Time bomb or gold mine? Policy, sustainability and media representations of tropical peatlands in Malaysia

Rory Padfield [a,e,*], Helena Varkkey [b], Kate Manzo [c], Vignaa Ganesan [d]

[a] School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK
[b] Department of International and Strategic Studies, Universiti Malaya, Jln Profesor Diraja Ungku Aziz, 50603 Kuala Lumpur, Malaysia,
[c] School of Geography, Politics and Sociology, University of Newcastle, Daysh Building, Newcastle-upon-Tyne, Tyne and Wear NE1 7RU, UK
[d] Department of International and Strategic Studies, Universiti Malaya, Jln Profesor Diraja Ungku Aziz, 50603 Kuala Lumpur, Malaysia
[e] Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, Kampung Datuk Keramat, 54100 Kuala Lumpur, Malaysia

ARTICLE INFO

ABSTRACT

Tropical peatlands represent an acute site of contested development on the front line of global climate change and action. Media analysis reveals how and why these ecosystems are understood in the context of local and national discourse, and the implications of these representations for peatland policy-making. In this study, we provide an instructive account of media representations of tropical peatlands in Malaysia – a country home to 6% of the world's tropical peat by area and 12% by magnitude of the peat carbon pool. Set against an examination of the policy context for peatland media representations, we analyse how this critical ecosystem is framed in Malaysian media, and explore how these representations cast light on current sustainability-related policy and management debates. Drawing on media framing methodology, we analysed three English language newspapers (*News Straits Times*, *The Star* and *Borneo Post*) and one popular news website (*Malaysiakini*) from 1995 to 2018. From a sample of 1359 news articles, we found four dominant frames: development, conservation/protection, sustainable development and fire/haze. Within these frames, a number of key themes emerged including ecological benefits, community livelihoods, threats to peatland, integrated management approaches, and the value of peatland research. Our findings also reveal a polarising representation present across the study period – peatlands portrayed as a 'time-bomb' of ecological destruction and as a 'gold mine' in terms of their opportunities for development. We argue that contrasting interpretations of the sustainable development of peatlands may serve to obfuscate rather than facilitate current peatland policy discourses. Finally, we conclude that the fate of Malaysian peatlands hinges on recognising the localised challenges faced by peatland communities. We urge policy makers to consider food systems transformation approaches to move beyond a vision that relies entirely on drainage-based development.

1. Introduction

In an era of rapid information creation and transfer, the media plays an important role in shaping public attitudes, perspectives and behaviours whilst also informing national level political discourse (Boykoff, 2011; Maeseele, 2011). The media acts as a bridge between science and society (Pearman et al., 2021) filtering and interpreting different sources of information and knowledge, before communicating it back to the public in a particular form. In recent years, place-based media analyses have become a growing feature of the sustainability and global challenge research literature. Place-based media analysis can unpack the shifting nature of policy debates within newspapers and online news

media, whilst highlighting individual perspectives of public and private actors as they play out in a particular place. Examples of published studies include media representations of climate change (Boykoff, 2011; Manzo and Padfield, 2016), media coverage of Australian seafood certification (Haas et al., 2020), energy transitions in the Finnish press (Lyytimäki et al., 2018), and world newspaper coverage of Covid-19 (Pearman et al., 2021).

The sustainability and management of tropical peatlands is a topic of considerable interest amongst the research community and various governmental and non-governmental stakeholders (Evers et al., 2017; IPCC, 2021). In addition to the provision of a variety of ecosystem services, e.g. habitats for flora and fauna, flood prevention and food

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products for local communities, tropical peatlands represent one of the most globally important carbon stocks (Page, Rieley and Banks, 2011). A recent study estimates the peatlands in the Democratic Republic of Congo (DRC) and the Republic of Congo store 30 billion tonnes of carbon (Garcin et al., 2022), which is the equivalent of 'three years of global fossil fuel emissions' (Carrington, 2022; para. 4). Accordingly, leading climate change policy actors have recognised the need to protect tropical peatlands to mitigate and adapt to climate change, e.g. IPCC Special Report on Climate Change (2019).

Notwithstanding their local and global significance, tropical peatlands are under increasing threats from anthropogenic activities. The majority of the world's tropical peatlands are located in emerging economies of the Global South – including countries such as Malaysia, Indonesia, DRC and Brazil – and thus are subject to local and national policy plans and regulations. In these economies, logging, deforestation and urbanisation have led to considerable peatland degradation (Evers et al., 2017). Thus, tropical peatlands represent an acute site of contested development on the front line of global climate action and policy. Detailing media representation and perceptions help us understand how and why these ecosystems are understood in the context of local and national discourse, and, importantly, the implications of these representations for peatland policy-making.

Drawing on media framing methodology, our aim is to provide an authoritative account of representations of tropical peatlands in Malaysian media. We do so with the objectives of understanding how this important ecosystem has been portrayed over time in the media, and how analysing these representations may shed light on current peatland policy and management debates. We focus on Malaysia, a country in the Global South with a significant amount of peatlands – Malaysia has 6% of all tropical peat by area and 12% by magnitude of the peat carbon pool (Page et al., 2011). Malaysia has made a number of bold and ambitious climate-related targets, including updating its 2015 Intended National Determined Contribution (INDC) with the goal to reduce its economy-wide greenhouse gas (GHG) emissions intensity of GDP by 45% by 2030 compared to 2005 levels (Government of Malaysia, 2015). Preservation of vulnerable ecosystems, such as peatlands is explicitly mentioned in the INDC; in effect, the foundations are in place for Malaysia to take a leading position globally in the policy and management of tropical peatlands.

Four research questions underpin the paper as follows: What are the key policy representations of Malaysian peatlands? How are peatlands framed in the Malaysian media? How is sustainable development represented in the context of peatland policy and management across the media sources? Finally, in view of the contested nature of sustainable development in the Global South, what are the policy implications for the future of Malaysia's peatlands? Running through our analysis, we identify a spatially defined politics of sustainable development; specifically, a knowledge politics that reinforces a palm oil-centric vision in the peatland dominated state of Sarawak underpinned by the voices of pro-development actors and their interpretations of sustainability. We argue that policy-makers should recognise the localised challenges faced by communities who rely on the peat soils, whilst also giving greater onus in national development plans on their livelihoods beyond one that relies on drainage-based agriculture.

The paper is structured as follows. After the introduction, we provide a synthesis of Malaysian peatland policies to contextualise later policy discussions. The paper then discusses the methods employed for data collection and analysis. The Result sections follows with the presentation of data tables and figures from our media analysis proceeded by the Discussion section. We identify a polarising representation in the media – peatlands portrayed as either a 'time-bomb' of ecological destruction or a 'gold mine' in terms of their opportunities for development – and a distinct pattern in the use of specific stakeholder perspectives to support these representations. We argue that these contrasting interpretations of the sustainable development of peatlands may serve to obfuscate rather than facilitate constructive policy outcomes.

2. Malaysian peatland policy discourse: a brief synthesis

In order to set the policy context for the analysis of media reporting later in the paper, the following section synthesises Malaysian peatland policy phases covering the period from the early twentieth century to the present day. As compared with a conventional review of published literature which tend to combine elements of summary and critical analysis of key debates, empirical findings or concepts (Knopf, 2006), we have undertaken a form of discourse analysis. Discourses are defined as 'structured ways of representation that evoke particular understandings and may subsequently enable particular types of actions to be envisaged' (Hugé et al., 2013: 188); furthermore, discourses not only shape policy debates but are institutionalised in particular practices (Hajer and Laws, 2006). Discourse analysis is a particularly instructive methodological tool in analysing sustainable development policy discourses, and contributes in the following three ways:

i) Identifies specific bias in the discourses and practices through which policy is made;

ii) Exposes the way in which responses to sustainability challenges are reflected in ideas about the respective responsibilities of government and citizens; and

iii) Reveals discourses that shape what can and what cannot be thought e.g. discourse analysis acts as built-in filters that distinguish 'relevant' from 'irrelevant' data (Hugé et al., 2013: 188).

By analysing the way policy representations of Malaysian peatlands have enabled specific *practices and types of (in)actions*, we aim to bring meaning to contemporary peatland policy narratives. We have drawn our analysis from a range of governmental and non-governmental policy documents at different scales, e.g. national, international and industry-wide (see Table 1). These were identified through the searching of publicly available policy documents, a review of academic literature, consultation with informed participants, and the authors' knowledge of working in the field of tropical peatland policy.

From this synthesis, we have identified below three phases of Malaysian peatland policy. These three phases are not distinct periods – i.e. some of the earliest policies still have an influence today – but rather reflect the key policy discourses prevalent in those periods.

