A HISTORICAL PERSPECTIVE OF PEAT EXPLOITATION IN EUROPE AND ITS SUSTAINABILITY
Foo-Yuen Ng, Yusof Basiron, Kalyana Sundaram*

Abstract
Availability of natural resources is instrumental in ensuring both growth and survival of a sovereign state’s economy and its population’s livelihood. As such, it is essential that natural resources, both renewable and non-renewable be managed sustainably. Natural resources can be found in a variety of forms and functions – including mining of rare earth and minerals, crude oil, forests and arable land for livestocks and agriculture.

Peatlands are one such resource and historically they have been excavated and exploited for fuel and used as arable land for agriculture and forestry. Peatlands also have vital ecological functions, such as supporting biodiversity and functions as a depository for carbon stocks.

The focus of this review is to look at how peat, especially in Europe has been exploited; literally fuelling its economy in certain cases. In addition to this, peat also played an important role in providing arable land for Europe’s forestry, agriculture and horticulture sectors. Some of these sectors have remained key pillars in Europe’s economy. For example, the Dutch horticulture sector is a €4 billion industry. In Sweden and Finland, peat is a vital cog in their energy supply chain.

However, in the process of exploiting any natural resources, it is inevitable that land use change and other environmental impacts would arise, especially if it is poorly managed. Thus, this begs the questions of its sustainability. It is especially critical now, as a growing body of scientific evidence, for example the IPCC (in 2007), have pointed towards land use change as one of the major contributors towards global greenhouse gas (GHG) emissions, thereby accelerating the detrimental effects of climate change.

In this review we estimate the amount of peat loss in this transition (when it was developed for the European countries’ economic wealth creation), as well as the GHG emitted during this period (which is still continuing to do so). A comparison is also drawn with the utilization of peatlands in developing countries, where it is driven primarily by the need to increase population living standards, and to eradicate poverty. The review shows evidence that Europe has also significantly contributed towards global GHG emissions as a result of its peatland development, and created better standards of living that currently may not necessitate further exploitation of its peatlands, compared to scenarios in developing countries.

Key words
Peat, Natural Resource, Europe, Greenhouse Gas (GHG), Biodiversity, Sustainability, Malaysia
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1. Introduction

1.1. Natural Resources

Natural resources are critical and instrumental for both the survival and growth of a country’s economy, as well as its population’s livelihood. From the context of development, natural resources are described as “stocks of materials that exist in the natural environment that are both scarce and economically useful in production or consumption, either in their raw state or after a minimal amount of processing”\(^1\). The OECD defined natural resources as ‘natural assets (raw materials) occurring in nature that can be used for economic production or consumption’\(^2\). In recent years, fossil fuels and mining products have been the world’s most exported natural resources\(^3\).

As a result of the need to sustain both the world’s economic development and its increasing population, natural resources are depleting rapidly\(^4\). Although some of them can be (arguably) classified as renewable (e.g. forests, water), over-exploitation can threaten to render them a finite commodity. For example, according to the Food and Agricultural Organization of the United Nations (FAO)\(^5\), more than 1.2 billion people globally experience severe water scarcity, whereas about 250 million more are affected by desertification. As such, it is essential that the natural resources, both renewable and non-renewable be managed sustainably and yet help eradicate poverty.

1.2. Peat as a natural resource

Natural resources can be found in a variety of forms and functions. It can be classified as biotic resources (of living and organic origin, such as forests, fossil fuels) or abiotic resources (of non-living and non-organic origin, such as minerals, sunlight, fresh water)\(^6\). Peat normally contains at least 30 percent (by dry mass) dead organic material\(^6\) and is one of such natural resource. It has been excavated and exploited over the centuries for fuel, agriculture and forestry\(^7\).

Peatlands are areas with a natural layer of organic soil materials on its surface\(^8\). Technically, they are defined as ‘wetlands with a thick water-logged organic soil layer made up of dead and decaying plant materials’\(^9\). Types of peatlands include moors, bogs, mires, peat swamp forests and permafrost tundra\(^9\). Apart from commercial exploitation, peatlands also have vital ecological functions, including supporting local biodiversity and as a depository for carbon stocks.

From a soil science perspective, peat soil is described as an organic soil where its soil solum (upper layer of the soil) is filled with organic materials\(^5\). Here, organic soils are referred to as soils with a substantial layer of organic matter at or near its surface. In the USDA soil taxonomy, peat soils are classified as Histosols and are differentiated from mineral soils by having more than half of the upper 80cm of the soil as organic soil materials\(^10\).

