Forged in the Floods: Transnational Networks in the Habsburg Monarchy

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Abstract

Riparian communities in the Habsburg monarchy experienced perennial flooding with tragedy often eliciting heroics and generosity. What made these empathetic responses even more admirable was their juxtaposition with the antipathy that nationalist groups expressed in the political realm in the monarchy’s final decades. Studying government and public responses to flooding in the nineteenth century demonstrates the critical link between empire and environment which forged transnational communities through floods of adversity, charity and cooperation. As this paper is part of a special issue, Water History in the time of COVID-19, it has undergone modified peer review.

Keywords Habsburg monarchy · Austria · Hungary · Transnational · Hydraulic engineering · Empire-building · Environment

Introduction

On1 March 1, 1830 the Österreichischer Beobachter broke the news that the frozen Danube had partially thawed and had carried chunks of ice downstream in its swollen current.2 Despite watch posts in place to warn against flooding, the water level rose too quickly to raise and spread the alarm. Strong floodwaters washed away preparatory measures—staircases and boats—meant to help residents quickly exit buildings and escape the water (Fig. 1).3 In the coming days, the Beobachter and several regional papers documented

1 This paper is part of a special issue, Water History in the time of COVID-19. This issue was designed to be a venue for scholars who had been planning on presenting their research at academic conferences that were postponed or cancelled due to the virus. We recognize the vital importance of conference presentations for us to get feedback on work in progress, to share promising projects, and to begin meaningful conversations with peers. This special issue has undergone modified peer review, and these essays are to be seen as works in progress rather than final results; the authors welcome your feedback, conversation, and engagement.

2 Anon., ‘Wien, den 28. Februar,’ Österreichischer Beobachter, 1 March 1830, p. 248.

3 Anon., ‘Wien,’ Grazer Zeitung, 6 March 1830.

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the damage different communities sustained throughout the Habsburg monarchy. Once the initial flooding subsided, the Wiener Zeitung published a large, front-page appeal asking for “noble-minded, well-intended people” to help with funds to rebuild communities and get the afflicted lower classes back on their feet. The next day, the paper graciously thanked residents for their generous and heroic responses, many having donated or helped during the flood. Regional papers also continued to publish appeals delineating where and how goods and aid could be delivered. In the coming weeks, a committee set up to collect and distribute aid received large donations from associations, clubs, companies, members of the imperial family, municipalities, and private individuals from magistrates to soldiers from around the monarchy (Sartori 1832). Donations were numerous and generous: nearly 300,000 florins from residents in Vienna (over 50,000 alone from Emperor Franz I and his wife), more than 75,000 from the various crownlands, and 3,000 from around Europe. This total sum was immense: an average agricultural worker in the monarchy’s western half earned six florins a month in 1840. All donors who gave over ten florins (over two thousand entries) were later published by Franz Sartori (1832) in his work.
While those living along rivers experienced perennial flood dangers, tragedy often elicited heroics and generosity. That fact that so many people around the monarchy helped in the wake of the 1830 flood was unsurprising. In fact, as Pieter M. Judson has documented, civil society in the early nineteenth century was emerging everywhere in the monarchy as a critical source of funding and support for economic improvements and social causes which supported the general wellbeing (Judson 2016). When a similar flood in 1838 destroyed over 10,000 houses along the Middle Danube stretches and killed 300 people, aid again poured in from around the monarchy (Helischer 1839). Without any mechanisms or permanent funds designated to provide relief, residents sent petitions to the Palatine and the Austrian National Bank for foodstuffs, relief materials, and funds to help rebuild (Fig. 2). Communities from the surrounding area donated food and clothes and sent bread and other baked goods, flour, sugar, salt, potatoes, bacon, peas, and pork. A city councilor for Eszterom, József Helischer, recorded the town’s gratitude for ‘the Viennese charity’ (a bécsi jótékony).

What made the population’s empathetic responses notable was its juxtaposition with the conflict that increasingly characterized political and nationalist rhetoric among segments of the monarchy’s different language groups (Barany 1994; Wingfield 2003; Beller 2008). After the monarchy’s collapse in 1918, emerging nation-states magnified nationalist narratives that emphasized differences, particularly between the German and Hungarian-speaking regions of the monarchy (Jászi 1929). Gradually, scholars have begun to dismantle these

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7 Pieter M. Judson (2016) discusses the crucial role that civil society played in establishing institutions like museums, libraries, and others that improved community life in the early nineteenth century. He argues that such work was the initiative of locals and, as such, united many social classes and linguistic groups.

8 The monarchy officially recognized eleven different languages: speakers of German, Hungarian, Slovak, Serbian, Croatian, Czech, Polish, Ruthenian (Ukrainian), Slovenian, Romanian, Italian.
narratives. In particular, transnational and environmental research have begun to bridge lingual and historiographical bifurcations in this history (Frank 2005; Huszár 2009; Coen 2018).

