

FLOWING PROGRESS

Transforming the Danube Through Infrastructure

edited by
Stefan Dorondel
Luminita Gatejel



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Cover: Jochenstein ‘run-of-river’ power plant bridge, situated on the Danube, in the municipality of Untergriesbach near Passau, Bavaria. Build in 1952-56, it supplies circa 221,000 households with hydropower electricity. The Jochenstein waterdam also serves as a popular border crossing between Upper Austria and Bavaria, Germany, open to cyclists and pedestrians: Courtesy of Constantin Iordachi, August 2021

*Stefan Dorondel: To my family who lived and died on the banks
of the Danube. They passed to me their love for the river.*

Luminita Gatejel: To Paul and Andreas

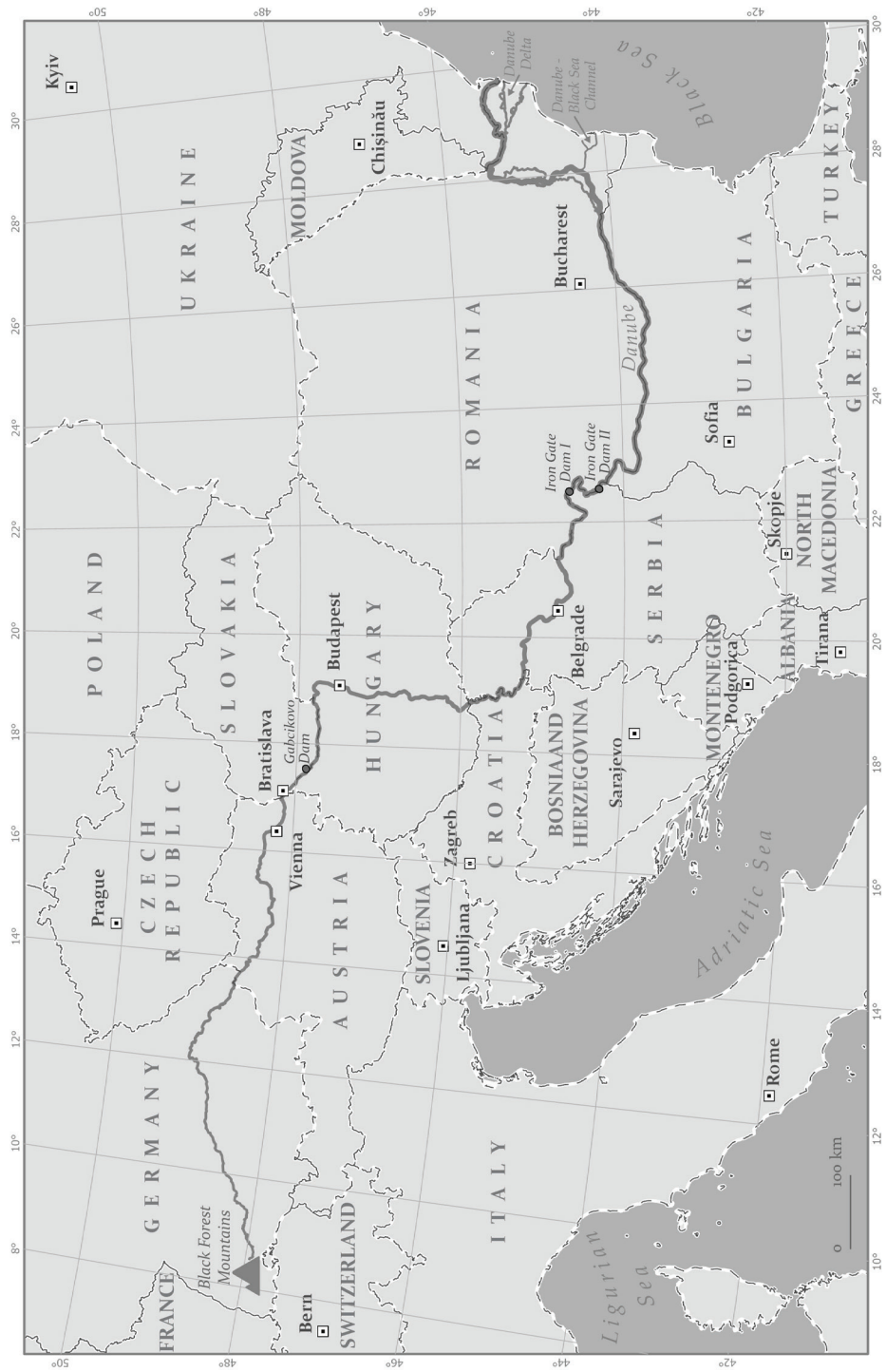
. . . and the Danube keeps on flowing along, murky, enormous, unfeeling. . . . Just as life is sometimes.

—Geo Bogza, *Țări de piatră, de foc și de pământ* [Realms of stone, fire and land]. Editura Litera, 2011 (1939), 145
(translation from Romanian by Claudia Ghișoiu)

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The Danube River from the source to its end. Map made by Marina Virghileanu.

PREFACE

STEFAN DORONDEL AND LUMINITA GATEJEL

“WHILE HIS PEN FAIRLY DANCED OVER THE PAPER, HE SAW IN HIS mind’s eye large ships steaming through his canal’s bright waterways, heavily laden with the raw products of faraway lands.”¹ The main character from a novel that immortalizes the pipe dreams of European modernity—Henrik Pontoppidan’s *Lucky Per*—dreams of technology and infrastructure that would transform Jutland, a poor agricultural region in Denmark, into a global urban site. From peripheral European regions to extra-European ones, the “idealist side of developmental discourse,” as Dipesh Chakrabarty puts it, has traversed the last two centuries, influencing technological imaginations, local economies, and political interests. Chakrabarty talks about a global project of modernization—but one that also has regional reverberations.²

Infrastructuring the Danube in the nineteenth century was perceived not just as a physical change to the river but as a victory of Western civilization. Enabling steamboats to navigate from Vienna to Istanbul via the boisterous river facilitated export from Western states to regions thought of as less developed.³ Controlling the depth and the flow of the Danube—a main artery to Eastern Europe and from there to Asia Minor and beyond—was perceived as a matter of “fixing” the improper nature of the river, a technological and infrastructural adventure, and a way of exporting progress to less economically developed regions. The title of this collection recognizes and critiques how this belief took shape in the nineteenth century. As several chapters in this volume show, the belief that technology and infrastructure could control the river and thus protect human life was more hubris than historical reality. In telling the story of the *infrastructuring* of this important European river, we follow Anders Block, Moe Nakazora, and Brit Ross Winthereik in using the verbal form to draw attention to the contested practices through which different state and suprastate bodies attempt to organize the natural environment via infrastructural and technological projects.⁴

The idea for this book first emerged sometime in 2017, when the editors decided to apply for research funding from the Leibniz Institute for East and Southeast European

Studies Regensburg (or IOS as it is known worldwide). We were both interested in the history of the Danube and its technological, infrastructural, and ecological transformations. From 2020 to 2024, the project *Contested Waterway: Governance and Ecology on the Lower Danube, 1800–2018* was funded by the Leibniz Association (Leibniz Collaborative Excellence, grant number K237/2019).⁵ Coordinated by the IOS and in close exchange with the Leibniz Institute for the History and Culture of Eastern Europe (GWZO) in Leipzig, the project brought together researchers from Bucharest, Vienna, Ljubljana, and Sofia.

Starting in 2021, another project has also been very important for this volume. Stefan Dorondel put together a team of anthropologists, historians, geographers, and biologists to study the islands of the Lower Danube and their impact on local economics, politics, and ecology. The project *State, Communities and Nature of the Lower Danube Islands: An Environmental History (1830–2020)* was awarded a three-year grant by the Romanian Ministry of Research and Education (PN-III-P4-ID-PCE-2020-1238, financed through UEFISCDI).

This book is largely the outcome of the theoretical conversations between the two projects and teams. The chapters by Stefan Dorondel and Stelu Șerban are heavily in debt to the *State, Communities and Nature* project, while research for most other chapters was supported by the IOS Regensburg project.

STEFAN DORONDEL'S ACKNOWLEDGMENTS

I would like to note my debt to both institutions, UEFISCDI and IOS. It was while visiting Regensburg that I worked with Luminita Gatejel on the first draft of the introduction and my own chapter. Meanwhile, IOS, its excellent library, and my daily talks with researchers (special thanks are due to Ulf Brunnbauer whose questions and suggestions helped to clarify the overall theoretical route taken) were instrumental in the conceptualization of this book. I thank the University of Regensburg for the chance to hold a special seminar (Hauptseminar) on the Anthropology of Infrastructure. This enabled me to deepen my knowledge on different theories of infrastructure together with the students. Special thanks are also due to Ger Duijzings, who not only made the teaching collaboration possible but also extensively discussed various theories on infrastructure with me over a glass of the best beer in Regensburg. Aleksandra Salamurović, the academic coordinator of the seeFField project (of which the Hauptseminar was a part) made my stay in Regensburg more pleasant than I would have dreamed. I am also in debt to Adrian Deoancă, Alexandra Ion, and Stelu Șerban who read and commented on the introduction and my own ethnographic chapter. Rowan Deer, my language guardian angel, ensures all my texts are readable and more enjoyable (thank you, Rowan, for

your patience and willingness to work with a non-native speaker who taught himself English!). Finally, none of this would have been possible without the support, understanding, and encouragement of (and sometimes the push from!) my wife Luminița. My life generally, and my academic life in particular, would be much poorer without her.

LUMINITA GATEJEL'S ACKNOWLEDGMENTS

I would like to thank all my colleagues at the IOS for providing an inspiring research environment. Many thanks in particular to Barbara Stupka-Pleban and the other colleagues in our administration for dealing with complex bureaucratic issues that grew more complicated the moment money crossed borders. A very warm thank-you goes out to Merve Neziroğlu who supervised the project at the GWZO. I am grateful to Steven Jobbitt and Robert Nemes for commenting on an earlier draft of the introduction. I am further indebted to Karin Taylor, Andy Hodges, and Patrick Schmitt for helping me out with language editing and formatting issues. And, last but not least, I would like to thank Constantin Ardeleanu and his colleagues at New Europe College in Bucharest for hosting the workshop “Disturbance on the Danube: State, Infrastructure and the Environment” in September 2022. This event gave us the wonderful opportunity to finally meet in person in a beautiful environment to exchange ideas and test hypotheses.

Both editors thank the two anonymous reviewers. There are many academic jokes circulating on social media that complain about the cantankerous tendencies of Reviewer 2, but we were lucky. The second reviewer made thorough and judicious comments that helped us rewrite the introduction and contributed directly to the sharpening of all chapters. This report alone should be published as a model for what helpful peer review should look like. Whoever you are, a huge thank-you! Though it goes without saying: The authors alone are responsible for any errors or inconsistencies.

Finally, we are grateful to Justin Race and his team at Purdue University Press who believed in this book project from the very start and provided advice every step of the way. Our volume could not have found a better home.

