetlands gave from those in authority was that those in power sought to remove them from the landscape and to control both the environment and the people.

Results: The case studies in more detail

The particular case of the Sphagnum harvest

The once widespread peat bogs and moors of Yorkshire also helped a remarkable national and international effort to save the wounded in two world wars. As a part of the research building up to this conference, we made a remarkable discovery. Something found by me and Thelma Griffiths of the National Trust at Longshaw in the Peak District resonated with an interview with locals at Holme Moss who had spoken of people collecting Sphagnum or bog moss for the war effort in 1940s. We were told of a hitherto forgotten way in which people across Yorkshire went out to collect a healing harvest from peat bogs and mires across the county. Sphagnum moss, today associated with hanging baskets, has remarkable properties to hold liquid and to cure or stop infection. In a medical world pre-antibiotics the combination of the power to mop up copious quantities of blood and staunch open wounds, and its healing powers, made sphagnum invaluable for helping the terrible injuries of war. (The sphagnum story is presented in more detail in other papers).

The story relates to landscape change across the county, since at the time, peat bogs and wetlands were more widespread across England, and especially prevalent and important in Yorkshire. Therefore, the call went out to communities and people across the county to go to the bogs and harvest the sphagnum. This was then carefully processed and shipped out to the front or to hospitals where the injured were being treated. Our research has found that some people still remember how this was done, if not themselves directly, then from parents or even grandparents. At Longshaw in the Peak District, we have found a family whose relative, a nurse, helped gather moss for
attended the National Trust talk by Thelma, they had only half-believed grandma’s tales of roaming the moors in search of moss. However, further north in the Pennines, at Holme Moss, we have older people that still recall the collection of sphagnum during the Second World War. A pattern is emerging, and it is now clear that this was no cottage industry but a major undertaking and in places an industrial operation. Huge efforts went into collecting, sorting, processing and packaging the healing harvest, and this was across Britain, from North America, and in Europe itself.

Magazines and newspapers carried stories and calls for action from volunteers. The Northern Rambler, June 1942, for example stated ‘FOR MOORLAND WALKERS. Sphagnum moss is wanted for surgical dressings. There is an urgent demand for this. It is only necessary to squeeze out the surplus moisture before packing. Supplies should be sent to EV Benett-Stanford, Pythouse Hospital Supplies and Comforts Depot, Tisbury. Postage will be refunded.’

Nevertheless, there were still contentious issues of access to moors ‘preserved’ for game shooting. These included ones in both Yorkshire and Lancashire. On the Burnley moors for example, there were notices stating ‘These moors are strictly reserved for game. You are, therefore, requested not to trespass and to help that which is sport for some, work for others and in some measure food for all.’ Another note by the editor observed that ‘Under
**War & Peat: the History, Archaeology & Ecology of the Military Heritage of Moors, Heaths, Bogs and Fens**

- **Figure 6. Sphagnum in war**

**THE WOUNDS OF WAR**

*Healed by the magic of... Sphagnum Moss... from the peaceful moor.*

Sphagnum Moss is one of Nature’s oldest choices for wounds, and whereas the same exists, especially in Scotland, pupils of all ages and social conditions are on the border, as it were, collecting for the soldiers wounded in the Great War. This article, describing how Sphagnum is, has been specially written by one of the most enthusiastic buyers at a big Sphagnum Moss organisation in the North of Scotland.

...can fully appreciate the value of this early after receiving the comments of many over-worked doctors and nurses at the front, who are profusely thanked for a dressing which lasts a little longer than cotton wool, and thus saves men suffering as well as expense.

The preparation of the moss is very simple. It should be gathered with reasonable amount of care, as closely as possible, and in order to dry it is a very common method is to spread it out on the heather or grass near the spot where it grows, and to leave it to dry in the open air and wind. Another plan is to hang it out on a clothes line in open bags made of a very coarse open mesh or netting, and to suspend it out on sheets of gauze or on boards, so that it is easily carried indoors at night, or during rain.

Experiments have been tried of drying the moss artificially in an oven, or in the drying-machines of a laundry, but neither plan was very successful, as when it is rapidly dried it becomes very dusty and brittle, and the worker who makes it into dressings finds it both wasteful and unpleasant to handle.

It must be dried slowly, either in the open air, which is by far the best method, or by spreading it out indoors, or under the roof of an empty room.

This cleaning is equally simple, and this is best done while slightly damp. All other substances, such as grasses, twigs, bits of heather, etc., must be picked out, and this part of the work must be carefully and conscientiously done, and should be well supervised, for one of the most brilliant things in the world is the pine needle, which has a trick of disappearing among the moss, and penetrating farther as it pushes its sharp point through the dressing, not in a very desirable thing to hand over to a wound! The moss should be used whole, not broken up into short pieces.

The final stage is the packing of the moss into bags, some varying from as small as five inches square to a very large dressing, both oblong and square, according to hospital requirements. The bags are made of a fairly close but very thin muslin, not fine enough to limit the absorbency of the moss but close enough to prevent dust filtering through into the wound.

(Continued on page 285.)

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*The Graphic, September 7, 1916*
the Access Act, Sect 6 (h), anyone picking Sphagnum moss would be liable to a fine not exceeding forty shillings. That Act makes it an offence to wilfully injure, remove, or destroy any plant, shrub, tree, or root or any part thereof.’

On Dartmoor too, local people set out to the moors and bogs to gather and process Sphagnum moss for the wartime efforts. As told to us by Tom Greeves of the Dartmoor Society, this contribution is commemorated by an inscribed shell outside Church House in Widecombe-in-the-Moor.

Conflict and energy supplies
Sometimes, war or extreme weather might trigger a move from the utilisation of say coal, back to peat, a resource either not used or used historically but then abandoned. This was described for farmers in the south Lancashire Pennines, apparently as a response to bad winters and coal not being available. They reverted to using the local peat turbaries. However, on reflection this seems unlikely since the peat fuel needs careful harvest and drying in order to be useful. In a bad winter, the peat would not solve the immediate problem since you have to plan 6-9 months ahead. It seems more reasonable that the farmers reverted to peat use during the wartime period or the 1920s Depression as a response to economic pressures and energy shortages. Economic problems or matters of fuel price and fuel competition could be disastrous. Richardson (1874) discusses in detail how in Scotland the price of coal had risen so much that it ‘...has become quite a luxury, and almost beyond the reach of any but the wealthier classes’. The crisis was not of availability but of price and the impacts of competition to export coal abroad, which inflated domestic prices beyond the reach of ordinary people. The total exports of coal from the United Kingdom were increasing at around one million tons per year and the resulting price inflation meant a colossal increase in the domestic expenditure on coal fuel, estimated in 1873 to be about £44 million rise in two years. This threatened to cripple industry and to cause serious problems for the ordinary household consumer. The response was to advocate the widespread exploitation of peat from bogs. Richardson described the state of the potential resource and its state at the time:

‘It is evident, therefore, that there is no lack of peat in the United Kingdom, indeed, in so far as it is mere unprofitable and waste land. There is a very great deal too much. Slowly, it is true, but only very slowly, the vast tracts of peat bog are decreasing. Civilisation and agriculture are nibbling at their borders, and many a fine green sward was but a few years ago a dark and filthy moss.’ This description gives an insight into the state of the United Kingdom’s peatlands at the time, and a dramatic comparison with their condition a little over a hundred years later when most were destroyed. At this time, in the 1870s however, it was suggested that Scotland in particular, possessed a rich untapped wealth of fuel to be used in times of coal crisis.
committee at Alfred, Ontario, between 1919 and 1923, when, during the investigation, between 16,000 and 17,000 tons of peat were made. Since that time small quantities have been made intermittently in Ontario and Quebec for local use.

In 1943, owing to an expected shortage of wood fuel in the Province of Quebec, there was a renewed interest in peat fuel, and, with the co-operation of the Emergency Coal Production Board, a start was made in the manufacture of machine peat on a small scale. The Quebec Department of Mines had developed a portable macerating machine which called for the minimum of equipment and only ordinary labour for operation, and a number of these machines were made available to a selected number of operators. Ten operations were in progress during the summer at different localities in the province and about 1,500 tons of peat were made.

