Knowledge production about coastal flooding in Britain: The 1953 East Coast Flood, patronage and blame

Note for conference attendants: This paper concentrates on one aspect of my original abstract: central government views on knowledge production regarding coastal flooding at a key point. My talk will set this into a longer-term context, as well as discuss knowledge production in more depth.

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Abstract: In early 1953 over 300 hundred people died in a coastal flooding event on the East Coast of England. Since then central government has funded research into forecasting such storm surges. Secondary literature has argued that there was not much discussion about the government’s responsibility after the event, which would make it different from other disasters analysed by historians, and also that the funding of storm surge science fits into a wider picture of government belief in science as a problem solver. However, the picture is much more complex: there was intense pressure on the government from parts of the opposition and this pressure impacted on how they responded to the event. For example, the Cabinet’s decision to support an inquiry into the event was more about limiting financial pressure than belief in science. This inquiry later recommended research into forecasting, but only with the Ministry of Agriculture and Fisheries’s support and research-friendly attitude did storm surge science become supported by central government. The picture of central government in the 1950s as pro-science needs to be qualified by investigating who in government supported science, and how and why that support was given.

Keywords: history of oceanography, patronage, disaster studies, post-war British science
INTRODUCTION

In early 1953 over 300 people died in a storm surge flooding event on the East Coast of England. It has been argued that there was unusually little blame laid on central government regarding this event and, also, that government belief in science explains the creation of the Waverley Committee into the event and, later, the support the government gave the research that committee suggested. Usually disasters of this type, such as the 1703 storm described by Defoe and Hurricane Katrina, lead to discussions about blame. Before assuming the 1953 storm surge was different in this respect, this should be thoroughly investigated. When this is done we see that in fact much pressure was put on the government following the event, making it more similar to other disasters. This also problematizes the government’s support of the Waverley Committee and its recommendations about research into forecasting surges. I argue this support was just as much about avoiding blame and reducing financial demands on the government as about Cabinet belief in science.

Storm surges are also known as meteorological effects on sea level and scientists today define them as relatively rapid changes in sea level due to wind and atmospheric pressure, affecting the regular periodic tidal pattern. Surges form when ‘the atmosphere forces the water body, which responds by generating oscillations of the water level with various frequencies and amplitudes’. Such an oscillation is then transported by the wind until it comes into contact with a coast. A complex combination of causes decide the period and level of storm surges, such as the direction, speed and duration of the wind, the change in atmospheric pressure, the layout of

2 Two introductory texts to tides, prediction and surges are John D. Boon, Secrets of the Tide: Tide and Tidal Current Analysis and Applications, Storm Surges and Sea Level Trends (Chichester, 2004), David Pugh, Changing Sea Levels: Effects of Tides, Weather and Climate (Cambridge, 2004).
3 Gabriele Gönnert et al., Global Storm Surges, ed. German Coastal Engineering Research Council (Archive for Research and Technology on the North Sea and Baltic Coast; Holstein, 2001), 7.
the coastline and seabed, the track and intensity of the storm, and the rotation of the earth.\textsuperscript{4} The southern North Sea, including England’s East Coast, is sensitive to storm surges due to its semi-enclosed funnel shape which intensifies the height of the surge. Like the ordinary tide, surges travel southwards along Britain’s eastern coast. As they also both travel at about the same speed, due to both being similar kinds of travelling waves, a surge that coincides with high tide will affect most of this coast, as it did in 1953.\textsuperscript{5}

Storm surge flooding has been recorded throughout European history, often with severe consequences in terms of loss of land or lives\textsuperscript{6} and the British have a long history of dealing with coastal flooding and erosion. Their responses to surges have varied across time and circumstances. For example, the number of storm surges in the Thames Estuary increased in the Middle Ages, causing loss of land, and considerable resources were initially spent to combat this, but as labour costs increased after the Black Death some retreat from the threatened land took place instead.\textsuperscript{7} At least since the late nineteenth century scientific research into storm surges has been one key way of responding to storm surges in Britain. From the 1920s much of this research has been conducted at the Liverpool Observatory and Tidal Institute (TI) and its successors, now the National Oceanographic Centre Liverpool.

TI was established in 1919 when the increasing size of ships and the First World War had created an industrial and military demand for increasingly accurate tidal predictions. In the early 1950s it was the largest provider of tidal predictions in the world. Much of its funding came from the sale of such predictions to the Hydrographic Department of the Admiralty and other

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\textsuperscript{4} The rotation of the earth matters as the highest storm surges do not necessarily result from winds perpendicular to the coast, as the coriolis effect leads to what is known as Ekman transport when wind-drifted water is deflected up to 45° away from the wind direction (to the right in the Northern hemisphere). Gönner et al., *Global Storm Surges*, 2-4, Pugh, *Changing Sea Levels*, 139-41, Keith Smith and Roy Ward, *Floods: Physical Processes and Human Impacts* (Chichester, 1998), 151.

\textsuperscript{5} Smith and Ward, *Floods*.

\textsuperscript{6} Smith and Ward, *Floods*.

organizations such as publishers of nautical almanacs. It also received funding from the local shipping industry and Liverpool University. Since the 1920s it had from time to time researched storm surges, first for the local shipping industry and later local authorities and, briefly during the Second World War, for the Hydrographic Department. The aim of the research at TI was usually to forecast surges. In 1947 one of TI’s researchers, Thomas Henry Corkan (1906 – 1952), produced a report to the London County Council, containing a statistical forecasting formula for surges at Southend, on the coast north-east of London. 