By studying transnational networks operating across the monarchy like bureaucracies, volunteer associations, aid networks, and hydraulic engineers, we can see how natural disasters provoked positive forms of civil engagement and imperial institution-building. Social, technical, recreational, and commercial groups contributed to and participated in these oft spontaneous demonstrations of imperial compassion and solidarity, while imperial, provincial and local authorities sought to capitalize on such moments to strengthen technological, social, and sometimes political cohesion across the monarchy. What we see, is a critical link between empire and environment which forged communities through floods of adversity, charity, and cooperation.

Flood debates

Such unity was necessary in the face of floods inflicting damage both locally and transnationally, endangering many communities at once. In the wake of the 1830 flood, newspapers around the monarchy ruminated on the multifaceted causes, both natural and human, of flooding. Seasonal factors, such as spring rains, glacial thaws, ice floes, and summer rainfall influenced water volume. Topography such as low-lying land, mountainous terrain, soil and tree coverage, and the geology of river beds contributed to a river’s distinct hydrology (Lóczy 2007). Some engineers blamed these conditions for creating hindrances like islands and sandbanks; obstacles that slowed rivers’ currents, causing them to spread out and flood more readily.

Human activity exacerbated rivers’ natural tendencies to flood. Denuding trees along the river to build towpaths or clear fields for crops, anchoring boat mills midstream to grind grain, and raising embankments to prevent flooding all changed how rivers like the Danube flowed, eroded their banks, and moved sediment in their currents (Jungwirth et al 2014). After the 1830 flood, some newspaper opinions claimed that because the Danube had carved its bed over millennia, high roads, embankments and buildings built along it considerably narrowed its bed. Consequently, when the river flooded over these barriers, drainage was slow and recovery prolonged; criticism that was repeated after other devastating floods later in the century (Nagy 2007).

Large floods persisted in the Habsburg monarchy, because until the mid-nineteenth century, disparate local authorities remained responsible for funding and constructing preventative measures. In the early nineteenth century, river regulation and embankment works were undertaken by separate engineering directorates (Wasserbaudirektion) in each province in the western half of the monarchy and by individual property-owners, riparian

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9 There are three types of rivers that flood, a simple regime, a mixed regime, or a complex mode. The simple regime can be further distinguished as nival, pluvial, or glacial, depending on where the river’s water originates, for example, whether its water primarily stems from high altitude glacial melts, seasonal precipitation, spring snow melts, or other sources. Mixed regimes have some combination of these elements. Complex regimes characterize certain larger rivers, like the Danube, whose tributaries themselves are different river regimes, due to differing altitudes, climates, and other features.
10 Anon., “Hydrotechnisches,” Wiener Theater-Zeitung, 22 April 1830, p. 195.
11 Anon., “Wien,” Grazer Zeitung, 27 March 1830.
communities, and eventually private companies\textsuperscript{12} in the eastern (Hungarian) territories (Sárközi 1968; Dénes 1973). This disjointed approach was contrary to the grand scale regulation efforts envisioned elsewhere in Europe (Walcher 1781; Blackbourn 2006). Johann Gottfried Tulla’s ambitious plans to regulate the entire Upper Rhine, for example, demonstrated the cost and initial successes of holistic flood preventions with embankments, river transections, and regulation united under a single plan, albeit one with its own unintended consequences (Cioc 2002). After the 1830 flood, the Pressburger Zeitung soberly acknowledged that “it is only through experienced hydraulic engineers implementing a regulation of the Danube, the Tisza, the Waag, the Maros, and so on, not from the mere embanking of the rivers, that we in Hungary can expect the elimination of so frequent recurring and untold losses due to floods!”.\textsuperscript{13}

While physical measures to prevent flooding remained fragmented, technical and social developments slowly built up transnational cooperation. In November 1845, the Viennese newspaper Die Gegenwart (Present Times) had a small, innocuous excerpt that a new ‘electromagnetic telegraph’ would be erected between Prague Castle and the Hofburg in Vienna.\textsuperscript{14} By January 1847, tests were announced to run between Vienna, Brünn, Prague, and Pest on the newly constructed lines.\textsuperscript{15} In 1849, the expansion of telegraph lines was overseen by German physicist Karl August Steinheil (1801–1870) who became Chief of the newly established Telegraph Department in Vienna. By 1852, the monarchy had 1000 miles of telegraph lines, connecting Vienna to all provincial capitals (Calvert 2008). Two floods in 1847 and 1849 had hastened construction. According to Michael Neundlinger, some of the first telegraph lines to appear in the monarchy “were installed along the course of the Danube, connecting Upper Austria to Vienna. Telegrams were then used to send flood warnings from the upper stretches downstream to the capital city, where the k.k. Telegraphen-Centrale subsequently disseminated the warning to city dwellers. The introduction of telegraph networks that spread across a large part of the Habsburg Monarchy promised to lessen threats posed by Danube floods” (Neundlinger 2012).