Description of Peat Machine and Method of Operation: The peat macerating machine developed by the Quebec Department of Mines is derived from the Dolberg machine, which was largely used in Europe. Briefly, it consists of two intermeshing worms—one right-handed and the other left-handed—about eight inches in diameter and 50 inches long, enclosed in a cast iron casing provided with a feed hopper at one end and a delivery

Figure 7. Canadian Geographical Journal 1945 with move to peat fuel because of wood shortage
This phenomenon can be seen operating around the world, especially for example, in North America. Peckham (1874) considered the potential of peat and turf for domestic fuel supply in Minnesota. A key point that he makes is the importance of competition with, and of scarcity of, more sought after fuels. Peat fuel might be viable if an area was remote from forests, and away from coal transportation routes. Shaler in 1895 examined the origin, distribution and commercial value of peat deposits for the USA. He noted the relationship between peat use and the lack of available fuel wood. In northern Europe he suggests that the greatest use of peat fuel was during the eighteenth century when forests had been cleared but mineral coal was not in widespread use since transport to rural areas was difficult. The bulk of the rural population of Northern Germany, Scandinavia, Russia, France, and the British Isles, except in the case of the wealthier classes depended on peat and turf for household fuel. He describes the descendants of Native Americans in the town of Gay Head being amongst the last to use peat fuel in that part of the USA. By the late 1800s, the availability of cheap anthracite coal led a move away from peat. The decline in peat use – which was free except for the cost of collecting, was the availability and low price of coal. The first commercial extraction and processing of peat fuel in the USA was in 1902, when a strike of the Pennsylvania miners caused a fuel crisis (Soper & Osbon, 1922). However, in the USA for example, during the First World War, there was considerable interest in a move from coal and wood to peat or turf as domestic fuel. Turp (1916) reported that little machine—

Figure 8. Peat as fuel in Alsace 1918
processed peat fuel would be extracted in the USA in 1915, but by 1917, there would be a resumption of operations. In 1918, Haanel noted the difficulty in obtaining an adequate and cheap fuel supply in Canada. The reasons related to war were complex and included a labour shortage in the USA that restricted coal imports to Canadian provinces. The situation was considered very grave in that fuel could be reduced or even cut off completely. The report argued for urgent attention to developing peat fuel as ‘an excellent substitute for coal’. He finishes the paper with a plea ‘... to the establishment of a peat industry on a sound basis in Canada, and thus insuring the people against a possible shortage of fuel and the suffering it would entail’. Blizard (1917) reported on the value of peat fuel for industrial steam generation, and considered that the key issue was price competition with coal. As coal prices rose, so peat would become competitive. According to Soper & Osbon (1922), the wartime coal shortages in the USA in 1917 and 1918 showed that peat fuel could be extracted and be competitive if coal was scarce and expensive. This observation is evidenced by subsequent activities and by numerous governmental and scientific reports. Whilst there is an extensive literature on the possible exploitation of peat for fuel and for other purposes that stretched back to the mid-1800s (e.g. Peckham, 1874), it is clear that in both the USA and in Canada, war and other crises triggered new interest. Following the fuel shortages in the early 1900s, there are numerous reports on resources in the USA and then in Canada (e.g. Nyström & Anrep, 1909), and then more during the war period (Turp, 1916; Anrep, 1914, 1915, 1918; Blizard, 1917; Haanel, 1912, 1918). Fullerton in 1906
asks whether in the event of another coal strike, ‘Is there no fuel but coal?’ He then turns his interest to the possible exploitation of peat fuel to alleviate the risk of coal-dependence. Further interest is obvious during the Depression years (e.g. Auer, 1930; New York Times, 1918), and then again during and after the Second World War (Trefethen & Bradford, 1944; Leverin, 1943).

During the Second World War, fuel shortages became critical and Leverin (1943) noted that ‘Prior to the war, the Canadian production of peat moss was small and Canada and the United States obtained their supplies chiefly from Europe. When these were cut off, the industry in Canada began to expand and since the commencement of the war many plants have been brought into production. The output is fairly large and is mostly exported to the United States.’ In this case, the main uses of the peat were other than for fuel, and included stock feed, building insulation, peat pads for asparagus growing, metallurgy, preserving food in the home, packing foods and other materials, and as a deodorant and disinfectant for cess pools and earth closets. Leverin also notes the use of peat moss for surgical dressings, but he is considering peat rather than sphagnum moss itself. He states that the ‘Peat moss and particularly fibrous peat from Eriophorum (cotton grass) specially treated, makes very good surgical dressing, and was used during the war of 1914-1918 by the armies of the Allies and the Central Powers. The United States army used 600,000 pads made of moss obtained from the bogs in that country. It was found to be an excellent substitute for absorbent cotton. A similar material made in France, known as peat batting or peat wool, was used widely during the war for bandaging. It was also employed as filler for mattresses, pillows, and for upholstery in the military hospitals.’ Some of these materials to which Leverin refers, are clearly peat products but the US army pads were almost certainly processed sphagnum moss.

Leverin goes on to note other potential war uses as a substitute for materials that were in short supply. Examples that he quotes included cork for the insulation of aeroplanes, as linoleum filler, and as peat yarn for making coarse blankets for both horses and cattle. Peat fibres were mixed with wool to make underwear, which, due to the insulating properties of the peat, was apparently warmer than pure wool. Additionally, peat was used to manufacture paper, cardboard, building bricks, sweeping compounds, and various chemical compounds such as waxes, dyes, alcohol, and dyestuffs. Wartime manufacture of paraffin could be added to Leverin’s list. Swinnerton (1945) provided a detailed account of the peat industry in Canada by the latter stages of World War Two.

**The Irish Question**

The Irish Department of the Environment has a useful website with background information on the peat industry and its history. Traditional peat cutting has been of huge importance to the Irish people and cutting for domestic fuel has caused the greatest decline in
Figure 10. Clothes from peat fabric
Northern Ireland peatlands. With the demise of native woodlands, peat became the major source of fuel in Ireland during the seventeenth and eighteenth centuries. Rights to cut peat on small plots of land, known as turbary rights, were allocated to landowners. Traditionally peat was cut by hand using a special turf-spade known as a sleán or slane. Interestingly, hand-cut turf production in Ireland reached its peak in 1926 when over six million tonnes of turf was cut. This follows the First World War, the Irish Troubles, and is during the Great Depression.

Over the years, the amount of turf cut declined steadily until World War II, when peat again became a vital domestic fuel source again as the supplies of coal from Great Britain almost ceased. The deep peat in raised bogs and the extensive areas of blanket bogs were cut extensively.

The use of fen peat as a source of fuel, known as mud turf, was less common because the peat is very shallow and cannot be cut with a spade. Instead, mud turf is gathered by digging a hole and mixing water with the peat, then trampling or ‘puddling’ it with bare feet, shovelling it onto the bank and finally moulding it into blocks by hand. This was a very labour intensive process and was only practised in a few areas, such as Brackagh Moss in County Armagh. After the War, the low price of coal and oil kept peat cutting to a minimum, and by the 1970s, the annual production of peat was down to about a million tonnes, mostly from the blanket bogs in the west. However, the introduction of tractor-drawn auger machines during the 1980s increased the amount of peat cut again. Since then mechanised peat extraction has become the norm in Northern Ireland and the tradition of hand-cutting turf has almost disappeared.

In Northern Ireland 77.5% of raised bogs have been cut for fuel. The majority of peat cutting was for domestic purposes, but the relatively limited commercial extraction for fuel has had important local effects. Commercial extraction needs planning consent, but the complexity of land ownership and turbary rights sometimes makes the distinction between commercial and domestic cutting difficult to determine. This brief description of the situation in Ireland demonstrates the impacts of utilisation, the variety of approaches, and the potential effects of war and other socio-economic stresses.

Landscapes destroyed: war and the English Fens

With the outbreak of WW2, there was an upturn in British central government interest in farming improvement and drainage. In the Fenlands, as I describe in ‘The Lost Fens’ (Rotherham, 2013), the land around Wicken Fen in Cambridgeshire was acquired by the pioneering horticulturalist, Alan Bloom. By the spring of 1940, Alan Bloom was considering ambitious plans. ‘There were other more or less waterlogged and inaccessible parts of the Fens, and why should I not try to get a few people together with money to invest, and make
a big thing of this reclamation job?’ His scheme did not get much support but it was a hint of things to come, and by June 1940, he was investing in a caterpillar tractor to allow access onto wet and difficult land. Bloom goes on to describe how in his view Priory Farm had become a battlefield on which the forces of dereliction had paused in their encroachment on the farmed land. In fact for years, the advantage had been with ‘wilderness’ and nobody could farm against water, but now the tables were turned. The plough was going on the offensive and on the one side ‘swamp’, was deliberately encouraged because it gave sanctuary to wildlife. On the other side, there was farmland, its aim, food production. The level of water in the dykes, which divided the two, determined which would prevail, and with flat land on both sides of the drain, there was no possibility of compromise. This very personal account begins to give us an insight into the processes and drivers at work in this bitterly contested landscape. Bloom felt that he had got to ‘fight the National Trust, or rather, I supposed, the local governing Committee……, men with mainly academic interests. They could not see things in the same light as those whose interests were agricultural.’ The final stage seemed to be set over the potential to bring into cultivation around fifteen acres of the flooded lands at the request of the War Agricultural Committee. However, this scenario quickly changed when it was decided at a higher level that Adventurers’ Fen would actually be used as bombing target; both Bloom for Priory Farm, and the National Trust for the nature reserve, received the appropriate requisition notices. Then the situation changed abruptly again and the requisitions were cancelled. In August 1941, the Biology War Committee presented a Memorandum on ‘R. frangula as a source of charcoal for munitions’, to the Joint Committee of government research organisations. This plant was Rhamnus frangula or R. catharticus, the Alder Buckthorn, and long known to provide fine grade charcoal needed for explosives. Unfortunately, it is uncommon in Britain and with maritime blockades overseas supplies had been halted and so this was an urgent matter of national security. Because of the report a survey of the distribution of the species was commissioned (November 1941), and it had been found on Adventurers’ Fen. This brought a temporary stop to the reclamation work as Bloom and other farmers were commissioned to clear scrub and selectively harvest the Alder Buckthorn, and for this the National Trust got paid. Essentially the work involved cutting or coppicing the Buckthorn and it was anticipated that it would take at least three years for any significant re-growth. However, within a few months, the Buckthorn was all cut out and the War Agricultural Committee was fretting over the state of the Fen, anxious to bring it into cultivation. The proposal was now for the entire two hundred and eighty-six acres of Adventurers’ Fen; the rules of engagement had changed: ‘…..the Catchment Board engineers and officials, the overseers and their men –
were of the opinion that Adventurers’ Fen could be and would be drained.’ Apparently, some of the local farmers were still against the scheme saying that it would be a colossal waste of money and would not work. However, the battlefield was soon to receive a visit from the chairman of the War Agricultural Executive Committee, and then not many months after, by the King and Queen and their entourage. The War Agricultural Committee had already begun work on reclaiming the southern part of the Adventurers’ Fen prior to March 1941, and the hope was to be cropping the whole site by summer that year. Apparently, the Catchment Board men had already deepened the drain to the immediate north of Rothschild’s Thirty Acres, and the impact in lowering the water-table was considerable for some distance inside the reserve; for Bloom this was a good sign. Apparently, across the Fen the National Trust had done a thorough job of making a swamp with not a drop of water allowed to run into the drainage system. The water could only drain away very slowly and the consequent impact was to render the site exceedingly wet. This was good for the purposes of conservation but was regarded as a major hindrance to those wishing to shed superfluous water from the Burwell Fen and surrounding lands. The first job was therefore to dig out and clear all the dyke outfalls into the ‘interline’ and the old main drain, and then to drain off the surface waters to allow ploughing on land adjacent. Major new drains, ‘new dykes – in long straight gashes’ were cut across the ancient landscape to release the pent up waters. As Bloom wrote ‘It was sheer delight to watch that water running full pelt from seven or eight points along the boundary of the Fen out of those grips we had been digging’. After a drying breeze for a few days, they could begin the process of burning off the surface vegetation, and the end of an era was finally closing in on the Adventurers’ Fen. Lighting just a small pile of Sedge litter, the flames burst up as if the area had been doused in paraffin.