2.1. 'Wastelands', palm oil and modernist policy discourses

"…peatlands were considered a wasteland and draining was considered an effective rehabilitation to improve the productivity" (Government of Malaysia, 2015: 4)

The first policy phase analysed spans the period from the early twentieth century through to the 1990s. As explicitly recognised by the Malaysian government in the drafting of the country's first INDC for the Paris Agreement in 2015 (see quotation above), in historical terms drainage-based approaches were considered a necessity for the development and management of peatlands. Arguably these perceptions stem from colonial policy discourses which depicted rural landscapes, such as peatlands as "idle" or "waste" land where shifting cultivation and extensive agricultural land use systems constitute less than optimal uses of vast areas that might best be put to other developmental purposes' (McCarthy and Cramb, 2009:113). Historical accounts from that period paint a very different picture of Malaysia's rural landscapes, one that depicts peatlands supporting local community livelihoods in a multitude of ways. Pakiam (2017) draws on a wide variety of historical documents to show that peatlands in the Peninsular Malaysian state of Johor were sites of coconut, rice, sugar cane and banana cultivation. In other accounts, areca palms were harvested for construction lumber and fruit sales (Pakiam, 2017). Nonetheless, the portrayal of rural landscapes as unproductive idle lands set the tone for subsequent modernist development policies that favoured large-scale plantation development to

Table 1
List and categories of policy literature drawn from to inform the synthesis of Malaysian peatland policy discourse.

Policy source ordered alphabetically	Publication type				
	International	National	Industry /Industry affiliated	Academic/ Research institute	Other
Centre for International Forestry Research (CIFOR) (2013). Q&A on fires and haze in Southeast Asia.				X	
Gabungan Pengusaha Kelapa Sawit Indonesia (GAPKI) (2013) Indonesia and Oil Palm Plantations amid Global Environmental Issues. Jakarta, Indonesia: Indonesian Palm Oil Association.			X		
Government of Indonesia (2021) Updated Intended Nationally Determined Contribution		X			
Government of Malaysia (2015) Intended Nationally Determined Contribution		X			
Government of Malaysia (2011) National Action Plan for Peatlands. Ministry of Natural Resources and Environment		X			
International Peat Society (2010) Strategy for Responsible Peatland Management					X
IPCC (2021) Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change	X				
Malaysia Palm Oil Certification Council (2021) MSPO Certification Scheme, August 2021			X		
Matahir, M. (2019) Keynote address by Prime Minister Tun Dr Mahathir Mohamad on environmental stewardship to achieve sustainable development		X			
Roundtable for Sustainable Palm Oil (RSPO) (2012) RSPO Manual on Best Management Practices (BMPs) for Existing Oil Palm Cultivation on Peat. 111 pp.			X		
Wetlands International (2010) A Quick Scan Of Peatlands In Malaysia					X
United Nations (1992) 'Agenda 21', UN Conference on Environment & Development Rio de Janerio	X				

meet the country's economic and political purposes.

In the state of Sarawak – home to the vast majority of Malaysia's peatlands – Cramb (2011) argues that much of today's land management policies originate from outdated discourses of 'modernisation' that prevailed in international development in the 1950s. These discourses perceive rural landscape transformation as 'based on ideas of a dynamic, large-scale, capital-intensive, technologically advanced modern sector driving forward the process of economic development which draws in and thereby transforms the resources of small-scale, capital-constrained traditional sectors' (Cramb, 2011: 275). To illustrate the explicitness of the modernists' approach that has characterised Sarawak's development, the Chief Minister of Sarawak Abdul Taib Mahmud proclaimed: '*development…is the only way that can bring people within one generation into the mainstream of the economy. People from the interior who are today struggling with outdated economy…Do they have land? When I ask do they have land, my God, they have plenty*' (cited in Cramb, 2016: 189).

Despite the costs involved in draining peatlands in preparation for the cultivation of crops, large tracts of peatlands were opened up in Peninsula Malaysia and Sarawak during the later half of the twentieth century for agricultural plantations (Padfield et al., 2016). Due in part to the palm oil boom in the 1960s and 1970s and the limited return from the planting of other crops on peat soils, government driven policies led to wide-scale conversion of peatlands for oil palm (McCarthy and Cramb, 2009). Wicke et al. (2011) estimate that between 1975 and 2005 the total land expansion for oil palm production in Malaysia reached 4 million hectares (Mha), which represents 12% of the total land mass of Malaysia (World Bank, 2022). Of the 4 Mha of oil palm, approximately 1 Mha of the crop is planted on peat soils (Miettinen et al., 2012).

2.2. Sustainability, haze and 'business as usual'

The next phase of peatland policy analysed covers the period from the early 1990s to the early 2010s. In 1992, the United Nations Conference on Environment and Development in Rio de Janeiro helped to spur dialogue and action by various stakeholders – governments, private sector, non-governmental and civil society – to tackle global environmental degradation, such as climate change, deforestation, pollution, desertification, and so on (United Nations, 1992). The goal for many of these stakeholders was to achieve 'sustainable development', which acknowledged finite global natural resources and a desire for

intergenerational equity. Underpinning much of the discourse at that time – and still evident in much of today's sustainability discourse – was the notion that sustainable development could be achieved by balancing the 'triple bottom line' of economy, environment and society (Elkington, 1998; Lozano, 2012).[1] Malaysia participated in the policy discourse at this time as reflected in Prime Minister Mahathir Mohamad's speech at the UNECD where he pledged the country would 'maintain at least 50% of our land mass under forest cover' (Matahir, 2019: no page number).

Against this backdrop of rising global interest in the environment, a number of scientific discoveries highlighted the considerable carbon storage and sequestration potential of tropical peatland (Immirzi, Maltby, and Clymo, 1992; Page and Rieley, 1997; Page, Siegert and Rieley, 2002; Rijksen, Diemont, and Griffith, 1997). In addition to known functions such as groundwater recharge, biological diversity, micro-climate stabilisation and flood control, and biodiversity habitat (Page and Rieley, 1997), these discoveries underscored the global significance of the ecosystem; in particular, as playing an important role in climate regulation (IPCC, 2021). Arguably, the scientific discoveries during this period helped to stimulate and contribute towards science and policy discourse at global and local levels regarding the sustainability of tropical peatlands, with a particular goal towards peatland conservation (International Peat Society, 2010; Wetlands International, 2010). During this period in Malaysia, three peatlands were designated as Ramsar sites in Peninsular and East Malaysia: Tasek Bera (1994), Kuching Wetlands National Park (2005), and Lower Kinabatangan-Segama Wetlands (2008).

In addition to efforts made by environmental groups, such as Sahabat Alam Malaysia (SAM) and Wetlands International to lobby for the conservation and protection of remaining intact peatlands, the Malaysian government produced a national level peatland policy called the National Action Plan (NAP) in 2011 (Government of Malaysia, 2011). The NAP provided an overarching policy document for peatland management in Malaysia containing priority actions to be taken forward. However, it is not legally binding and is merely a guideline. Initiatives were also taken during this period by industry bodies acknowledging the

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[1] The TBL concept has become fully integrated into corporate discourse despite more recent critiques calling into question the notion that all three pillars are equal – rather that the environment must be given ultimate priority since 'without a healthy planet, no social or economic system can be sustained' (Kopnina and Blewitt, 2018: 7).

need to maintain the integrity of peat soils. For instance, the Malaysian Palm Oil Board (MPOB), the government's research arm for the industry also published guidance for the cultivation of oil palm on peat, such as recommendations for water table depth. Evers et al. (2017) argue that this is neither effective, nor are these guidelines enforced anyway.

The second influence on policy discourse in this period was the increase in the number of peatland fires leading to transboundary haze episodes (Varkkey, 2016). Haze in Southeast Asia is commonly caused by the burning of forest and peat soils to make way for agricultural development (Centre for International Forestry Research [CIFOR], 2013). The major haze episodes in the late 1990s and early 2010s generated intense public scrutiny over the rate, methods and types of landscape change in Malaysia and the region more broadly (Padfield et al., 2016). Much of the debate centred on the responsibility for the haze with accusations of poor agricultural practice directed at Indonesian farmers and large corporate plantation owners (Forsyth, 2015). National level responses have included the banning of burning of peatlands and after 2015 a number of palm oil companies published 'no planting on peat' policies (Padfield et al., 2016).

Evers et al. (2017) argue that policy related to peatland management has remained focused on haze and peatland burning – reflecting the diplomatic challenges concerning the trans-boundary impacts (Marti, 2008: 12) – rather than climate change aspects. Similarly, Lupascu et al. (2020) observe that the role peatlands play in the prevention of floods is largely ignored in favour of haze and fire related management interventions. Ironically, this has raised concerns that if the governments involved are able to successfully implement haze and burning related reductions, the need to protect peatlands for the reduction of carbon emissions, biodiversity conservation or other ecosystem values, such as flooding may disappear from the agenda (Miettinen et al., 2013).

Despite the emergence of a sustainability policy discourse and increased efforts to tackle the haze, this period is characterised by a 'business as usual' approach; peatlands remained an ecosystem exploited for the purposes of agricultural production, and in most cases for oil palm (Evers et al., 2017; Harrison et al., 2020; Wijedasa et al., 2016). Furthermore, historical factors have surfaced which have served to intensify the pressure to develop land resources. Evers et al. (2017) identify Malaysia's decentralisation of land policy as adding to the current policy challenges. Dating back to the drafting of the first constitution in 1960 and still in force today, natural resources, such as land, forest and water, fall under State jurisdiction (Nagulendran et al., 2016). This arrangement meant that the once prosperous tin and rubber sectors provided state governments with significant revenues. However, the decline of these industries means that by the early 2010s, states were almost entirely reliant on land development and discretionary payments from the Federal Government (Evers et al., 2017). The conservation of lands for ecosystem services and conservation raises no income, and as any environmental disaster (such as flooding) is covered by federal funds coordinated by the National Disaster Management Agency (NADMA), there is little incentive for states to maintain habitat or ecosystem service functionality.