Following the 1953 flooding event, a state-funded research programme into storm surges, including further developments of TI’s statistical forecasting formula for other ports, was implemented, which continues to this day. As I will describe the change towards state patronage of storm surge science came about in a setting of strong political pressure on the government from parts of the opposition. This pressure impacted on policy, leading to relative government generosity in terms of grants and also to the creation of an investigation into the event, called the Waverley Committee. Later belief in planned science and technology as a problem solver also had a role, with the technical members of the Waverley Committee being important in formulating its recommendations. The technical members formed a sub-committee which recommended further research, arguing this would improve the warning system. However, this belief in science and technology as a problem solver was not uncontested. The Cabinet does not seem to have been motivated by such beliefs, and when the sub-committee’s report did the rounds of various government departments the worth of the proposed research was questioned. It was eventually picked up by officers within the Ministry of Agriculture and Fisheries (MAF) who considered themselves research-friendly. They set about implementing it well before the publication of the Waverley Committee’s final report. They established the Advisory Committee

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of Oceanographical and Meteorological Research, which then for many years formed the framework for TI’s work on storm surges, including forecasting formulae.

This story complicates existing narratives about the event, making it more similar to other natural disasters as there were considerable debates about blame and responsibility. In addition, it makes it clear that it is necessary to qualify narratives about the 1950s governments as having strong belief in science and increase in government support of science with more detailed analysis of who gave the support and why they did so.

THE EAST COAST FLOOD AND THE POLITICAL RESPONSE

On Saturday 31 January a cyclone passed north of Scotland before turning south. Its unusually intense pressure gradient led to extremely strong winds and a major storm surge together with high waves. The surge travelled down the East Coast, starting at Spurn Head at 4 p.m., reaching King’s Lynn and maximum height at 7.20 p.m. and Canvey Island at 1.10 a.m., Sunday morning. It caused major flooding, as sea defences were breached in over 1,200 places, either by direct wave action or by overtopping and erosion. The timing of the surge, arriving after dark and late in the evening, especially further south, increased the deadliness of the event, and in England 307 people died, either of drowning or exposure. Most of those who died were over sixty and lived in

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post-war wooden or prefabricated single-storey buildings, some intended only for summer inhabitation. The impact was much worse in the Netherlands where 1,795 people died. No public warnings were given, though the Met Office, as part of the Thames surge warning system, had given some warning to at least some River Boards.\(^\text{10}\) Most of the immediate search and rescue operation was organized locally with the help of the USA and UK army which had a strong presence in the area.\(^\text{11}\)

On Monday a major government response was initiated. The repair of sea defences before high spring tides in mid-February, to stop further flooding, was a major logistical challenge, involving 30,000 workers, half from the UK and USA military, and masses of material and machines, but was deemed successful. The cost of the damages to the defences was estimated at about £30 million by the Home Secretary at the time, Maxwell Fyfe. In addition, telephone lines, electricity, gas, water, sewage and drainage had been disrupted, 24,000 houses and over 200 industrial premises needed repairs and 32,000 people were evacuated. 160,000 acres of land were flooded by salt water and 46,000 livestock died.\(^\text{12}\)

As part of its response to the flooding, the government established an inquiry, the Departmental Committee on Coastal Flooding, more commonly known as the Waverley Committee after its chair, Viscount Waverley. Secondary sources discussing the event have not analyzed why the Waverley Committee was set up. For example, Clare Johnson, Edmund

\(^{10}\) See e.g. *The Manchester Guardian*, 'Flood Warnings', Feb 5 1953b, 4. The Met Office warnings are often not noted in secondary sources.

\(^{11}\) Secondary sources have portrayed central government as not getting involved until Monday, leaving local people to fend for themselves during the weekend (often described as doing so heroically and successfully), but the Guardian reported that Prime Minister Churchill, as well as his Ministers of Housing and Local Government (Harold Macmillan) and of Health (Iain MacLeod) had been kept informed throughout Sunday and had been involved in organising the response via the government’s regional offices. *The Manchester Guardian*, 'Statement Today by Mr Churchill', Feb 12 1953e, *The Manchester Guardian* (1828-1959), 'Up to £80 an Acre for Sown Land Damaged in Floods', 1953. In addition, the involvement of the army in the rescue implies state involvement, even if the response was organised on the ground.

Penning-Rowsell and Sylvia Tunstall, who compared the policy response to four major English flood events in 1947, 1953, 1998 and 2000, seem to assume that inquiries, like the Waverley Committee or the Bye Report after the flood in 1998, are a natural policy response after a major flood. They do not analyze why such inquiries were established after events in 1953, 1998 and 2000, but analyze in considerable detail the lack of such an inquiry after the one in 1947. However, the lack of an inquiry after the flood in 1947 and the delay of many months in setting up such an inquiry after the 1952 London smog disaster in which around 4000 died highlights that the creation of an inquiry was not necessarily a straightforward or obvious response to a weather-related disaster at the time. The quick creation of it, and, in extension, the creation of the institutions through which storm surge science was done after the event, requires just as much explanation as the lack of an inquiry after 1947.

In addition, secondary sources have deemphasized the allocation of blame and responsibility as a reason for the government response to the event. For example, Peter Baxter argues there was a lack of public apportioning of blame to government and individuals ‘[d]espite the absence of warnings and the deficiencies of defences’. While Johnson, Penning-Rowsell and Tunstall link controversy to the creation of the new warning system, they do not link such pressures to the creation of the Waverley Committee. The scale of the event clearly had a key role in the government’s response to the event, but I will argue that political pressure also played an important role in the creation of the Waverley Committee and, in extension, the funding of TT’s research.

14 On the smog, see Mark Whitehead, State, Science, and the Skies: Governmentalities of the British Atmosphere (Chichester, 2009), 142.
16 Baxter, 'The East Coast Big Flood', 1310.
The government’s response

As opposed to what other secondary sources have argued, there was actually a substantial amount of discussion regarding the responsibility of the government after the event. On one hand, the Leader of the Opposition, Clement Attlee, was supportive of the government’s response effort and assisted it, for example by ‘pairing’ MPs for voting purposes when members returned to their coastal constituencies to deal with the event. When praising the courage and neighbourliness of the British (and other) people in a speech to Parliament he also included the work of public authorities, preferring to talk of heroism rather than blame.  