NOTES

1. Henrik Pontoppidan, *Lucky Per*, translated by Naomi Lebowitz (Peter Lang, 1910), 135–36.
2. Dipesh Chakrabarty, *The Climate of History in a Planetary Age* (University of Chicago Press, 2021), 110.
3. Michael Quin, *A Steam Voyage Down the Danube: With Sketches of Hungary, Walachia,*

- Servia, Turkey, Etc.* (Paris: A. and W. Galignani et Co., 1836); Joanne Yao, “‘Conquest from Barbarism’: The Danube Commission, International Order and the Control of Nature as a Standard of Civilization,” *European Journal of International Relations* 25, no. 2 (2019): 335–59; Constantin Ardeleanu, *Steamboat Modernity: Travel, Transport, and Social Transformation on the Lower Danube, 1830–1860* (CEU Press, 2024).
4. Anders Block, Moe Nakazora, and Brit Ross Winthereik, “Introduction: Infrastructuring Environments,” *Science as Culture* 25, no. 1 (2016): 6.
 5. The global COVID-19 pandemic and the subsequent lockdowns meant that the start of the project in 2020 was largely based on online research.

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INTRODUCTION

DISTURBANCE

Danube River, Infrastructure, State

STEFAN DORONDEL AND LUMINITA GATEJEL

INTRODUCTION

“The flooding of the Danube confronts us every year. We again plead for your mercy and aid to overcome this evil. Please, command the men you think are best suited to eradicate this evil and provide the resources necessary for this purpose.”¹ In this and similar letters from April 1840, the inhabitants of the town of Giurgiu on the banks of the Danube River ask the prince of Wallachia to order engineering works to protect them from the high waters that threatened their lives and livelihoods each spring.² Other riparian communities confronted with the same phenomenon also emphasized the destructiveness and menace of rising waters.³ They saw the central government as the only force strong enough—and with adequate technical knowledge and funds—to oppose a powerful river. From this correspondence emerges a picture with four actors: the riparian people, the unpredictable river, state entities (the prince and his engineers), and infrastructure. Together they form an assemblage that, according to Jesse Bazzul, encompasses multiple materialities, living entities, stories, discourses, and politics.⁴ Central to this assemblage was the strong belief in infrastructural systems that can impede disturbances caused by the high flow of the river. In this reading, infrastructure brings the promises of safety, freedom, and prosperity.⁵ Nikhil Anand, Akhil Gupta, and Hannah Appel argue that infrastructure “permits states to separate politics from nature, the technical from the political, and the human from the nonhuman.”⁶ In the Giurgiu letters, however, the infrastructure that would protect the inhabitants against the fury of the waters does not just separate them from “nature,” but also contains a messianic

promise of defeating evil once and for all to ensure safety. In this sense, the built environment seems to function as a generator of “pipe dreams,” as Casper Bruun Jensen put it.⁷

This volume explores the relationship between the Danube River, riparian populations, and various state bodies—national and international—as mediated by infrastructure and technoscience.⁸ Using combined methodologies from environmental studies, anthropology, and history alongside insights from studies of infrastructure and science and technology studies (STS), this book assesses the scale of the political, social, economic, and ecological transformations triggered by the technological remaking of rivers. With a focus on the Danube as the most international river on the European continent, the volume provides a variety of relevant case studies and local contexts that show how humans have coped with disturbances wrought in their lives by an “unruly” river.

This volume uses the concept of *disturbance* to point to a circular relation between the river and its natural pulses, the humans that populate its floodplains, and the state bureaucratic apparatus with its infrastructure-building programs. Like “organic machine,” “envirotechnical systems,” or “socio-natural sites,” the concept of *disturbance* also problematizes the boundaries between nature and technology.⁹ Sara Pritchard emphasizes the systemic character of rivers as “complex, large-scale network[s] of interrelated and interacting parts,” in which artifacts, practices, people, institutions, and ecologies form a so-called “envirotechnical system.”¹⁰ The concept of “socio-natural site” (which Verena Winiwarter coined together with an interdisciplinary research team in a long-term study on the Viennese Danube) shows how city and river co-evolved over more than four centuries. Defined as the nexus of human practices and material arrangements, “socio-natural sites” are hybrids in which human and nonhuman forces and processes are inextricably interwoven. Their coevolution shapes the landscape as much as it shapes society.¹¹

But it is not enough to say that society, technology, and the (natural) environment intertwine. *Disturbance* as an analytical tool puts emphasis on the circular and spiraling dynamics between hydrological processes and technopolitical and economic practices. Technology is indeed a powerful agent of change that mitigates and often reshapes social and natural orders, drawing attention to the agency of nonhuman elements in these interactions,¹² while, as Astrid Oberborbeck Andersen suggests, water often “breaks boundaries and rearranges empirical and analytical binaries” (such as nature/culture).¹³ However, going beyond nature-culture hybridity, infrastructure and disturbance determine and respond to each other. As humans and riparian states build ever more infrastructure to control the river, the river will always find new, even more violent ways to reply. Over time, a large portion of the river has been transformed by escalating the infrastructural process as a response to different perceived “natural” disturbances,¹⁴ and the cycle of action and reaction can be traced within most examples in the book.

DISTURBANCE: ECOLOGY, STATE, AND INFRASTRUCTURE

Let us look at the various meanings of *disturbance* in order to operationalize it. The term has received wide attention in the ecological sciences since the 1980s. One of the most accepted definitions is “any relatively discrete event in time that disrupts ecosystems, community, or population structure and changes resources, substrate availability, or the physical environment.”¹⁵ Disturbance is seen as a natural process that affects organisms, species, ecosystems, or landscapes—all of which form nonhuman communities.¹⁶ While some ecologists equate disturbance with perturbation and stress, others—such as Wayne Sousa—have pointed out that the displacement or damaging of an individual or group may create an opportunity for new ones to establish themselves.¹⁷ Disturbance may be a cataclysmic event, but, as the above definition points out, it may also be a discrete event, such as the establishment of invasive species. Some ecologists use the term in its literal meaning to refer to the alteration of a state. In this sense, it describes an impact on an ecosystem.¹⁸ The river management literature uses the term to gauge human-induced perturbations to an ecosystem. Such disturbances may be short-term, acute episodes (such as chemical spillover) or long-term disturbances when humans make physical changes to a river (for instance, by changing its course).¹⁹ Some types of disturbance are short-lived but their consequences may endure. Recent ecological literature acknowledges the role that human activity plays in the ecology of disturbance and the fact that disturbances—especially extreme events, such as severe floods or hurricanes—affect both ecological systems and human societies significantly.²⁰ Regardless of the ecological definition of disturbance, it always causes a rearrangement of the landscape, ecological community, or ecosystem and generally has a negative meaning for ecologists.

Yet, as anthropologist Anna Tsing has pointed out, new species emerge and thrive in disturbed landscapes. Her case study is the much-prized Matsutake mushroom, which grows only in disturbed forests where pine also prospers. After harvest, this pungent mushroom creates a chain of value across continents, economies, and various ethnic groups. Thus, Tsing shows how value and different lives are created in a highly disturbed environment.²¹ From this perspective, disturbance is generative rather than destructive. For Paul Warde, “disturbance” pairs with “integrity” in the sense that these terms help us explain socio-ecological dynamics from a historical perspective. He writes of early modern German communities whose livelihoods were based on forest exploitation. Disturbing political and economic events were met with attempts to salvage the communities’ livelihood integrity through “keeping things locally,” but also by accepting the regulatory role of central authorities dealing with disturbances.²² For Rebecca Bliege Bird, human disturbance may have both positive and negative effects on plants and animals.²³ For instance, landscape fragmentation produced by human activity or

human-induced fire may act as an evolutionary force favoring medium-size animals or increasing plant species' stability and diversity.²⁴

Going beyond the negative and positive aspects of disturbance, multiple dimensions of disturbance unfold at different scales. We pinpoint three such dimensions that show how we operate this concept.

RIVER DISTURBANCE AND INFRASTRUCTURE

The first dimension refers to the dynamics of natural processes and politico-economic practices, interactions, and intersections: Infrastructure is built in response to natural processes perceived as disturbance, such as flooding. In turn, the river is affected and finds new ways to react. River swelling is beneficial for the entire system, including the floodplain, refilling it with sediment and nutrients vital for the ecosystem and its biodiversity.²⁵ From the river's perspective, a flood is not a disturbance but a way to support an ecosystem and maintain connectivity inside the river system.²⁶ As Cioc brilliantly put it, humans tend to think of rivers as having a length but not a breadth. They often used the anthropocentric term "flood" to enforce modernist discourses and perceptions that vilify the natural pulse of rivers.²⁷

Several chapters in this volume attest to the image of floods as a disaster (Luminita Gatejel's, Stefan Dorondel's, and Stelu Șerban's) or as a military attack (Robert Nemes's). Franz Mauelshagen has remarked on the semantic interchangeability of the terms "catastrophe" and "revolution," because of their shared meaning of an "upheaval" that threatens the preexisting order. Under certain circumstances, floods are disturbances to "normality" and threats to the political order.²⁸ As our case studies show, catastrophic floods not only upended the lives of those directly affected but also represented a breach of the social contract in which government institutions were (or became) responsible for the safety and well-being of its citizens. Thus, as Nemes's chapter elaborates, social and political disturbances elicit a "test of strength" for the state and institutions to prove themselves when facing adversity. This requires not only their ability to restore order to humans and natural environments but also to create a shared narrative about the meaning and outcome of a flood. Restoring "normality" after a flood goes hand in hand with reestablishing political legitimacy. This could mean various things for government officials, ranging from providing emotional and material support for those directly affected to more comprehensive safety measures, including material arrangements to keep high waters at bay (see Șerban's chapter). Meanwhile, the chapter by Haidvogel et al. takes a bird's-eye view of the interplay of floods, technology, and state policies as being both progressive and cyclic. As societies have built increasingly

taller infrastructures, aimed at protecting people and things from a one-hundred-year flood event, each major flood started a cycle of damage, reconstruction, improved infrastructure, and repopulation of the floodplain, followed by a new flood that restarted the cycle. It is naive to believe that more technologically advanced societies living on highly regulated rivers are better protected from catastrophic floods and other hazards. On the contrary, more complex structures have often augmented floods to devastating proportions. Recurring events have shown that modern infrastructure can only adapt to floods to a limited degree, thus increasing the vulnerability of those living on the former floodplain. Artificial artifacts designed to subordinate nature have limited reliability. Less catastrophic unintended effects, like the erosion and ultimate disappearance of a popular Hungarian beach (see Nemes's chapter), reveal structural changes that comprehensive dam-building had on the Danubian environment. While the robustness of infrastructures is often overestimated, flood variability is underestimated. Every gain in precision has been matched by a new vulnerability to breakdown. This is why recent flood mitigation schemes either call on societies to relearn to live with and (partly) fear major rivers, or they implement more flexible structures that mimic water movements, with no guarantees that they will work as intended.²⁹ The European Union has recently introduced a policy to transition from traditional "gray" antiflood infrastructure—made of concrete and cement—to "green infrastructure." This approach promotes the ecological restoration of floodplains and wetlands by partially breaching levees, allowing rivers to reclaim space and reestablish dynamic relationships with the landscapes and beings they shape. It acknowledges, in part, the limitations of built infrastructure in certain contexts and recognizes rivers as living entities, entangled with human and nonhuman worlds, whose right to breathe and flow extends beyond human-imposed constraints.³⁰

STATE AND THE SCALING UP OF THE INFRASTRUCTURE

A second dimension of disturbance is the multiple scales that imbue the relationship between local natural processes and global geopolitical, economic, and infrastructural practices. We opened this book with the townspeople of Giurgiu's request to the state to implement "engineering works" against the river's disturbance. The term "infrastructure" was unknown to them but the term they used has in common with "infrastructure" the reference to matter, technological knowledge, political and economic power, and transformative potential. In the nineteenth and early twentieth centuries, the term had some of the valences of infrastructure as material assets and facilities to make possible human life at a local level.³¹

Starting in the nineteenth century, the capitalist economy, technological development, and growing scientific knowledge induced a radical shift in the way states saw their role in raising a globalizing infrastructure. Rivers as main transportation channels were particularly targeted in an attempt to adjust the flow and depth to the new technological possibilities of shipping. Previously, the Danube's hydrological conditions constrained the early modern Ottoman Empire's military and commercial expansion. The Ottoman state responded with technological innovations that helped them adapt to the "doings" of the river. For instance, they built flat-bottomed ships that were better suited to shallow waters. Further, pontoon bridges were highly flexible and seasonally adaptable, enabling Ottoman troops to cope with a river that frequently changed shape (Akto and İnal in this volume).