2. Economic, Social & Environment value of Peat

Peatlands are national resources that can be used for agriculture, fuel and forestry. Countries with limited natural resources other than peat, often rely on its peatlands to manage the economic needs and economic growth. However, peat is also equally important for the environment; for example, as a wetland or forest that has vital ecological functions. Socially, peatlands play a vital role towards local communities who are dependent on it for food or other forest supplies (Table 1). As such, there is bound to be development-environmental conflicts arising if peatlands are to be developed.

Peat has been excavated over the centuries for fuel, traditionally for cooking and heating. This is still ongoing today, for example in Ireland and Finland. Peat is also added to the soil to increase its moisture and nutrient retaining power. For this purpose, peat is excavated and sold as a soil conditioner. The Netherlands has vast areas of peatland (estimated to be around 1.5 million hectares originally) which have been drained over time and converted into polders, although the conditions are less than favourable for development. In tropical countries, peatland is often used for agriculture, for example farming vegetables, oil palm and sago. Among the less common uses of peat are the peat fires to dry

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\(^{a}\) While a peatland is classified as an area with a naturally accumulated peat layer at the surface, the term ‘mire’ is used to describe peat which is currently being formed and accumulating\(^{11}\).
malted barley in the production of whisky and its use in medicine and balneology\textsuperscript{b}.

3. Distribution of Peatlands

3.1. Distribution of Peatlands Globally

Peatlands are found in many parts of the world, in at least 175 countries\textsuperscript{11,12}. Geographically, more peat deposits are found in the northern hemisphere than the southern hemisphere. Peatlands covers around 3\% of the Earth’s total land area of 14.9 billion hectares\textsuperscript{13}. The majority of the global peatlands are found in the Americas, Asia and Europe (Figure 1). As peatlands have been utilised globally for at least the last 300 years (especially in Europe), it has been estimated that at least 10 – 20 \% of the global peatlands were lost throughout this period\textsuperscript{14}.

3.2. Global Peatlands database/ inventory

Publications on the global distribution of peatlands since the late 1980s\textsuperscript{9,14}, a comprehensive, consistent and harmonized global peatland database is still lacking. Often, there are different interpretations on the extent of global peatlands by different organizations or governments which are mainly caused by the following factors: \textsuperscript{6,9,11,15}

i. Scarcity and lack of robust (peatland inventory) information, especially in Africa and South America. This is more apparent in developing countries, where often its soil mapping are not extensive and documented, compared to developed European nations.

ii. Different methodologies and standards for peatland definition / classification. For example, FAO’s peat classification includes shallow peat layers over ice or rock while Wetlands International only defines peatlands as areas with a peat depth of 30cm and above while in the Tropics it is 50 cm or more.

iii. Limitations in estimating peatlands via remote sensing technologies since this technology has (visual) limitations and as such, further ground trothing is needed, especially to quantify peat depth and to determine the nature of the peat.

iv. The change in national borders, for example the case of the former Soviet Union where it was classified under Eastern Europe before its dissolution. However, after 2001, Russia and other former Soviet republics have been reclassified under either the European or Asian continent.

v. Soil map’s scale constraints, where certain mapping scales (e.g. 1:5 million scale) are unable to indicate the presence of smaller peatlands areas.

These issues have hindered attempts to measure, consolidate or update relevant information available into a common global database or inventory that is both standardized and harmonized. However, as more data and information becomes available, improvements and updates are made to the global database, while technical errors are reduced.

Currently, possibly the three most in-depth research findings (on the global peatlands inventory) available are published by FAO in 1988\textsuperscript{9} (426 million hectares globally), Joosten and Clarke, 14 years later in 2002\textsuperscript{14} (416 million hectares globally) and finally Wetlands International’s report, ‘The Global Peatland CO\textsubscript{2} Picture’ in 2010\textsuperscript{11} (381 million hectares globally) (Table 2).

It is obvious from these reports that there is a lack of agreement in the statistics of the global peatlands area reported. The differences could possibly be due to the factors mentioned earlier, for example different standards for peatland classification, as well as availability of more accurate data due to recent soil mapping exercises.

As a result of this, between 1988 – 2010, peatland estimates for the African continent has seen an increase of 167\%, while for the Oceania continent an even larger increase of 4315\%! (comparing FAO’s 1988’s and Wetlands’ 2010 publications). These examples further amplify the need for a standard peatlands definition and soil mapping methodology, consistently updated peatlands inventory coupled with extensive ground exploration to ensure the accuracy of the inventory data.