On the other hand, more leftist members of the Labour Opposition, led by Attlee’s rival Herbert Morrison and Aneurin Bevan, did not hesitate to raise issues of blame. They questioned whether a government circular from 1952 limiting the use of steel for flood defences had caused weaknesses in defences and whether the government was willing to incur expenses by requisitioning houses to use for the evacuees. In response the government defended its actions as sufficient. For example, they said that they had authorised twice as much expenditure on steel for sea defences in 1952 as had been authorised in 1951. As the Conservatives had taken over in government from Labour in late 1951, the implication was that Labour had spent less on coastal defences than the Conservatives had.

Throughout February and March issues like this bubbled up, for example during a lively debate on 11 March when the opposition demanded clarification of what financial aid the government would provide. Churchill had declared shortly after the event ‘that the catastrophe is one which will require to be treated upon a national basis and, broadly, as a national responsibility’, a statement which was frequently used by the opposition following the event to discuss the

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On this occasion Morrison claimed the Prime Minister Churchill’s reputation depended on the government fulfilling his promise of treating the event as a national responsibility.\(^{20}\)

The political pressure from these debates about blame and responsibility was keenly felt by ministers and was visible to others. For example, when the Lord Mayor briefed the Home Secretary on the charity’s progress regarding the flooding he did so ‘since I see you will be in trouble again on Thursday’.\(^{21}\) Similarly, when writing to the Home Secretary regarding the funding of the Local Authorities’ response to the disaster, the Conservative MP of Horncastle in Lincolnshire, Commander John Maitland, stated that ‘there is no doubt that the slightest appearance of niggardliness or muddle will be used by the Opposition to inflame opinion against the Government’.\(^{22}\)

The pressure impacted on the government’s financial policy regarding the event, making the Treasury seemingly more generous than it had previously been towards storm surge science. In the 1930s the Treasury had repeatedly refused to provide funding for a research project proposed by TI, the Hydrographic Department and the London County Council. The Treasury feared that if it provided funding for the research this would lead to demands for increased government funding for flood defences once the research had been concluded.\(^{23}\) Eventually the London County Council, which Morrison had been the Leader of during some of these discussions, decided to fund the research together with the Port of London Authority and a


\(^{21}\) *The Times*, ‘Flood Losses’, Mar 11 1953d.

\(^{22}\) The National Archives: Public Record Office, Kew (TNA:PRO), T 277/312, M Trustram Eve to D M Fyfe, 3rd Mar 1953.

\(^{23}\) TNA:PRO, T 277/311, John Maitland to Home Secretary, 12th Feb 1953.

\(^{24}\) TNA:PRO, HLG 51/39, Minute sheet, Accountant-General SC Alford, 18th Feb 1936.
group of coastal local authorities. However, the Treasury’s attitude was different after the 1953 event, in part because of opposition pressure.

The impact of the opposition’s noises on senior figures in government can be clearly seen in a memo to the Chancellor from the Financial Secretary, John A Boyd-Carpenter, labelled ‘secret’, from mid-March. Soon after the event the Treasury had agreed to double whatever the public contributed to the so-called Lord Mayor’s Fund, the key channel for distributing charitable aid to those affected by the flood. Initially the Chancellor, Richard Austen Butler, had wanted to stop these payments when the government’s contribution had reached £2m. These contributions were now well beyond this sum, as while the Chancellor had been away Boyd-Carpenter and Second Secretary B Gilbert had decided any such stop would have been unwise, and Boyd-Carpenter argued this was still the case: ‘any attempt to do so would both provoke a major row and stimulate even greater demands that the Exchequer should accept liability for various forms of loss’. It was ‘politically impossible’ to stop doubling the public’s contributions. They argued that providing more money to start would lead to the Treasury’s bill being lower in the end.

Another example of the impact the political pressure had on funding issues is the Cabinet’s discussion on 17 March of a draft statement to Parliament by Maxwell Fyfe, the Home Secretary and co-ordinator of the government’s response. The main issue during the Cabinet debate on Fyfe’s March statement was two possible paragraphs regarding reimbursements to be given to local authorities. The Chancellor questioned the high Exchequer liability for the event: ‘Is it really a national disaster?’ If it was, he agreed they must pay up. In response Fyfe argued that the event was ‘unprecedented in our history’, adding that the political pressure was ‘v. strong’. This exemplifies how the scale and framing of the event as a ‘national’ unprecedented

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26 TNA:PRO, T 227/312, ‘Floods’, memo by JA Boyd-Carpenter to Chancellor of the Exchequer, 14th Mar 1953.
27 TNA:PRO, CAB 195/11, CC 20(53), Notebooks, Cabinet meeting held on 17th Mar 1953, minute no. 10.
disaster together with political pressure impacted on government funding. Though the Chancellor claimed to be willing to consider paying more than was implied by the less generous version of Fyfe’s draft, he did not want to promise it in advance. The Cabinet in the end chose the less generous of the two paragraphs. The Treasury tried to limit the government’s contributions, but felt there were stricter than normal limits imposed by the political difficulties such reductions could cause. This meant that much of the Treasury’s internal debates were more about allocation and organizing of money than about putting severe limits on spending, so the political pressure impacted on the government’s funding decisions.