The nineteenth and twentieth centuries raised states' interest in large infrastructures meant to "repair" the river's natural inconveniences that impeded naval transportation and thus the connection between various regions of the globe. These indeed became structures that facilitated social relations, creating "grounds on which other objects operate [. . .] as systems."³² These infrastructures are relational and facilitate interconnectedness. As Brian Larkin puts it: Infrastructure is "matter that enable[s] the movement of other matter."³³ Chapters by Constantin Ardeleanu on infrastructural work carried out by the European Commission of the Danube (ECD) at the mouths of the river at the end of the nineteenth century, and Constantin Iordachi on the socialist construction of the Danube–Black Sea channel, analyze the way two different political regimes—capitalism and state socialism—had the same take on the river and river infrastructure. Both political regimes viewed Danube-built infrastructure as a means to connect the European and national economies to global flows. What started as localized, small interventions turned into an overall process that reassembled the Danube into a straight, uninterrupted connection between Central Europe and the Black Sea, and from there to any destination in the world. Many actors partook in this transformation, including navigation companies, riparian communities, professional groups such as engineers and cartographers, state bureaucrats, and diplomats. Robert Shields Mevissen's chapter in *Austrian History Yearbook* looks into interactions between municipalities, benevolent associations, engineers, imperial bureaucrats, navigation companies, and the Habsburg royal family to trace transregional networks that endorsed plans to improve the Danube.³⁴ Another strand of this transformation is the legal internationalization of the Danube, which happened first on its lower stretch. Several studies have dissected the activity of the ECD, which imposed a strict free navigation regime along the Lower Danube in the aftermath of the Crimean War (1856).³⁵ The collective tenure of the European Great Powers was interpreted as a "civilizing mission" directed at the Ottoman Empire, justified by moral authority, technological superiority, and practical commercial gains from free trade regulations.³⁶ The idea of free navigation

had far-reaching consequences for the physical shape of the river, adapting it to accommodate steam navigation.³⁷ The ECD was one of the main promoters of river regulation projects, but riparian states conducted their own share of improvement plans. The canalization of the Danube in Vienna in the 1870s and the removal of parts of the stone blockage at the Iron Gates two decades later were only two of the most prominent projects that enabled the Danube to flow through an improved riverbed.³⁸

The river was therefore perceived less like a part of the natural environment and more like a water highway to be used for transportation, while its richness was harnessed by the European Great Powers and later by the young national states that were eager to display their own technical prowess.³⁹ Successor states of the Habsburg and Ottoman Empires mostly used the Danube for state-building purposes and economic development that appropriated and expanded previous uses and plans to modernize the river.⁴⁰ Consequently, several competing infrastructures emerged along the Danube, erected by different governing bodies and serving different, often conflicting, purposes.

The next outburst of infrastructural activity happened after the installation of state socialist governments in Eastern Europe following World War Two. Many large-scale modernization projects that had existed on paper for decades or even centuries were put into practice (the building of the Danube–Black Sea Canal being a case in point, as Iordachi's chapter shows). Geographically and temporally comprehensive plans reassembled entire river segments, adding new layers of artifacts and technological systems to already highly engineered riverbeds. It was during this time that the Danube became a highway for energy production.⁴¹ State socialist countries pursued the same high-modernist agenda as their capitalist counterparts, resulting in some very ambitious and consequential projects. New technical and organizational capabilities also increased the scale of projects that began to attempt to redesign entire landscapes in the name of science and progress.⁴² As a way of catching up with the economically more developed countries, state socialist authorities in Romania and Bulgaria initiated pharaonic reclamation plans that would engineer a new society along with an "improved" nature. Confined behind strong, high levees, almost 500,000 hectares of land were drained in Romania alone.⁴³ If the regime presented the construction of large infrastructures as proof of the superiority of the socialist system, it also—as Iordachi's chapter illustrates—brought sufferance, sacrifice, and death to certain social groups.

DISTURBANCE AND FLOW

The third dimension of *disturbance* has to do with flow. The English word "flow" suggests water in motion and is related to "flood" (of Germanic origin).⁴⁴ A prominent usage is as a metaphor of globalization ("flows" of capital, people, goods, and ideas moving

around the world), transnational processes, mobility, and expansion.⁴⁵ But such uses have been subject to harsh critique. Garry McDonogh warns that the concept lacks preciseness and scientific accuracy,⁴⁶ while Stuart Alexander Rockefeller points to some of the problematic methodologic, conceptional, and ideological issues. He suggests that engaging flow as a metaphor confines analysis to a top-down approach that ignores or obliterates the “variety, scale, and agency” of certain local actors and imports capitalist language into social theory.⁴⁷ David Graeber also criticizes the term for being impersonal, obliterating individual humans affected by global flows, and for naturalizing capitalism.⁴⁸ Ulf Hannerz defends the term, contending that it does not necessarily imply smoothness and evenness as flows may also be tumultuous, uneven, whirlpool-like, or centripetal.⁴⁹ Meanwhile, Franz Krause, an anthropologist focused on rivers, wetlands, and volatile environments, reclaims the term to think through the material engagement of people with water and rivers. Krause suggests that social scientists should pay attention to the materialities of water, to the various rhythms of flow, and to the various more-than-human lives that are involved in it.⁵⁰ River flow, as Krause points out, consists of water, fish and other species, infrastructures, political economy visions, riparian communities, and national and international institutions that administratively and politically manage the river. Far from leveling these components, the concept of flow allows us to study them together.

Taking inspiration from Krause, we maintain that flow does not suggest only continuity, smoothness, or a bird’s-eye-view analysis, as Rockefeller suggests. Flow means continuity and discontinuity, material and immaterial forces; it is a metaphoric but also a “down to earth” concept.⁵¹ That continuity and discontinuity are inherent parts of flow is obvious to anyone studying water infrastructure on modern rivers. Most rivers of the world are physically fragmented by power plants and dams. The construction of power plants along the Danube—along with pollution, dredging, and overfishing—threatens many migratory fish species, in particular the sturgeon (*Acipenseridae*), with extinction.⁵² The river’s flow became disputed between the national Romanian interest—which promoted technological strategies to improve fish stocks—and international interests that promoted different infrastructural works to increase navigability, as Ardeleanu’s chapter shows. The Danube River, like many other rivers around the world, is a continuous flow of water that is highly disturbed by large infrastructure projects.

Flow encompasses the idea of force, both material and immaterial. An increased river flow—a flood—is a very powerful material force able to dislocate land, concrete infrastructures, and human lives. Several chapters of the volume (by Gatejel, Șerban, Nemes, and Dorondel) illuminate the destructive force of the river. But even the medium flow of the river dislocates land from the banks and carries it and deposits it elsewhere. Erosion was and still is a major technopolitical concern for the national and international bodies that try to keep the river navigable. The sandbar that constantly

forms on the Sulina branch where the Danube meets the sea has been perceived as a major disturbance of regional and global transportation, requiring constant infrastructural interventions. Sailors perceived sandbars as living beings that move and change shape, proving the material force of the Danube's flow.⁵³ Danube sediments that create new land out of water challenge the stark opposition between mobility (usually implied with the metaphor of flow) and fixity (territory).⁵⁴ In her chapter on the history of the Great War Island in the heart of the city of Belgrade, Milica Prokić shows how the postsocialist infrastructural plans of the prospective developers were permanently thwarted by the shapeshifting sediments of the river.

Flow is a powerful metaphor but a real natural process as well. As a metaphor, it provides insight into how river flows are scientifically imagined and politically constructed. Steve Jobbitt's chapter shows how hydrological arguments were mobilized (domestically and internationally) against the Trianon Treaty of 1920 by the Hungarian state. Losing not only territory but also a good part of the Danube basin, including the Tisza's basin, Hungary argued that hydrological experts and engineers contributed to the "modernization" of the Danube basin by building infrastructure to control and redirect the river's flow and accused the neighboring states of being scientifically and technologically incapable of performing such tasks. Geographers brought arguments against the political fragmentation of the Danube's basin, seeing it as an act against the nature of the river itself. Thus, control of the river's flow is both a metaphor for state power and a concrete technological and infrastructural action.

Flow is also the velocity of any channelized running water, a quantity that can be mathematically approximated but that is not regular. Increases and decreases in flow rate vary depending on the season, the quantity of precipitation, and other variables, including human activity.⁵⁵ Knowing that the main input of a river basin is the quantity of precipitation, which plays a major role in water quantity and quality, we can understand better the physical materiality of rivers and the metaphorical aspects of the political discourse regarding rivers.

As the sections so far have shown, disturbance, infrastructure, state, and flow are intertwined concepts that together will give us a more complex view of the environmental history of the Danube.

A CONCISE ENVIRONMENTAL HISTORY OF THE DANUBE

The history of rivers has been booming for the past twenty years. However, due to the practical difficulties of conducting archival and ethnographic research on multiple sites and in several languages, studies of large rivers that cross several political and cultural

boundaries—including the Danube—have been sparse.⁵⁶ While the number of works that deal with this mighty European river has risen steadily, numerous blind spots still remain. Overviews have rarely been able to capture the interplay between myriad local experiences and the overall chronological shifts throughout time. One notable exception is Schmid et al.'s chapter on the Danube in the 2023 book *River Culture—Life as a Dance to the Rhythm of the Waters*, which spans from the very first evidence of humans using and altering its ecosystems until today.⁵⁷ Its main aim is to show how the river's history influences current debates and practices in river management. Edited volumes on the Danube have also done a wonderful job of providing in-depth, locally embedded studies. The majority of such studies adopt “a broadly conceived cultural-historical approach” that welcomes multidisciplinary contributions but gives preferences to literary and cultural studies research,⁵⁸ and there are only a few studies that employ historical and social sciences methods. For instance, questions of scale, agency, and power dynamics have been addressed only at case-study level, without a comprehensive reflection. In contrast, the recently published *The Lower Danube River: Hydro-Environmental Issues and Sustainability*, edited by Abdelazim M. Negm, Liliana Zaharia, and Gabriela Ioana-Toroimac, collects natural sciences perspectives without any contributions from the humanities or social sciences.⁵⁹

This last example is also an example of the way that the scholarly literature on the Danube usually focuses on a certain river sector. This is for many reasons. First, it reflects the history of the region, which, over the course of several centuries, was subject to different legal and administrative regimes shaped by empires, international organizations, nation states, socialism, and the European Union. The Danube was (and remains) an area of geopolitical contestation between different nation-building processes and political systems.⁶⁰ Second, the hydrological characteristics of certain river segments justifies the division into Upper, Middle, and Lower Danube.⁶¹ And third, historical and cultural studies at universities and research institutes are often organized around area studies that still reinforce Cold War divisions—fragmentation reinforced by national historiographies and linguistic barriers. Though the Danube transgresses political and cultural boundaries, our understanding of it is often divided by them.