‘The flames crackled and licked the lower growth, and ran up the bare, hard reed stems to consume first what plumes remained over winter, leaving them twisted and burnt like spent match sticks. All beyond became hidden in smoke, mounting, swirling higher and higher, black at first but turning a rusty-white against the background of blue sky. Out of the smoke bushes came into view, blistered and gaunt as the flames swept on. ..... the smoke ..... seemed to be hundreds of feet up in a billowing cloud.’

The result was clear within less than thirty minutes, with the Fen changed completely in appearance with the dull buff-grey turned to black, and except for occasional reeds persisting in damp turf pits, the charred bushes and smouldering sedge hassocks were all that remained. Bloom and his companions grinned through their blackened, sweaty faces as they surveyed their victory over ancient nature. The cultivation costs were grant aided at £2 an acre plus the cost of ploughing. Half of the grant was to
cover costs and half went to the landowner or farmer. The tenancy on this land was to run for three years after the end of the war, the same as the power of the War Agricultural Committee. However, as Bloom admitted, it was clear by later in 1942 that the costs of the work had been significantly under-estimated. But as he said ‘......there was nothing I could do about it. We had our work cut out to get the two hundred and eighty-six acres cropped by 1943, let alone 1942’, and this despite a colossal investment of public money and a huge effort by Bloom and his colleagues. It was shortly after this time, that King George and Queen Elizabeth, the Minister of Agriculture, the Duke of Norfolk, and Mr Tom Williams MP, plus a huge number of pressmen visited the area to inspect the efforts to feed the landlocked country. They were no doubt impressed. This was just the sort of stirring stuff that the country needed.

By February, the area was losing a massive amount of the topsoil and the losses got progressively worse through March. Nevertheless, the land was soon sown with oats and barley, plus beet and potatoes. With dry weather, there was the ironic spectre of a drought. The solution was to get permission from the Catchment Board to abstract from Wicken Lode; action that would certainly have drawn down the watertable on the remaining nature reserve fen even further. In May, there was an even worse gale which swirled up great black clouds of dust from Swaffham, Waterbeach, Soham, and Isleham, giving the sky ‘a queer, dark tinge for hours’. This was apparently the worst ‘blow’ for years, a certain result of the War Agricultural Committee’s efforts. Dust settled across a wide area and was reported from homes in Bury St Edmunds over twenty miles away. The ancient fenland, robbed of its water, was now just blowing away. A further complication of the wind-blow was the infilling of dykes that needed to be re-dug, and the replanting by some farmers of the same crops two to three times. Nevertheless, that summer they were harvesting wheat and barley and plenty of sugar beet. The best crops of all seemed to be off Rothschild’s Thirty Acres nature reserve. By the end of 1943, Alan Bloom’s initial work was done and the land was moving towards intensive, industrial agriculture. As he says: ‘Adventurers’ Fen and Priory Farm had proved that crops equal to any other black fens – and better than some –could be grown. Those ideas and hopes, that for so long I’d been pushing back into the pigeon-holes of my mind, could now begin to emerge. More complete fertility, extended mechanization, more and better buildings, a thorough livestock policy, alternative leys to give some of the much-cropped land a rest in turn.’

He goes on to consider how the improvement of these three hundred acres had cost the nation so dear, but it was the country’s fault for neglecting the land in the first place. It was, he felt, the fault of the previous generation and the intensive two years was simply making up for time lost twenty or thirty years before. But he was looking towards what he felt was the permanent
recovery of agriculture in Britain and an end to the neglect. He saw signs that ‘...the welfare of the land must in future run parallel with that of the nation’, and the main thought of millions of people ‘...was that cheap food, abundant in quantity and variety, is the only thing that matters’.

Therefore, this was the vision that oversaw the final demise of the ancient fenland in the southern area. Little did he realise how rapid mechanisation and agri-industrial development, spurred on by the post-war zeal to be self-sufficient in food, subsidised by the public purse and petrochemicals would totally transform the landscape and the communities. These factors would make all of Alan Bloom’s vision come true only a hundred times bigger. However, perhaps too, he did not foresee or approve of the loss from the land and the villages of the families and communities that for generations had been there. His vision was of vibrant communities living and working around the farms and learning to love the land and the landscape. If only he had known......Alan Bloom, MBE, plantsman, was born on November 19th, 1906, and died on March 31st, 2005, aged 98 years. He was one of the great pioneers of British horticulture in the middle to late twentieth century. His vision and passion drove the move to reclaim what he saw as the derelict and wasted fens for the good of the nation. I would have loved the chance to ask him what he felt about them looking back from the following millennium.

The last of the old fen

Not long after Bloom’s wartime account, that most prolific of countryside writers James Wentworth-Day wrote his ‘History of the Fens’. As with much of his work, Wentworth-Day writes from the gut, full of incisive observation and passion. He was raised in a thatched farmhouse close by the Fens that Bloom came to ‘improve’, and his ancestors had lived there for generations before. Here he experienced:‘.... in the witch-hours before dawn, the smell of the fen. A strange indefinable smell, scent of reeds and peaty waters, of sallows, and meadowsweet, of rotten lily pads – and of fish. That smell of freshwater fish which is penetrating, ineluctable, indefinable. An old, strange, blended smell, a smell as old as Time, compounded of scents that belonged to an untamed, undrained England, the England of the Saxons’.

He goes on to describe the whimper of wild ducks’ wings at night, with the thin whistle of the teal, and the pig-like squeal of water rails. There was the kerk-keek and ker-erkk of moorhens moving from lode to lode at night, and then the br-oomp-oomp, hollow and ghostly of the bittern in May and June. These were the quiet chorus of secret voices of the fens during the ‘manless’ hours and carried on the soft fenland breeze. This was the fen of Wentworth-Day’s childhood, and by the end of his life reduced to just the rump of Wicken Sedge Fen; all else was gone. However, whilst Wicken remained undrained, it was, as Wentworth-Day observed, not
unchanged. ‘Still a place of dense reed-beds, of sedge jungles, of forests of sallow bushes and creamy oceans of meadowsweet. But the old village proprietors, the fen owners, who each had their few acres of the wild fen, where they cut their reeds, mowed their sedge, and speared their eels, have sold out.’

He noted that the National Trust now owned the Fen, almost to the last acre; cutting neat grass rides and placing signs on neat white posts to tell you where to go. Nevertheless, the villages had changed too; the mud and thatch cottages tumbled down back into the earth from which they came. They were replaced by ‘hideous villas of staring white Cambridge brick, with their grim, unsmiling roofs of alien slate, under which no swallows nest, on whose rooftrees no starlings whistle’. It was the same in all the villages around in Wicken and in Burwell, they were ‘……divorced from their brown and smiling mistress, the fen. And the villages are the poorer’.