These telegraph lines wove together a loose-knit network of observation stations around the monarchy which had been measuring precipitation and water levels since the end of the eighteenth century (Brázdil et al. 2012).\textsuperscript{16} These data provided useful insight into the relationship between precipitation, water volume, and flooding. They also contributed to the burgeoning field of climatology, embodied by the work of Karl Kreil (1798–1862). Trained as an astronomer, Kreil spent much of his early career working and interacting with geologists, physicists, chemists, and other natural scientists within the monarchy to advance scientific knowledge about the state. When the Academy of Sciences was established in 1847,

\textsuperscript{12} Private companies in the 1830s named Árvízmentesítő Társulatok literally “flood eliminating companies,” raised capital to drain wetlands, channel rivers, and raise embankments, in order to eliminate the threat of floods.

\textsuperscript{13} Anon., “Pressburg,” Pressburger Zeitung, 20 April 1830, p. 362.

\textsuperscript{14} Anon., “Für das Stadtgespräch,” Die Gegenwart. Politisch-literarisches Tagblatt, 11 November 1845, p. 168.

\textsuperscript{15} Anon., “Das Inland,” Die Gegenwart. Politisch-literarisches Tagblatt, 4 January 1847, p. 9.

\textsuperscript{16} Starting between 1775 and 1780, several stations measured the water levels on the Danube at Buda and on the Vltava in Prague. In January 1784, the k.k. Hydraulics Administrator Jean-Baptiste Brequin began measuring water levels in Vienna, which the Wiener Zeitung began publishing in 1811. Newspapers in Buda started reporting these figures in May 1817, the Pressburger Zeitung in 1819. Stations also recorded the Danube’s measurements at Linz (1821), Stein, Vienna-Nußdorf and Vienna-Kuchelau (1828), Melk (1831), Struden (1841), Tulln and Zwettendorf (1844), Fischamend and Hainburg (1846), and Mauthausen (1847).
he was appointed one of its first members. He used his position to pursue his vision for a
monarchy-wide observation system which would help unite the disparate observatories and
measuring stations. In 1851, Emperor Franz Joseph approved plans for the Imperial-Royal
Central Institute for Meteorology and Earth Magnetism (ZAMG).

One of Kreil’s goals was to ensure that both the central meteorological station and the
growing number of new meteorological stations throughout of the Austrian Empire were
equipped with all the appropriate instruments… The meteorological-station network, origi-
nally planned to have 100 stations across the empire, developed rapidly. In 1859, the net-
work comprised 124 stations (Hammerl 2018).

This rapidity of this expansion was in part a product of the Franz Joseph I’s centralizing
efforts in the 1850s, which brought together hitherto disparate engineering departments
and offices. Rather than individual engineers recording data at isolated locations, a task at
least some complained about to central authorities as mundane or under-supported, observ-
vation stations became a crucial part of a grand flood prevention strategy.

**Flood networks**

With integrated communications, equipment, and scientific expertise from different regions
in the monarchy, it was possible to deliver early warnings about weather, and thus river
conditions. Increasingly, one could predict how climatic features in one part of the mon-
archy would affect seasonal flooding as well.\(^\text{17}\) According to one government publication
at the time, the monarchy’s new technical organization would create for the first time a
unitary hydrographic overview by unifying scientific data from each province, such as the
Danube’s water speeds, depths, ice formation, and other measurements. Previously, such
information had been kept separate by region, if it had been recorded at all. Aggregating
this information would enable the scientists to create maps of the entire Danube water sys-
tem, in order to determine where hydraulic engineering works were necessary.\(^\text{18}\)

This data helped drive a flurry of more integrated embankment construction in the
1850s neo-absolutist era. A central engineering office in Vienna oversaw and directed all
embankment works in the monarchy. Outside the capital, communities built about 250 km
of new embankments between 1850 and 1855. By 1861, there was already 425 km of embankments just along the Danube from its border to Bavaria to the Rába River in Hun-
gary (Pasetti 1862). The venerable statistician and ethnographer Karl von Czörnig, who
spent the 1850s working on Danube regulation projects, praised imperial expenditures and
initiatives which were creating a more holistic system of protection on the Danube and its
tributaries (Czoernig 1858). In Buda, the new k.k. Engineering Directorate oversaw gen-
eral embankment construction along the Danube, Tisza, and Maros in conjunction with
Viennese authorities. To ensure uniformity of construction, technical authorities in Vienna
mandated the exact form and material of embankment construction. Franz Joseph I’s

\(^\text{17}\) Deborah Coen (2018) has also pointed out that by the early to mid-nineteenth century, measuring daily
temperatures and precipitation was no longer simply used as a gauge for daily weather conditions. Instead,
measurements were used to produce maps which delineated and revealed fundamental features of the mon-
archy’s diverse environments from vegetation coverage to climatic zones.