\textsuperscript{b} balneology is the study of medicinal springs and the therapeutic effects of bathing in them. (Wikipedia)
### Table 1: Peatland’s Economic, Social and Environment Values

<table>
<thead>
<tr>
<th>Economic Values</th>
<th>Social Values</th>
<th>Environment Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Food Source</td>
<td>Carbon Sink</td>
</tr>
<tr>
<td>Forestry</td>
<td>Income Source / livelihood –</td>
<td>Biodiversity - natural habitat for flora and fauna</td>
</tr>
<tr>
<td></td>
<td>hunting, fishing, forest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>materials eg. timber etc</td>
<td></td>
</tr>
<tr>
<td>Energy – heat generation</td>
<td>Source of drinking water</td>
<td>Hydrology - Water regulations</td>
</tr>
<tr>
<td>Horticulture – growing media, soil improver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other uses – balneology, production of medicine, whisky etc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Figure 1: Current Geographical Distribution of the Global Peatlands

*Source: The Global Peatland CO₂ Picture (2010), Wetlands International™*
### Table 2: Updates in Global Peatland Distribution Estimates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>177,943,950*</td>
<td>51,488,200</td>
<td>50,460,800</td>
</tr>
<tr>
<td>Africa</td>
<td>4,856,500</td>
<td>5,853,400</td>
<td>13,012,600</td>
</tr>
<tr>
<td>Asia</td>
<td>24,886,500</td>
<td>152,328,700</td>
<td>154,570,900</td>
</tr>
<tr>
<td>Australia, New Zealand, the Pacific (Oceania)</td>
<td>165,000</td>
<td>500,900</td>
<td>7,284,500</td>
</tr>
<tr>
<td>Antarctica and Subantarctic Isles</td>
<td>Not listed</td>
<td>300,000</td>
<td>1,587,100</td>
</tr>
<tr>
<td>North America</td>
<td>209,640,000</td>
<td>205,074,600 (including Central and South America)</td>
<td>154,439,400 (including Central and South America)</td>
</tr>
<tr>
<td>Central America</td>
<td>2,524,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South America</td>
<td>6,173,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (Global) / hectares</strong></td>
<td><strong>426,188,950</strong></td>
<td><strong>415,545,800</strong></td>
<td><strong>381,355,300</strong></td>
</tr>
<tr>
<td><strong>Percentage of Earth’s Total Land Area (%)</strong></td>
<td>2.86</td>
<td>2.79</td>
<td>2.56</td>
</tr>
</tbody>
</table>

**Sources:**


iii. The Global Peatland CO2 Picture (2010), Wetlands International

*Including Soviet Union*

**3.3. Temperate & Tropical Peat**

Peat can be categorized as temperate or tropical peat (Table 3). While temperate peat developed over organic soil materials from the remains of moss, grasses and low plants, tropical peats developed over organic soil materials from the remains of woody materials. Tropical peat often has large amounts of surface litter and can form distinctly dome-shaped deposits which can go as deep as 10 metres, while temperate peat seldom exceeds 1.5 metres depth. Finally, climatic differences (temperature, rainfall, evapotranspiration) play a major role in differentiating the hydrology and oxidation rates of tropical peat from temperate peat. As such, temperate and tropical peat would obviously need different management strategies.

Most of the temperate peat are found in North America (Canada primarily) and Eastern Europe (Russia primarily). It is also found in Western Europe and certain parts of Asia, South America, Central America and the Pacific.
### Table 3: Characteristic Differences between Temperate and Tropical Peat

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Temperate Peat</th>
<th>Tropical Peat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Soil Material Origin</td>
<td>Moss, grasses</td>
<td>Woody materials (trees)</td>
</tr>
<tr>
<td>Rainfall / Precipitation</td>
<td>Low to moderate</td>
<td>High</td>
</tr>
<tr>
<td>Mean Annual Temperature</td>
<td>Low to high</td>
<td>Very high</td>
</tr>
<tr>
<td>Geographical location</td>
<td>Northern and Southern Hemisphere, excluding the latitudes 35 degrees North and South</td>
<td>Within the latitudes 35 degrees North and South</td>
</tr>
<tr>
<td>Depth</td>
<td>Rarely exceed 1.5 meters</td>
<td>Distinct dome-shaped deposits which can exceed 10 meters</td>
</tr>
</tbody>
</table>

Sources:  
3. S. Paramananthan (in press 2016), Organic Soils in Malaysia – Their characteristics, mapping, classification and management for oil palm cultivation, Malaysian Palm Oil Council, Malaysia

In order to geographically differentiate tropical peat from temperate peat, tropical peat is defined by FAO as ‘all organic soils in the wetlands of the tropics and subtropics lying within latitudes 35 degrees North and South including those at high altitudes’. According to the United States Department of Agriculture (USDA), tropical peat can also be defined as those in areas with iso-temperatures regimes. Most of the tropical peatlands can be found in South East Asia and Papua New Guinea. In South East Asia, the majority of peatlands are located in Indonesia (Figure 2).