In 1935, Wentworth–Day bought a part of the old Fen ‘….a half-drowned, stinking swamp of disused peat diggings, red-beds, and interlacing dykes’. He stopped up the drains to hold back the winter flood-waters on the land and the meres were instantaneously re-created. This miniature oasis close to the remnant Wicken Fen, in a very short time, drew in huge numbers of wildfowl and an amazing diversity of water-birds both common and rare. Wentworth-Day recorded pintails and goldeneye, common and arctic terns, six cattle egrets and a great white egret, mallard, teal, garganey, gadwall, shoveller, curlew, curlew-sandpiper, green sandpiper, common sandpiper, greenshank, a yellowlegs, bar-tailed godwits, ruffs and reeves, little grebes, common snipe and great snipe, and much more. He had starlings coming to roost in flocks half a mile long and a hundred yards deep. There were even nesting black-necked grebes. Hen harriers and marsh harriers swept over the reed-beds and Montagu’s harriers bred there. ‘A wild and lovely place, which dwells in the memory as a very perfect picture of the older England, the England of Hereward the Wake and St Guthlac, the Saxon hermit.’ On Wentworth-Day’s little fen ‘Coots clanked, ducks splattered, snipe drummed, pewits wailed, and the redshanks sprang on flickering wings, ringing their carillon of a thousand bells’, and up to 50,000 sand martins swirled in massive migration roosting flocks. It was, in just this few hundred acres of Adventurers’ Fen, ‘….the old spirit of the Great Fen that once covered half Lincolnshire and Cambridgeshire’, but destined not to last long. The war came along and then:

‘They drained the fen with a great clamour of bureaucratic self-praise. The waters went away and the fish died by the cartload. The reeds stood rustling and dry above the black mud. Then they set fire to the reeds, and for a day or more my secret fen roared and crackled in a tawny yellow, red-hot sea of flame. Great billowing clouds of black smoke rose up and polluted the blue skies and swept away on the wind until dust,'
ashes, and smoke fell like a grey pall on the roofs and the green heath of Newmarket, away on its windy upland.’ The duck rose up and were away, and the moorhens, rails, bitterns, warblers and others too. When the wind blew the dust, smoke and ashes away, all that was left of the secret fen was ‘…… burnt and black and scorched. An insult to the high fen skies. An altar of burned beauty. A sacrifice to man’s neglect of pre-war farming, a burnt offering to humanity’s failure to live together in harmony. And thus, in a funeral pyre vanished the last and loveliest remnant of what had been a recreation in all its wild glory of the ancient Fens of Eastern England.’ He had bought the fen ‘… to preserve it, to save for all time the essential Englishness of it, to love and enjoy the sight of birds and clouds, the wind in the reeds, herons fishing in summer shallows, gulls wheeling against May skies, the sting of winter sleet …..’. Now however, it was no more and Wentworth-Day questioned the wisdom of it all.

‘Is the world any better for this change in my fen, or in the ten thousand acres of other fens which they have drained, burned, grubbed up, and cultivated during the War? Materially, yes. Spiritually, no. Economically, again no. Those are the answers in a nutshell. On my fen they spent thousands of pounds in expensive drainage, in constructing concrete roads which will probably crack, sink, and become derelict in a few years. The bill for our County Agricultural Executive Committees is estimated to be in the neighbourhood of £25,000,000 a year. Do the Committees grow £25,000,000 worth of food each year? The answer, I think, is no.’

The war had brought a brief reprieve from total destruction for the harvesting of the alder buckthorn, but ultimately the fate of the Fens was sealed. In the wider landscape, the arable production from the old fens rivals the best in the world, though of course it depends on massive inputs of petro-chemical fertilizers and fuels. It is arguable as to whether the wartime ‘improvement’ of the relict fens produced much at all from the substantial investment.

**Landscapes transformed: fuel allotments and common rights:**

*Frimley Fuel Allotments, Surrey*

**The background to Frimley**

The development and roles of fuel allotments were discussed in an unpublished conference paper by Rotherham (2005). A good example and one particularly affected by military use, is that of the Frimley Fuel Allotments Charity, founded in 1801, and has been particularly well documented. The account provides a unique insight into the provision of the upkeep of the poor at the time of enclosure. The Fuel Allotment Charity owns land on which the Pine Ridge Golf Centre is built, along with around 100 acres of open access heath. The Charity was established when Parliament under George III passed the Frimley Enclosure Act in 1801. The common was physically enclosed in 1826 and a portion set aside to provide ‘Fuel for Firing’ for the poor of the
Hamlet of Frimley. The history has been documented in detail by Wellard (1995) and provides a very interesting example case study. A perhaps unique aspect of this has been the wealth generated by the arrangement of the golf course on a part of the land holding; generating an income of £65,000 per year in the 1990s.

In 1793 the extensive ‘wastes’ of Frimley had only a small population (905). Almost all of the modern settlements of Camberley, Frimley, and Frimley Green were built on what was then an expansive tract of open heath, including Frimley Heath, Cow moor, Bisley common, Pirbright Common and Chobham Common. The area was covered by gorse or furze, heather, scrub and sparse grass. It had abundant deer but provided poor grazing for sheep. Commoners held rights to cut turf or wood, and to fish and to pasture cattle. The 1801 Act allowed for the dividing, allotting, and inclosing of the waste grounds and commons and commonable lands within the Manor of Frimley in the Parish of Ash, in the County of Surrey. By 1820 the parish workhouse was established on part of the Fuel Allotments site and this housed nineteen paupers. Throughout the late 1700s and early 1800s, the Frimley overseers dealt with the practicality of helping the poor of the parish, and they were funded by a levy of a Poor Rate on the parishioners. This might be money, clothing, food, or fuel. In some cases the poor might, if not infirm, be employed. According to Wellard (1995), this might include physical labour such as cutting turves for fuel, digging graves, or extracting stone for building. Turf was cut on the common waste of which much in Frimley was peat moor and not enclosed at that time.

At the time of enclosure the Act stipulated that ‘...such part of the waste Lands of Frimley as in the judgement of the Commissioners was adequate to provide a reasonable supply of fuel for those inhabitants of the Hamlet who did not occupy lands or a dwelling of an annual value of more than Five Pounds.’ In effect all agricultural labourers, cottagers, and small tradesmen would qualify for fuel from the ‘Firing’ Allotments. Many were poor due to changing urban and rural economics and the demise of small rural crafts and industries, the aftermath of the Napoleonic war, and the rising price of grain. Areas of land were specifically set aside for this purpose. Along with the right, for those qualified under the Act, to take fuel away, the Trustees were empowered to lease the whole or part of the allotments to any person they thought would be suitable as a tenant for a term not exceeding twenty-one years. The rent was to be paid quarterly and on expiration, the tenant would have to leave the land in good condition. The Trustees had to ensure that they spent the money raised on the purchase of ‘fuel for firing’ under the £5 qualification.

The cost of providing fuel was not too great when the bulk was wood or peat. However, as these declined and coal became the more commonplace fuel, the costs increased. The situation was becoming acute by the early 1860s
when an offer to purchase some of the land from the Trust was made. With permission from the Charity Commissioners, the sale was allowed and the money invested. The Charity Commissioners also provided future guidance on the management of the Trust at various times. This allowed for example a waiver in the interpretation of the original Act to provide fuel, to ‘When not required for the purchase of fuel shall be laid out by the Trustees in the purchase of warm clothing and blankets to be distributed by the Trustees at their discretion to the deserving poor resident in the parish of Frimley.’ So fuel was the first priority but warm clothing and blankets could qualify. Those residing in properties valued under £5 already qualified but there was discretion to allow others too. According to Wellard (1995) there followed a series of disputes over the allocation and interpretation of rights allowed under the 1801 Enclosure.

By about 1860, the poor were burning coal along with wood and peat, and money was required. With a total income of around £30 per year from rents and investments, the outlay on coal was about £1 a ton with a quarter of a ton per person per year. For clothing expenditure, a blanket was about 3s (15p), a pair of shoes 12s (60p), a petticoat 5s (25p), and a pair of trousers and a man’s coat a £1.

By 1894, the Frimley Urban District Council was formed and after four years, the Fuel Allotment Charity’s Trustees passed over responsibility for the Fuel Allotments to it. By the early 1900s, the Council was looking to sell the land and extinguish the rights, and to purchase land for a Recreation Ground elsewhere. The Charity Commission turned down their original proposals as unacceptable. However, combined with a military use of the recently enclosed common now purchased by the army, it did prove acceptable. This also allowed for the maintenance of heath and for the cutting of furze fuel.

The military connection

The British Army was seeking a large area of land for training and close to London. With new developments in warfare and military strategies, a location were large-scale encampments and extensive training trenches could be constructed was essential. In 1902, tentative go-ahead was given for detailed discussions with the War Office. Subsequently, the agreement was approved and signed; bringing an income of around £140 per year. Along with this the Charity Commissioners provided a ‘Scheme’ of guidance for the Trustees now in the Council in the administration of the Fuel Allotments Charity; and this gave the rules by which the area was managed from then on. In 1904, 112 people or families received the Christmas coal allocation in Camberley and Yorktown (30 tons), and another 120 in Frimley, Frimley Green and Mytchett (19 tons), at a total cost of £50. By 1909, the annual income was around £200, equivalent to around £20,000 at 1990s values. Not everyone received the same allocation of coal with amounts varying from 2
cwt to 6 cwt. In 1914, there were 327 recipients with 360 paid at 25s per ton. Records over the following period until the 1940s have been lost.

There were serious disputes over the rights to allocations and conflicts between ‘rights’ to take sand and gravel from the land. This was hard to assess or to police effectively and caused significant nuisance. One of the more interesting observations is that many local residents still assumed a right of common over the area even though the common had long since gone and the remainder was endowed to a charitable trust. This caused confusion and resentment. This applied particularly when the army took over the lease. Restrictions on sand and gravel were clearly displayed but none were stated about any rights to take firewood or to cut trees. Some were allowed to do this with the agreement of the trustees; for example, Mr Pearce a broom maker could collect brushwood for his trade. Permission could be granted by the caretaker for the occasional taking of trees, with no more than two allowed each year. However, the uncontrolled and indiscriminate cutting of far more than this (up to eighty on one occasion) was causing serious damage.