\(^\text{18}\) Anon., “Über Zusammenstellung der gleichseitigen Wasserstandsbeobachtungen an sämmtlichen schiff-
baren Gewässern der österreichischen Monarchie,”Austria Tagblatt für Handel und Gewerbe, öffentliche
Bauten und Verkehrsmittel, 10 February 1851, p. 214.
imperial representatives in the crownlands—the Statthalter and their offices—spearheaded local coordination. In some regions, they took it upon themselves to visit embankments and consult with technical authorities when repairs were necessary. In Hungary, the central k.k. Engineering Office inspected works.

Flood reduction was a task shared by all. The newly established k.k. Engineering Office in Buda cooperated with private companies to drain adjacent land and regulate rivers in a bid to reduce flood risks. Not only large landowners, but plenty of small and middle-sized landowners supported these draining efforts, which reduced flooding and increased arable land (Sárközi 1968). Embankment works were also a joint endeavor between private companies, and local and imperial governments (Pasetti 1862). Transnational companies operating in the monarchy were coopted as well. The prominent imperial-royal Danube Steam Navigation Company, operating across the monarchy’s thousands of kilometers of waterways, helped survey and regulate rivers as well as construct quays and embankments (Vadas 2003). Railway companies, expanding their routes along rivers, likewise contributed to embankment construction in a bid to protect their enterprises.

To supplement physical flood protections, imperial and local authorities cooperated with riparian populations to implement new practices to prepare for floods and to respond in a more organized and uniform fashion during rescue operations. In 1851, the emperor’s representative (Statthalter) for Lower Austria informed the Viennese mayoral office, the Lower Austrian Engineering Directorate, the Viennese Magistrat, and district leaders in Bruck, Klosterneuburg, St. Pölten, Amstetten, Krems, Korneuburg, and Großenzersdorf how precisely they were to respond during flooding. The Statthalter’s office in Hungary similarly wrote to the Pest mayor with instructions for both Pest and Buda’s magistrates. In the event of a flooding, the imperial-royal police directorate (cs.k. rendőrigazgatóság) would maintain “public calm and order” and support the Buda and Pest councils, which would maintain communication channels throughout the city and coordinate search and rescue efforts along with aid distribution.19

Eventually, permanent associations and departments in each city monitored water levels and prepared citizens how best to respond when flooding occurred. In 1860, Statthalterei officials in Hungary along with the Pest mayor and k.k. Engineering Directorate created a permanent commission to ensure that a sufficient number of rescue boats were on hand, designate locations for food distribution, and determine which buildings might not survive sustained flooding. After flooding hit Vienna two years later, the Vienna Gemeinderat followed suit, setting up the “Advisory Commission for Protective Measures Against Flood Dangers” in February 1862. Like its Pest counterpart, it coordinated safety measures, such as ordering rescue boats, pre-arranging warning and relief efforts, ordering food reserves, and designating specific buildings for emergency shelters.

**After the flood**

These efforts to reform flood response were often born in the aftermath of flooding. As such, disaster relief still relied older practices—appealing directly to citizens for aid. Much like the monarchy-wide outpouring in 1830 and 1838, for example, flooding in 1847

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19 A magyarországi cs. k. helytartóság, “Utasítás a hátóságok számára, a jégzajlás általi vízárvészélynél Budapesten,” 29 August 1860, D203, Box 2, Folder 2, Hungarian National Archives (MNL), Budapest, Hungary.
led poverty and choral associations in Pozsony/Pressburg put on concerts to raise relief funds.\(^{20}\) After the 1862 flood, the *Reichsrat* (Imperial Diet) asked its delegates to sell subscriptions to solicit donations for the affected regions. The 2500 florins collected were distributed to the Hungarian Chancellery and executive authorities (*Landespräsidien*) in Bohemia, Vienna, Lower Austria, Moravia, Upper Austria, Styria, Tirol, and Salzburg for local relief.\(^{21}\) Following the 1876 flood, members of the dynastic family donated nearly 14,000 florins, the Rothschild family gave 5,000 florins, notables in Hungary from both the ministry and commercial leaders also collected a respectable amount. Members of the public also contributed; there were bakers who donated bread, wealthier individuals offered to feed people, and lists of donations were published for all to read in the papers. Aristocratic women organized lotteries, benefits, and other social events to raise and donate funds for the flood victims (Nagy 2007). Flooding in 1883 prompted commercial organization and Christian groups to donate clothes, food, and over 10,000 forints to help Győr’s displaced victims (Sárközi 1968).

Flooding in 1854, 1876, 1879, 1883 and beyond elicited immense personal generosity from the emperor and empress, who also encouraged solidarity and charity from citizens. After flooding in 1876, Franz Joseph I. and Elisabeth donated 65,000 florins, which the Hungarian Prime Minister Kálmán Tisza divided between the flood-struck counties. When the 1879 flood on the Tisza corresponded with the imperial couple’s twenty-fifth wedding anniversary, they encouraged citizens to donate to benevolent causes and organizations rather than pay for costly celebrations (Unowsky 2005). Empress Elisabeth specifically insisted that people donate to Szeged flood relief funds rather than gift anything to the imperial couple.\(^{22}\) Franz Joseph reportedly told citizens of the flooded city during his visit “Szeged szebb lesz mint volt” or “Szeged will be more beautiful than it was” and directed funds to help quickly rebuild the nearly destroyed city in the following years.