When Fyfe gave his statement to Parliament on 18 March the Opposition’s questioning of the government’s actions came to a crescendo. Fyfe’s statement led to a lively debate, with questions and comments from several Labour members, saying that it breached the promise given by Prime Minister Churchill on the Monday after the event to treat the event on a national basis. Some Labour members claimed Fyfe’s statement broke this promise by not providing sufficient financial assistance. After a few days the Opposition backed down, with Mr Edward Evans, the MP for flood-affected Lowestoft, declaring the government’s actions ‘timely, decent, and not ungenerous’. Despite the end result, this and the earlier exchanges show that there were substantial debates regarding blame and responsibility, both past and future, and, in particular, about the role of the government, in the wake of the 1953 event. This pressure also

28 TNA:PRO, CAB 128/26, CC (53), 20th Conclusions, Cabinet meeting held on 17th Mar 1953, minute no. 11. See also TNA:PRO, CAB 129/60, C.(53) 104, ‘Flood damage,’ Memorandum by the Secretary of State for the Home Department and Minister for Welsh Affairs, 16th Mar 1953, which includes the alternative paragraphs.

29 See also TNA:PRO, T 227/312, Minute on ‘Flood Damage’ by JG Owen to Mr Jenkyns, 16th Mar 1953.

30 For examples, see documents in TNA:PRO, T 277/311. These deal primarily with contributions towards the rebuilding effort and compensation to individuals and small businesses, and do not mention payments related to the warning system or the research. I have not been able to locate any Treasury files on these latter topics, but the costs for these were much smaller and there is nothing to indicate the overall argument did not apply to them too.


impacted on the government’s response, both regarding their financial response, as discussed above, and the establishment of the Waverley Committee, as will be discussed next.

The establishment of the Waverley Committee

These debates about funding were background to the establishment of the Waverley Committee. Johnson, Penning-Rowsell and Tunstall have argued that a belief in the ability of science and technology to solve problems and inform policy, fostered during the recent war, meant that there was no debate regarding whether the research should be funded or about the capability of research to produce the sought-after answers after the 1953 event. They argue that the Waverley committee’s recommendations, over which they say scientific members had a strong influence, were not openly debated or questioned but instead accepted because of this belief in science. This chimes with others’ portrayal of the post-war period, with a substantial literature showing an increase in state patronage of research during the 1950s. Jon Agar summarizes this literature: ‘The increased funding [of science] reflected the post-war regard for ‘boffins’ and for rational planning, both popularly and within government,’ also arguing that this depended on and further developed networks between government, military and academic science developed during the Second World War. It is thus well documented that belief in science and planning as problem solvers was strong in Britain in the 1950s and that government investment in science and technology increased dramatically in this decade.

However, central government’s response to the 1953 flooding was not that of a believer in science as a problem solver. Instead the Cabinet used the supposed objectivity of science as a

support mechanism to defend and protect itself from its political opponents. During a Cabinet meeting in mid-February Fyfe mentioned that he was going to announce the appointment of what became the Waverley Committee ‘to consider what long-term measures should be taken to guard against a recurrence of flooding on the rare occasions when tide and wind conditions were the same’ as during the event. Fyfe used the rarity of the event, as having happened ‘3 times in 1,000 yrs’, to argue that they ‘must be careful to see how far we shd. go’. Fyfe wanted to appoint an expert committee to ensure that the costs of the response to the event did not exceed the benefits by going too far in the building of further flood defences or the creation of a warning system, given the rarity of these events. The announcing of the expert Waverley Committee did not reflect a Cabinet belief in science, but was instead a cost-limitation exercise in response to the political pressure for high government assistance following the event.

**DEPARTMENTAL REACTIONS: THE CREATION OF THE ADVISORY COMMITTEE ON OCEANOGRAPHICAL AND METEOROLOGICAL RESEARCH**

Political pressure impacted on the political response to the event, producing a seemingly generous Treasury attitude and the creation of an expert inquiry, both in fact thought to be long-term cost saving measures. I have downplayed the importance of beliefs in science and technology as problem solvers at the Cabinet level. However, while the political pressure appears to have provided an unusually receptive Treasury response to funding requests, this does not explain central government’s quick implementation of the Waverley Committee’s recommendations regarding further research – the recommendations were being implemented well before the publication of the Committee’s report. By seeking to explain this, it is possible to analyze differences in the belief in science and technology within central government. Different

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56 Compare Ted Porter’s argument that threatened or weak organisations (or scientific disciplines) are more likely to refer to objectivity and scientific rules than less threatened ones. Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Chichester, 1995).

57 TNA:PRO, CAB 128/26, CC (53), 12th Conclusions, Cabinet meeting held on 17th Feb 1953, minute no. 7.

58 TNA:PRO, CAB 195/11, CC 12(53), Notebooks, Cabinet meeting held on 17th Feb 1953, minute no. 7.
government departments had different views of the value of the Waverley Committee’s recommendations and different beliefs in the value of science were an important consideration in this. To understand the increased state patronage of science in the 1950s it is necessary to understand who within government provided this patronage.

This section explains how the government’s patronage of TI’s surge science came to take the form it took and how a new framework for storm surge science was set up. It does this by outlining the creation of the organization that commissioned the work, placing the Advisory Committee within a wider framework of departmental discussions regarding whose responsibility its research should be and what the value of it was. The end result was an Advisory Committee on Oceanographical and Meteorological Research under MAF. While the setting up of such a committee was one of the recommendations of the Waverley Committee, the creation of it actually came about slightly differently, with the report of a scientific sub-committee of the main Waverley Committee doing the rounds of various departments, eventually being picked up and implemented by MAF. The main effect of the Waverley Committee’s final recommendation was the relatively minor one of making a scientist the chair of the proposed committee. The entire process exemplifies the contested nature of central government support of storm surge science.