In 1914, with the outbreak of war, the use of the Allotments for training necessitated the digging of several miles of trenches and the removal of around 1,000 trees to give the impression of a French battlefield. This was combined with the impact of a prisoner of war camp lacking sanitation and generating foul smells across the whole area. At the conclusion of the war, the army compensated the Council for its losses and began a re-planting programme. By
1939, although the price of coal had increased, the income and expenditure of the trust were almost the same as in 1909. The Second World War brought more military training and usage of the Allotments. By the 1960s, with an annual income of £450, there were continuing problems of maintenance of the Allotments and the other assets of the Trust, and in 1967, permission was given to sell part of the site for the building of a County Council school. With increased revenue, the council began to establish partnerships with other local charities to further the aims of the trust and to dispense the awards. Therefore, at this time around £1,255 was given as £5 fuel vouchers, £2,000 for the support of old people, and £750 for other charitable purposes.
Frimley in the modern era

By the early 1970s, with increasing urbanisation, the Fuel Allotments were one of the few remaining open spaces in the Urban District, and they too were under pressure. Alongside pressures to develop was the idea of creating a golf course over the land. At this point, the Charity Commissioners reminded the Council quite forcibly that the Allotments were for the specific charitable benefit of the poor of Frimley Parish and not for the general benefit of all residents. Capital raised from any land sale could not be used for wider recreational or social welfare purposes even if charitable. The debate continued as to whether the Allotments in their entirety should be made Public Open Space, or should some areas be sold off to provide income for the future. At the same time the Local Government Act of 1973 established the new Borough of Surrey Heath from the earlier Councils, the M3 motorway was constructed close to the district and the population rose by 20,000 people in less than fifteen years. With the departure in 1973 of the military presence on the heath, the go-ahead was given for the design and construction of a municipally owned golf course on 210 acres of the Fuel Allotments. However, the whole issue was clouded by suggestions of exchanges of land for housing development and the loss of large areas of currently open heath with public access. There was significant local community objection, the Charity Commissioners were alerted to the concerns of local people, and the scheme was shelved in 1976. However, in 1979, the Council received permission to go ahead with a Local Authority owned golf course on 120 acres with 160 acres left as free public access. There was by now a deep-seated conflict between local people who demanded the unfettered use of the area as ‘common land’ which it had not been since the early 1800s, and those who saw the main function as raising funds to dispense to the poor and needy of Frimley Parish. There also those interested in the development opportunities that would inevitably arise should planning consents be granted. In the face of these conflicts, the Council established a new charitable body to oversee the future of the Frimley Fuel Allotments. This came into being in 1983.

By 1985, it was decided that the Council was unlikely to proceed with the golf course proposals. The Trustees therefore decided to move independently and seek a developer interested in taking this forward. The result was that by 1986 there were heated public meetings to discuss the options and the future, with angry exchanges between ‘dog walkers’ and those interested in the charity income. From these debates, there emerged several developers wishing to pay several millions of pounds for the opportunity to develop the golf course and varying amounts of housing. Delays of at least two years in deciding on the issues by the Charity Commissioners were estimated to lose around £90,000 of charitable income to be distributed to the poor of Frimley.
Eventually, after further debate and protest, permission was granted in 1988, to begin work on the new golf course. The developer funding the scheme would also pay £100 per acre in annual rent plus 8% of the gross income from Green Fees and the Driving Range. This was with a 125-year lease with a break clause after twenty years. The result was the Pine Ridge Golf Course extending over 164 acres of former heath, leaving 98 acres to free public access. Reluctant to employ an officer to manage the remaining area, as ‘it would be a drain on their charitable resources’, and with the Council unwilling to pick up the cost, the Trustees cast around for a suitably qualified volunteer. However, on a positive note the Frimley Fuel Allotments Charity was by 1994, dispensing around £60,000 per year to the needy of Frimley Parish, and this still included the elderly needing assistance with fuel bills. This story provides a well-documented example of the military training use of a peatland site, and the intensive use by the army was a key aspect in the changing landscape and the loss of the common.

Peatlands in the European theatre of war

Peat use was important in many countries of northwest Europe, particularly in Germany, Holland and the other Low Countries, as well as further east into Poland. The French situation was discussed by Rotherham & McCallam (2008), and makes an interesting case study. In 1869, France exported 321,000 tonnes of peat at 10 francs 20 cents per tonne. Comer & Lordier (1903) detail fuel usage and resources in France at the turn of the nineteenth century, but by 1914, the amount was insignificant (Berthelot, 1941). In the early 1940s, there was renewed interest in the industrial exploitation of peat as fuel and for chemical extracts. This focus on peat turf as fuel during times of shortage or of adversity was noted for regions such
Figure 15. Low country defence
Figure 16. WW2 German soldiers crossing a wet field

Figure 17. WW2 German vehicles mired down

Figure 18. Sea floods Holland by Germans
War & Peat: the History, Archaeology & Ecology of the Military Heritage of Moors, Heaths, Bogs and Fens

as Scotland, Canada, and the USA (Rotherham, 2005) and the situation in wartime France was a similar response to crisis. The inventory of French peat resources at the time suggested around 1,200,000 hectares available for exploitation as valley peats, marine peats, lowland plains peats etc. The report in La Nature (1941) concluded that in its peat reserves France had a resource to be exploited to help reinvigorate its economy. By 1980, France’s annual peat production was 50,000 tons for fuel and 100,000 tons for horticulture, half that in the UK (Bord Na Mona, 1985).

However, a major role of peat bogs and wet landscapes was in the actuality of warfare and the strategic approach to the battlefield. This ranges from the important of a line of massive peat bogs that separated Holland from its potentially aggressive neighbour, Germany, to the strategic flooding of worked peat cuts and polders by the Allies to slow the German advance in WW2. The conquering German forces also broke the dykes in order to flood and destroy Dutch food production. As noted in The Stars and Stripes on Monday October 30th, 1944, bogs and muddy conditions hindered both offence and retreat, as the feeling Nazis were bogged down in the Dutch landscape.

Particularly in WW1, bogs, marshes, fens, mud and peat, were immensely important. The Somme, Flanders and other major battlefields were in generally flat or rolling landscapes dominated by bogs, rivers, marshes and farmland, which quickly degenerated into fields of mud as the conflict developed. This is described in detail by the seminal volume by Johnson in 1921, and is a theme worth exploring further.

One final impact of conflicts on peatlands has been the migration of skilled workers and the application of prisoners of war, to the reclamation of bog and fen. In the 1600’s, as I describe in the Lost Fens and in Yorkshire’s Forgotten Fenlands, Huguenots and Walloons, escaping Catholic persecution came to England’s fenlands and helped in their drainage. Prisoners of war from
Dutch and Scottish conflicts with the English were put to work on this task, and many of them died in the process, buried in the soft, peaty soils by the drains they had dug.

To end the chapter, there is a further remarkable story of peat and conflict. This is the recapture from the Spanish, of Breda in the Netherlands during the Eighty-Year War, which used a Trojan Horse-type plan. However, in this case a turf barge in which seventy soldiers were concealed replaced the wooden horse and on 25th February 1590, was left for the Spanish to take inside the fortress. The ruse was successful and the vital fortress of Breda fell to Maurice of Nassau, Prince of Orange. The Dutch recall the victory as the ‘Turfschip van Breda’.

Conclusions
This short review of the relationships between peatlands, people, and conflicts of various sorts, establishes the nature of the interactions and the fact that they have been important in various places and at different times throughout history. The research so far, also indicates that much of the knowledge and heritage relating to these uses or interactions has been either lost or forgotten. Most historians and experts on military issues have had little interest in peat or wetlands, and few ecologists are knowledgeable about history or warfare. Furthermore, the evidence presented is that peatlands writ broad, from bog and moor, to heath and fen, were not only landscapes of conflict but were often contested spaces, if not militarily, then socially, politically, and economically. The exploitation of peatlands and their resources were also
influenced immensely by conflicts and stresses, from economic issues to poor weather. In times of resource shortages, the versatility and abundance of peat led people to explore a remarkable diversity of uses from chemical extractions to manufacture of fabrics. Yet in a little over a hundred years or so, even the memories of these uses have been forgotten.

The peatlands were seen as both ‘waste’ lands for which almost any use was an improvement. They were also considered virtually inexhaustible. However, a century or so on, most areas in Western Europe and the Eastern USA for example, have been almost annihilated. It seems that through the interactions described, landscapes have been transformed and ecologies altered, often radically, but the phenomena have yet to be appreciated.

Finally, as a stage for the theatre of war in many conflicts, peatlands were crucially significant. Nevertheless, despite their sometimes-obvious importance such as in World Wars One and Two, historians just don’t see it.

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**Figure 22.** Scotch regiment resting in the mud of Flanders WW1 sold in aid of the YMCA Hut Fund to provide shelter and recreation for our soldiers
Figure 23. Peat as a substitute for coal
**Sphagnum: the healing harvest**
Thelma Griffiths, Ian D. Rotherham¹ & Christine Handley²
¹Sheffield Hallam University, ²BaLHRI / SYBRG.

**Abstract**
*Sphagnum* Moss or Bog Moss as it is sometimes known has been used for millennia for medical and sanitary purposes. This paper introduces the general uses and properties of *Sphagnum*. It then looks in more detail at the harvesting and processing of *Sphagnum* as part of the war effort during World War One. Finally, the timeline is brought into the twenty-first century with modern usage. Most of the work in the paper is based on research carried out by Thelma Griffiths whose interest in the subject came about through work at the Longshaw Estate, near Sheffield. The local connection with the *Sphagnum* ‘industry’ will also be explored.