To address the ongoing flood dangers at each capital, representative bodies passed legislation regarding funding and construction, which brought together all levels of government with civil society. The new Imperial Diet, Lower Austrian provincial authorities, and city of Vienna all agreed in 1868 to jointly fund the regulation project at Vienna. The French company “Castor, Hersent and Couvreux” of Suez Canal fame won the bid to dig out the new bed with its newly freed up excavators.\(^{23}\) Thousands of workers from around the monarchy—Czechs, Poles, Slovaks, and Italians—also worked on the five-year project from 1870 to 1875 (Hinkel 1995). The National Diet in Pest approved a law in 1870 to fund the Danube regulation, with contributions from the surrounding counties and the three separate municipalities Buda, Pest, and Óbuda (the three would be united as the capital Budapest in 1873). The Austrian General Construction Company won the bid and began on the approved work. Danube Regulation Committees at each city oversaw progress.

Thanks to the re-established Imperial Diet (*Reichsrat*) in Vienna and National Diet (*Országgyűlés*) in Budapest, representatives from each half of the monarchy were able

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\(^{20}\) Anon., “Aus und für Pressburg. An die Bewohner Pressburgs,” *Pressburger Zeitung*, 24 February 1847, p. 130.

\(^{21}\) According to the president of the chamber, the Hungarian Chancellery received 700 florins, Bohemia 400 fl., Vienna 505 fl., Lower Austria 225 fl., Moravia 200 fl., Upper Austria and Styria each 150 fl., Tirol 100 fl., and Salzburg 85 fl.

\(^{22}\) In their annual municipal report, the Linz city council (1881), for example, noted that although it arranged an address from the city and organized a festive mass, instead of lighting and decorating communal buildings, it donated 300 florins to the Szeged flood victims.

\(^{23}\) The Suez Canal opened in 1869 and construction on the Viennese Danube bed began in 1870.
to successfully direct expertise and secure funding for local projects. By the 1870s and 1880s, more and more laws took aim at completing regulation outside Budapest and Vienna advocated by local and transnational organizations. In February 1871, Baron Gyuła Nyáry implored his colleagues in the House of Magnates to consider relief for the counties:

Perhaps when we consider Budapest, water danger has largely subsided, but while communities along the Danube are not yet saved from the threat of flooding – allegedly Tolna environs are already under water – I venture to ask the members of this high office: shall we not find out what precautionary measures and rescue and relief arrangements should first be taken care of?

In response, Hungarian authorities established the “River Engineering Office” (Folyam-mérnőkségek) in 1871, which had 13 offices on the Danube and “supervised waterways, provided hydrographic duties, checked regulated river stretches, and directed flood protection measures” (Dóka 1983). In 1871, the National Diet also passed Law XXXIX regarding the creation of companies to reduce flooding. Some of these included embankment construction companies (Gátépitési Társulatok), formed by large landowners and members of the public, which numbered around 10 by the early 1870s. Several pressures from petitions and interest groups prompted legislatures in Vienna, Budapest, and provincial diets to approve laws regulating rivers and drain floodplains along many rivers in the monarchy. Communities wrote to local and royal-imperial governments to complain that local rivers, which were unimportant for navigation, had yet to be regulated and were still flood threats. In 1881, the Upper Austrian Trade and Industry Association published a work castigating the lack of embankment protection along the Inn River, the international border with Bavaria. In 1882, heavy rains in Carinthia and Tirol led to avalanches and flooding and some of the worst death tolls in the Habsburg Monarchy from natural catastrophes (Beimrohr 2020). This finally prompted renewed action in the provinces. Imperial legislation eventually included laws regulating the Narenta (1875/1887), Mur (1875/1883), Gail (1875), Etsch (1879/1880/1883/1886), Drave (1884), Glan (1884), and Inn (1906) and provincial Landtage in Tirol, Carinthia, Upper and Lower Austria, Salzburg, and Styria confirmed their contributions. After an 1883 flood, Law XV in 1885 provided seven million florins for the Rába’s regulation and embankment.

Flood recovery

At the same time, floods in the last quarter of the nineteenth century reveal ways in which civil and governmental groups participated in post-flood recovery efforts. New, civil associations supported imperial and provincial governments in securing and distributing flood relief. After flooding in the early 1880s, the Imperial Diet (Reichsrat) spent the next few

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24 After the 1867 Compromise, internal affairs in the monarchy were divided between separate governments and legislatures in Vienna and Budapest. The Imperial Diet in Vienna was a collection of representatives from the crownlands (what we might consider modern provinces) of Bohemia, Bukovina, Carinthia, Carniola, Dalmatia, Galicia, Austrian Littoral, Lower Austria, Moravia, Salzburg, Silesia, Styria, Tyrol, Upper Austria, and Vorarlberg. The National Diet in Budapest represented the lands known at the time as “the Lands of the Holy Hungarian Crown of St. Stephen” and included Hungary, Transylvania (incorporated into Hungary) and Croatia-Slavonia.