![Figure 2: Tropical Peat Soils Distribution in South East Asia and Papua New Guinea](source)

Source: The Global Peatland CO2 Picture (2010), Wetlands International
3.4. **Peat distribution in Europe**

Currently, the European continent has the world's third largest peatlands occurrence (Figure 3). Various publications have estimated the size of its peatlands to be around 50 – 53 million hectares, (which is a reduction of around 15 – 20% from its historical total original area)\(^9,11,14\). The largest depository of peat in Europe (by nation) can be found in Russia (European part), followed by Finland and Sweden\(^11,21\). Other European countries with a sizable peatland area include Norway, Belarus, United Kingdom and Germany (Figure 4).

**Figure 3: Current Geographical Distribution of the Global Peatlands (Hectares)**

![Graph showing current geographical distribution of global peatlands in hectares.]

Source: The Global Peatland CO₂ Picture (2010), Wetlands International\(^{17}\)

**Figure 4: Top 10 European Countries with the Largest Peatland Area (hectares)**

![Bar graph showing the top 10 European countries with the largest peatland area in hectares.]

Source: The Global Peatland CO₂ Picture (2010), Wetlands International\(^{11}\)
4. Peatland utilization in Europe

Historically, peatlands are thought to have been reduced significantly since the 1800s, primarily through human encroachment. In the Netherlands, large scale peat exploitation has been recorded as early as the 1600s. The exploitation of peat here coincided with the Dutch Golden Age in the 17th century, when the Dutch (and most of the West Europe) ran out of forests to harvest wood lots, and peat came into the picture as a viable energy supply.

Apart from energy, agriculture and forestry were also amongst the main drivers in the development/reduction of its peatlands. It was documented that ‘well-managed peatland soils are among the most productive agricultural lands available’ Today, FAO recognises that in the countries’ quest for economic and social development, around fifteen percent (15%) of the world’s peatlands have been ‘drained and used for agriculture, grazing, peat mining and forestry, especially for bioenergy plantations’. Currently, the major uses for peat in Europe are agriculture, forestry, energy and horticulture.

European countries such as Finland, where one third of the land area are covered by peatlands rely heavily on it as a natural resource. Around half of the Finnish peatlands have been drained for commercial forestry, while 4% is used for agricultural purposes and 0.6% is used for peat production. As an energy source, peat plays an important role in supplying power to one million Finns; contributing about 17-20% of its district heating and Combined Heat and Power (CHP) energy.

4.1. Agriculture

14 – 20% of the world’s peatlands are utilised for agriculture, primarily as meadows and pastures. This is also true for Europe. Its fens and raised bogs are drained to regulate the air and water conditions in its soil for agricultural use (cultivated or pasture plants). However, due to these draining, GHG are emitted. These GHG emissions from peatlands collectively contribute towards Europe’s total emissions, thereby potentially impacting climate change as well.

In certain countries, such as Hungary (98%), Greece (90%), The Netherlands, (85%), Germany (85%) and Poland (70%), almost all its peatland areas are cultivated. In other parts of Europe, a small section of its peatlands are utilised for agriculture (Finland, 2%; United Kingdom, 4%; Sweden, 5%). Most of this peatland is used as meadow and pasture, and the rest as arable land. For example, in Finland, barley is cultivated, and in Germany rye maize is cultivated on peatlands.

In Germany, most of its fens have been drained for agriculture, mainly grassland farming, for the purpose of dairy cattle farming. On the downside, the GHG emission potentials is very high, as 80% of the German peatlands that have been developed now contributes up to 4.5% of the overall German national GHG emissions. Cattle grazing also contributes further to GHG emissions.

4.2. Forestry

Peatlands utilisation for forestry is mainly located in the Nordic countries (such as Norway, Sweden, and Finland) and Russia, with more than 10 million hectares of peatlands drained. Peatland forestry also has economic importance in the United Kingdom and Ireland. The impacts (of peatlands utilisation for forestry) on climate change are assumed to be less compared to agriculture, as the oxidation of organic matter in the surface peat is suggested to be much less.