*Keywords: Sphagnum, World War One, Medicine*

**Introduction**
*Sphagnum* moss species are major peat forming plants, which grow in wet, boggy places and often form large mounds or cushions over the surface. Over the years, if undisturbed these mosses are responsible for deep accumulations of partly decayed material, which slowly helps to form a peat layer. The moss is made up of minute tubes and spaces, giving it a structure similar to a sponge, enabling it to absorb large amounts of water. However, one of the key characteristics is that water can be squeezed out of the moss without damaging its structure, the moss can be dried and when re-wetted is able to absorb fluid once again (Grieve, 1930). The virtues of its absorbent qualities have been known for centuries and in addition, it has healing qualities having mildly antiseptic and astringent properties. These absorbent and antiseptic qualities made it an ideal medium for wound dressings as well as other uses such as babies’ napkins and sanitary products.

By the late nineteenth century, cotton dressings and cotton wool were used widely for wound dressings and other purposes. However, although cotton and cotton wool is quite effective it is many times less absorbent than *Sphagnum* and absorbs liquid in a different manner. *Sphagnum* can absorb 16-20 times its own weight in liquid compared with the four to six times of cotton. An experiment carried out at Edinburgh Royal Infirmary showed that 5lb of moss, after being pressed and slowly dried, weighed only 10oz, the other 4lb 6oz having been water (Cathcart, 1915). Instead of allowing the discharge of a wound to pass through the dressing directly above the wound as cotton wool does, *Sphagnum* moss absorbs the discharge laterally. This means the dressing is less likely to leak out onto surrounding clothes or sheets. In
addition, the moss is not only cool and soothing but also has mild antiseptic properties, not possessed by cotton. However, the over-riding advantage is that wound dressings could be left in place for up to 2-3 days without the site of the wound deteriorating. All of these qualities coupled with the shortage of cotton because of the huge demand for surgical and other dressings in the

Figure 1. *Sphagnum Moss*
World War One conflict, meant that sphagnum was collected and processed on a vast scale. This harvest is now largely forgotten.

Historical and global uses

The medicinal use of Sphagnum moss has been known for millennia. ‘Otzi the Iceman’, the five thousand year old body found on a mountain glacier in 1991 showed signs of having used Sphagnum moss to dress a wound on his hand (Dickson, 2009). There is a Bronze Age burial in Fife where it was found on the chest of a body, possibly suggesting that it was put there to dress a wound (Dickson, 1978) and archaeologists excavating the site of a broch at Howe, near Stromness in Orkney in the early 1980s found the remains of Sphagnum moss, possibly Sphagnum cuspidatum. This was just one of seventy plant species identified at the site, fifty-four of which have known medicinal uses.

An early eleventh century Gaelic Chronicle refers to the aftermath of the Battle of Clontarf in Ireland, where the wounded soldiers insisted on taking part tied to wooden stakes for support with their wounds ‘bound up with moss’. (From Joyce’s ‘Child’s History of Ireland’ published in 1910, cited Cathcart, 1915). Grieve (1930) gives an example from the early sixteenth century after the Battle of Flodden where the Highlanders are reported to have ‘staunched their bleeding wounds by filling them with bog moss and soft grass’.

The use of Sphagnum on a military-scale for wound dressings appears to have declined in the nineteenth century until its accidental (re)discovery in Germany in the 1880s. A severe wound on a workman’s arm was wrapped in fragments of ‘peat’ as there was no other suitable material to hand. After several days travelling to get medical attention, the original dressing was undisturbed and when it was removed the wound had started to heal rather than deteriorate. This prompted German scientists to investigate the properties of Sphagnum and its efficacy in treating wounds. The conclusions documented in several medical journals were that Sphagnum was an ideal material for surgical dressings. In 1895, the French War Department began using Sphagnum dressings. It was first employed on a large-scale in the Russian-Japanese War of 1904-05.

The First World War saw the greatest use of sphagnum for medical purposes but it was also collected on a smaller-scale in the UK during WW2. In December 1939, the Glasgow Herald reported that ‘Sphagnum moss picked on the moors of Scotland is being flown to Finland for use as hospital dressings’. In the early 1940s, Sphagnum was collected on the moors around Holme Moss and further north in England by volunteers. A request appeared in the Northern Rambler in June 1942 for walkers to collect Sphagnum moss, which elicited the response that the moors were ‘out of bounds’ for walkers so the request was advocating an illegal activity.
Laplanders and Canadian Indians laid dried *Sphagnum* in their children’s cradles instead of a mattress, often covering it with the downy hairs of reindeer, ‘and being changed night and morning, it keeps the infant remarkable clean, dry and warm’ (Grieve, 1930). In both Lapland and Newfoundland, it has been used for dressing wounds. The Chippewa Indians, one of the largest groups of native American people, used *Sphagnum* moss as an absorbent, for pillows, mattresses, furniture stuffing, and as an insulator to keep milk either cool or warm. Eskimos traditionally used the dried moss to pad their sealskin boots instead of socks while in China, it has been used as a cure for haemorrhoids and eye conditions.

From the late nineteenth through the twentieth century and into the twenty-first, *Sphagnum* has been used for a variety of commercial products. Peat Products (Sphagnol) Limited, an English company was in operation from at least 1899 until January 1969. During the First World War, the company’s products were endorsed by medical journals, and were advertised widely. The products were made from a distillate of peat moss and included ointment, medical soap, suppositories and shaving soap. They claimed to be a remedy for a wide range of skin diseases and the suppositories were used in the treatment of haemorrhoids. Sphagnol preparations, according to one surgeon, were ‘A valuable first aid dressing for wounds’. The company also produced veterinary preparations, and advertised in the Crufts Dog Show catalogue for a number of years in the 1930s.

![Figure 2. Sphagnol soap wrapper, dated by the Wellcome Institute 1945-1960](image)

![Figure 3. 1938 Advertisement for Veterinary Products made by Sphagnol](image)
A number of patents have been applied for since the mid 1990s for using *Sphagnum* moss for a variety of purposes. The following are some of the results produced by an internet search for ‘US Patents *Sphagnum* Moss’

- Sanitary products including a sanitary napkin, diaper, incontinence pad, wound dressing.
- Dessicant for packaging materials.
- Water and oil absorbent medium.
- Mycorrhizal seed pellets.
- Medium for binding chlorine gas.
- Inhibition of biofilm formation and removal of biofilm.

Of the above, the final item appears to be the one that has had the greatest commercial success. Initially used for home pools and spas, in 2009 the application started to be used commercially in public swimming pools in the USA. Sterilized moss is placed in containers and the water is allowed to flow through it. By limiting the growth of bacteria, algae, mould and fungus it reduces the amount of chlorine and other chemicals that are required. It is also claimed that it removes heavy metals such as iron and helps stabilize the alkalinity of the water (Horizon Pool Supply, 2011). It is also being used by at least one hospital in Minnesota in its therapy pool, which claims the use of chemicals has been reduced by 30-50%, and has also cut the number of times the water needs cleaning by 50%, saving both water and staff time, and therefore money (Health Partners Press Release, 2011).

**Sphagnum for Medical Purposes in the First World War**

**Need and Uses**

As casualties mounted in the First World War, the need for enormous numbers of dressings became apparent very early on, and an address to the Medical Society of London in November 1914 referred to ‘the great prevalence of sepsis’ that was observed among the wounded. By 1915, when both sides were experiencing heavy casualties, *Sphagnum* was already being used alongside non-absorbent cotton and gauze dressings. However, the heavy casualties being suffered by British forces at that time were threatening to exhaust the available supply of cotton and gauze. Therefore, in the same year, 1915, *Sphagnum* dressings became an official part of medical supplies and the processing of *Sphagnum* began in earnest. In 1916, it was estimated that the minimum number of dressing required per man would be thirty, and that up to one hundred million dressings would be required in a six months period (Riegler, 1989). A further major advantage of *Sphagnum* dressings were their cheapness. When manufactured by the method used in Britain, the cleaned and dried moss was simply placed into muslin bags, which were then sterilised. Muslin was cheap and nearly all the labour was supplied by volunteers (Cathcart, 1915).
The three main medical uses for *Sphagnum* were surgical dressings, dysentery pads and rest pillows or pads. According to many sources, *Sphagnum papillosum* is the species, which makes the best surgical dressings. Lower grade species were used to make dysentery pads, and the waste moss was made into rest pillows (The Queenslander, 1917).

**Surgical Dressings**
The highest quality and the greatest quantity of *Sphagnum* were used for wound and surgical dressings. Its antiseptic and absorbent qualities meant that it could be used to dress a wound in a field hospital and the dressing could be kept in place until the casualty arrived at a main hospital perhaps two or three days later. Field (wound) dressings and surgical dressings were manufactured differently. This will be explained in more detail later. Cathcart (1915) also reported on the efficacy of peat moss, the semi-decayed *Sphagnum* moss that forms a layer between the fresh, growing moss, and the lower layers of actual peat. The peat moss nearest the surface, and therefore that, which is the least decayed, was found to be the best for surgical dressings.

**Rest Pillows and Pads**
These larger pillows and pads were made from lower-grade moss. The pads were used in hospitals for providing splint supports and the pillows for supporting the stumps of amputees. The quality of the moss meant the pillows were soft and flexible and had cooling or soothing properties.