25 Minutes from the oberösterreichischer Landesausschuss (1890) indicate that factory owners in communities like Schwertberg, Mistlberg, Altaif as well as residents from along the entire Aist River wanted to see what measures the state could undertake to protect it from the “danger of new, disastrous floods.”.
years passing legislation to approve ongoing state funds for post-flood reconstruction in several regions, including Carinthia, Galicia, Bohemia, Tirol, Lodomeria, and Krakow. Public funds were also created to compensate property owners for flood damages. In 1886, the provincial diet had set up councils and district communes to educate farmers and advocate for them at the political level. By 1895, there were 58 such collectives with over 11,000 members. When floods hit in 1897 and 1899, the k.k. Agriculture Ministry charged members with distributing almost 9,000 crowns to alleviate farmers’ harvest losses (Oberösterreichischer Landesausschuss 1902).

Besides helping coordinate and distribute aid, the monarchy’s civil society increasingly provided a growing number of volunteer groups trained to assist in flood rescue operations. Already in 1868, Vienna’s residents organized 163 rescue ships and 380 men supporting local engineering regiments and the Men’s Gymnastics Association, which had created a water brigade (Wasserwehr).26 When the 1876 flood hit, groups in Budapest and Vienna seemed prepared to help. The Vásárnapi Újság reported that in Budapest a “Voluntary Rescue Committee” of 110 members was attached to the river—the National Gymnastics Association, boat captains, voluntary fire brigade, and boating and skating clubs took part in initial relief and safety efforts.27 Authorities in Vienna coordinated “safety defense forces” (Sicherheitswache) from different cities along the Danube for what appeared to be an inevitable flood. The “Central Inspectorate for Safety Defense” assured the capital that hundreds of volunteers and boats stood ready for rescue efforts, and the Statthalterei gave permission for troops from provincial cities like Linz and Pressburg/Pozsony to be mobilized at Vienna to bolster the capital’s resources.28

Such organization spread to smaller towns by the 1880s and 1890s. For example, the Krems distinct fire brigade newsletter, representing interests of fire brigades throughout Lower Austria, succinctly summarized that “the floods of recent years, which several places lacking equipment have resisted in vain, have turned our thoughts of creating an organization similar to the fire brigade that will allow us to fight against such natural disasters with greater success.” It cited as its inspiration similar groups formed in Tirol, where the 1883 flooding and mountain torrents had required a more systematic approach to training and preparing a disaster rescue corp.29 After the 1899 floods, cities such as Linz and Wels also made it official, forming groups out of local fire brigades, and in some cases included members of the city council, the rowing club, the gymnastics association, and civil engineers (Linz City Council 1900). These groups drew on volunteers from around the monarchy (Fig. 3). During the 1897 flood in Győr, a city on the Danube downstream from Pozsony/Pressburg, participants in the rescue operations included members of the Fifth Corps headquarters, Ninth Hussar regiment officers, the Nineteenth Infantry, the Bratislava sappers, the Győr Csónakázó Egylet [Punting Club], the Moson county alispán, the Royal Hungarian Sea and River Navigation Company, the imperial-royal Danube Steam Navigation Company, and the Lower Csalóköz and Csilizköz Flood Protection Companies (Sárközi 1968).

In the aftermath of the disastrous 1897 and 1899 floods, local communities forged new ties to imperial and transnational resources for flood protection and relief aid. The 1899 flood catastrophe, the likes of which “had not been observed in recent memory” sparked

26 Anon., “Wien ist gerüstet,” Wiener Presse, 22 January 1868, p. 9.
27 “A Duna áradása,” Vásárnapi Újság, 30 January 1876, p. 60.
28 “Vorkehrungen gegen eine Überschwemmung,” Neue Freie Presse, 12 January 1876, p. 5.
29 Anon., “Feuerwehr als Wasserwehr,” Krems-Freundfeuerwehrzeitung, 27 February 1886, p. 1.
the government to pass similar emergency measures to those in 1897 (Oberösterreichischer Landesausschuss 1902). The Reichsrat passed bicameral legislation in November 1899, offering three million crowns in reconstruction loans and donations to provinces across the monarchy. In December 1900, Franz Joseph I. decreed that the Reichsrat should approve two million florins for relief in several flooded provinces, including Bohemia, Silesia, Upper and Lower Austria, and Vorarlberg. Provincial authorities iterated support for the population in times of need, citing its benefits for both “economic and financial reasons.” Imperial and municipal authorities and the savings bank all donated funds to aid relief (Oberösterreichischer Landesausschuss 1902). Petitions also flowed in to construct protective dams along the Danube, Inn, Traun, and other rivers. The following year, the Danube Regulation Commission reported in the Wiener Zeitung that it had received a 50% rise in funds covering new flood embankments and repairs for communities affected by the 1899 flood.30