4.3. Energy

Peat can be also extracted, mostly for fuel and horticulture use. Finland, Ireland, Russian Federation, Belarus and Sweden are amongst Europe’s major peat extractors, responsible for almost 90% of the world’s production and consumption of energy peat. The extraction and use of peat has its environmental drawbacks though, as GHG is emitted into the atmosphere and contributes to global warming. In Finland alone, the GHG emission from peat combustion (which accounts for 7% of the country’s primary energy) contributes to about 14% of fossil fuel CO₂ emissions.

4.4. Horticulture

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\(^c\) District heating – heat distribution system from a centralised location
For the Dutch, peat is essential as a growing medium for its horticulture sector, which is worth around Euro 4 billion. As its natural peatlands are mostly gone, and little is remaining, the Netherlands has to import roughly 4.2 million m$^3$ peat per year from countries like Germany, Estonia and Ireland. As a result, it is facing a challenge to ensure that its peat supply is from sustainable sources$^{27}$.

5. The sustainability of (European) peat?

That lobbying for the sustainable use of tropical peatlands in South East Asia is primarily driven by Western NGOs is a well-known fact$^{28,29}$. However, almost 20% of Europe's original peatlands has already been compromised (Figure 5), primarily driven by agricultural activities, forestry and peat extraction$^{14,27}$. This has caused damage to its environment, notably through increased GHG emissions and biodiversity loss. It is thus equally imperative that urgent actions should similarly be initiated to ensure that the remaining European peatlands are not further lost.

5.1. Europe’s peat loss compared to the global situation

Wetlands International and Greifswald University, in a 2010 report considered to be one of the most authoritative and comprehensive on global peatlands, have recorded that over the period of 18 years (from 1990 - 2008), the global peatlands area has seen a loss of 3.7 million hectares, or around 1% of its total peatlands (Table 4). Europe, out of all the continents, has recorded the highest peatland loss equivalent to almost 2.6 million hectares. To put the magnitude of the loss in perspective, Europe's percentage loss is about 5 times higher than the global average. This data only accounts for the study period of 1990 to 2008, and does not take into consideration its intensive utilization of its peatlands from the 1800s and above. Otherwise the peat loss percentage would be much higher (Figure 5).

Figure 5: Comparison of Europe's Peatland Area and Its Percentage of Loss (Original Area /circa 1600s - 2008)

Sources:
i. The Global Peatland CO$_2$ Picture, Wetlands International and Greifswald University (2010) $^{11}$
### Table 4: Comparison of Global Peatland Loss from 1990-2008

<table>
<thead>
<tr>
<th>Region</th>
<th>1990 (hectares)</th>
<th>2008 (hectares)</th>
<th>Peat area lost (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>385,077,300</td>
<td>381,355,300</td>
<td>3,722,000</td>
</tr>
<tr>
<td>Asia</td>
<td>155,716,900</td>
<td>154,570,900</td>
<td>1,146,000</td>
</tr>
<tr>
<td>Europe</td>
<td>53,074,100</td>
<td>50,460,800</td>
<td>2,613,300</td>
</tr>
<tr>
<td>Africa</td>
<td>12,923,300</td>
<td>13,012,600</td>
<td>(89,300)</td>
</tr>
<tr>
<td>America</td>
<td>154,442,800</td>
<td>154,439,400</td>
<td>3,400</td>
</tr>
<tr>
<td>Australasia &amp; Pacific Isles</td>
<td>7,323,800</td>
<td>7,284,500</td>
<td>39,300</td>
</tr>
<tr>
<td>Antarctica &amp; Sub-Antarctic Isles</td>
<td>1,596,400</td>
<td>1,587,100</td>
<td>9,300</td>
</tr>
</tbody>
</table>


While the peatland area in the American continent remains largely unchanged, Europe has seen a 4.92% loss of its total peatland area, compared to the global percentage (0.96%) and Asia (0.73%). In comparison, Asia experienced a 0.7% loss rate, followed by Antarctica, Australasia and America. Africa recorded an increase in its peatland area, which could be the result of improved peatland inventory management, rather than through natural formation of peat.

In the same period (1990-2008), Malaysia lost about 31,500 hectares, or about 1% of its peatland area. This figure only represents about less than 3% of the total peatland loss in Asia. (The highest peat loss in Asia during this time frame is in Indonesia, which lost about 450,000 hectares).

A current review of Malaysia’s peatland estimates has highlighted that there is a range given; from the lowest of 2.13 million hectares to the highest of 2.73 million hectares (Table 5). About 0.67 million hectares are estimated to have been developed for oil palm plantings. However, there was no reference found on the history of these peatlands development in Malaysia, although it was widely accepted that peatlands were planted with cash crops and vegetables such as pineapples and tapiocas since the 1950s by the locals.