However, research that analyses specific spots on the Danube has made groundbreaking methodological and thematic contributions. The Viennese section of the Danube has been subject to thorough interdisciplinary research that combines approaches from the natural and social sciences and history. Verena Winiwarter, Martin Schmid, and Gert Dressel have focused on the long-term coevolution of the river and the city of Vienna. Coining the concept “socio-natural site,” the authors show how material artifacts and technological systems transformed and ultimately blurred the line between the social and the natural.⁶² Human practices, together with the hydro-morphological features of the Viennese riverscape, determined future water

uses and services demanded by processes of industrialization and urbanization.⁶³ The approach was also applied to the broader Austrian Danube, tackling topics ranging from flood mitigation practices to various drainage and canalization projects and energy production systems.⁶⁴ This new methodological approach brought together the various social, technological, and morphological aspects that determined the multifaceted transformation of this river segment over the course of several centuries.

The Bio-Politics of the Danube Delta uses the concepts of eco-governmentality (a legacy of Michel Foucault's notion of biopower) to trace the complex manner in which political, economic, and social factors affect past and present environmental issues of the delta.⁶⁵ Several other micro-studies have focused on the delta as a highly contested site, both now and in the past, marred by political, social, and environmental conflicts. For instance, Stefan Dorondel and Veronica Mitroi explore how conservation measures implemented by Romania in the 1990s undercut the economic interests of the riparian communities.⁶⁶ Tanya Richardson has conducted extensive archival and ethnographic work in the Ukrainian delta to exemplify the politics of infrastructuring, understood as a process of assembling networks of humans and nonhumans rather than fixed facilities.⁶⁷ She makes the case for animals, plants, sediments, and technologies as active participants in social and political world-making, carefully scrutinizing their interactions in "unruly," liminal, amphibious spaces at the Danube's ends.⁶⁸ Reflecting on infrastructural systems, she highlights both their fragility (they are often prone to breakdown and malfunction) and the obduracy of modernist promises of progress and predictability that reinforce a strict nature-society divide.

In sum, environmental studies of the Danube open up discussions on the various scales of its transformation, from the micro level of a village to the macro levels of provinces, independent states, and international governing bodies, while also highlighting the various actors, including the river itself, that participate in transformation processes.

This volume sets out to complement and expand existing research in several ways. First, it aims to present stories that capture the transformation of the river as a whole, overcoming the usual fractures of the Upper, Middle, and Lower Danube or national studies. Second, it traces changes over several centuries—changes in the river, the human communities connected to it, and the knowledge and tools they used. Looking back to premodern times allows us to tease continuities and ruptures with the modern remaking of the Danube, questioning the singularity of modernity. In addition, a long-term perspective links premodern adaptation practices to river spaces with present-day ecological conflicts to show that the transformation of the Danube has been long in the making and that morphological and social shifts are best captured in a *longue durée* perspective, beyond political caesurae. Third, the volume adds the rich concept of "disturbance" to existing analytical tools in river studies. Disturbance denotes the long-term dynamic between human attempts to control the Danube, the

material systems they implemented to achieve these goals, and the agency of the river that both enabled the functioning of infrastructure and the breakdown of such arrangements. It draws particular attention to the concerted efforts to contain and optimize the Danube's flow: the adding of layer after layer of dams, channels, and pipes that could potentially leash the power of the river.

ORGANIZATION OF THE BOOK

The volume starts with Deniz Armağan Akto and Onur İnal's chapter, which examines how the Danube enabled and constrained Ottoman commercial and military expansion in Southeast Europe. They point to manifold interactions between the river, riparian communities, and central government, which aimed to modify the river and to adapt technology to the natural environment. New practices and institutions ensued that enabled local and central authorities to govern and exploit this central artery of the empire. Ultimately, the chapter tells a story of coexistence with the river that was predicated on the government accessing local knowledge.

Luminita Gatejel's chapter zooms in on the 1840s, when the semi-independent Ottoman province of Wallachia embarked on a reform process that aimed at shedding its imperial legacies. It shows how the reform process impacted the former Ottoman fortress of Giurgiu, reordering its relationship to the new Wallachian government and the surrounding environment. By using flood mitigation policies as an example, Gatejel analyzes the bureaucratic and technological processes that confined the Danube behind dams and outside the city. This approach to sever the river from the town diverged significantly with the previous adaptative practices Ottoman authorities displayed toward the Danube.

Similar optimization and rationalization practices toward nature are at the core of Constantin Ardeleanu's chapter, which deals with clashing economic and ecological interests in the Danube Delta during the nineteenth and early twentieth centuries. The European Commission of the Danube (ECD) coordinated hydraulic works to increase shipping traffic, which interfered with technical systems constructed by the Romanian state to improve fish stocks. Ardeleanu examines the lengthy technical and political negotiation process to render the two modernizing visions compatible and reset relation between the ECD and the Romanian state.

Geopolitical reconfigurations after imperial dissolutions also play a significant role in Steven Jobbitt's exploration of how Hungarian geographers and hydrological experts portrayed the territorial loss of the 1920 Trianon Treaty as a natural disaster or "disturbance," one that flew in the face of both history and the laws of nature. Revisionist hydrological arguments became particularly poignant in the interwar period

because they defined the pre-Trianon Kingdom of Hungary as a unified and indivisible watershed, thereby justifying modernizing approaches of river regulation and infrastructure building.

Stelu Șerban's contribution analyzes the interwar efforts of the Bulgarian state to reconfigure the Danubian floodplain through the prism of a disastrous flood that engulfed the area of Vidin in 1942. With reference to the concept of the "affective state," he explains why the riparian community welcomed help, which they had previously rejected, from central authorities. The chapter posits that besides catering to material needs, state officials forged an emotional bond with the local population, which made the relief measures (both material assistance and engineering constructions) more effective. Moreover, the strong emotional bond between locals and high-level officials from Sofia persisted in the local memory over decades.

After the socialist takeover of East-Central and Southeast Europe, interventions into the floodplain grew in size and intensity. The next two chapters show state socialist authorities in two distinct modes of operation: the first one in an acute crisis and the second one in a prolonged planning mode. Robert Nemes looks at the aftermath of the 1956 flood in Hungary to show how local, regional, and government authorities joined together to reinforce their mastery over nature. However, a single "shared narrative" did not emerge after the catastrophe, especially since the local population, while largely accepting the state's vision of reconstruction, displayed a mixture of pride, loss, and regret. Meanwhile, Constantin Iordachi takes on a longer perspective to analyze the planning and execution of the Danube–Black Sea Canal. First modeled on the Stalinist plan to master nature, it failed in the late 1950s because of insurmountable physical obstacles and political disagreements. This gargantuan attempt to divert the confluence of the Danube was revived in the 1980s by Nicolae Ceaușescu's government to prove the superiority of the "socialist way of life." As with many similar endeavors, it came to represent postsocialist economic decay and infrastructural shrinking. Stefan Dorondel's chapter further investigates what happened to socialist infrastructure after the dissolution of the Socialist Bloc. By looking at political and economic decisions prior to and in the aftermath of a major levee breach on the Romanian Danube in 2006, he argues that the disaster was the result of misunderstanding of the presocialist environmental infrastructure, a human-made process, reflecting the neoliberal political economy that had governed the exploitation of the Danubian floodplain since 1989.

The two concluding chapters take a long-term perspective on how infrastructure and nature-building went hand in hand on the Danube, linking premodern times with contemporary concerns. By reflecting on an island's amphibious nature, Milica Prokić examines the long-term coexistence of the Great War Island at the Sava–Danube confluence and the city of Belgrade from the Middle Ages until today. She emphasizes the island's "muddy materiality" as it constantly blurred the boundaries between water and

land, a fact that rendered human attempts at infrastructuring the island futile. In the last chapter of the volume, Gertrud Haidvogel, Severin Hohensinner, and Martin Schmid offer a *longue durée* perspective on how humans coevolved with the Upper Danube. They use “disturbance” as a conceptual tool to analyze interactions between rivers, human societies, and infrastructure, pointing to a circular relation between them. Because humans started viewing the river’s natural pulse as a threat, they built more and more sophisticated technical works to contain the water and started moving into the drained floodplain. When the “tamed” river responded with new floods, humans built higher levees and have been creating dams that could supposedly withstand a 100-year flood. The new constructions, however, also served to increase the intensity and variability of floods, underlining the inherent wildness of the river.

CODA: A WARNING BOOK

The history of infrastructuring the Danube should serve as a warning for the present and the future. Even in our time of environmental crisis, rivers continue to be the locus of pipe dreams for various megaprojects. For example, the EU-funded project Fast Danube is meant to improve “the waterway infrastructure with a view to develop the river transport on the Romanian–Bulgarian common sector of the Danube.”⁶⁹ The river is seen as merely a water highway, abstracted in mathematical and hydrological models to be engineered in line with global economic expectations for speedy waterway transport. One proposed way of engineering the river is to build underwater infrastructures to impede clogging and make dredging less necessary.⁷⁰ If this technical solution is accepted, the Danube’s velocity will increase, drastically affecting the river’s biodiversity. Other river administrations are similarly aggressive toward rivers, despite the warnings of scientists and environmental activists. As of 2014, an astonishing 3,700 hydropower dams were either planned or already under construction worldwide,⁷¹ while in 2019 the Lao government announced the construction of the seventh dam to be built on the Mekong River. The ecological consequences on the Mekong Delta, the third-largest delta in the world, are appalling.⁷²

History evidently does not serve as a teacher for the world’s leaders. We hope at least that the historical gaze we advance in this collection will serve as a warning for present and future river experts, scholars, and policymakers.

NOTES

1. Arhivele Naționale Istorice Centrale București (ANIC), Ministerul Lucrărilor Publice (MLP), 1830–1944, dosar nr. 37/1840 (March 22, 1840). Wallachia was at that time a province of the Ottoman Empire but had gained enough political autonomy to settle its internal affairs without interference from its suzerain power.
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I

COPING WITH THE RIVER

Nature, Empire, and the Making of the Early Modern Ottoman Danube

DENİZ ARMAĞAN AKTO AND ONUR İNAL

INTRODUCTION

Ottoman historians have delved deep into the history of Ottoman rivers and explored the ways they contributed to political, military, economic, and social transformations while at the same time being shaped by human and nonhuman actors. Nevertheless, thus far, only a handful of historians have explored the relations between Ottoman rivers and larger processes from the viewpoint of environmental history, even though there has been a surge in interest in Ottoman environmental history in the last decade.¹ Unsurprisingly, the multifaceted relationships between the Danube River and the peoples and groups who confronted, used, shaped, and benefited from it in the Ottoman Empire, especially in the premodern era, have remained a blind spot for many researchers.²

The early modern Ottoman Empire was an agrarian empire. Its economic goal was to collect the agricultural surplus to finance its wars and the bodies of the state apparatus, which would lead to the further extension of its income. The state's agricultural revenues were used based on the "Circle of Justice," the Middle Eastern concept that depicted how the powerful reign of the ruler was based on his troops, the success of his troops was dependent on funds, and money was collected from the peasants whose well-being was essential for the perpetuity of rule.³ Since the well-being of peasants and ruler were strongly bonded, the ruler needed to keep the cogs working by providing justice. Therefore, the early modern Ottoman state sought a balance between the sultan's taxpaying subjects and the military class. Accordingly, the Ottoman Empire can

be defined as a redistributive “world empire,” in line with the framework developed by Immanuel Wallerstein in his world-system theory.⁴

The early modern Ottoman state’s redistributive role was reflected in how it adapted and adjusted to—insofar as it tamed, modified, and utilized—its rivers and its relationship with the riverine communities. As Alan Mikhail has explained for the example of the Nile, the Ottomans benefited from the accumulation of local knowledge when dealing with the disturbances caused by their rivers.⁵ However, how the Ottomans shaped the riverine landscape was not a one-way process. In most cases, this was a constant negotiation, or mutual interaction, between the state, the river, and the local people.⁶ As we will discuss in detail below, the Ottomans did not seek to transform the Danube independently of its physical and hydrological dynamics. On the contrary, the relationship of the early modern Ottomans with the Danube was a mutual one that included coming to terms with the river, as well as its modification and adaptation.