Initially when the Hydrographic Department (Hydro) was consulted on the draft membership of the Waverley Committee it did not contain a ‘tidal expert’, something which Hydrographer Day and Commander WI Farquharson, the Tidal Super-Intendent at Hydro, were unhappy with. Arguing that this lack was likely to lead to questions of the legitimacy of the committee in the eyes of other scientists, the Hydrographer successfully suggested the addition of Joseph Proudman (1888 – 1975), whom he already knew.39 Proudman, a physical oceanographer focused on research into the dynamical theory of tides, had started his career as a

39 Documents in UK Hydrographic Office Archive, Taunton (UKHO), H 01041.53. The phrase tidal expert was used repeatedly; see e.g. Minute by Hydrographer Day to Secretary, 13th Mar 1953 and Proudman to Farquharson, 13th mar 1953, both in UKHO, H 01041.53.
mathematician trained at Liverpool and Cambridge University. He had worked with Hydro since shortly after he established TI with financial help from Liverpool shipping industry in 1919. While remaining the Director of TI until 1946, and subsequently staying involved with the Institute and its work, Proudman had always had separate appointments at Liverpool University, first in mathematics and from 1933 as Professor of Oceanography.41

Following the Hydrographer’s intervention, the final Waverley committee consisted of a mix of Lords, former politicians and civil servants, as well as engineers and four scientists, including Proudman.42 The Waverley Committee’s terms of reference included examining the causes of the flooding, what lessons could be learned, in particular regarding physical sea defences, and whether a further warning system should be set up.43 The committee’s questions concentrated on scientific and technological matters, and also included planning-related matters such as how to organize the management of flood defence. The intervention of scientifically-inclined Departments such as Hydro, ensuring Proudman’s place on the Committee, increased the scientific membership of the final version of the committee.

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40 Liverpool University Archive, Liverpool (LUA), P744/4, Proudman to Hobhouse, 19th Nov 1945; LUA, P744/4, Hobhouse to Proudman, 21st Nov 1945, and TI, Annual Report 1946 (Liverpool, 1946), 3.
42 The names, titles and affiliations of the members of the Waverley Committee were Right Honourable Viscount Waverley GCB GCSI GCIE FRS, Dr GMB Dobson CBE FRS (Reader in Meteorology in the University of Oxford), Sir Donald Ferguson GCB (former Permanent Secretary of the Ministry of Fuel and Power, and Ministry of Agriculture and Fisheries), Mr RD Gwyther CBE MC (partner in Messrs. Coode and Partners, chartered civil engineer), Sir Claude Inglis CIE FRS (Director, Hydraulics Research Station, Department of Scientific and Industrial Research), Mr RG Leach CBE (partner in Peat, Marwick, Mitchell and Company, former Deputy Finance Secretary of Ministry of Food), Major Sir Basil Neven-Spence (Lord Lieutenant of Zetland), Proudman, Mr AS Quartermaine CBE MC (President of the Institution of Civil Engineers and lately Chief Engineer of the Great Western Railway), Lord De Ramsey TD (Lord Lieutenant of Huntingdonshire), Professor JA Steers (Professor of Geography at the University of Cambridge), Sir Miles Thomas DFC (Chairman of British Overseas Airways Corporation), Sir John Wrigley KBE CB (former Joint Deputy-Secretary of the Ministry of Housing and Local Government), Mr T Yates CBE (General Secretary of the National Union of Seamen). Affiliations taken from TNA:PRO, MAF 135/341, Hansard extract 'Flood and Storm Damage' from 23rd Mar 1953, and Parliamentary Debates (Commons), 'Flood Disaster Committee (Membership)', 514, 23 April 1953, 1395 http://hansard.millbanksystems.com/commons/1953/apr/23/flood-disaster-committee-membership, accessed 16th Dec 2010.
43 Report of the Departmental Committee on Coastal Flooding [Waverley Committee], para 1.
The Waverley Committee issued two reports: first, an interim report in the summer of 1953 on the development of a warning system, and, second, a final report in the spring of 1954, which included the report of a Sub-Committee suggesting the establishment of the Advisory Committee. These reports together with departmental discussions led to the creation of a committee which then financially supported research into storm surges at TI and elsewhere. The reason for the creation of this Advisory Committee is thus the direct reason behind increased state patronage of storm surge science after 1953. So, what was the reason for the research suggested by the Waverley Committee, what did they suggest should be done and how did central government in fact implement these suggestions?

The reason for research: The warning system

The Waverley Committee argued that the research it recommended in its final report would make forecasts done by the newly established warning system more accurate, i.e. make them more like observed surges, and reduce the number of costly false alarms. The Hydrographer estimated that each cancelled warning or false alarm cost at least £1,000 for local authorities, the police etc. To him the aim of the suggested research was to improve the ‘accuracy’ of forecasts which in turn would enable him ‘with confidence, to lower the margin of safety which he now applies,’ so that there would be fewer costly false alarms.44

The background to this was that an emergency warning system had been set up soon after the event.45 The Waverley Committee was asked by the government to produce an interim report regarding the continuation of the warning system, so that this could be organized for the following winter.46 The warning system suggested by the Waverley Committee in its interim report was fairly similar to the emergency one. Hydro staff would be based at the Met Office

44 UKHO, HW 287.54, ‘Waverley Committee on Coastal Flooding, Report on Oceanographic Sub-Committee’, Note for [the departmental] meeting on 3rd Feb 1954.
45 UKHO, H 01041.53, Minutes of Cabinet Emergency Committee.
46 UKHO, H 01041.53, Cabinet, Official Committee on Emergencies, Sub Committee on the Setting Up of Flood Warning System, Minutes from third meeting, 24th Mar 1953.
forecasting office in Dunstable receiving special hourly tidal predictions from TI, tidal observations from gauges along the coast and meteorological information from the Met Office. The formula Corkan had calculated at TI for the London County Council in the 1940s would be further developed by Hydro’s staff, who would then calculate a forecast of the surge using their version of the formula, and put out warnings if necessary.47

As can be seen in a memo to the River Boards, which would receive warnings under the system and needed to prepare, the government very quickly accepted the recommendations. In mid-August 1953, even before the government had officially accepted the report, MAF sent the River Boards a confidential memorandum telling them that the government had accepted the interim report ‘in toto’.48 The lack of a warning system had been a common complaint voiced both by media actors and by others whose views were covered by the newspapers, for example, East Suffolk County Council and the jury at the coroners’ inquests in King’s Lynn and Canvey Island.49 While this controversy was one of the reasons why the warning system was implemented fast and as suggested by the Waverley Committee, as Johnson, Penning-Rowsell and Tunstall has argued, I would add that the government did this to avoid further political controversy and demands for funding.50