Flood generally forged additional linkages between riparian communities and transnational technical authorities, much as they had in the late 1840s. Building on ZAMG’s success expanding meteorological observations, the Ministry for Religion and Public Education in Pest set up the Royal Hungarian Central Institute for Meteorology and Earth Forces (Meteorológiai és Földdelejességi Magyar Királyi Központi Intézet- MFKI) in 1870. The institute’s first director was the Austrian Benedictine Guido Schenzl. Like many scientists who studied and worked in different parts of the monarchy, Schenzl had been born and

30 Anon., “Nichtamtlicher Theil,” Wiener Zeitung, 28 April 1900, p. 5–6.
educated in Austria, worked for a while in Maribor, Slovenia and at an imperial Catholic Gymnasium in Buda before establishing a Realschule equipped to observe and measure meteorological and geo-magnetic phenomena. For his work, Schenzl was admitted into the Hungarian Academy of Science and enlisted to lead the new MFKI. The institute itself operated thanks to forty-seven observation stations that the imperial authorities had previously administered (Antal 1996).

Along with meteorological stations across the monarchy, authorities in Vienna also saw the benefits of establishing a specific governmental organ to monitor water levels for the population’s general wellbeing. The k.k. Interior Ministry set up the Hydrographical Central Bureau in 1894, the statue for which appeared in Die Presse in December that year:

The hydrographic service was established for the purpose of a general and systematic expansion in the empirical and theoretical basis for a goal-oriented solution for striking technical problems in the field of hydraulic engineering and to advance the general wellbeing of the economy with the results of these studies, above all, through procuring data which is necessary for constituting and assessing the necessary measures for improving land cultivation, internal river traffic, and the general usage of water, as well as data necessary for reducing the devastation and damages of floods and for establishing water level and floodwater prognostics.\(^3\)

Observation stations monitored water levels and informed imperial groups like the Royal-Imperial River Patrol (k.k. Stromaufsicht) to warn downstream communities during ice flows or floods and to mobilize rescue boats if necessary.\(^3\) But when posted bulletins and news reports seemed insufficient to warn communities in 1899, the Upper Austrian Statthalter decided to set up a “hydrological services office” to monitor river conditions as part of the “Flood Information Service.” As of October 1901, a telephone in the observation station was able to phone different parts of the monarchy about dangerous water levels (Oberösterreichischer Landesausschuss 1902). In 1900, the Hungarian Trade Minister declared the need for a network of telegraph stations on the Danube’s right bank. In 1904, the Upper Austrian Diet declared that telephone stations should line each side of the Danube from Passau to Hainburg (on the Hungarian border) and cover the Danube’s largest tributaries as well. Citizens petitioned the k.k. Trade Ministry, responsible for monitoring telegraph stations, requesting that the ministry make it free for citizens to send telegraphs from any station along the Danube or its tributaries to warn of rising water levels. By 1912, Danube municipalities from Vienna to Linz were offered the chance to be connected to the State Telephone Network for a fee of 15,000 crown.\(^3\)

Despite the multifaceted and multitude of flood prevention measures taken in the nineteenth century, it is clear that regulation and coordination both lagged in some regions. Sometimes this was due to technical disagreements about how best to reduce flooding, which plagued construction at both capitals in Vienna and Budapest and on several stretches. Other times, a lack of funding or coordination hindered efforts to protect people. In the late 1890s, for example, it was clear that the Moravia River—partial boundary between Austrian and Hungarian halves of the monarchy—ironically lacked coordination or oversight into how to protect riparian communities on both sides of the river. In the Hungarian House of Representatives, a member from the region informed his colleagues

\(^3\) Anon., “Organisations-Statut des hydrographischen Dienstes in Oesterreich,” Die Presse, 14 December 1894, p. 14.
\(^3\) Anon., “Tages-Neuigkeiten,” Deutsches Volksblatt, 6 February 1893, p. 4.
\(^3\) Melker Gemeinderathsprotokolle, 13 February 1912, Stadtdarchiv und Museum, Melk, Austria.
that Austrian embankments on the Moravia River’s right bank were causing constant flood-
ing in Hungary, particularly small landowners and residents in the border town of Dévény. In his petition to the Agriculture Ministry, the governmental body responsible for reclaim-
ing floodplains, the man argued that, “for 70 km, the river Morava is not a purely Hungarian river, but common river and therefore Austrian interests are necessary to respect as well. However, negotiations with the Austrians are going really slowly” (House of Representa-
tives 1897).