2.3. 'Divergent expertise' and peatland policy contestation

The most recent phase of peatland policy discourse has been characterised by a contested knowledge politics over what constitutes the means and methods of peatland management. Goldstein (2015) refers to this contested scientific discourse as 'divergent expertise', which she argues can be found in the localised scientific knowledge networks of Southeast Asia; scientists of whom are linked to either government or industry associations. Countering scientific claims that tropical peatlands only release GHGs when they are drained for agricultural development, such scientists have argued that peatlands' GHGs are high regardless of the type of land use (GAPKI, 2013; Melling et al., 2011). As Goldstein (2015) observes, the argument rests on the notion that oil palm cultivation does not increase GHG emission but rather has the

potential to lower emissions via proper land management, such as soil compaction and monitoring of the water table (Sabiham et al., 2012).

Untangling the link between knowledge production and wider economic and political priorities in Malaysia is far from straightforward. As Goldstein (2015: 9) observes: 'some industry-affiliated scientists also work for the Indonesian Ministry of Agriculture while others are funded by the Malaysian Ministry of Science, Technology and Environment; both of these state institutions have been tasked with expanding oil palm production for national economic growth'.

To highlight the heterogeneity of Malaysia's peatland policy landscape, conservation policy success is largely isolated to Peninsular Malaysia rather than representative of peatland environments across the whole country. Charters et al. (2019) report collaborative efforts between the local state forest department and an NGO in securing state commitment to the conservation of the North Selangor Peat Forest Swamp in Peninsular Malaysia in 2016. The policy approach rests on a zonal approach, which sets out clear designated areas of conservation on the deepest deposits of peat and areas for oil palm development on the perimeter of the forest where peat is degraded or shallow (Charters et al., 2019). Conversely, in Sarawak there is limited political will to pursue similar conservation-aligned policies that have succeeded in Peninsular Malaysia. This is explained in large part by the need to generate livelihood from peat soils as a consequence of the limited economic opportunities across the state (Nair and Sagaran, 2015; Wasudawan and Ab-Rahim, 2018).

Despite conservation policy successes in this latest phase, overall Malaysian peatlands are exposed and vulnerable; peatlands remain an ecosystem open for development and there is still limited policy commitment by national level government to sufficiently address the necessary protection of peatlands. For example, the jurisdictional Malaysian Sustainable Palm Oil (MSPO) certification scheme cautions against planting on peat, unless permitted by local legislation (Malaysia Palm Oil Certification Council, 2021). This point is epitomized by the position taken by the Malaysian government towards peatlands in the INDC at the Paris Agreement in December 2015. Despite acknowledging the degradation of peatlands in the past, no significant formal statement or actions was offered on how peatlands will be managed into the future (Government of Malaysia, 2015). This is in notable contrast to neighbouring Indonesia, where peatland restoration figures prominently in its mitigation pledges (Government of Indonesia, 2021). The INDC thus leaves open the potential for both conservation and development of peatlands.

3. Methodology

This paper is the second in a research project investigating Malaysian media representations of tropical peatlands. We draw on the same sample of newspaper articles collected in the first paper (Manzo, Padfield & Varkkey, 2020), as well as aspects of the data analysis e.g. media framing. While the first paper focuses entirely on two frames – development and conservation – in this paper we analyse all four frames identified – development, conservation, sustainability and haze/fire – and include one new aspect for analysis referred to as 'sustainability impacts'. In order to ensure replicability of our study, below we have briefly summarised each stage of the data collection and analysis process. Considering this research draws on the same data set as described in Manzo, Padfield & Varkkey (2019), we have focused primarily on aspects of the methodology original to this specific study.

Figure 1 below presents a summary of the process flow of data collection and analysis. In Phase 1 the news media were selected based on their appropriateness for the study. To represent a cross-section of local and national media in Malaysia we identified three newspapers (New Straits Times [NST], The Star, Borneo Post) and one news website (Malaysiakini). While necessary to include national media within the sample as a means to 'index' government initiatives and policies related to tropical peatland, we chose a regional (East Malaysia consisting of
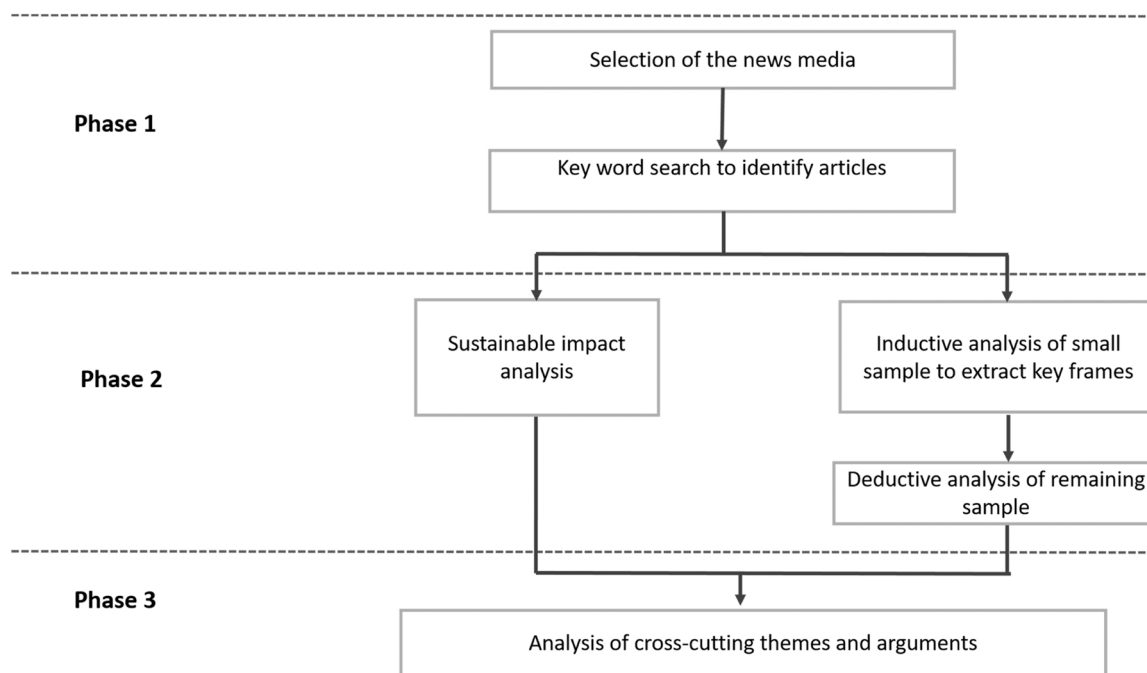
Fig. 1. Process flow of data collection activities and analysis.

Sabah and Sarawak) newspaper, the Borneo Post, as a means to offer local insights into peatland reporting. Seventy-four percent of Malaysia's peatland, including 1697,847 ha (69% of Malaysia's total peatlands) are found in the state of Sarawak alone (Wetlands International, 2010) and initial scoping of the Borneo Post revealed a higher percentage of peat related stories than the other two national news media identified. Malaysiakini is an online news website and regarded as an independent and well-respected news platform (Manzo and Padfield, 2016) and, accordingly, provides a more critical perspective.

Following the selection of the news media, the next activity in Phase 1 was to undertake a keyword search. The words "peatland", "peatlands" and "peat" were searched within the main body of text in the articles, as well as their headlines and sub-headlines. The LexisNexis database provided the articles for the NST whilst the others were sourced from their respective archives. We started the search for articles in 1995 in order to gain insight on representations of peatlands predating the 1997 Southeast Asia haze crisis. This haze episode is regarded as one of the most severe in the modern era, and at the time generated considerable media attention around the cause and effects (Forsyth, 2014). As shown in Table 3 below, the NST was the only media source with an archive accessible to 1995; the archives of the other news media started later, i.e. The Star (2003), Borneo Post (2010) and Malaysiakini (2000). Accordingly, media representation of peatlands pre-1997 was only possible through the NST.

The next phase involved two types of analysis: i) media framing; and ii) sustainability impacts. In media studies the frame concept refers to 'a storyline or unfolding narrative about an issue' and can be single-issue or larger frames that transcend a single issue (Manzo and Padfield, 2016). Gamson et al. (1992: 385) argue that frames can be 'aggregated and disaggregated into larger and smaller issue-frames'. Corner and Richardson (1993) argue that studying media representations of single-issue or multi-issued topics and how these differ over time is an instructive entry point in the examination and analysis of public discourses. Lockie (2006) and Chapin and Knapp (2015) contend that analysis of media representation is an especially useful adjunct to research on sustainability politics and uneven development.