It is possible to draw some parallels with practices along other major rivers in other regions of the empire with respect to how local knowledge contributed to the alteration of the river landscape, the utilization of rivers as supply routes and waterways, and attunement to the river’s natural cycles. Nevertheless, the Ottomans developed unique practices during their long and reciprocal relationship with the Danube. What distinguished the Danube from most rivers in the early modern period of the Ottoman Empire was its unique place in the military campaigns against the Habsburgs and its role as the main artery for provisioning the empire’s western frontier and the capital, Istanbul.⁷ This chapter deals with how the Danube River enabled and constrained the expansion of the Ottoman commercial and military sphere of influence in southeastern Europe in the sixteenth and seventeenth centuries. It examines how the Ottomans mobilized their resources and benefited from local knowledge and experience to overcome disturbances generated by the river (see also the introduction in this volume). It argues that the Ottomans developed unique methods, technologies, and strategies; created *sui generis* institutions such as the *girdap ağalığı* (whirlpool chieftain) and the *vüzariyye* (passage toll); enhanced bridge engineering methods; and exploited human and nonhuman resources to understand, make, and manage the Danube River landscape in the early modern period. Sultan Süleyman I’s (r. 1520–66) last campaign to Szegedvár in 1566 and river infrastructure in the Ottoman province of Nikopol serve as case studies.

THE DANUBE UNDER OTTOMAN RULE

As the Ottomans expanded their control over southeastern Europe from the fourteenth century onward, they increasingly used the Danube River as a waterway. The Danube, “le roi des fleuves de l’Europe” (the king of European rivers), as Napoleon Bonaparte

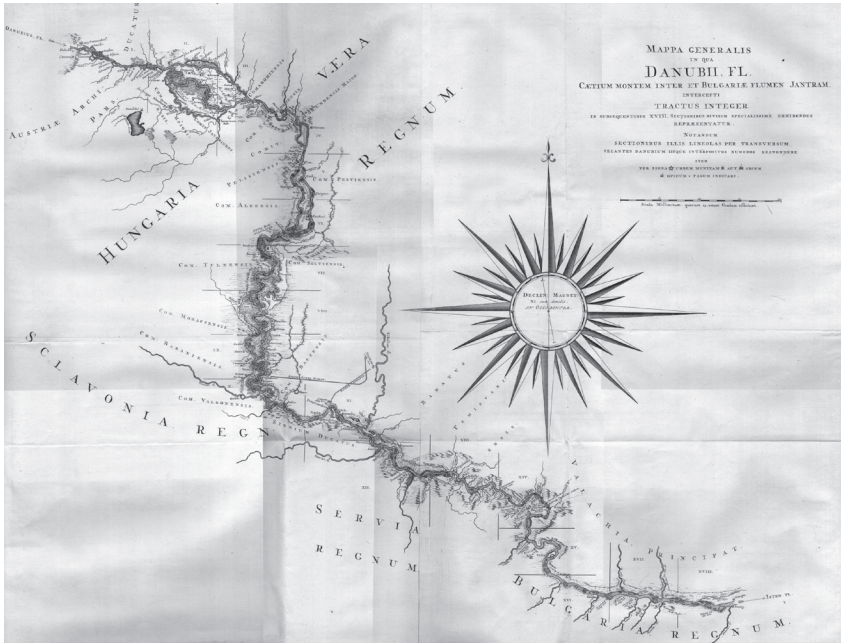


Figure 1.1 Lower and Middle Danube in the eighteenth century. Luigi Ferdinando Marsigli, *Danubius Pannonico-Mysicus*, vol. 1 (Den Haag–Amsterdam, 1726), Section XVII.

called it, was a vital channel for Ottoman commercial and military shipping in south-eastern Europe. Moreover, it allowed the Ottoman state to move supplies and munitions between the Black Sea and the Hungarian plains.⁸ It became an inseparable part of Ottoman campaign logistics.⁹ Using the Danube as a military waterway enabled the Ottomans to apply their military projections to Europe; without a riverine supply line, their military operations would not have been successful (see figure 1.1).¹⁰

In a recent study, Faisal Husain has argued that the Ottoman imperial navy, from its base in two shipyards in the Tigris-Euphrates basin and using riparian fortresses and other installations on land, helped the Ottoman state to secure its foothold in Iraq and control and monitor trade and transportation in the region.¹¹ Like the roles of the Tigris and Euphrates in the eastward expansion of the Ottomans, the Danube was crucial in sustaining Ottoman political, military, and economic interests in Europe. Therefore, the Ottomans kept an eye on the Danube through installations and facilities, which we refer to as riverine infrastructures. Ottomans altered the riverine landscape and built a fortress network that dotted the Danubian landscape with strongholds from the Black Sea to Esztergom. This network represented the Ottoman state's efforts to consolidate its position, secure supply lines and communication on the Danube, and foster and promote trade and transportation along the river. Especially after the expansion of

the empire to Hungary, the Ottomans focused on creating a defensive network to protect Buda and the Danube.¹² Furthermore, they supported this militarily and strategically important waterway by constructing several shipyards. In the sixteenth and seventeenth centuries, shipyards operated in Golubac, Belgrade, Varadin, Kruševac, Zvornik, Požega, Osijek, Smederova, Vidin, Nikopol, and Ruse.¹³ The Danubian fleet was vital in reinforcing Ottoman rule over the Hungarian plains.¹⁴ It was on demand when the army had to cross the Danube.¹⁵ However, the administrative and military organization of the Danubian fleet did not have a uniform structure until the establishment of the General Admiralty of the Ottoman Danube Fleet (*Tuna Kapudanlığı*). Ottoman historian İsmail Hakkı Uzunçarşılı has suggested that after the Ottoman conquest of Hungary in the first half of the sixteenth century, the Danubian fleet was divided into two main flotillas with further subdivisions. One was deployed between the estuary at the Black Sea and Vidin. The second was stationed between Vidin and Buda.¹⁶ On the other hand, Colin Imber established the existence of three admiralties in the Rumelian provinces of the Ottoman Empire in 1566; two were headquartered in Buda and Mohacs and one patrolled the Sava River.¹⁷ There were several captaincies for almost every militarily significant province on the Lower Danube.¹⁸ However, researchers are not unanimous about the existence of a general Danubian admiralty that controlled the entire fleet operating on the river before the end of the seventeenth century.¹⁹

The Ottoman Danube fleet comprised various types of supply and troopships, including *üstüaçık*, *aktarma*, *işkampoye*, *şalope*, *tonbaz*, *at gemisi*, *top gemisi*, *borazan gemisi*, and *kırlangıç*, as well as warships such as *kalyata*, *firkate*, and *şayka*.²⁰ New ships were built and put into operation according to requirements. For example, during the Szigetvár campaign, the Ottoman government ordered the construction of new ships on the Lower Danube and sent them to the Middle Danube.²¹ Furthermore, in addition to various supply and troopships, civil and merchant vessels were used for grain transportation during the campaigns.²²

In the early modern period, according to Bruce McGowan, the river was not a continuous trade route connecting the Middle Danube to the Black Sea.²³ The Ottoman experience of the Danube was certainly not free from problems and challenges. As we discuss in the following section, the width of the Danube was one of the many difficulties in bridging the waterway. In other places, its narrowness presented a severe obstacle to navigation. For instance, at some spots in the Iron Gates section—a gorge that stretches for 134 kilometers between the Serbian and Romanian borders—the Danube was as narrow as eighty meters, a breadth that rendered the passage of large ships impossible when water levels were low and forced merchants onto the land for trade.²⁴ Because the Iron Gates posed a natural obstacle, Halil İnalçık has argued that the Lower Danube was used primarily as a commercial channel and the Middle Danube as a military waterway.²⁵ Nevertheless, a constant exchange of goods and commodities via the

Danube brought metals and woolen cloth from Europe to the Ottoman Empire. Silk, cotton cloth, and spices were shipped the other way.²⁶ Records of the customs duties of Ottoman settlements on the Lower Danube reveal the extent of trade on the river. For example, the riverine cities and towns in the province of Nikopol, such as the city of Nikopol, Oryahovo, Svistov, and Ruse, had a total annual revenue of approximately 1.1 million *akçes*²⁷ in 1516.²⁸ Furthermore, the Danube connected the mills and bakeries of Istanbul with grain fields in Wallachia and Moldavia, playing a pivotal role in the provisioning of the Ottoman capital. Wheat from the Danubian provinces was delivered to Istanbul via the river because it was the cheapest and safest way.²⁹ For example, in the seventeenth century, the Sublime Porte leased 118 ships from fifty-six captains to carry approximately 17,000 tons of grain to Istanbul from the Danubian cities and towns.³⁰ On the Middle Danube section, Belgrade acted as an important administrative, military, and logistical center. It received supplies and provisions from the other Danubian provinces for its storehouses via the river.³¹

Due to the navigational challenges of the Iron Gates, commercial shipping between the Lower and Middle Danube was limited. On the other hand, military traffic between the two river sections cannot be underestimated. As we discuss in detail in the following sections, Ottoman military and administrative structures on the Middle and Lower Danube supplied the necessary materials and ships for the 1566 Szigetvár campaign.

OTTOMAN SOLUTIONS TO THE DISTURBANCES OF THE DANUBE

The Danube presented obstacles and difficulties both to those who wanted to cross the river as well as to shipping. One of the problems experienced by the Ottomans on the Danube was that the river often froze in the winter due to the harsh continental climate predominant in the region. This made the river impassable in many places, delayed traffic, and thus increased costs.³² The Ottomans faced other setbacks and impediments due to low water levels, extensive marshes, drifting logs, and tree roots.³³ On the other hand, these compelled the Ottoman state to seek solutions and create new opportunities for the populations along the river.