Often known to be a soil type that needs intensive maintenance, peatlands are often avoided by the agricultural sector. However, the Malaysian Government’s policy in the 1960s to promote commercial crops such as rubber and oil palm have seen the sector considering peatlands as well. It was not until the 1970s when planting of oil palms in peatlands (through the introduction of sustainable water table management) was successfully pioneered that the oil palm industry begun the industry to utilise peatlands as an alternative planting area to mineral soils.
### Table 5: List of Studies / Reports on Malaysia’s Peatland Area

<table>
<thead>
<tr>
<th>Studies / Reports</th>
<th>Peninsular Malaysia</th>
<th>Sabah</th>
<th>Sarawak</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands International (2010)44</td>
<td>642,918</td>
<td>116,965</td>
<td>1,697,847</td>
<td>2,457,730</td>
</tr>
<tr>
<td>ASEAN Peatland Forests Project30</td>
<td>717,000</td>
<td>124,457</td>
<td>1,289,114</td>
<td>2,130,571</td>
</tr>
<tr>
<td>RSPO (2012)31</td>
<td>984,500</td>
<td></td>
<td>1,746,000</td>
<td>2,730,500</td>
</tr>
<tr>
<td>MPOB (2010)32</td>
<td>716,944</td>
<td>121,514</td>
<td>1,588,142</td>
<td>2,426,600</td>
</tr>
<tr>
<td>Oil palm on peatlands32</td>
<td>207,458</td>
<td>21,406</td>
<td>437,174</td>
<td>666,038</td>
</tr>
</tbody>
</table>

Sources:

i. Wetlands International report: A quick scan of peatlands in Malaysia: [http://www.wetlands.org/LinkClick.aspx?fileticket=6u6tRZtINkx%3d&tabid=56](http://www.wetlands.org/LinkClick.aspx?fileticket=6u6tRZtINkx%3d&tabid=56)

ii. ASEAN Peatland Forests Project: [http://www.aseanpeat.net/index.cfm?&menuid=4](http://www.aseanpeat.net/index.cfm?&menuid=4)

iii. RSPO Manual on Best Management Practices (BMPs) for existing oil palm cultivation on peat (2012)37


### 5.2. Severe loss of peatlands in Europe

Decades, and in some cases centuries of exploiting peat have resulted in some European countries almost depleting its peatlands resources. Countries like Portugal (95%), Denmark (87%) and Greece (87%) have now lost almost all of its natural peatlands (Table 6).

Germany, the Netherlands and Denmark’s natural peatlands have almost disappeared12 and most European countries have now lost between 50% to 90% of its peatlands35. A recent report by Wetlands International pointed out that “most of the 96,000 km² of natural peatlands in Finland are impacted by drainage for forestry, and Ireland (original peatland area 14,000 km²) lost 93% of its raised bogs and 82% of its blanket mire resource”35.

While the perils of overexploiting natural peatlands is now well realised in Europe, the danger of unsustainable peat exploitation still continues with a sizable amount of peatlands lost in Belarus, Estonia, Latvia and Ukraine11. These countries are generally less financially strong compared to its established European peers, and thus more dependent on utilising its available natural resources, such as peat to grow their economies.

### 5.3. Impact on biodiversity conservation

Generally, only certain biodiversity can adapt to the unique ecological conditions found in European peatlands. Although its peatlands support comparatively less biodiversity, most of the species that are found are rare and important for conservation,36 for example orchids, butterflies and birds. In the UK, its peatlands play an important role in supporting protected bird species such as the golden plover, the greenshank and the red-throated diver12. However, the unsustainable peatlands exploitation has threatened the survival of its biodiversity and negatively affected the population of its key species37.

The level of environmental protection also differs between EU-28 and non EU-28 countries in Europe. Wherein the members of the EU-28 have to adhere to its Natura 2000 legislation that protects its high conservation areas such as its peatlands, the non EU-28 countries do not have such conservation policies, and as such they are exposed to the perils of uncontrolled exploitation of its high conservation value peatlands.