**Dysentry Pads**
The use of ‘second class’ species of *Sphagnum* moss to make dysentery pads does not appear to be widely reported, and even when it is it is usually just a brief mention, as if it is of little consequence. However, due to the appalling (non-existent) sanitary conditions encountered, dysentry was rife amongst the troops. At Gallipoli, of seven battalions of Anzacs examined, 78% were found to be suffering from dysentry (Waugh, 2001) ‘They were in a terrible state, all suffering from dysentery and enteric. Their insides had simply been turned to water, and all they had been able to do for them on shore was to tie their trousers tight round their legs with pieces of string. …’.

The circumstances which caused dysentery included ‘the swarms of flies and the magnificent collection of dead Turks between the lines’ ….. ‘…flies … simply billions of ‘em everywhere. … All around in the open lay our own dead, whom no one could approach to bury by day or night, for to climb out of the trench even in the dark was to court disaster. … The stench was indescribable.’ (Barrett, 2007).

The connection between physical health and mental health was beginning to be recognised. Dr A F Hurst, the officer in charge of a special neurological hospital reported that in Lemnos in 1915, ‘Very few of them could hold their hands out without shaking, and they were all in a condition of profound neurasthenia. The vast majority of the men at that time
were suffering from dysentery.’ (Report on Shell-Shock, 1922). It would seem that, given the appalling physical effects of dysentery, together with the potential of mental breakdown, these pads are worthy of more than a single line because they were made from lower grade moss. If they played just a small part in making men feel more comfortable, and perhaps more importantly, enabled them to maintain just a little bit of dignity, then they fulfilled an equally important role as that of the surgical dressings.

**Extent and Volume**

It is impossible to come by an accurate total of dressings used, but a few statistics from a variety of sources give some idea of the scale of production and the amount of Sphagnum harvested:

- 22,000 dressings each month were produced in Aberdeen (Orcadian Features, 2005)
- In March 1916, the War Office requisitioned 5,000 dressings per month from Ireland, an increase of 50% of previous monthly output. Production was disrupted in April by the Easter Rising, but by May they had ‘caught up’ (Reilly, 2002).
- Between October 1917 and November 1918, Red Cross volunteers in Washington, Oregon and Maine made 595,540 dressings (Washington State History).

- When the war ended in November 1918 the American Red Cross had just completed an order for half a million dressings, and had just started on another order of one million. At the same time, the Canadian Red Cross was working on an order for 20 million dressings, and was producing between 200,000 and 300,000 per month (Riegler, 1989).

- It was estimated that an inexperienced woman could make five dressings per hour; an experienced one might make ten. It would therefore take a minimum of two million ‘woman hours’ to fulfil the Red Cross order of 20 million dressings (Riegler, 1989).

- Locally the Sheffield University Hospital Supply Depot produced a total of 85,000 Sphagnum moss dressings together with 117 moss pads (possibly dysentery pads or splint pads) (SUHSD, 1919). In addition, the depot agreed to supply 1,000 muslin bags per week for compressed Sphagnum moss dressings, which were being manufactured in Edinburgh. A total of 27,800 bags were produced (SUHSD, 1919).

- By the time the Armistice was signed in 1918 over a million bags of moss a month were being prepared and despatched to British military hospitals; the Germans used even more (Buckingham, 2013).
Gathering

The collection of *Sphagnum* moss appears to have been carried out across the UK wherever there were peat bogs, from Orkney to Dartmoor and Ireland during WW1. It was also collected in peat bog locations across the British Empire and, after it had entered the war, in the United States. The methods used in collecting and processing were sometimes different but in all cases the basic work was carried out largely by volunteers. They were co-ordinated through a series of local, regional and national depots and centres.

Collection of the moss could be done either by hand or by using a rake (Grieve, 1930). Gathering by hand must have been back-breaking work but it cannot have been easy using either method. *Sphagnum* grows in boggy conditions and often in remote locations, which were not easily accessible unless you lived nearby and were used to working on the moors. A report from The Times in 1918 describes one of the collectors from Dartmoor, ‘Often knee-deep in the great bogs and mires for miles around a man, who has devoted himself to the work, labours daily in the fair and foul weather. Nearly 5,000 sacks has this devoted worker collected since last spring.’ (Buckingham, 2013). In Ireland, Mary Pakenham (a Voluntary Aid Detachment worker) wrote, ‘Easily the most picturesque of our war activities was the gathering of Sphagnum moss from the bog. We had a special sort of two-ended sack which we hung round out necks like a stole and we went barefoot over the bog fishing the clumps of moss out of the pools. There were three sorts, brown-and-thick, green-and-straggly and the commonest and much despised third class stuff which was red-and-measly.’ (Reilly, 2002). As the *Sphagnum* was so full of water, advice was given that the moss should be squeezed out by hand as much as possible on the moor before putting it into the transport sacks. This would save on the volume and weight to be transported.

![Figure 4. Irish notice regarding the collection of *Sphagnum* for dressings](image)

In Dumfries and Galloway, the collection of *Sphagnum* moss was organised by the Reverend Adam Forman, manager of the family estate of Craigielands, near Beattock. ‘… he organised the collection and despatch of *sphagnum* moss for field dressings. … his organising powers were considerable and soon, with a battalion of Women’s Army Corps workers at his back, he was organising *sphagnum* moss for the whole of Scotland.’ (Forman, 1990)
Once at the edge of the moor, the sacks would be loaded and transported by a variety of means. On Orkney, local businesses provided lorries to both transport moss gatherers to the moors, and to take the moss back to Kirkwall (main town in Orkney).

In a memorandum written to assist the efficiency of other organisations, which gathered moss, Reverend Forman gave the following instructions:

- Camp the workers on or near the moor, with transport near at hand. Where this is impossible workers must be conveyed to and from

Figure 5. Reverend Adam Forman’s transport system of two wheeled trolley-like giant scooters used to push the sodden sacks of moss across the bog to the road

Figure 6. Kirkwall Moss Gatherers July 1917
the moors, and much valuable time and transport is expended on the journey.

- Workers should start in a line and keep in line.

- Workers should not bring their own food. It should be provided for all and be made as simple as possible. Meal times should be set, and the food made ready for the workers – a large kettle of fish is useful and beyond this, and cups, no utensils are necessary.

- All gatherers should understand that they are doing ‘essential war work’ and should undertake to carry out instructions. Where civilian and military workers are mixed, the civilians must obey orders on a par with military workers. (Fisk 1992)

In the UK there did not appear to have been any resistance on the part of private landowners to the gathering of Sphagnum moss. At this time and for most of the following century, much of the upland moors were closed to local people, used as shooting estates and patrolled by gamekeepers protecting the game-birds. However, collecting Sphagnum, irrespective of patriotic duty as part of the war effort, was seen in a positive light. Indeed according to The Scotsman, ‘Proprietors and shooting tenants would hail with pleasure the total extirpation of this moss. It is within its simple, narrow leaves that the destructive heather beetle lays its clutch of eggs. … Owing to its perennial dampness it is difficult or impossible to destroy Sphagnum by burning, and the picking of it by hand will operate potently to the benefit of game preserving’ (Cathcart, 1915).

After the United States entered the war the University of Washington was heavily involved in the collection of Sphagnum moss and the manufacture of dressings. It required all of its female students to spend two hours per week on this work (Scherer, 1918). The Assistant Professor of Botany, J.W. Hotson, wrote extensively about the collection and processing of the moss, with detailed instructions regarding the making of dressings, their labelling and packing. Regarding collection, he gave the following instructions:

- Samples of moss should be taken to headquarters and approved before collection began. Until gatherers were experienced in the work, they should carry a sample with them to compare frequently with the moss they were gathering, to ensure they were collecting the correct species.

- Quality, rather than quantity, should be the aim, and care should be taken to ensure the moss was ‘clean’, and as free from other plants and debris as possible.

- The moss bed should be worked as deeply as possible, i.e. as far down as the moss remains intact, with the stem fairly well crowded with lateral branches.
The moss should be gathered in double handfuls, and squeezed as dry as possible before putting into sacks.

Moss should be picked methodically, taking as much as possible from one area before moving on to another.

Professor Hotson stressed the importance of careful gathering, as ‘carelessness on the part of the collector may greatly reduce the efficiency of the sorter, frequently rendering otherwise useful moss absolutely worthless’. He did, however, go on to state ‘with the difficulties confronting the collector, too much time cannot be spent on that end of the work as there are a hundred persons available for sorting where there is one for collecting. There is a happy mean to which we should strive in order to obtain the greatest result with the least labour’ (Hotson, 1919).

**Processing**

Once the *Sphagnum* had been collected and taken to the local depot or collecting centre it underwent a series of processes before it was ready to be made into dressings or pads. Depending on the scale of operation the first stages could take place locally and then the partly processed *sphagnum* was transported to a regional centre for completion.

The first stage, which had begun on the moor, was to squeeze out as much water as possible to make it lighter to transport and as a preliminary to the drying process. Additional squeezing could then be carried out using a laundry mangle at the local depot. The moss had to separated out before further drying took place, carefully avoiding tearing it or breaking it into small pieces. If the moss was separated after drying it would easily become damaged (Grieve, 1930).