To extract the frames, we employed a combination of inductive and deductive analytical reasoning (Matthes, 2009). From our identified pool of articles, we selected a random sample of 100 articles – this

represented 7% of the total sample which is broadly consistent with previous inductive-deductive approaches in media analysis (Manzo and Padfield, 2016; Pan et al., 2019) – and media frames were inductively determined and agreed upon by the co-authors. This process led to the identification of four frames – development, conservation/protection, sustainable development and haze/fire – as defined in Table 2 below.

Subsequently, we analysed the remaining sample deductively for these four frames. We coded each article according to the four pre-identified frames and allowed for hydridisation of frames within a single article if applicable. Accordingly, some of the articles received multiple frames (41 articles in total). In a small number of cases (20), articles did not receive a frame where the researcher judged there to be no connection to one of the four frames. We designed in a validation step whereby a sample of ten from every hundred articles was cross-checked

Table 2
Frame definitions.

Frame	Definition
Development	• Drainage-based agriculture to grow crops such as palm oil, rice, sago, etc. • Water extraction from peat swamps, e.g. drainage canals leading to peat drying and oxidation • Peat as energy source • Urban development of peat, e.g. roads, residential and commercial property, airport • External threats to peatland development from trade and policy barriers
Protection/ Conservation	• Raising awareness of ecological values of peatlands • Need to protect and conserve peatlands • Threats to peatland integrity
Sustainable development	• Recognition of the balance of social, economic and environmental priorities • Systems and schemes to limit development of peatlands • Long-term integrity of peatland ecosystems • Peatlands represent livelihood opportunities • Balance and/or compromise between economic, social and environmental pillars of sustainability
Fire / haze	• Air pollution, e.g. air quality index • Fire outbreaks and institutional response, e.g. fire fighting, face-mask guidance etc. • Disruption from fire and haze, e.g. closure of schools, airports etc.

Table 3
Total number of articles per news media, number of frames over time and the period of analysis.

News media	Nos of article	Period of analysis	Frames				
			Development	Protection /Conservation	Sustainable development	Fire/Haze	Total
NST	679	1st Jan 1995 – 31st Dec 2017	58	106	148	379	691
Star	311	1st Jan 2003 – 31st Dec 2017	37	61	60	177	335
Borneo	251	1st Jan 2010 – 31st Dec 2017	66	19	43	121	249
Malaysiakini	118	1st Jan 2000 – 31st Dec 2017	0	15	11	77	103
Total	1359		163	201	262	754	1380
%			11.9	14.5	18.8	54.4	

by each co-author and, if agreed by the co-authors, changes made to the original framing.

The remaining analysis in this phase related to the sustainability impacts of the peatland activities (e.g. the types of activities occurring on peatlands) referenced in the articles. The aim was to understand how the news media were representing sustainable development in the context of Malaysian peatlands. To this end, we focused entirely on articles within the sustainable development frame.[2] In this sample, we analysed the types of activities discussed in this frame and depending on the interpreted impact of the activity on peatlands ascribed one of the following codes: 'peat largely conserved', 'integrated peat management', or 'development focus'. Drawing on academic literature to support our interpretation of peatland impacts (Cole et al., 2021; Evers et al., 2017; Murdiyarso et al., 2019; Padfield et al., 2014), we defined 'peat largely conserved' as activities with either no or minimal impact on the integrity of the peatlands, such as conservation activities, education and research, recreation and eco-tourism. The authors are only focusing on analysing the impact of the specific activities as described in the article; we are not considering any historical activities that have affected the quality of the peatlands to date.

Drawing on the trade-off debates in sustainability discourses (Hahn et al., 2010), 'integrated peat management' articles are those reporting similar low-impact activities, as described above, but also accepting that some selected areas – typically degraded peatland or shallow peats – are utilised for development. The authors recognise the tensions in ascribing an 'integrated peat management' code to activities when there are different perspectives of what constitutes a viable trade off or compromise for tropical peatlands (see Evers et al., 2017; Goldstein, 2015) but also the incomplete information about the integrity and extent of peatlands to make a judgement call on an activity. Notwithstanding these tensions, the authors have attempted to ascribe 'integrated peat management' codes where articles describe a relative balance of social, economic and environmental concerns but, crucially, where peatland development activities, e.g. drainage based agriculture, have limited or minimal impact.

Articles ascribed a 'development focus' code report and discuss stories related to the policy and practice of drainage based agriculture, e.g. oil palm cultivation on peat and urban development. These articles largely consider the economic arguments for the sustainable development of peatlands, with particular emphasis on livelihoods of farmers and the local community who rely on income from peatland environments. The activities described in these particular articles will have a potentially severe and wide-ranging impact on the integrity of peatlands. The third and final phase involved analysis across the different data sets to reveal any cross-cutting themes, arguments or trends.

4. Results

4.1. General trends and article frames

A total of 1359 articles were identified and analysed from the four news media outlets. As shown in Table 3 the highest number of articles came from the NST (679); this is unsurprising considering the NST had the longest time frame in which articles were available for analysis. Moreover, as a country-wide newspaper it is inevitable that the NST should index a high number of stories of national importance, such as the disruption caused by peatland fire and international diplomacy efforts related to transboundary haze. The Star generated the second highest number of articles (311) followed by the Borneo Post (251), which had the smallest period in which articles were available for analysis – an eight-year period from 2010 to 2017. The relatively high number reflects the socio-economic importance of peat soils to the news agenda in East Malaysia. Malaysiakini was shown to have the fewest number, 118, which largely reflects their concerns with political stories of international or national significance (e.g. transboundary haze) as compared with day-to-day local level news events.

Figure 2 presents the longitudinal distribution of frames; the fire/haze frame dominates across the four news media over time (54.4% of the total number of frames). Articles framed in this way index the geographical sources of haze – e.g. location of fires and affected communities in Malaysia, Indonesia or both countries – and efforts by fire-fighting agencies to tackle peatland fires. Thematic analysis of the frames in Table 4 below shows articles tend to report the disruptive impacts of fire and haze on public health and society, such as the closure of schools, airports and businesses, as well as state responses at varying scales of governance to address the problem. While all of the media are relatively consistent in their characterisation of fire and haze episodes through a haze frame from 2013 to 2017 – a period of increasing haze events in Malaysia (see Fig. 2) – there is less uniformity prior to that period. In particular, the NST and Malaysiakini have a relatively high number of articles of haze events in 2005 compared to the Star (no data for Borneo Post); and in 2012 there was a relatively high number of haze framed articles in the Borneo Post – reporting local haze events in the state – and yet limited reporting in the other three news media. This is likely to be explained by the fact that NST, The Star and Malaysiakini are media companies with HQs in Peninsular Malaysia and therefore, are more focused on news that directly affects the Peninsular than events occurring in East Malaysia.

The second most common frame is the sustainable development frame (18.8%). As shown in Table 4, articles in this frame report policy initiatives and activities that recognize the need to manage the impact of development on peatlands. Themes in this frame include news reports of low-impact activities, such as ecotourism and education programmes, selective conservation and development policies and reduced drainage-based activities. A longitudinal analysis shows the presence of this frame

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[2] The hybridisation of frames approach meant that a number of the 'sustainable development' framed articles could also receive development, conservation and fire/haze frames. We recognise that 'haze/fire' is in itself a sustainable development issue; however, articles in the haze/fire frame only received a second frame if reference was made to the types of activities causing the haze/fire. Articles concerned only in describing a specific event, e.g. reporting the air pollution index score in a particular town, or closure of a school or airport on a given day received a haze frame only.
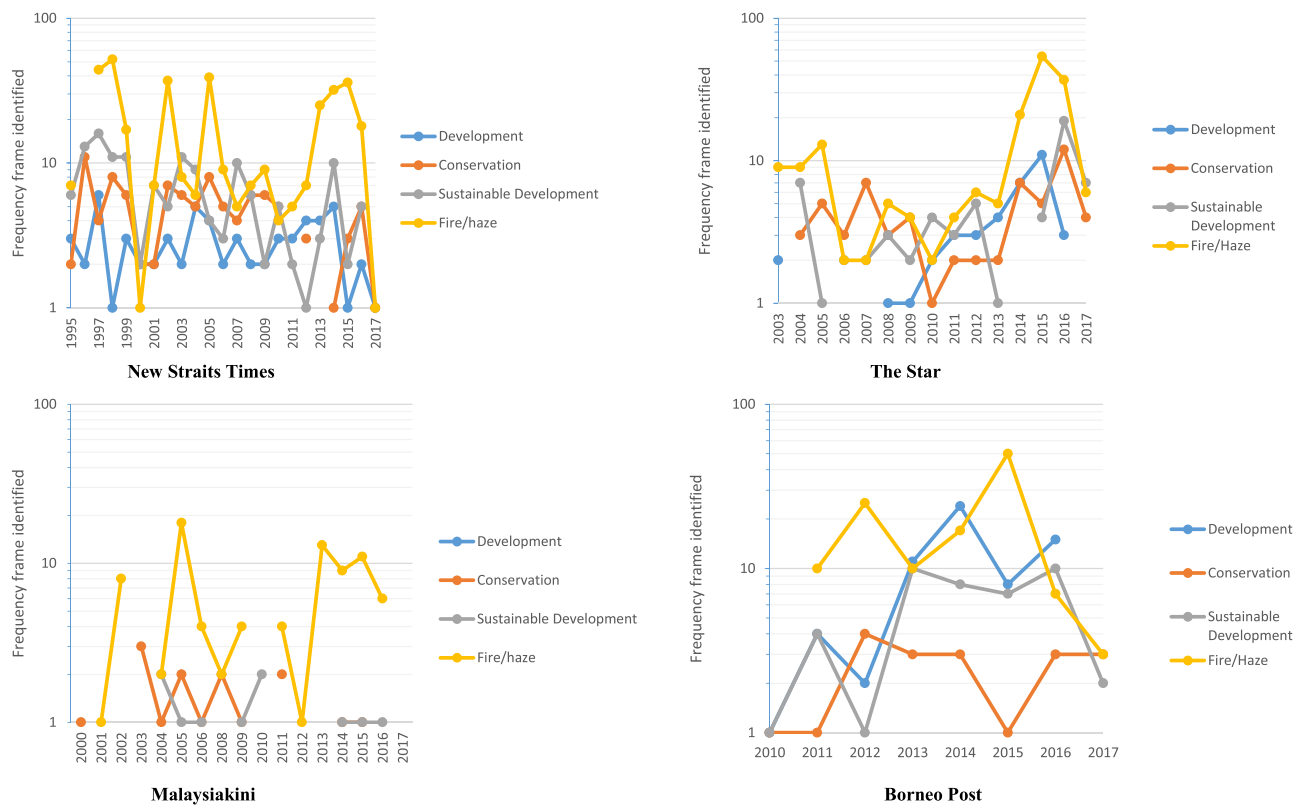
Fig. 2. Distribution of the four frames over time in the New Straits Times, The Star, Malaysiakini and Borneo Post (logarithmic scale)].