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3d Natura 2000 is EU’s network of nature protection areas, established under its 1992 Habitats Directive to protect its high conservation value biodiversity. 38
<table>
<thead>
<tr>
<th>Country</th>
<th>Original peatland area (circa 1600s) (ha)**</th>
<th>2008 peatland area (ha)*</th>
<th>Peatland area lost (ha)</th>
<th>Peatland loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia (European Part)</td>
<td>24,300,000</td>
<td>19,941,000</td>
<td>4,359,000</td>
<td>18</td>
</tr>
<tr>
<td>Finland</td>
<td>9,600,000</td>
<td>7,942,900</td>
<td>1,657,100</td>
<td>17</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,500,000</td>
<td>345,100</td>
<td>1,154,900</td>
<td>77</td>
</tr>
<tr>
<td>Denmark</td>
<td>1,000,000</td>
<td>127,600</td>
<td>872,400</td>
<td>87</td>
</tr>
<tr>
<td>Poland</td>
<td>2,000,000</td>
<td>1,152,800</td>
<td>847,200</td>
<td>42</td>
</tr>
<tr>
<td>Belarus</td>
<td>2,939,000</td>
<td>2,235,200</td>
<td>703,800</td>
<td>24</td>
</tr>
<tr>
<td>Sweden</td>
<td>7,000,000</td>
<td>6,562,300</td>
<td>437,700</td>
<td>6</td>
</tr>
<tr>
<td>Ukraine</td>
<td>1,100,000</td>
<td>765,600</td>
<td>334,400</td>
<td>30</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,900,000</td>
<td>1,711,300</td>
<td>188,700</td>
<td>10</td>
</tr>
<tr>
<td>Switzerland</td>
<td>200,000</td>
<td>28,800</td>
<td>171,200</td>
<td>85</td>
</tr>
</tbody>
</table>

Sources:

There are 19 rare or threatened bird species, 27 vulnerable plants, 6 globally threatened mammals and 6 globally threatened amphibians and reptiles in the mostly non-EU 28 Central European peatlands[9]; all of these are strong motivators to ensure that these peatlands must be conserved and not developed.

### 5.4. Climate Change, GHG emissions & peat

Global increases in carbon dioxide concentrations are mainly due to fossil fuel burning and deforestation, while the increases in methane and nitrous oxide are mainly contributed by agricultural activities. Major efforts have taken shape since the mid-90s to mitigate the effects of climate change, from the Kyoto Protocol in 1997 to the Copenhagen Accord in 2007 where it was stated that global warming should be limited to below 2°C (3.6°F). Initiatives were also undertaken to identify the countries and its sectors that contributed towards climate change, at the same time presenting mitigated opportunities and avenues to enable them to reduce their GHG emissions as per the above requirements.

Land use change was one of the key GHG emission contributors identified, in particular the deforestation of forests and the degradation of peatlands. From the global context of GHG emissions, peatlands played an important role, as it contributed to almost a quarter of the CO2 emissions from the Land Use, Land Use Change and Forestry sector (LULUCF)[40].
5.4.1. GHG emissions from peatlands in Europe

Europe is the world’s second largest emitter of drainage-related CO$_2$ emissions, excluding extracted peat and peat fires$^{11}$ (Figure 7). The European countries who are the highest emitters of CO$_2$ include Russia, Finland, Belarus, Germany and Poland (Figure 8). Wetlands International$^{15}$ has also identified that ‘more than 90% of EU’s agricultural soil-based emissions are from peatlands (which occupy only 6% of EU’s agricultural land)’.

When compared with the 2008 emission rates against its 1990 rates, most of these European countries did not register any significant reductions at all (Table 7). Only Russia (European Part), Estonia and Ireland showed significant reductions in its CO$_2$ emissions from degrading peat. USA, the other developed nation with a sizable amount of peatlands also showed no reductions in its CO$_2$ emissions from degrading peat (1990 vs 2008).

The findings above clearly illustrated a stark disparity between the efforts of the Western governments and that of their NGOs. On one hand, they are leading the current drive to halt peatland development in South East Asia, on the assumption that it contributes significantly toward GHG emissions. On the other hand, data presented here has shown that most of Europe’s highest GHG emitters have not demonstrated significant reduction of their GHG emissions from degrading peatlands.

This clearly demonstrates that Europe (and the USA) have not really made credible progress in their efforts from 1990-2008 to reduce emissions from degraded peatlands. As such, the propaganda and campaigns by Friends of the Earth, Greenpeace or Union of Concerned Scientists on peatlands development should perhaps be re-directed back to their home ground. Instead of aiming their barbs at developing countries like Malaysia, they should be concerned that countries like the United Kingdom and USA has not reduced their peatlands emissions at all. Leadership by example could be a key driver for sustainable management of global peatlands.