Formulation of a research plan: The Oceanographic Sub-Committee

The framework for TI’s research came out of an Oceanographical Sub-Committee set up by the Waverley Committee on the suggestion of Proudman and the meteorologist on the committee, GMB Dobson. The Waverley Committee’s original terms of reference did not allow it to make

48 TNA:PRO, MAF 222/306, Memorandum to river boards, 17th Aug 1953, ‘Flood Warning System’.
recommendations on future research, but the creation of a sub-committee made this possible. This sub-committee provides a good example of the members of the Waverley Committee (as opposed to the Cabinet) favouring planned research, especially as the sub-committee’s recommendations made it into the final report of the Waverley Committee. By suggesting the sub-committee Proudman was able to ‘piggy-back’ a research agenda for storm surge science onto the Waverley Committee’s report. This suited the Waverley Committee, Proudman and TI, which was recommended as a research contractor to the state as a result of the close connections between the Institute, Proudman and Hydro.

The Sub-Committee’s terms of reference included reporting on what research was needed to improve the recommended warning system and who should do this work. Proudman chaired while the other three scientists from the main committee were members of the Sub-Committee: Dobson (Reader in Meteorology at the University of Oxford), Claude Inglis (Director, Hydraulics Research Station, Department of Scientific and Industrial Research) and JA Steers (Professor of Geography at the University of Cambridge). They also consulted George Deacon at the National Institute of Oceanography (NIO) and Farquharson at Hydro. The scientists recommended further research and the creation of an Advisory Committee to co-ordinate the work. They identified seven specific problems and allocated these to TI and NIO, both represented directly or indirectly at the meeting. Amongst other problems TI was allocated ‘[t]he search for empirical formulae’ to predict surges at seven named ports along the East Coast as early as possible and ‘[t]he search for formulae which will enable external surges, as

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51 TNA:PRO, MAF 135/344, Minute by JE Maher (secretary of the Waverley Committee) to Chairman, 22nd May 1953.
52 Liverpool World Museum, Liverpool (LWM), Bidston Archive, Correspondence between Proudman, Rossiter (one of the researchers at TI) and Doodson, spring and summer 1953, Waverley Committee, Box 120, especially Proudman to Rossiter, 24th Apr 1953.
53 TNA:PRO, MAF 135/341, Departmental Committee on Coastal Flooding, Minutes of third meeting, 8th Jun 1953, and Report of the Departmental Committee on Coastal Flooding [Waverley Committee], Appendix B. The Sub-Committee’s one meeting was held at the Royal Society in June. TNA:PRO, MAF 135/344, Maher to Steers, 17th Jun 1953.
54 Proudman represented TI’s interests.
recorded at Aberdeen, to be forecast from meteorological data’. The recommended research allocated to NIO was studies of free and forced oscillations in the North Sea, the reaction of the sea surface to winds of different strengths and how surges and long waves were modified in shallow water.\(^55\) TI was then asked whether it was able and willing to do the suggested work, which it said it was, subject to finance of at least £2000 per year and time to fulfil its other responsibilities regarding tidal predictions.\(^56\)

In its report the Sub-Committee formulated a specific research programme aimed at improving the warning system, to be undertaken by TI and NIO. This specification was heavily dependent on existing networks and contacts, as well as on existing ideas about what research would be useful. For example, Proudman communicated with TI informally regarding the proposed research, suggesting they stress the need for research on statistical formulae in their submission of evidence to the Waverley Committee.\(^57\) In a supporting circle this was one of the ideas then allocated to TI by the Sub-Committee.

In summary, the recommended research from the Sub-Committee was framed as necessary to decrease the costs of the warning system and improve its performance, and the suggested research plan was formulated by a group of scientists including Proudman in close collaboration with the research institute’s they suggested should do the work. We now turn to the establishment of the suggested Advisory Committee.

**Establishing the Advisory Committee: Which department would lead?**

The Sub-Committee’s recommended research programme turned into the Advisory Committee through a process of departmental negotiations, during which the value of the proposed research

\(^{55}\) TNA:PRO, MAF 135/344, Oceanographic Sub-Committee Report, undated, ca July 1953, document nr 18, and Report of the Departmental Committee on Coastal Flooding [Waverley Committee], Appendix B.

\(^{56}\) LWM, Bidston Archive, Box 120, Doodson to Ministry of Housing & Local Government, 23rd Jul 1953, folder Waverley Committee. See also correspondence in TNA:PRO, MAF 135/344.

\(^{57}\) LWM, Bidston Archive, Box 120, Correspondence between Proudman, Rossiter and Doodson, spring and summer 1953. Folder ‘Waverley Committee’, especially Proudman to Rossiter, 24th Apr 1953.
was debated and different views on the value of this kind of science were aired. After the subcommittee’s report had been accepted by the main Waverley Committee, the chairman asked the Committee’s Secretary, Maher, to bring it to the notice of the government. The subcommittee’s report then did the rounds of Whitehall, bouncing between different departments until MAF picked it up.

The Home Office co-ordinated the report’s Whitehall travels, but officials there said it did not have any other departmental interests in the proposed research. Indeed an Assistant Secretary in the Civil Defence Department, RF Wood, quickly pushed the report away from the Home Office by suggesting that the matter was not something that the Home Office could play a ‘useful part’ in. He implied that the report was overly academic and technical, and that the work would only possibly lead to indirect benefits to the warning system over the long term. The Admiralty was then asked to lead on the report. They responded that while they were ‘flattered’ to be asked and were ‘competent to advise on the technical aspects of the report’ they would not take the lead as they were not the right Department to decide whether the potential increase in protection to life and property was worth the expense and effort of the suggested work. They claimed to be too technical to lead – no doubt there were also financial or personnel considerations involved. Following this, the Home Office bounced the report to others, asking MAF, the Ministry of Housing and Local Government (MHLG) and the Scottish Office to take over the lead on it.