across the study period, with peaks in the NST occurring in 1997, 2003, 2007 and 2014. The highest number of sustainable development framed articles in the NST occurred in 1997 – a year with unprecedented haze impacts across Southeast Asia (Forsyth, 2014) – whilst the peak for the Star took place nearly two decades later in 2014. Conversely, there is a relatively low proportion of sustainable development framed articles in both the Borneo Post and Malaysiakini.

The conservation/protection frame is the next highest with 14.5% of the total number of frames. These articles framed peatlands as under threat from various developmental activities and champion the benefits of a conservation approach to peatland policy and practice (Table 4). The development frame had the lowest number of articles across the four media and includes three noteworthy trends: first, both the NST and the Star had consistently low numbers of development framed articles across the study period; second, Malaysiakini was found to have no development framed articles; and third, the Borneo Post had the largest proportion of development framed articles with articles reporting various developmental activities and policies defending the oil palm industry from environmental campaigns and a general theme of the value of research to support the development of peatland soil.

4.2. Types of activities in the sustainable development frame

Figure 3 presents an analysis of the types of peatland activities that are referred to in the sustainable development frame across the four media as categorised by 'peat largely conserved', 'integrated peat management' and 'development focus'. With the exception of the Borneo Post, 'integrated peat management articles' are the most common across the NST, the Star and Malaysiakini. NST has the highest number of 'peat largely conserved' articles compared with the other newspapers. Non-drainage-based activities described in this sample of articles include ecotourism, recreation, and research expeditions. The Borneo Post has the highest number and proportion of articles that connect palm

oil development with notions of sustainability or sustainable development. A number of the articles discuss the ability to achieve sustainable development with the proviso of managing the impacts on peat soils, such as monitoring water table depth and soil compaction.

5. 'Time bomb' vs 'gold mine': polarised representation of tropical peatlands in Malaysian media

Analysis across the data sets reveals a distinct polarisation in the reporting of Malaysia's peatlands over the study period. From 1995 – the earliest point in the data set – there are repeated calls for stronger conservation of peatlands against agricultural and other developmental uses in order to maintain ecosystem services and to prevent the likelihood of transboundary haze. In effect, peatlands are regarded by many as a potential 'time bomb' that could lead to significant ecological impacts, such as fires, habitat destruction and errant greenhouse gas emissions. On the other hand, peatlands are portrayed as sites of development and are symbolised as a 'gold mine' in terms of the possible socio-economic outcomes. This section unpacks the polarised representation of peatlands arguing that this unique ecosystem has come to embody the contested nature of sustainable development in the Global South within a dynamic yet disputed knowledge politics of sustainability. To support the analysis Table 5 below presents a selection of article headlines and excerpts across the study period illustrating the polarisation of reporting in the Malaysian news media.[3]

5.1. Peatlands as a 'time-bomb'

Across the period of study, Malaysia's peatlands are portrayed as

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[3] The 'time bomb' and 'gold mine' metaphors were terms used by journalists in the reporting of peatlands and are shown in Table 5.

Table 4

Indicative headlines and themes illustrating the respective four frames – development, conservation, sustainable development and fire/haze – in the four news media.

| Frame	Themes	News media			
		NST	*The Star*	*Malaysiakini*	*Borneo Post*
Development	Developmental activities and policies on peatlands	'Still the nation's engine of growth', NST, 31 August 2002	'Putting peat soil land to good use', The Star, 27 March, 2010	n/a	'Sarawak planters offer best output growth in Malaysia', Borneo Post, 17 April 2014
	Livelihood of communities	'Enjoying the fruits of their labour', NST, 3 September 2008	'Planters confident palm oil price will stay above RM3000 per tonne this year', The Star, 14 July 2011	n/a	'We develop, not destroy', Borneo Post, 2 October 2010
	Defence of the oil palm industry planting on peat	'TH Plantations refutes allegations', NST, 31 August 2016	'Ignore anti-oil palm NGOs', The Star, 8 September 2013	'Don't single out palm oil for EU compliance', Malaysiakini, 25 May 2010	'State government won't bow to anti-palm oil movement, stresses Masing', Borneo Post, 16 May 2014
	Value of research to support the development of peat soil	'Promoting study of peat and marine soils', NST, 22 November 2000	'Seminar on the best peatland management strategies', The Star, 6 September 2016	n/a	'Understudied, underappreciated tropical peat soil', The Borneo Post, 7 November 2016 'Varsities to be engaged in infrastructure devt of peat soil', The Borneo Post, 19 November 2014
Conservation/ Protection	Benefits and wonder of peatland conservation	'Nature's treasure trove waiting to be discovered', NST, 11 January 2004	'Swampland but no wasteland', The Star, 24 June 2015	'Win for rainforest tree, hope for orang-utan, tiger', Malaysiakini 13 October 2004	'Lee: Be passionate in forest conservation' Borneo Post, 10 October 2010
	Threat of developmental activities on peat	'WWF warning on the need to conserve wetlands', NST 5 August, 1995	'Save our wetlands', The Star, 6 February, 2007	'"Peatswamps depletion worrying", says NGO', Malaysiakini, 1 February 2011	n/a
Sustainable development	Peatlands largely conserved, e.g. Ecotourism, education programmes	'Malaysia Wetland Sanctuary to be tourist attraction', NST, 3 December 1997	'Scientists set to study Sarawak nature park', The Star, 28 March 2004	'Enhance understanding on root causes of the haze', Malaysiakini, 5 March 2014	'Exploring Bukit Lima Forest Park', Borneo Post, 24 March 2013
	Integrated peat management, e.g. reduced drainage-based activities	'Seek balance in using peatlands' NST, 6 July 2014	'FGV says no deforestation at West Kalimantan plantation', The Star, 26 May 2017	n/a	'Sarawak to maintain its 60 pct forest cover', Borneo Post 28 February 2014
	Development focus, e.g. economic arguments for the sustainable development of peatlands	'Green concerns or trade barriers?' NST, 1 December 2009	'Yield of oil palm on peatland can be doubled', The Star, 16 August 2016	n/a	'Balancing sustainability and profit in the palm oil industry', Borneo Post, 28 September 2016
Fire/haze	Fire & haze events, including disruption to society	'Forest fire: Firemen on the alert', NST, 8 October 1995	'Hazy days continue in Klang Valley', The Star, 18 August 2016	'Malaysia hit by drought, fires and pollution' Malaysiakini, 19 February 2002	'Sabah has least number of hot spots – DoE director', Borneo Post, 10 August 2011
	Policy governance of fire/ haze	'Asean approves regional action plan to avoid haze' NST, 23 December 1997	'Total ban on open burning in Miri division' The Star, 23 February 2003	'Govt bans open burning amid thick haze' Malaysiakini, 9 August 2005	'Haze: Malaysia, Indonesia to find permanent solution' Borneo Post, 28 June 2013
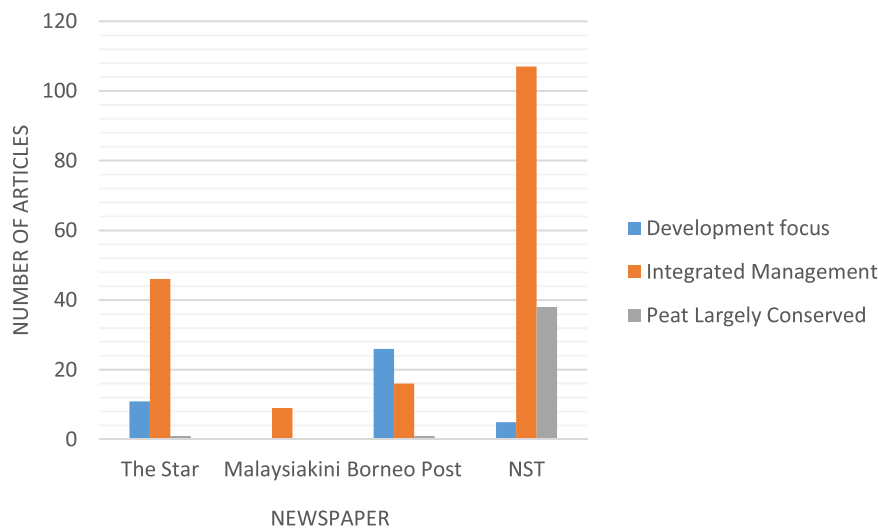
Fig. 3. Type of activities referred to in the sustainable development framed articles by 'peat largely conserved', 'integrated peat management' and 'development focus' in the four news media.