Figure 7: Total emissions from degrading peat in 2008 (by continent)

Source: The Global Peatland CO$_2$ Picture Wetlands International (2010) $^{11}$
Figure 8: European Countries with the Highest GHG Emissions from Degrading Peat in 2008 (with Malaysia and USA as comparison)

Table 7: Comparison of European Countries with Highest GHG Emissions from Degrading Peat (1990 versus 2008)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Total emissions from degrading peat (Mton CO2/a)</th>
<th>Emissions Reduction / Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1990</td>
<td>2008</td>
</tr>
<tr>
<td>Russia (European part)</td>
<td>275</td>
<td>139</td>
</tr>
<tr>
<td>Finland</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>Belarus</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Germany</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>Poland</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Iceland</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Sweden</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Estonia</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Ireland</td>
<td>11</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: The Global Peatland CO2 Picture (2010), Wetlands International
6. Managing the sustainability of peatlands- A level playing field

Western NGOs are unanimous in their stand that peatlands, as a resource are neither sustainable nor renewable\textsuperscript{15,28,35}. However, many international organisations believe that peatlands can be managed sustainably, while some European countries like Estonia define peat as a renewable natural resource\textsuperscript{41}. There are now comprehensive researches, technical guides and reports to ensure that the peatlands are managed in a sustainable manner, especially for agriculture use. (Table 8)

Notable examples include FAO’s Mitigation of Climate Change in Agriculture Series 5 (2012) and 9 (2014), which advocate responsible peatlands management when developing peatlands for agriculture and the International Mire Conservation Group and the International Peat Society’s Wide Use of Mires and Peatlands (2002), which acknowledged that there can be a balance between developing peatlands for economic gains and conserving them.

These documents shared some common key findings:

i. Peatlands are a natural resource whose development could be considered to improve the social welfare of the local community or the economic growth of a country

ii. Peatlands can be responsibly managed through Good Agricultural Practices or proper guidelines to ensure that environmental degradation are minimised

iii. Peatlands classifications and mapping are essential so that informed decisions can be made to identify the areas to be conserved or to be developed.

These indicate that the mainstream opinion believes that proper management is vital in the development of global peatlands, regardless of the peatlands location (Europe vs Asia) or type (temperate vs tropical). It runs contrary to the environmental NGOs’ stand of “No Peatlands Development”. If the global consensus is that peatlands can be developed responsibly, there should be no reasons for restrictions to be placed on Asian peatlands, or African peatlands. As long as common guidelines and mitigation practices are adhered to, peatlands can be responsibly managed, similar to other natural resources such as petroleum and forests.

<table>
<thead>
<tr>
<th>No</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wise Use of Mires and Peatlands, (2002) by the International Mire Conservation Group and the International Peat Society\textsuperscript{14}</td>
</tr>
<tr>
<td>2</td>
<td>Mitigation of Climate Change in Agriculture Series 5: Peatlands – guidance for climate change mitigation through conservation, rehabilitation and sustainable use, (2012) by FAO and Wetlands International\textsuperscript{29}</td>
</tr>
<tr>
<td>3</td>
<td>Mitigation of Climate Change in Agriculture Series 9: Towards climate change-responsible peatlands management (2014) by FAO\textsuperscript{6}</td>
</tr>
<tr>
<td>4</td>
<td>Global Peatland Restoration Manual (2008) by Greifswald University, Germany\textsuperscript{42}</td>
</tr>
<tr>
<td>5</td>
<td>Manual on Best Management Practices (BMPs) For Existing Oil Palm Cultivation on Peat, (2012) by Roundtable on Sustainable Palm Oil (RSPO)\textsuperscript{31}</td>
</tr>
<tr>
<td>6</td>
<td>Guidelines for the development of a standard operating procedure for oil palm cultivation on peat (2011) by Malaysian Palm Oil Board (MPOB)\textsuperscript{43}</td>
</tr>
</tbody>
</table>
7. Conclusion
A country’s economic progress is of paramount importance to maintain social well-being, and this development is often aided by its natural resources. Peatlands, one of such natural resources available have been heavily utilised by Europe, playing an important role in supporting its agriculture, horticulture and energy sector. As a result of this, many European countries have lost huge tracts of its natural peatlands, to the detriment of its environment and biodiversity.

Europe’s intensive use of its peatlands in the last few centuries (for economic progress) mirrors the stage Malaysia is at currently. As a developing nation, Malaysia needs to utilise (sustainably) every natural resources that is available to improve its citizens’ living standards. Malaysia, however, can draw upon the experiences of Europe in sustainably managing its peatlands. This is to ensure that its natural peatlands are not completely exhausted, as well as accelerating the climate change through unchecked GHG emission. Therefore, finding an ideal balance through a measured approach in developing Malaysia’s peatlands will be the key to ensuring Malaysia’s economic progress will not be at the cost of its environmental degradation.

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