At this point the Permanent Secretary Alan Hitchman at MAF said they would lead on the implementation of the report. MAF seems to have decided to take the lead on the report

58 Correspondence in TNA:PRO, MAF 135/344, and TNA:PRO, MAF 135/341, Departmental Committee on Coastal Flooding, Minutes of fifth meeting, 6th Jul 1953.
59 TNA:PRO, HO 325/13, Minute by A Booth, 24th Sep 1953.
60 TNA:PRO, HO 325/13, Minutes by RF W[ood], 14th Sep 1953 and 25th Sep 1953.
61 TNA:PRO, HO 325/13, Jarrett to Allen, 28th Oct 1953.
62 TNA:PRO, HO 325/13, Newsam to Milne, 18th Nov 1953.
with only little discussion. Assistant Secretary CHA Duke’s first minute in the file stated that ‘since this Department is responsible for the sea defences of low-lying land and therefore has a major interest in seeing that information about tidal surges is as complete as possible I think we should take the initiative in this matter’. As mentioned above, in the interwar period the Treasury had argued that if the state became the patron of surge science this could lead to demands for funding of sea defences. Duke now argued that as the state, specifically his department, were responsible for sea defences, they should support the research – a symmetrical argument, but stated in the opposite direction to what the Treasury had earlier feared.

There were briefly some discussions whether MAF or the MHLG should lead, with the latter arguing for joint leadership, but Duke pressed for MAF to lead as he thought MHLG’s attitude to research left much to be desired, implying they were not keen on supporting research. He also ascertained that the Chief Engineer of MAF thought an increase in the reliability of the warning system was worth ‘the relatively modest sum of £25,000’. By mid January Duke confirmed to the Home Office that MAF would lead on the report.

It is clear that while the 1950s may have been a decade of strong belief in planning and scientific research as a problem solver, some departments and some officers believed this more strongly than others. In this case Duke at MAF was keener on scientific research than Wood at the Home Office, and Duke also thought MAF was ‘better’ at research than the MHLG. The implementation of the sub-committee’s research plan relied on arguments by officers such as Duke at MAF, who due to their established interests in sea defence were favourably inclined towards research in that area and also saw themselves as generally research friendly.

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63 TNA:PRO, MAF 135/324, Minute by Duke, 28th Nov 1953.
64 TNA:PRO, MAF 135/324, Minute by Duke, 28th Nov 1953, and TNA:PRO, HO 325/13, Sheepshank to Newsam, 8th Dec 1953.
65 TNA:PRO, MAF 135/324, Minute by Duke, 11th Jan 1954.
66 TNA:PRO, HO 325/13, Duke to Wood, 13th Jan 1954.
Establishing the Advisory Committee: Funding

Once MAF had adopted the report, they set about organizing its implementation by calling a departmental meeting. Representatives of the Admiralty (including the Hydrographer and Farquharson), MHLG, the Ministry of Transport and Civil Aviation, the Met Office, the Scottish Home Department, and MAF attended. The representatives discussed the merits of the proposals ‘from a technical point of view’ and quickly appear to have agreed to advise Ministers to accept the Sub-Committee’s recommendations. The report now had supporters who believed its arguments that research would improve forecasts and reduce costs, but funding was still an issue.

At the meeting none of the Departments present claimed to be able to fund the work in its entirety, though all, especially the Met Office and Hydro, agreed to contribute. Following the departmental meeting one of MAF’s finance officers contacted the Treasury to discuss the matter, finding that they were ‘more or less reconciled to the fact that any money for this purpose will have to be provided on this Ministry’s [MAF’s] vote’. While MAF would need to seek Treasury authority for the grants, providing further details of the work proposed and the finances needed, they could assume that the principle of funding storm surge science had been accepted by the Treasury. Formal Treasury approval was given after some formalities had been

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67 The names, affiliations and titles (where known) of the representatives were: from the Admiralty SP Osmond (Principal) and Farquharson, the Ministry of Housing and Local Government HH Browne (Principal), the Ministry of Transport and Civil Aviation Mr FE Page, the Met Office Dr JM (James Martin) Stagg and Mr SB Peters (both Deputy Chief Scientific Officers), the Scottish Home Department Mr NJP Hutchison, and from MAF the chair CHA Duke (Assistant Secretary of Land Drainage and Water Supply Division), A Sparks (Assistant Secretary in the Finance and Accounts Division), EAG Johnson (Chief Drainage Engineer) and JE Maher (Principal in the Land Drainage Division).

68 Documents in UKHO, HW 287.54, quote are from Departmental Committee on Coastal Flooding, Report of the Oceanographic Sub-Committee, Minutes of meeting held at 3rd Feb 1954.

69 UKHO, HW 287.54, Departmental Committee on Coastal Flooding, Report of the Oceanographic Sub-Committee, Minutes of meeting held at 3rd Feb 1954.

70 TNA:PRO, MAF 135/324, Minute by Assistant Secretary, Finance and Accounts Division Sparks, 3rd Feb 1954. See also documents in UKHO, HW 287.54. There were some discussions regarding how to pay for the installation of additional tidal
sorted, such as which sub-head the grants should be charged to and the provision of a minimal budget from TI outlining how much of the grant would be spent on different costs.\(^{71}\) For the rest of the 1950s MAF and Treasury financial support for TI’s research on surge forecasting was not questioned. For example, while there were critical debates between a number of Departments regarding the funding of further tidal gauges in 1958/59, this debate did not affect the funding of the rest of TI’s work.\(^{72}\) Central government was now a direct patron of storm surge science, especially work like that at TI on forecasting formulae for the warning system.