Removing driftwood and tree roots from the water was a necessity for the safety of navigation. A Habsburg envoy to the Ottoman Empire, Ogier Ghiselin de Busbecq, traveled via the Danube from Buda to Belgrade in 1554. He reported that floating logs and mill constructions that reached far out into the river had threatened the safety of the voyage. Unfortunately, the envoy's fleet was unable to avoid the hazardous objects and the ship's deck was damaged during travel.³⁴ Due to the dangers of driftwood to shipping, which caused delays in the arrival of provisions to their destination, military

and administrative officials in the Danubian towns and fortresses, as well as the Danubian captains, were assigned the task of cleaning up the waterway.³⁵ The accumulation of alluvium was another problem the Ottomans had to deal with to improve the safety of navigation. In 1574, due to floods on the Danube and Sava rivers, alluvium deposits blocked the port of Belgrade, which had to be cleared under the authority of the governor of Smederevo.³⁶

Our exploration of the early modern Ottoman experience on the Danube creates a different picture from the classic modernist approach characterized by the hegemonic control of humans over nature through science, technology, and capital. In the sixteenth and seventeenth centuries, the Danube under Ottoman rule was a socio-ecological system (SES), to use the definition put forward by Gertrud Haidvogel, Severin Hohensinner, and Martin Schmid in this volume. The Ottoman state responded to the environmental anxieties it encountered on the Danube by adapting its technologies, strategies, and institutions to the river's realities and needs. The Danube prompted and encouraged the Ottoman administration to establish new institutions for the better operation of military and commercial shipping on the river. However, unlike institutions with specific "hydraulic missions," such as the European Commission of the Danube (ECD) and the State Fisheries Service (SFS) in Romania, which used modern technology to engineer the Danube Delta in the late nineteenth and early twentieth centuries (as Constantin Ardeleanu documents in this volume), early modern Ottoman institutions relied on and attached priority to local knowledge and experience to cope with the Danube. One example was a maritime unit called the *girdap ağalığı* (whirlpool chieftain), whose mission was to keep ships away from the whirlpools and reefs at the Iron Gates and provide safe passage.³⁷ Like today's maritime pilots, the unit provided experienced captains and boatsmen to vessels wanting to maneuver through the dangerous waters of the gorge and travel from the Middle to the Lower Danube, or vice versa.³⁸ During the operation, local Christian mercenaries called *cerahors* assisted the pilots.³⁹ According to famous Ottoman traveler Evliya Çelebi, the *cerahors* numbered as many as one thousand in the seventeenth century.⁴⁰ Moreover, the *kadı*⁴¹ appointed steersmen and oarsmen to the ships that navigated the Danube.⁴² *Açıklar ağası*, who commanded the *üstüaçık* ships, were responsible for the safe passage of provision ships through the rapids.⁴³ Thus, two riverine institutions ensured navigation security through the Iron Gates. However, despite all the precautions the state took, low water levels sometimes posed a problem for navigation. For example, in August 1573, a Habsburg envoy carrying the tribute to the Ottomans set sail on the Danube to Ruse. However, his plan fell through due to the low water level at the Iron Gates.⁴⁴

Another example of a service provided by local rivermen to help the flow of trade and transport—in this case across the Danube—was connected to the *vüzariyye*. This was a fee that a group of ferrymen, *vüzars*, in Nikopol received in exchange for

transporting people, goods, and animals from one bank to the other.⁴⁵ Their existence resulted from the interaction of people and the river, creating a unique organization that enabled transportation for those who wanted to cross.

The Danube posed particular difficulties for people on both sides of the river. Even when water levels were low, crossing remained a challenge for the early modern Ottomans. Unlike the Romans, the Ottomans did not erect masonry bridges over the Danube. Instead, they preferred to build pontoon bridges. These constructions were either temporary for military purposes or permanent for civilian use.⁴⁶ The fact that the early modern Ottomans did not build stone bridges across the Danube might lead to the mistaken assumption that they were unaware of suitable engineering technologies. However, the Ottomans were skilled bridge builders, and some works of Ottoman builders in southeastern Europe remain intact. For example, Uzunköprü (Long Bridge) was built in 1427 on the Ergene River and was 1,392 meters long, making it the longest stone bridge in the world. Another example is the Mustafa Paşa Bridge, a 300-meter-long arched bridge built over the Maritsa River in Svilengrad by Ottoman statesman Çoban Mustafa Paşa in 1529. Half a century later, the famous grand vizier Sokollu Mehmed Pasha commissioned a 180-meter-long masonry bridge over the Drina River in Višegrad in 1578.

While the Ottomans erected bridges across smaller rivers and streams in southeastern Europe, the Danube was so extensive and flowed so rapidly that bridges could not be quickly built. A construction linking economically and strategically important points on the Danube would have had to be some 500 to 1,500 meters in length. Small islands in the river might have eased the construction of masonry bridges, yet Ottoman officials preferred not to erect foundations upon them. In addition, the Ottomans were cautious about permanent bridges because enemy armies could use them to threaten the safety of the Danubian frontier. Such military confrontations along the Danube occurred at the Battle of Nicopolis in 1396, in conflicts with the Hungarians between 1443 and 1445, and during the Long Wars with the Habsburgs between 1593 and 1606. Thus, instead of building permanent bridges, the Ottomans established pontoon bridges that could be swiftly opened and closed, particularly during military campaigns. Some pontoon bridges continued to be used after the conclusion of military operations, such as the bridge in Osijek built during the Szigetvár campaign, which remained in use until 1664.⁴⁷ A 260-meter-long pontoon bridge was built in 1567, connecting Buda and Pest. It was made up of seventy pontoon ships.⁴⁸ In the seventeenth century, Evliya Çelebi described a similar pontoon bridge in Buda and noted that 300 *nigahban*⁴⁹ were responsible for its protection and opening and closing it.⁵⁰ This meant that ensuring the security, maintenance, and movements of such a bridge required complex organization involving many people. In a further account, Evliya noted that the Danube froze while he was in Buda in winter, enabling people to cross the ice with carts and sleds instead

of via the bridge. They thus bypassed officials and avoided paying taxes for the crossing. While this disturbance on the river prevented navigation on the one hand, on the other, it eased the lives of traders and local inhabitants by providing uncontrolled access to both riverbanks.

THE DANUBE AS AN OTTOMAN MILITARY WATERWAY: THE 1566 SZIGETVÁR CAMPAIGN

The mid-sixteenth century witnessed the intensification of rivalries and tensions between the Ottomans and the Habsburgs in Transylvania, which finally set off military conflict. In 1566, under the command of Sultan Süleyman I, the Ottomans embarked on a campaign against the Habsburgs. The 1566 campaign is a perfect example of how the riverine landscape was transformed by the massive mobilization of human and natural resources to support the Ottoman front line. In the Tigris and Euphrates basin in the first half of the sixteenth century, the Ottomans had successfully demonstrated their innovation and ability to construct and manage what Faisal Husain calls “fluvial infrastructure” and turned the twin rivers into an Ottoman supply line.⁵¹ Similarly, in the western part of the empire, they used the Danube as a waterway to convey ships, provisions, and weapons to the battlefield during the 1566 campaign.

For this operation, the Ottomans recruited soldiers and collected goods, animals, military supplies, and food mainly from the *sanjaks* (districts) within the province of Rumeli due to their proximity to the battlefield and delivered them to the theater of war.⁵² The Ottoman state also demanded provisions and soldiers from their vassal states of Wallachia and Moldavia. Istanbul ordered 100,000 kiles⁵³ of barley from the voivode of Wallachia for the campaign preparations. The barley for the troops was sent to Nikopol and Vidin to be loaded onto 200 newly built ships.⁵⁴ The voivode of Moldavia received a similar request from Istanbul. The Ottoman central administration demanded that 100,000 kiles of barley be sent to Belgrade from Moldavia. However, these requests for provisions could not be fulfilled due to the lack of a sufficient number of ships to transfer all the supplies.⁵⁵ After several changes in the amount of barley, 80,000 kiles of barley were sent to Istanbul by ship instead of to Belgrade. Instead of delivering the remaining 20,000 kiles, the Moldavian voivode paid its corresponding value to the governor of Smederevo.⁵⁶ One of the most frequently used transport ships on the Danube was the *üstüaçık*. The *üstüaçık* ships were 21 zira (approximately 13–14 meters) long and had a tonnage of 500 kiles (around 13,328 kilograms).⁵⁷ Some researchers have estimated that about 100 *üstüaçık* ships operated on the Danube at the end of

the seventeenth century.⁵⁸ However, 200 ships ordered to be built in Vidin and Nikopol in 1565 were probably *üstüaçık* ships designed to carry provisions to the theater of war.⁵⁹ More than 200 ships would have been needed to transport the 200,000 kiles of barley ordered from Wallachia and Moldavia. Thus, officials had to find an alternative for the required grain; they chose to demand equivalent payment from the voivodes and procure the barley from another province.

The use and modification of the Danube as a military waterway to transport arms and supplies for the Ottoman armies prompted an upgrading and refitting of the Danubian navy. In several riverine towns, the Ottoman administrators ordered the construction of new ships and refitted existing ones for the upcoming campaign against the Habsburgs. Whirlpools and rapids in the river often caused damage to ships. In winter, ice formation on the river was detrimental to sailing vessels and voyages were canceled due to the frozen Danube.⁶⁰ Although there were winter docks where ships could be hauled onto shore to protect them from the ice,⁶¹ they constantly needed repair or replacement. These conditions shortened the lifespan of the vessels. For example, due to their bad shape, the imperial center ordered the replacement of *şayka*-type ships triennially in Zvornik.⁶² Especially when there was a greater need for ships, such as during wartime, construction activity intensified in the shipyards of the Danubian towns. At the initial stage of the Szigetvár campaign, Istanbul ordered the *kadıs*⁶³ of Varna, Ruse, and Nikopol to organize the completion of vessels to transport ammunition and gunpowder to the Middle Danube.⁶⁴ Istanbul also ordered the construction of new ships for military use on the Danube from several other riverine towns.⁶⁵ For example, the *sanjakbey*⁶⁶ of Smederevo received orders to build ten vessels to ship cannons on the river.⁶⁷ Furthermore, Istanbul expected merchants in the Danubian towns to fund the building of ships to transport provisions for the campaign.⁶⁸ Members of the military class in the Danubian provinces were occasionally employed to organize and operate the Danubian fleet when needed. For example, since the *sipahis*⁶⁹ of Vidin were called up to construct ships on the Danube, they were excluded from other assignments issued by the governor of Timișoara.⁷⁰ Oarsmen for the provision ships were recruited from Wallachia.⁷¹ In February 1566, as the preparations for the Szigetvár campaign were well underway, the imperial center ordered the governor of Izvornik to construct 200 provision ships and 16 *şaykas*. When the ships were built, the governor loaded them with provisions and sent them to Belgrade.⁷² In April 1566, the Sublime Porte demanded the delivery of the ships constructed in Nikopol, escorted by an *alaybeyi*⁷³ and his *sipahis*, to Smederevo.⁷⁴ Meanwhile, 140 ships were made ready to sail in Vidin, while additional vessels were constructed in Smederevo.⁷⁵ At the end of May, when the army was on the march, the Sublime Porte asked the district governor of Smederevo to report on the progress of construction. In addition, he was ordered to build further vessels suitable for shipping cannons from Smederevo and Belgrade.⁷⁶ As archival material verifies, the

Ottomans used the Danube to send supplies and military equipment to the battlefield on ships built in the riverine cities.