This disparity in flood defenses also drew attention to the, at times, different flood responses. In June 1903, a representative from a district near Pozsony/Pressburg likewise expressed frustrations that the national authorities in Budapest were not doing enough to prevent flooding or help citizens recover after floods hit. He criticized Hungarian officials’ inactivity during Moravian River floods, particularly juxtaposed with Austrian officials, who came and examined flood damage and distributed bread and aid. He requested that the Interior Minister feed and aid those affected by flooding, otherwise, residents would turn to Vienna for help (House of Representatives 1903). This comment reveals ways in which informal but dependable aid continued to flow from different regions in the monarchy, a fact that could provide convenient political leverage in disputes with other authorities. While such frustrations frequently ran deep with officials whenever help or decisive action was not forthcoming, for the most part, developments across the monarchy continued to unite people, networks, and organizations in their efforts to help the population in the face of continued flood threats and disasters.

Conclusion

On 27 May 1907, floodwaters on the Danube tore a hole in the local embankments at Rudolfszgnád, a town of three thousand inhabitants near the confluence of the Danube and Tisza Rivers. The volume of water flooding the town caused hundreds of houses to col-
lapse. Crews of several steamboat companies including the imperial-royal Danube Steam Navigation Company and the Royal Hungarian River and Sea Navigation Company, as well as two battalions of soldiers and fifty gendarmes rushed to aid the beleaguered residents. While buildings crumbled around him, the postmaster risked his life to man the telegraph and telephone office to coordinate outside communications. A ministerial commissioner arrived shortly after the flooding subsided to approve plans for clearing the floodwaters. A collection was started for the town. As always, all hands were on deck in emergencies such as these, which activated an informal network of businesses, civil servants, and volunteers from the region and beyond to rescue stranded individuals and undertake relief measures.

By the time this flood hit, however, a more formalized network of protocols and responses had also been developing over the nineteenth century to give humans the upper hand against the vagaries of nature. While Rudolfszgnád was unfortunately positioned at the confluence of the monarchy’s two largest rivers, and thus susceptible to frequent flood-
ing, in other regions, reports emerged that most measures to hold back the floodwaters were successful. In the following days, the Royal Hungarian Agriculture Minister Ignác Darányi reassured the populace that thanks to the work of flood relief companies (árvízmentesítő társulatok), river engineering offices, technical officials, and private embankment compa-
nies along several stretches of the Danube, the relatively large volume of water did not pose any major threat to inhabitants. Relief works were already being dismantled in some places
as water levels diminished. The National Hydraulic Engineering Department did, however, warn people that high waters would continue to sweep down the Danube in the following days, based on reports and calculations from further upstream.34

While flooding remained a potential threat for many riparian communities in the final decades of the monarchy, preventative measures became more unified and rescue responses more sophisticated, increasingly mitigating some of the worst effects. These developments followed a meandering albeit progressive path. In the early nineteenth century, efforts to modify the Danube, including flood protective measures, had remained ensconced at the provincial level. Although permanent departments and county offices existed to erect local dams and embankments, inconsistent funding and piecemeal planning had resulted in many works that consistently washed away during each of the nineteenth century’s many large floods.35 Flood relief was ad hoc, though much more successful in mobilizing resources from around the monarchy to help in the aftermath of flooding. While early progress often manifested itself wake of tragedy, gradually conditions enabled proactive measures to knit the monarchy closer together.

As the century flowed on, informal networks expanded and formalized with the establishment of new technical innovations, such as climatological sciences and communications systems. Bureaucratic centralization in the mid-century catalyzed more holistic plans to physically protect residents from floods and develop more permanent mechanisms for rescuing flood victims and for helping them rebuild. Whether through more integrated technology, knowledge, or communication, citizens relied on a more interconnected set of tools to avoid disaster. These measures only increased in value as the century went on. As floodplains were drained and embankments raised to protect residents, newly reclaimed land near most rivers was colonized by factories, residential districts, and commercial zones in cities throughout the monarchy, increasing the potential risk of flooding for millions more people (Haidvogl et al 2013; Hauer and Hohensinner 2016; Hohensinner and Schmid 2016). While national differences provoked conflict and schism in segments of the population during this period, as did social and economic concerns, many people in the monarchy recognized the universal threat and devastation that flooding represented and were quick to offer compassion and cooperation across regional and political boundaries. Indeed, natural disasters tempered the population year after year, forging in the floods institutions, practices, and communities that brought together bureaucratic, commercial, private, technical, and communal interests across the monarchy in a cohesive whole.

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34 Anon., “Az árviz pusztítása,” Budapesti Hírlap, 29 May 1907, p. 10.
35 Floods in the early nineteenth century reflected the prevailing rainier conditions in Central Europe during the last decades of the Little Ice Age (app. 1300–1850). Some scholars have pointed to sea surface temperature variability in the central and eastern tropical Pacific (congruent with the El Niño–Southern Oscillation) as producing Central Europe’s large, late-nineteenth-century flooding, Bichet, Folini, Wild, Schär, “Enhanced Central European summer precipitation in the late nineteenth century: a link to the Tropics,” Q. J. R. Meteorol. Soc. 140 (2014): 111–123.
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