The Advisory Committee on Oceanographic and Meteorological Research met for the first time on 8 October 1954, in MAF’s offices. The terms of reference for the Advisory Committee were to co-ordinate oceanographic and meteorological research work in relation to sea defence, as recommended by the Waverley Committee’s technical sub-committee.\(^{73}\) Initially it had been suggested that the Advisory Committee should be chaired by MAF’s Chief Engineer,\(^ {74}\) but ‘in deference to the recommendation in the Waverley Report’ Duke suggested Proudman should be asked to chair it.\(^ {75}\) This was agreed by the Departmental representatives, so Proudman was asked and accepted to become the chair of the Advisory Committee. George Deacon represented NIO, Arthur Doodson TI, Commander CT Suthons Hydro and Dr RC Sutcliffe the Met Office where he was Deputy Director (Research). Doodson had been Proudman’s second in command at TI since its establishment in 1919 and was now the Institute’s Director.\(^ {76}\) Suthons

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\(^{71}\) TNA:PRO, MAF 135/324, Minutes and correspondence, October to December 1954, esp. Minute by Treadway, 8th Dec 1954.

\(^{72}\) Documents from 1958 and 1959 in TNA:PRO, MAF 135/324.

\(^{73}\) LWM, Bidston Archive, Box 160, Advisory Committee on Oceanographic and Meteorological Research, Minutes of 1st meeting held on Friday, 8th October, 1954, and agenda paper no. 1 ‘Advisory Committee on Oceanographic and Meteorological Research’.

\(^{74}\) TNA:PRO, MAF 135/324, Minute by Hugh Gardner, 25th Mar 1954.

\(^{75}\) TNA:PRO, MAF 135/324, Duke to Browne, 22nd Apr 1954.

had been involved with the Navy’s programme of swell forecasting during the war and was now a Principal Scientific Officer at Hydro, in charge of the warning system. The interests of government departments were also represented by officers from the engineering departments at MAF, MHLG and the Ministry of Transport and Civil Aviation. Inglis represented DSIR. The committee was dominated by scientists and engineers from within and without central government.

With this the Advisory Committee was established and the Treasury had agreed to pay for TI’s storm surge work; the state becoming a major patron of storm surge science. Once the overall responsibility for the report had been settled, the process of establishing the Advisory Committee appears not to have been contested, with little or no questioning of whether it was worthwhile or not. After MAF had taken it on, the arguments that the scientific research would reduce costs by reducing false alarms and increase the ‘reliability’ of the warning system were given space and were effective in securing support and funding. This was due more to Duke’s eagerness for MAF to support such work than to the Waverley Committee’s pressure. When the Waverley Committee at its last meeting in March 1954 were mistakenly told Treasury

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78 Documents from 1954 in UKHO, H 01041.53.

79 The departmental representatives were from MAF MR EAG Johnson, Chief Drainage Engineer, from Ministry of Housing and Local Government Mr AAL Lane, Senior Engineering Inspector, and from the Ministry of Transport and Civil Aviation Mr RE O’Malley, Harbour Engineer. The Committee’s initial Secretary was Miss JD Duncombe from the Land Drainage and Water Supply Division of MAF.

80 UKHO, HW 287.54, ‘Waverley Committee on Coastal Flooding, Report on Oceanographic Sub-Committee’, Note for meeting on 3rd Feb 1954.

81 In addition to the Hydrographer’s comments this had been how Proudman argued for the original research, see e.g. TNA:PRO, MAF 135/344, Minute by Maher, 22nd May 1953. UKHO, HW 287.54, ‘Waverley Committee on Coastal Flooding, Report on Oceanographic Sub-Committee’, Note for [the departmental] meeting on 3rd Feb 1954.

82 This of course did not mean all agreed. Once Wood had been told of the outcome of the Departmental Committee he wrote ‘This seems like a happy [illegible - route? minute?] out of one of our afflictions at least’, TNA:PRO, HO 325/13, Minute by RF W[ood], 22nd Feb 1954.

83 TNA:PRO, MAF 135/324, Minute by Duke, 28th Nov 1953.
authority had not already been given for the suggested research work it threatened to ask the Home Secretary ‘for an assurance that very early steps would be taken to authorise the research’. This provides an example of the committee’s support of research. However, as this was a case of miscommunication, with the authority already given, it also clarifies that issues other than the Waverley Committee’s pressure on the government were decisive for the Treasury’s provision of funds to TI’s research, such as avoiding a political backlash if they refused funding.\(^8\)

**CONCLUSION**

I have argued that the increase in state funding of storm surge science following the 1953 East Coast Flood was due to pro-research individuals within certain government departments promoting the recommendations of the pro-research Waverley Committee. These individuals were able to do so as the Treasury had already accepted to fund the response, in a context where Cabinet Ministers felt a high level of political pressure to be seen to be responding to the event with adequate levels of funding. Neither the Treasury nor the Cabinet seems to have regarded science as a problem solver but instead the Waverley Committee and its recommendations were promoted to reduce costs and blame.

Case studies like this one illustrate that the image of central government in the 1950s as pro-science needs to be qualified by investigating who in government supported science, and how and why that support was given. For example, physical oceanography in this period has been described as a state science,\(^8\) but when TI’s funding structure changed at the end of the 1950s, it moved towards increased involvement from Liverpool University and not increased involvement from the state. On the other hand, the NIO was established as a state-funded institute in the late 1940s. To understand why the state increasingly funded some aspects of

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\(^8\) TNA:PRO, MAF 135/341, Departmental Committee on Coastal Flooding, Minutes of twenty-sixth meeting, 22nd Mar 1954.

oceanography but not others, and thus to understand the details of increased state involvement in post-war British science, it is necessary to undertake further detailed case studies of particular disciplines and disaggregating different parts of the state.