Bridge construction was one of the most important material and physical manifestations of the Ottomans' coping with the Danube. Therefore, bridges are perfect examples of the early modern state's initiative to mobilize natural and human resources to remake the Danube for military purposes, as most of the needed material and labor was procured locally. The Ottomans constructed new bridges over the Danube and its tributaries and maintained and repaired the old ones to provide safe passage for their armies. As early as 1476, Sultan Mehmed II (r. 1444–46, 1451–81) used a wooden pontoon bridge over the Danube in Smederevo during his campaign against Hungary.⁷⁷ The Ottomans undertook another series of bridge construction projects almost a century later. Immediately after deciding on the Szigetvár campaign in 1566, the Sublime Porte ordered the district governor of Smederevo to build a bridge over the river. Nails, bolts, and iron for the bridge were supplied from the mines in nearby Samokov.⁷⁸ The bridge construction on the Danube and its tributaries during preparation for this campaign was one of the most extensive bridge-building initiatives of the Ottoman state since its arrival on the river's banks. However, news of flooding arrived in Istanbul from the governors of the Danubian provinces, stating that the route the Ottoman army planned to take had been washed away. Therefore, at the end of April, Istanbul asked the governor of Sirem to rebuild the pontoon bridge over the Danube in the vicinity of Vukovar, wide enough for two carts to pass.⁷⁹ However, as the soldiers crossed, floods destroyed the new bridge, causing casualties.⁸⁰ While preparations for the Szigetvár campaign were underway, the Ottoman *kadıs* and other administrators in settlements on the army's route were ordered to detect flooded areas and make preparations for the construction, strengthening, and revamping of bridges.⁸¹ For instance, the district governor of Smederevo was commanded to build *tonbaz* ships to form pontoon bridges and erect a bridge as soon as the Ottoman troops arrived in Sofia.⁸² The *kadı* of Belgrade was charged with procuring provisions and ensuring their storage in Zemun, across from the city, to supply the approaching army.⁸³ The *sanjak-bey* of Požega province was instructed to calculate the number of ships needed to enable the army to cross, to build the necessary bridges wide enough to allow three carts to pass, and to procure timber and other provisions.⁸⁴

The imperial center did not determine the location of bridges on the Danube and its tributaries on its own. Instead, it conferred with provincial governors and *kadıs*, and noted information they provided on flooding. Then, on May 25, 1566, it released an order concerning the southern Morava River, a tributary of the Danube, commanding the construction of a bridge at a spot confirmed by the district governor of Alacahisar.⁸⁵ However, due to flooding, the Ottoman government erected it in the village of Didak.⁸⁶ On the same day, the *sanjakbey* of Požega notified the Sublime Porte about

the need for 30 *tonbaz* ships to construct a pontoon bridge over the Drava.⁸⁷ On May 29, 1566, the government assigned the task of building a bridge for the army to cross at Osijek to the *sanjakbey* of Smederevo. If a bridge could not be erected, the government demanded that horse boats (*at gemileri*) be kept ready to transport soldiers to the other side of the river.⁸⁸ An order sent to the district governor of Smederevo on May 30, 1566, stipulated that the Vidova River constituted an obstacle to the construction of a bridge. Consequently, the bridge would have to be relocated. To this end, supplies in the areas designated for the army's encampment were to be arranged.⁸⁹ In another case, on June 6, 1566, the district governor of Sirem was ordered to investigate the physical and material conditions for constructing a bridge at Petrovaradin. In the same order, the district governor was asked to report on floods on the Drava and other rivers. It can be deduced from the preparations to erect a bridge in Petrovaradin that the Ottoman government had revised its plan to build a bridge in Osijek. Nevertheless, the government returned to the original plan because of changes in the army's route from Eger to Szegedvár.⁹⁰ Eventually, a 3.6-kilometer pontoon bridge over the Drava River at Osijek was ready to use in July 1566 (see figure 1.2).⁹¹ The extent of the flood and marshlands necessitated the construction of such a long bridge.

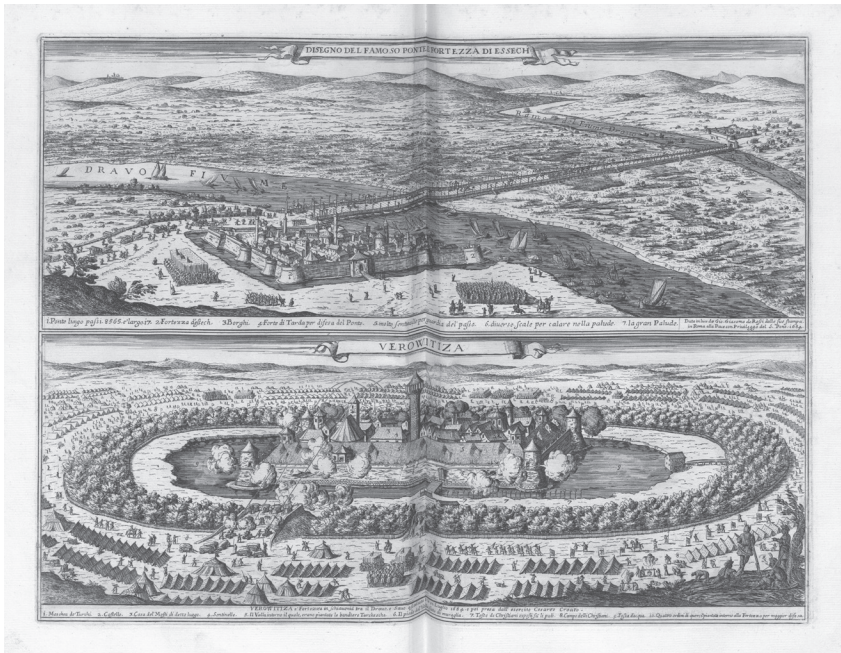


Figure 1.2 A bird's-eye view of a pontoon bridge over the Drava River at Osijek.
Giovanni Giacomo de Rossi, *Teatro della Guerra Contro Il Turco* (Rome, 1687).

As a result of the floods on the Danube, Sava, and southern Morava rivers in May 1566, the Ottomans searched for safer passages to cross these rivers and reach the Hungarian plain. Orders and writs were sent between the center and provinces to gauge water levels, understand the river flow, and inquire about potential crossing points. Floods at the end of the spring resulted from regular overflow due to the precipitation cycle and ice drifts from the Alps during this season.⁹² Because the flow rate is unknown, these floods' characteristics, magnitude, and extent cannot be estimated today. However, the length of the pontoon bridge in Osijek testifies to extraordinary floods at that time. Then again, disturbances of the river at the initial stage of the campaign were among the top problems that the Ottoman officials had to deal with.

A glance at the preparations for the Szigetvár campaign provides clues about how the Ottoman central administration dealt with the distress caused by nature on the Danube and its tributaries. It further indicates how the Ottomans regarded the river as an important waterway during the preparations for the campaign and developed alternative ways to cross it in the case of raging floods. In order to ensure a safe journey, Istanbul planned every step of the army's march and organized every construction activity on the river, monitored the floods on the Danube and its tributaries, and sent the required supplies via these rivers to their destinations. However, even though the Ottomans meticulously monitored the floods and endeavored to find solutions, inconveniences kept them from reaching their goal.⁹³

CENTRAL CONTROL, LOCAL INVOLVEMENT: THE THREE BRIDGES OF TURNU MĂGURELE

Gülsün and Uğur Tanyeli have argued that in an empire with vast territories and when transportation and communication were less developed than today, the central government took over the organization and financing of building pontoon bridges.⁹⁴ Nevertheless, locals were not passive bystanders in this process. Regional administrators occasionally interacted with the Ottoman government and participated in decision-making, while local people offered services in exchange for tax exemption. Although the Ottoman authorities occasionally exploited the human, animal, and material resources locally available when they undertook riverine construction projects, they conferred with local experts and administrators on these projects and their commercial returns. A case from Turnu Măgurele from the late sixteenth century highlights the importance of local involvement in planning riverine infrastructure on the Danube. The community of Turnu Măgurele applied to the local Ottoman authorities for immunity from

extraordinary levies in exchange for building and maintaining the bridges. Subjects of the sultan thus established direct communication with the authorities concerning infrastructure activities to transform the riverine landscape, which regional officials later took care of in collaboration with the imperial center. Financial expectations related to trade and the utilization of the Danube as a vital waterway constituted the backbone of discourse on this building initiative. However, the *reaya*⁹⁵ and local officials also contributed to the Ottoman management of the Danube River.

As mentioned above, in 1579, the residents of Turnu Măgurele petitioned to reconstruct the three bridges on the Danube that connected the port of Turnu Măgurele and Wallachia⁹⁶ in exchange for exemption from the *avarız-ı divaniyye* and *tekalif-i örfiyye* taxes.⁹⁷ Natural conditions determined the location and length of the bridges. Because the marshes around the river precluded a long, single bridge, the administrators and residents decided to construct three, each with a length of approximately 273 meters. In their petition, the residents of Turnu Măgurele raised the issue of carts loaded with salt from Wallachia having trouble crossing the river during heavy rains. After the *reaya* of Turnu Măgurele submitted their petition, the Ottoman officials requested an engineering estimate from experts. The projected cost of the reconstruction of all three bridges was 13,000 *akçes*.⁹⁸ The experts also calculated 2,000 *akçes* for annual maintenance. They confirmed that salt traders and *rençber*⁹⁹ groups were disadvantaged when heavy rains caused floods and blocked the only route to Nikopol. Furthermore, they pointed out that the delay of the salt carts and *rençber* groups came at a cost to the state, because it hampered agricultural activities and disrupted the salt trade, which was essential to animal husbandry. To prevent these consequences, the *reaya* of Turnu Măgurele were exempted from the *avarız-ı divaniyye* and *tekalif-i örfiyye* taxes for their services in maintaining the bridges.¹⁰⁰ Thus, the initiative of the *reaya* and local officials led to a solution to the threat posed to transportation and commerce by the Danube floods. In this case, the Ottoman state benefited from the experience of local people regarding a solution to an infrastructure problem on the Danube River (see figure 1.3).¹⁰¹

Similarly, the non-Muslim *reaya* of Nikopol was assigned the task of reconstructing and maintaining roads, bridges, and fortress walls damaged by river floods in exchange for immunity from extraordinary taxes and duties.¹⁰² For example, the residents of Debovo, a small village located on the Osam, a tributary of the Danube, were asked to build and maintain a bridge in return for tax privileges. The residents agreed to the proposition, and Şemseddin, the *kadı* of Nikopol, informed the Sublime Porte. The construction and maintenance of the bridge in Debovo were important due to the salt trade between the port of Nikopol and the inner regions of Ottoman Bulgaria.¹⁰³ Thus, local authorities and the residents of Debovo took care of the imperial center's interest. At the same time, the *reaya* benefited from the central government's decision to exempt them from extraordinary levies.

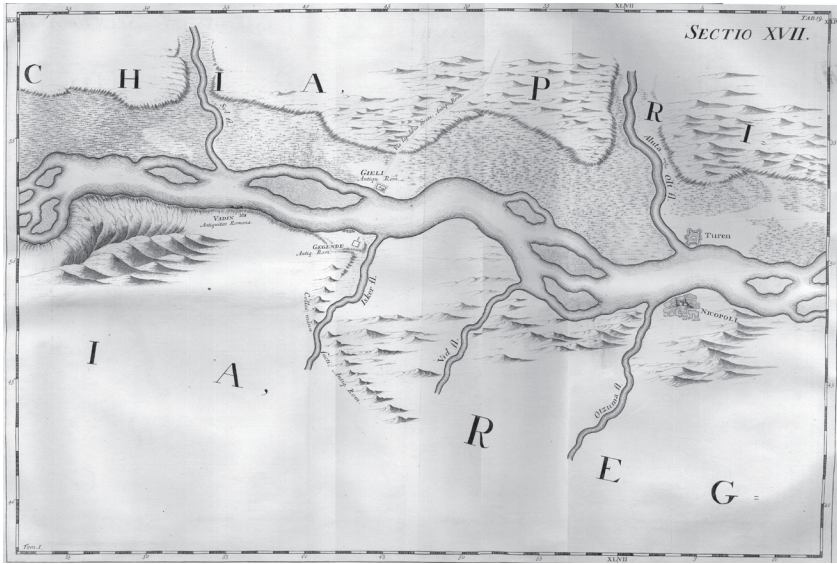


Figure 1.3 Turnu Măgurele and Nikopol in the eighteenth century. Luigi Ferdinando Marsigli, *Danubius Pannonico-Mysicus*, vol. 1 (Den Haag–Amsterdam, 1726), Section XVII.