The drying and cleaning process varied depending partly on the weather conditions, the speed with which the *Sphagnum* was needed and the quantity being processed. Opinion seemed to be divided as to whether artificial heat should be used in drying the moss. Mrs Grieve recommended drying in the open air, but on Orkney, it was taken to the baker or the blacksmith to dry (*The Orcadian*, 1917). Hotson in America claimed that artificial drying made the moss more brittle, but also stated he saw ‘no difference between moss dried in summer by placing it near a stove and that dried in trays in an ordinary Montreal workroom in winter’. He suggested that humidity of the circulating air was the controlling factor, rather than the time it took to dry the moss. He also stressed the importance of gentle handling of the dried moss (Hotson 1919). In Scotland, the methods seem to have been combined, at least to the extent of allowing the moss to be spread out to start the process and make it easier to get rid of any debris as Vickery (1995) describes, ‘At Langholme, in Dumfriesshire, the Duke of Buccleuch’s head keeper would take us out on the hill to pick *Sphagnum* moss as part of the war effort. We would collect it in sacks, and then lay it across the lawn on
Afterwards all the bits of heather and peat, dead frogs and other foreign bodies had to be picked out of it before it could be sent to the hospital. Reverend Forman operated on a larger scale but also used the grounds of his estate, ‘From far and wide lorries drove up to Craigielands laden with dripping sacks of moss which was spread to dry on frames on the tennis courts. Then, after a number of simple industrial processes, the moss was shredded, packed and despatched.’ As Buckingham (2013) points out, many of the areas where collecting was taking place were also areas with the highest rainfall, ‘After the moss had been gathered it had to be sorted and dried, usually by being left outside in wire trestles. Sometimes the drying period turned out to be long and frustrating when, Dartmoor weather being what it is, it began to rain or a mist came down and made the moss wet again!’

After the Sphagnum had been dried and picked clean it was then ready to be made into dressings. This may have been done locally, especially if it was to be used in the local hospital, or transported to a processing centre.

**Making the dressings**

**British method**

The most basic dressings simply consisted of some moss being packed into a small muslin bag. It was packed loosely to allow for the moss to swell as it absorbed moisture. An amount of 2 oz of moss in a bag measuring 10 x 14 inches was recommended. These dressings were for use in home hospitals (Grieve, 1930).

Figure 7. Kirkwall (Orkney) ladies making dressings
For field hospitals abroad, the \textit{Sphagnum} moss was compressed into cakes and then placed in muslin bags, very much larger than the size of the cake. These were much easier to pack to send overseas. In Scotland, there was a munitions factory where a hydraulic press was used to compress the moss into cakes. Thus, the machinery ‘which one hour was moulding shell bases, was in the next devoting its energy to compressing the healing cakes of \textit{Sphagnum} moss’ (Grieve, 1930).

The dressings were then treated to eliminate any harmful bacteria. The early method of treating them was by sterilisation but this had the disadvantage of destroying some of the \textit{Sphagnum}’s absorbent properties. Col Charles Cathcart F.R.C.S, a British pioneer in the use of \textit{Sphagnum} dressings, recommended an improved method known as ‘sublimation’. This consisted of dipping them in a mercurial solution followed by squeezing out any excess moisture and then drying them.

At the processing centre in Princetown on Dartmoor, they were hung in a drying chamber of at least 90° for 24 hours. When that stage had been completed they were ready for packing, first sealing the pillows into airtight hampers made by the inmates of Plymouth Blind Institution (Buckingham, 2013).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image.png}
\caption{The USA method of making dressings}
\end{figure}
The British government also procured tons of garlic bulbs, the raw juice of which was diluted with water and added to the moss, which was then applied to wounds. Garlic is also noted for its antiseptic qualities. ‘Where this treatment was adopted there were no specific complications, and thousands of lives were thus saved’ (Grieve, 1930).

**American Method**

The Americans adopted an altogether more complicated approach as described by Hotson. He gave very detailed instructions of how they should be made which went through fourteen stages. American dressings comprised four elements; gauze, ‘Zorbik’ or ‘Scot tissue’, non-absorbent cotton, and *Sphagnum*. Zorbik was a thin sheet of wood pulp paper which was used to envelop the moss and prevent it sifting out. It was also used for gas mask filters. Labelling was also important, with information about the number of dressings and their size together with a note stamped on each bundle, ‘N.B. The cotton side does **not** go next to the wound’. Finally, the best method of packing was described. In spite of his exacting instructions, Hotson also wrote ‘do not become fussy about minute non-essential details’.

**Volunteer effort**

In the UK, much of the collecting and initial processing was undertaken by local volunteers either individuals or groups who already worked on the moors or lived in the local villages. Buckingham (2013) describes some of the effort, which the people of Okehampton made to gather the *Sphagnum*. ‘Typical of those engaged in collecting *Sphagnum* moss were members of the Okehampton Bible Class ... Other Okehampton volunteers included Mr T. Dick who gathered 200 sacksful in just two months and Mr John Durant who, by mid-1916, had collected a total of around 1000 lbs of moss, mainly around Yes Tor, using a specially made rake and walking 800 miles in the process.’

This effort was replicated across the country but even then more volunteers and groups were needed to keep up the effort. Youth organisations such as the Boy’s Brigade, Scout Troops and Girl Guides were asked to take part, as were members of the Red Cross Voluntary Aid Detachments. Such was the importance of gathering *Sphagnum* moss for dressings that in 1920 the people of Widecombe-in-the-Moor were presented with a trophy in recognition of their work.

**Local focus – Longshaw & Sheffield**

The interest in *Sphagnum* moss was sparked for one of the authors by Doris Emma Elliott, who was a VAD (volunteer) nurse at Longshaw Lodge Convalescent Hospital for Wounded Soldiers during the First World War. Longshaw Lodge belonged to the Duke of Rutland at that time and had been requisitioned as part of the war effort. The Lodge had been built by the Duke to accommodate grouse shooting parties and was situated on the moors to the
west of Sheffield in Northeast Derbyshire. The estate was sold in 1927 and the Lodge and part of the estate passed to the National Trust in 1931. Doris’s granddaughter, Beverley Hardy, attended a talk about Longshaw during the First World War, and explained that her grandmother had told her about collecting _Sphagnum_ moss for use in dressings during the war.

In many places, the collection of the moss was organised by the Red Cross Voluntary Aid Detachments, which had been established in 1909 to aid the Territorial Army medical services in time of war. Doris Elliott, who collected moss on Longshaw, was a ‘VAD’, and it is very probable that the moss that was gathered by her was sent to Sheffield to be processed and made into dressings by the Sheffield University Hospital Supply Depot (SUHSD). The depot was opened in November 1915, with accommodation, heating and lighting being provided by the University, and the labour being provided by volunteers.

In the summer of 1916, a _Sphagnum_ moss department was started at the request of the Director General of Voluntary Organisations, ‘much of the moss being collected on the neighbouring moors’. (SUHSD Statement Undated). A total of 85,000 _Sphagnum_ moss dressings were produced, together with 117 moss pads (possibly dysentery pads or splint pads) (SUHSD Final Report, 1919). One nursing sister wrote from France that ‘all the surgeons have remarked that they have never used dressings so beautifully and practically made’ (SUHSD Third Annual Report 1917-1918).

In addition, the depot was asked to produce a regular supply of muslin bags for compressed _Sphagnum_ moss dressings, which were being manufactured in Edinburgh. It was agreed that they could supply 1,000 bags per week if the muslin was provided, and the Director General of Voluntary Organisations furnished them with 7,200 yards of the material.
War & Peat: the History, Archaeology & Ecology of the Military Heritage of Moors, Heaths, Bogs and Fens

(SUHSD Third Annual Report, 1917-1918). In total 27,800 bags were produced (SUHSD Final Report 1919).

One of the patients at Longshaw Lodge Hospital was Cyril Newbury, from Dunedin in New Zealand. He spent several months there in 1915. He had taken part in the Gallipoli campaign and had landed at Anzac Cove on 22 June 1915. Within three weeks, he was in hospital in Malta suffering from dysentery. He was then diagnosed with neurasthenia (‘nerve trouble’, commonly known as ‘shell shock’). He arrived at the base hospital in Sheffield on 17th September, and from there he was sent to Longshaw for convalescence. He died on 8th July 1916 near Armentieres.

Canada and USA

In Canada and the United States, a number of universities were engaged in the processing of Sphagnum moss and making dressings. The University of Toronto Women’s Club volunteered to process moss in February 1915 (Riegler, 1989), and The University of Washington claimed that it was furnishing 60% of the supply in the United States (Yearbook, 1918), a claim which may well have been true, given the industrial scale on which they appeared to operate, as shown in Figure 12.

Conclusion

This short chapter outlines the use of Sphagnum and Sphagnum products for a variety of purposes in different countries at different times. The use appears to have culminated in the effort, which took place during the First World War to supply medical dressings on a vast scale. The effort described here only highlights a few examples from within the UK and in the USA and Canada. Similar harvesting and production was also being carried out in Germany and elsewhere. Added together the amount of Sphagnum, which was used over a period of a few years, is colossal. In the Sheffield area alone, 85,600 dressings were produced.
At a conservative estimate of 2oz of dried moss per dressing this equates to approximately 5 tons of dried or 75-100 tons of wet Sphagnum harvested locally. The impact of this harvest on the lives of those who gathered it and whose lives were saved or made more comfortable by being treated with it is part of the human story touched on here. There is much more detail available which can develop these stories. We understand little of the impact on the landscape or on the ecology of the moors and bogs.

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Harvesting floral moss in Canada, 1945 © Ian D. Rotherham
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