Table 5

Selected headlines and illustrative excerpts from articles published in Malaysian news media illustrating the polarised representation of tropical peatlands in the Malaysians media, 1995–2015.

Decade	Conservation value of tropical peatlands and the threat faced from development		Tropical peatland as a site for development	
	Headlines	Excerpts	Headlines	Excerpt
1990s	'WWF warning on the need to conserve wetlands' NST, 5 Aug 1995 'Why wetlands must be saved' NST, 17 Oct 1995 'Wonder of the world' NST, 25 Aug 1996 'Economic expansion degrading wetlands' NST, 2 Feb 1997 'Man's greed fuels global bonfire' NST, 14 Jan 1998	'Peat swamps are amazing…Unfortunately these values are often ignored as we hurry to unearth them for other uses such as agriculture, housing and forestry' ('Our absorbing peat swamps…' NST, Aug 25 1996) 'Ester Tan [representative of NGO] said "there is a multitude of benefits, either direct or indirect, which could be reaped from sustainably-managed wetlands. They provide a myriad of functions which are valuable to man"'. ('Economic expansion degrading wetlands' NST, 2 Feb 1997)	'Taib: Don't be afraid of pioneering new projects' NST, 23 April 1997 'Stocking up the larder' NST, 5 Nov 1997 'Increasing food production' NST, 14 March 1998 'New estate concept to boost lifestyle, productivity' NST, 11 Aug 1999 'A plant that's hardy and eco-friendly' NST, 15 Dec 1999	He said peat swamp forests have considerable potential for intensive agriculture. "Peat, covering about six million acres, represents an environment of considerable potential, yet untapped," he said. ('Clearing of land and agro-based industries main cause of pollution' NST, 13 Dec 1995) 'The allocation of 20,000 ha in Belawai, Sarawak, for mechanised rice cultivation is a good beginning… It's a smart partnership that will turn one million hectares of peat swamp into glorious golden ricefields and thus, make Sarawak a major rice bowl'. ('Stocking up the larder' NST, 5 Nov 1997)
2000s	'Law: Manage peat soil and land well to avoid disasters' NST, 4 July 2003 'Experts: Develop peatlands responsibly' The Star, 25 Nov 2004 'Harsh peat swamp forests teeming with life' The Star, 15 Mar 2005 'It's vital to maintain peat land' NST, 22 Aug 2005 'Yet another rare fish species find' NST, 27 May 2006 'Saving peat forests' The Star, 23 Sept 2008	'Peat soil and land in Malaysia must be better managed so that they will not become a "time bomb" and spark dangers of bush fires and sinking of populated areas' ('Law: Manage peat soil and land well to avoid disasters', NST, 4 July 2003) "Environmentally sensitive areas like peat swamp need to be preserved. There is other state land that can be developed." ('Saving peat forests', The Star, 23 Sept 2008)	'Paper mill no pulp fiction for Ibans' Malaysiakini, 11 Dec 2000 'Land continues to hold great promise' NST, 31 Aug 2004 'Sago gets a new 'whiff' of life' NST, 13 Dec 2005 'Sarawak opening up more peat soil land for oil palm cultivation' The Star, 18 April 2007 'Planter reaping the fruit of its labour', The Star, 11 April 2008	"…the state will make available 2.4 to three million hectares, comprising NCR land, peat swamp, and over-logged land for the pulp and paper industry." ('Paper mill no pulp fiction for Ibans', Malaysiakini,11 Dec 2000) 'Taib said sago was unique because it could grow in peat swamps. "It will be a great loss if we do not utilise the peat swamps which are abundant in Sarawak," he said'. ('Sago gets a new 'whiff' of life', NST, 13 Dec 2005)
2010s	'Wet wonders' The Star, 2 Feb 2010 'Lee: Be passionate in forest conservation' Borneo Post, 10 Oct 2010 'Peatswamps depletion worrying, says NGO' Malaysiakini, 25 Oct 2011 'Plantation thrashing peatlands for palm oil' Malaysiakini, 3 Sep 2015 'Wonderland for nature lovers' The Star, 4 Nov 2016	'Wetlands encompasses bogs, marshes, peat swamps, freshwater swamps, lakes, mangroves and river systems, and are generally considered low-value lands, making them susceptible to reclamation for agriculture and other purposes. In truth, however, they are rich in species and provide man with numerous ecological services'. ('Wet wonders', The Star, 2 Feb 2010) 'According to Foto director Upreshpal Singh, BLD Plantations must immediately halt all clearing activities and adopt a strong policy to protect forests. "Palm oil development must not be at the cost of the environment, it can and must be planted sustainably. We urge BLD Plantations to stop clearing at once and announce a moratorium on any further development.' ('Plantation thrashing peatlands for palm oil', Malaysiakini, 3 Sep 2015)	'Putting peat soil land to good use' The Star, 27 March 2010 'For peat's sake, it's Sarawak's goldmine' Borneo Post, 13 July 2013 'Varsities to be engaged in infrastructure devt of peat soil' Borneo Post, 19 Nov 2014 'BLD to develop peat soil landbank' The Star, 18 June 2015 'Peat research lab key in devt of state's oil palm industry'. Borneo Post, Nov 4, 2016	'"After a lot of research and planning, I was totally convinced that the system will work and will permanently solve the problem of buildings sinking on peat soil," Tang said'. ('Putting peat soil land to good use', The Star, 27 March 2010) 'About 1.6 million hectares in Sarawak are peatland with 400,000 ha cultivated with oil palm, generating income for Sarawakians, especially those in the rural areas. The industry employs as many as 40,000 people. "If we develop 750,000 ha, we will get about 18 million metric tonnes. That means RM11.3 billion worth of potential revenue from fresh fruit bunches' ('For peat's sake, it's Sarawak's goldmine', Borneo Post, 13 July 2013)

critical ecosystems facing perennial threats from various types of development. As shown in Table 5, this portrayal is not isolated to one of the studied media nor is it a one-off representation; it is prevalent across the media, particularly within the NST, The Star and Malaysiakini, and reoccurs consistently over three decades. At times, the language is evocative to indicate the extent and scale of the threats (e.g. 'saving the peatlands', 'plantation thrashing peatlands for palm oil', 'peat swamps facing threat') whilst also passionate in the articulation of their ecological significance (e.g. 'Wonderland for nature lovers', 'Wet wonders', 'peat swamp forests teeming with life'). Within the sample of articles that frame peatlands within a conservation frame, it is important to note that a small number from the NST were published in the mid-1990s. This is significant since they pre-date the first major regional haze incident of 1997 and the elevated international profile of peatlands in the 2000s following scientific discoveries concerning their role in climate change regulation. For instance, in August 1995 the NST interviewed the WWF Malaysia director of conservation who argues for stronger protection of peatlands warning that 'the alternatives [e.g. conservation] for wetland areas should be looked into before they are converted for industrial developments' (August 5 1995, NST, 'WWF warning on the need to conserve wetlands').

Reflecting the role of science and scientific discoveries in the policy discourse from the 1990s onwards (see 'Sustainability, haze and business as usual'), across the study period scientists are shown to make repeated warnings against the development of peat; and at times, there is a sense of déjà vu in the reporting over the three decades of our study. For instance, in February 2004 ('Scientist: Take action to stop peat land fires', The Star), Malaysian researchers are referred to in a call to manage peatlands more sustainably. Twelve years later in 2016 an article with the headline 'Debate rages over impact of tropical peat conversion' (The Star 28 Oct, 2016) once again reports the concerns of a group of scientists. Likewise, the recurring haze episodes bring attention to peatlands and over the study period the same sorts of messages and discourses are visible.

The calls for the conservation of peatlands are more forceful during periods of haze. Figure 2 shows a relationship between peaks of conservation and haze frame articles in NST and The Star. Whilst blame for transboundary haze is largely assigned to the clearance and burning of Indonesian peatlands (Forsyth, 2015), a number of articles reflect on the disruption of the haze and its relevance in strengthening the

conservation of Malaysia's peatlands. Indicative headlines, such as 'Man's greed fuels global bonfire' (Jan 14 1998, NST) and 'It's vital to maintain peat land' (NST, August 22, 2005) underscore this point.

Analysis of the conservation frame as a whole suggests that the desire to conserve Malaysia's peatlands – while a belief not shared by all sectors and actors as shown below – has intrinsic roots within specific groups and actors in the country. Significantly, interest in peatland conservation spans the length of our study period – from the mid-1990s to the present day – and thus is not simply a reaction to the growing international sustainability agenda towards peatlands that emerged in the early 2000s (Goldstein, 2015).

5.2. Peatlands as a 'gold-mine'

In contrast to the 'time-bomb' narrative, analysis of the articles reveals Malaysia's peatlands framed as sites ripe for development (i.e. a 'gold-mine') that hold considerable potential to support local and national socio-economic needs. In particular, articles highlight opportunities for the cultivation of agricultural crops, such as oil palm, rice, sago and pineapples but also for residential, commercial and infrastructural development. As illustrated in Table 3 and drawing parallels with the conservation frame, the development frame runs throughout the studied time period and within the NST, The Star and Borneo Post.

Articles framing peatlands as a development opportunity are characterised by three key features. First, throughout this sample of articles there is an underlying modernist discourse that seeks to promote the productive use of peatlands via agriculture and infrastructural development. While our policy discourse analysis characterises modernist discourses as a feature of the early phases of Malaysian peatland policy, Table 5 demonstrates that this type of discourse persists into the present day. The headline from the Borneo Post in 2015 – 'For peat's sake, it's Sarawak's gold mine' – epitomizes the enduring appeal of peatlands as sites of economic prosperity.

A second key feature of the development frame of peatlands is the spatial trends. As shown in Fig. 2, the development narrative is present more in the Borneo Post as compared with the other media and, thus in effect, the gold-mine narrative is more closely associated with Sarawak's peatlands than with those in Peninsular Malaysia. Accordingly, spatial and historical context is important here in understanding these geographically defined media narratives. Sarawak has 57% of Malaysia's peatlands and by 2015, 50% of this had yet to be developed as industrial plantations (Miettinen et al., 2016). Yet Sarawak is regarded as one of the poorest states in the country (Nair and Sagaran, 2015; Wasudawan and Ab-Rahim, 2018) and to many 'burdened' with the various technical and environmental problems associated with peatland soil as compared with mineral or clay soil.

Conversely, Peninsular Malaysia has comparatively less peatlands – only 891,700 ha – as compared to mineral and clay soil (Miettinen et al., 2016). Influential figures in Sarawak's modern history, such as Chief Ministers Taib (1981–20014) and Abang Abdul Rahman Johari Abang Openg (Abang Jo, 2017-present) have consistently employed modernist discourses to encourage their 'productive use', regardless of the calls for peatland conservation played out in other media. Sarawak's peatlands have also been framed as an advantage; in reference to the impact of the global weather phenomena, El Niño, it is claimed that planting oil palm on peat can help mitigate the concerns of longer periods of drought ('Ta Ann declares 10 sen interim dividend per share for 2014', May 27, 2014, Borneo Post). The geography of Malaysia's tropical peatlands therefore provides instructive insights on the reason for particular discourses associated with peatlands.

A third characteristic of the development frame is the role of research and development in arguments supporting the development of Malaysia's peatlands. One example is the establishment of a peatland research laboratory in Sarawak known to be Taib's 'brain child' (Borneo Post, 2016). Taib stated that research was needed to support the progress of agricultural development: "we have to transform our agriculture to

large-scale agriculture for more controlled management, [and] integrate research into production". As shown in Table 4, articles in the Borneo Post report the various research and public outreach activities that support agricultural and infrastructural opportunities from the development of Malaysia's peatlands. In an example of note, a respected Malaysian geologist is interviewed about his views of oil palm cultivation on peatlands. The journalist summarises that the geologist 'sees little detriment to peat lands being used for agriculture, as long as the soil's needs are observed and managed accordingly' ('Peat debate peters out: Consultant geologist Dr S. Paramananthan busts myths about oil palm plantations', The Star, 17 June 2016). Thus, the findings from our analysis add depth to Goldstein's (2015) 'divergent expertise' argument; whilst there is the existence of a divergent knowledge community in Malaysia whose arguments run in conflict to the majority of published scientific literature on peatland use and management, there are also individuals and organisations who have proactively championed the conservation and protection of peatlands.

5.3. Discourses of sustainability: a 'common language' but for different purposes

Consistent with the emergence of a sustainability policy agenda as discussed earlier, the earliest reference to the language of sustainability in our data set is found as far back as August 1995. In an article reporting an interview with WWF Conservation Director, Dr Isabelle Louise makes reference to the 'sustainable use of wetlands' ('WWF warning on the need to conserve wetlands', August 5 1995, NST). Dr Louise emphasises the ecological (e.g. flooding mitigation, erosion prevention, biodiversity habitats) and community services (e.g. sources of food and raw materials) offered by peatlands. Drawing on examples of sustainably managed forests where trees are felled for harvesting and then left to regenerate, she concludes: '…what we want is conservation, and not preservation, as the people will be able to use the resources [of the peatlands]'. While Dr Louise is arguing for a balance of environmental, social and economic uses, ultimately, this vision of sustainability requires the long-term integrity of the ecosystem – that it should be allowed to return towards its original state (i.e. regeneration) after human impact. In the spirit of much of the literature that emphasises the need for compromise and trade-off 'for the sake of substantial sustainability gains at the societal level' (Hahn et al., 2010: 226), the sustainability vision described by Dr Louise embodies an integrated peatland management (or 'middle way') approach; one that recognises a certain but limited degree of human impact.

Other articles employ the language of sustainability with a focus on peatland conservation. For example, one article refers to an ecotourism site that will 'experience sustainable development, and wise-use practices that will promote the equitable sharing of benefits' ('Holistic ecotourism', NST April 8, 1997). In this instance, sharing of benefits refers to the employment and livelihood opportunities for local communities in this eco-tourism scheme, while maintaining the integrity of the peatland environment. Other references to sustainability in the mid-1990s also make the case for a long-term perspective of natural resource use. An article in 1996 argues: "And conservation as defined here is sustainable use of a natural resource. In other words, protecting the natural resources for sustainable use now and in future" ('The need to arrest the loss of biodiversity', NST, June 5, 1996).

Another key difference in the use of sustainability discourses between the news media appears across spatial lines. While the NST, The Star and Malaysiakini largely focus on sustainability outcomes with relatively low impacts on peatlands in Peninsular Malaysia (Fig. 3), the Borneo Post's appropriation of the lexicon of sustainability focuses mainly on agricultural and urban development in Sarawak. Their interpretation of the people-planet-profit concept is clearly in favour of local economic livelihood than holistic environmental needs (i.e. in terms of impacts to the original state of the peatlands). For instance, a Sarawak-based oil palm planting association states:

"By taking care of our people and placing good agricultural practices into our industry, we are ensuring that the future generation will be able to continue to enjoy the earth and all its beauty," said SOPPOA. It said as businesses [sic], there is certainly a need to be profitable to be sustainable too." (Oil palm most suitable crop for peat areas — Association, Borneo Post, 23 March, 2013)

Likewise, in 2014 an article discussing the launch of the tropical peat laboratory states that "The proposed research institute shall play a central role in providing technical and scientific knowledge for sustainable development on peat lands, especially in Sarawak". ('Peat Technology Research Institute to be launched on Dec 1' Borneo Post, 28 October 2014). In response to the launching of a 'no planting on peatlands' policy by a larger Singaporean palm oil producer, Wilmar International in 2013, the head of Malaysian Palm Oil Council (MPOC) is quoted as stating that 'palm oil is one of the world's most sustainable crops' ('Wilmar pledge merely wishful thinking?', NST, January 24, 2014). The journalist supports this argument with reference to palm oil's superior yield capabilities compared with other vegetable oils; yet, no acknowledgement is made of the various environmental impacts of large-scale drainage-based agriculture.

The above serves to illustrate the contrasting interpretations of sustainability and sustainable development, in particular, the differing emphasis placed on the people, planet and profit components of the triple bottom line concept (Elkington, 1998), and sustainability trade-offs discourse (Hahn et al., 2010). Indeed, a number of pro-development actors use the triple bottom line as a means to justify the expansion of oil palm into peatlands; i.e. cultivation of peatlands to support the needs of the people. Others emphasising more of a 'middle way' approach utilise very similar language but with a far different outcome in mind; they tend to stress the need for low impact activities (e.g. eco-tourism, recreation, education) and the potential for the development of low quality, degraded or shallow peat soils, which in turn supports the interests of local livelihoods. Thus, analysing the sustainable development frame over time and the activities discussed within these articles reveals actors from different sides of the peatland conservation-development spectrum employing sustainability discourse to support their own arguments. In turn, the appropriation of sustainability language, terminology and concepts by actors with different positions on peatlands may, in fact serve to obfuscate rather than facilitate a constructive policy compromise or solution.

6. Tropical peatland policy, the media and the geography of sustainable development

So what can we learn from this study about tropical peatland policy and does our analysis offer any clues in terms of a peatland policy breakthrough? As discussed in the peatland policy analysis component of this study, the current state of Malaysian peatland discourse reflects the country's overall ambivalence towards the ecosystem; to date, policy is fragmented, indecisive and lacks leadership from national level stakeholders. In truth, the modernist policy agenda that characterised Malaysia's development discourse through much of the Twentieth Century still holds considerable power over those championing sustainability. The publication of a national policy framework for peatlands in 2011 but without any legal or regulatory instruments to facilitate compliance – largely due to the management of land and natural resources at state level – has undermined any genuine attempt to adopt the policy (Evers et al., 2017). Instead, examples of conservation policy have emerged from the corporate (e.g. 'no planting on peatland' policy by large palm oil firms) and non-governmental sectors (Padfield et al., 2016; Charters et al., 2019). The INDC specifically identifies the drainage of peatlands as a legacy of past forest management (Government of Malaysia, 2015) yet evades any discussion of how to effectively integrate peatland specific policies into national level climate change action plans.

Analysis of media reporting of Malaysia's peatlands has provided insight into the complexity of the peatland policy debate. Set against an emerging sustainability discourse from the 1990s onwards as described earlier, we have identified competing internal visions and perspectives over the future of the country's peatlands, which reflect global policy debates regarding the management of critical ecosystems. There is also a distinctly geographical dimension to the Malaysian peatland policy discourse; in particular, media discourse in Sarawak is shown to be unwavering in its support for pro-drainage approaches as a means to generate livelihood for local communities. We have shown that while national level peatland discourse is dominated by a conservation vs. development debate – peatlands as a 'gold-mine' versus peatlands as a 'time bomb' – we also see actors supporting a 'middle way' approach. This approach recognizes the global value of peatlands, particularly from a climate change perspective while acknowledging the need to support the livelihoods of people who live on or adjacent to peatlands. We have also found the language of sustainability, rather than acting as a common language to develop constructive policy pathways, serves to inhibit the chance of achieving a common vision or mutual understanding. Thus, the limited success Malaysia has achieved in bringing into force an overarching national policy for peatlands e.g. National Action Plan reflects the competing perspectives of different spatially defined groups operating within Malaysia's peatland policy space.

Our analysis indicates that in order to break the current policy stalemate, national or local level policy-makers would do well to engage with the spatially defined politics of sustainable development. In the case of Malaysian peatlands, any kind of attempt to move the policy agenda forwards needs to first and foremost address the policy governance of Sarawak's peatlands. Due in part to the relative poverty and pronounced inequality in Sarawak compared with the rest of the country (Nair and Sagaran, 2015; Wasudawan and Ab-Rahim, 2018) and the dependence on land development for livelihood, there appears to be the widely shared view that peatland development via drainage-based approaches is necessary for improving livelihoods in the state. For instance, in discussing the adoption of national level sustainability targets in 2016, a Sarawak based university lecturer argues: "The government may also drive the sustainability issue. Like many of our national targets, it could be pegged to Vision 2020, but may not be realistic for Sarawak, which is still in the developing phase of her economy" ('Balancing sustainability and profit in the palm oil industry', September 28, 2016). The assumption that development can *only occur* by developing peatlands via drainage-based agriculture is clearly in direct conflict to the global climate agenda that calls for peatland protection to 'reduce greenhouse gas emissions, maintain ecosystem services and *secure lives and livelihoods* through improved adaptive capacity' (UNCC, 2018 [Talanoa Dialogue for Climate Ambition] Wetlands International, 2018 [emphasis added]).

Tackling the governance of Sarawak's peatlands, therefore, requires a fundamental change in policy perspective that can best support the long-term integrity of tropical peatlands whilst also protecting local livelihoods. We articulate a potential way forward as follows. First, the priority for future development planning and policy in Sarawak and other peatland regions should focus on practices that do not require drainage-based development. Examples of these practices include cultivation of non-wood forest products, paludiculture, eco-tourism, fish and aquaculture practices (Murdiyarso, Lilleskov and Kolka, 2019). While it could be argued that drainage-based activities could be permitted on shallow or degraded peat soils (see early discussion of a peatland conservation policy in Peninsular Malaysia [Charters et al., 2019]), the urgency of the global climate emergency requires efforts that minimise peatland degradation at all costs (IPCC, 2021). In terms of existing development on peatlands, particularly agricultural development, phasing out proposals to allow the soils to recover as quickly as possible (e.g. peat 're-wetting' by canal blocking) should be a priority for key stakeholders.

Second, to protect the livelihoods of communities who are heavily

dependent on peatland development, it is critical to recognise the socio-economic and environmental values of the state's peatlands within wider national and state level plans and policies (Murdiyarso et al., 2019). Drawing on the food systems transformation literature (Safford and Maltby, 1998; Whitfield et al., 2011, 2021; Williams et al., 2017), a national framework could be developed that goes beyond situating peatlands within specific catchments but aligns with wider national level plans to address the socio-economic welfare of communities in Sarawak. Drawing on participatory approaches to co-create livelihood strategies for peatland environments (Freeman et al., 2022; Martino et al., 2022) the framework could identify specific livelihood opportunities beyond harmful drainage-based practices. Ideally, national level stakeholders would take responsibility for the framework (e.g. capital, skills development, capacity building) to shift the resourcing burden from local or state level institutions. In effect, this framework aims to 'ring-fence' Sarawak's peatlands from harmful drainage-based development while supporting a non-drainage-based livelihood strategy for the local communities. Informed by empirical and conceptual developments in peatland management (Freeman et al., 2022; Martino et al., 2022), this type of holistic and systems-level framework would help deliver a more resilient and responsible future for Malaysia's peatlands.

7. Conclusion

Employing media framing methodology to examine representations of Malaysian peatlands over time, this paper identified four key frames: development, conservation/protection, sustainable development and fire/haze. Within these frames, we observe a particular polarisation in these representations; peatlands portrayed as a 'time-bomb' of ecological destruction *and* as a 'gold mine' in terms of their opportunities for development. Galvanising this polarisation is the language of sustainability to support specific agendas and (in)activities on peatlands.

This research has shown that Malaysia's peatland has come to embody the contested nature of sustainable development in the Global South within a dynamic yet disputed knowledge politics of sustainability. Building on Goldstein's (2015) notion of a 'divergent expertise', we have found the existence of a divergent knowledge community in Malaysia whose argument runs in conflict to the majority of published scientific literature on peatland use and management. Conversely, we also observe individuals and organisations who have defended the need to protect and conserve, and to consider low impact activities on the country's peatlands. Indeed, this latter group have remained a constant over the study period, despite the prevalence of articles embracing the palm oil-centric vision for peatland landscapes.

Central to explaining peatland media representations identified in this research is the importance of space and place, and across multiple scales. Past research has called for national level studies into media representation of environmental topics (e.g. climate change), particularly in the Global South where research is comparatively few compared to the Global North (Billett, 2010; Manzo and Padfield, 2016). In response to this call, we observe Malaysia's spatially defined relationship with its peatland soils, and an uneasy internal political economy that defines national and state-level development debates. We argue for greater consideration of local peatland communities and their reliance on the development of these important soils in national level debates and policy-making – no more so than in Sarawak, home to the vast majority of the country's peatlands. In view of the significant ecological value of peatland soils, especially their role in global climate regulation, elevating the needs of these communities to find livelihood opportunities that do not rely on drainage-based agriculture must be a global priority into the future.

Our research has identified the need for improved – or perhaps more effective – communication of peatlands in the Malaysian media as a means to inform policy debates. Wijedasa et al. (2016) and Liu et al. (2020) highlight the extent to which the media can misrepresent

discourse concerning the science and management of tropical peatlands. In this research, we have observed a largely uncritical use of the terms 'sustainable' and 'sustainability' as different groups appropriate the language of sustainability to support their view. Notwithstanding the political agendas underpinning the representation of local and national issues by certain news media, it is clear that the readership would benefit from articles that acknowledge the conflicting sustainability debates in the management and use of Malaysia's peatlands, including analysis of the different stakeholders in these debates and how they interpret definitions and ideas of sustainability. A more spatially-specific representation of Malaysia's peatlands – especially in the context of the political economy of peatlands in Sarawak – and how they connect at local and global scales, would help to paint a more nuanced and informed picture of the key issues at stake.

Finally, future research in this field should aim to prioritise two areas of study. First, there is a need for further investigations into media representations of peatlands and other critical yet sensitive ecosystems across different geographies. It is likely that similar contested media representations are taking place in other parts of the world where important ecosystems are found, and analyses of these will help to better understand competing stakeholder perspectives and potential policy solutions. Analyses should focus on both digital and print media, as well as local and national level media sources. Second, there is considerable scope for research into understanding how communicators – e.g., journalists working in the digital and print media, corporate and governmental communications, bloggers and vloggers, podcasters, and so on – can best engage with and communicate the complexity of sustainability discourses, particularly within the context of the climate emergency (Padfield et al., 2023). Communicators have such a broad reach in terms of their audience, which in turn facilitates opportunities for lasting impacts in terms of education and behaviour change. Research examining how communicators can gather relevant evidence-based information and produce stories that reflect the complexity and nuances of ongoing environmental and social justice debates would add significantly to this nascent field of research.

Declarations of interest

None.

Data Availability

Data will be made available on request.

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