Even though the residents of Debovo and Turnu Măgurele were not officially registered as *köprücüs*, their obligations connected to bridge construction and maintenance met the requirements demanded of *köprücüs* by the state. *Köprücüs* were part of the *derbend* organization whose primary purpose was to keep strategic passes and roads safe. Within the organization, the role of the *köprücüs* was to erect and maintain bridges and protect the surrounding area. They therefore received a tax exemption for their services.¹⁰⁴ The examples from Turnu Măgurele and Debovo in the Nikopol district reveal residents' participation in riverine alteration and the *derbend* organization—voluntarily or by appointment—providing security for trade, military activities, and administration in their region. The status of these riverine populations reflected the Ottoman institutional regulations designed to cope with the disturbances of the river.

CONCLUSION

The Danube River was a vital route for Ottoman military and commercial activities in the early modern period. The Ottomans used the river as a supply line to convey ships, ammunition, goods, and provisions. Because of the disturbances it caused, the Danube, as much as it enabled military and commercial shipping, also interrupted it, affecting the people and animals crossing the waterway, too. Therefore, the early modern

Ottoman state's response to the disturbances of the river focused on two main endeavors in order to prevent impediments to military and commercial activities and potential loss of income.

Whirlpools and rapids linked to precipitation levels and thaws presented a challenge to river traffic, while occasional floods caused disturbances that impacted the residents of towns and villages on the Danube's banks and the merchants, armies, and travelers attempting to cross it. The Ottomans made enormous efforts to cope with these disturbances. They adapted military and commercial operations to the challenges posed by the river by developing new institutions such as the *girdap ağalığı*, the *der-bend* organization, and the *vüzariyye*; they modified vessels to survive the raging waters of the river and constructed riverine infrastructures such as pontoon bridges, ship-yards, and wharves.

The river management of the early modern Ottoman Empire relied on the involvement of local communities. The Ottomans' coping with the Danube River parallels the practices they applied in other provinces of the empire where major rivers flowed. The residents of Danubian settlements initiated and participated in building and repair activities during peacetime, while the central administration carried out construction activities during military campaigns. Ultimately, the Ottomans benefited from the knowledge of riverine communities, used local people as a workforce for construction, redirected their taxes, and changed their daily lives by establishing new institutions. These were the means of an early modern empire to cope with the disturbances of a major river.

NOTES

1. Alan Mikhail, *Nature and Empire in Ottoman Egypt: An Environmental History* (Cambridge University Press, 2011); Jennifer L. Derr, *The Lived Nile: Environment, Disease, and Material Colonial Economy in Egypt* (Stanford University Press, 2019); Faisal H. Husain, *Rivers of the Sultan: The Tigris and Euphrates in the Ottoman Empire* (Oxford University Press, 2021).
2. Several studies are devoted to Ottoman rule on the Danube River in the early modern period. However, only a few have touched upon it from an environmental history perspective. Gábor Ágoston's work that questions the ways that Ottomans used geographical knowledge for their conquests and discusses the relations between the environment and the formation of military structures is pioneering in the field. See Gábor Ágoston, "Where Environmental and Frontier Studies Meet: Rivers, Forests, Marshes and Forts Along the Ottoman-Habsburg Frontier in Hungary," in *The Frontiers of the Ottoman World*, ed. A. Peacock (Oxford University Press, 2009), 57–79. In addition, there are

- two volumes of conference proceedings in which several works touch upon Ottoman rule on the Danube River with respect to military, social, cultural, and economic aspects. See: Şakir Batmaz and Özen Tok, eds., *Osmanlı Devleti'nde Nehirler ve Göller*, 2 vols. (Not, 2015).
3. Linda Darling, *A History of Social Justice and Political Power in the Middle East: The Circle of Justice from Mesopotamia to Globalization* (Routledge, 2013), 2–3.
 4. Immanuel Wallerstein, “The Rise and Future Demise of the World Capitalist System: Concepts for Comparative Analysis,” *Comparative Studies in Society and History* 16, no. 4 (1974): 387–415.
 5. Mikhail, *Nature and Empire in Ottoman Egypt*, 3–81.
 6. For example, in Egypt, the riverine community received the necessary materials from other parts of the empire to build dams and canals, while the Ottoman state was able to export the most necessary foodstuffs from Egypt to other regions and the capital, Istanbul. Furthermore, the state granted certain tax privileges to communities or used regionally collected taxes to complete the necessary canals and dam constructions in the same territory. See Mikhail, *Nature and Empire in Ottoman Egypt*, 3–124.
 7. The Tigris and Euphrates shared a similarity with the Danube. The Ottomans used the Twin Rivers in military campaigns against Iran in the early modern period.
 8. The Bulgarian kingdom in the region had used the river as a means of transport for trade and military purposes. The Ottomans benefited from the Danube immediately after their arrival on the shores of the river. For example, they demanded a specific amount of ships from their vassal Ivan Shishman after the Battle of Rovine (1395). See Rossitsa Gradeva, *War and Peace in Rumeli: 15th to Beginning of 19th Century* (Gorgias Press, 2010), 75–76.
 9. Caroline Finkel, *The Administration of Warfare: The Ottoman Military Campaigns in Hungary, 1593–1606* (VWGÖ, 1988).
 10. Rhoads Murphey, *Ottoman Warfare 1500–1700* (Routledge, 2003), 101.
 11. Husain, *Rivers of the Sultan*.
 12. Klára Hegyi, “The Ottoman Network of Fortresses in Hungary,” in *Ottomans, Hungarians, and Habsburgs in Central Europe*, ed. Géza Dávid and Pál Fodor (Brill, 2000), 166–67.
 13. Sadık Müfit Bilge, “Osmanlı Macaristan’ında Nehir Ulaşımı,” in *Osmanlı Devleti’nde Nehirler ve Göller*, vol. 1, ed. Şakir Batmaz and Özen Tok (Not, 2015), 513; BOA, MD 5/200, 496, 706, 744, 1176.
 14. The exact date of the establishment of the Danubian fleet is unknown, yet there is some evidence that ships were built and repaired on the river as early as the fifteenth century. For instance, Murad II ordered the construction of 100 ships on the Danube during the siege of Belgrade in 1440. Doukas, *Decline and Fall of Byzantium to the Ottoman Turks*, trans. Harry J. Magoulas (Wayne State University Press, 1975), 178. For

- more information on the Danubian fleet, see İdris Bostan, “Osmanlı Sefer Organizasyonundan Bir Kesit: 16. ve 17. Yüzyıllarda Tuna’da Kurulan Askeri Köprüler,” in *Osmanlı Devleti’nde Nehirler ve Göller*, vol. 1, ed. Şakir Batmaz and Özen Tok (Not, 2015), 15–30; İsmail Hakkı Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı* (Türk Tarih Kurumu, 1948), 404; Nihat Engin, “Osmanlılar’da İlk Deniz Hareketleri ve Tuna Donanması’nın Kurulması” (MA thesis, Marmara University, 1984); Filiz Yıldırım, *Nazlı Tuna’nın İnce Donanması (18. Yüzyıl)* (Hiper, 2019); Mehmet Taş, “18. Yüzyılda Tuna Donanması ve Donatımı,” *Electronic Turkish Studies* 15, no. 2 (2020): 1399–1418; and Seyfullah Aslan, “Osmanlı İmparatorluğu’nun Tuna Donanması: Teşkilatı ve Faaliyetleri (1683–1718)” (PhD diss., Istanbul University, 2022).
15. MD 5/1985.
 16. Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, 403.
 17. Colin Imber, “The Navy of Süleyman the Magnificent,” *Archivum Ottomanicum* 6 (1980): 274.
 18. Seyfullah Aslan, “Tuna Donanması’nın Kuruluşu Meselesi,” in *Kanuni Sultan Süleyman ve Dönemi: Yeni Kaynaklar, Yeni Yaklaşımlar*, ed. M. Fatih Çalışır and Suraiya Faroqhi (İbn Haldun Üniversitesi, 2020), 80. The captain of Nikopol commanded several groups of craftsmen, such as carpenters, ropemakers, and caulkers. He had 105 men under his command in 1516 (BOA, MAD 11, Folio 66B–68A). A captain was based in Vidin in 1454–55. See Rossitsa Gradeva, “War and Peace Along the Danube: Vidin at the End of the 17th Century,” *Oriente Moderno* 20, no. 81 (2001): 162.
 19. Aslan, “Tuna Donanması’nın Kuruluşu Meselesi,” 99–100.
 20. *Firkate* and *kalyata* were large galleys used solely for military purposes. The *şayka* was a riverine warship particular to the Danube. The *üstüaçık* was used to transport goods. The *işkampoye* was a courier or transport ship. *Aktarma* ships accompanied the navy when needed. The *borazan* was designed for shipping provisions. *At gemisi* carried animals, troops, and ammunition, while *top gemisi* transported cannon. The *tonbaz* was the most crucial component of pontoon bridges, though it was also used for transportation (BOA, MD 5/1223). For more detailed information about Ottoman navy vessels, see İdris Bostan, *Osmanlı Bahriye Teşkilatı: XVII. Yüzyılda Tersâne-i Âmire* (Türk Tarih Kurumu, 1992), 88–94; Bostan, *Kürekli ve Yelkenli Osmanlı Gemileri* (Bilge, 2005).
 21. BOA, MD 5/670, 701, 706, 1176.
 22. BOA, MD 5/1228.
 23. Bruce McGowan, “The Middle Danube Cul-de-Sac,” in *The Ottoman Empire and the World-Economy*, ed. Huri İslamoğlu-İnan (Cambridge University Press, 2004), 170–77.
 24. M. Emre Kılıçaslan, “XVIII. Yüzyılda Tuna Demirkapısı ve Girdaplar İdaresi,” *Karadeniz Araştırmaları* 25 (2010): 65–66.
 25. Halil İnalçık and Donald Quataert, *An Economic and Social History of the Ottoman Empire, 1300–1914*, vol. 1 (Cambridge University Press, 1994), 483–84.

26. İnalçık and Quataert, *Economic and Social History of the Ottoman Empire*, 296.
27. *Akçe* refers to a silver coin used in the Ottoman Empire.
28. BOA, MAD 11, folio 12B.
29. İnalçık and Quataert, *Economic and Social History of the Ottoman Empire*, 182.
30. Rhoads Murphy, "Provisioning Istanbul: The State and Subsistence in the Early Modern Middle East," *Food and Foodways* 2, no. 1 (1988): 226–27.
31. Gradeva, "War and Peace along the Danube," 167.
32. BOA, MD 110/1461; MD 102/763.
33. Numan Elibol, "XVIII. Yüzyılda Osmanlı-Avusturya Ticareti" (PhD diss., Marmara University, 2003), 165.
34. Ogier Ghiselin de Busbecq, *The Life and Letters of Ogier Ghiselin de Busbecq, vol. 1*, ed. Charles Thornton Foster and F. H. Blackburne Daniell (London: C. Kegan Paul, 1881), 92–93.
35. Aslan, "Osmanlı İmparatorluğu'nun Tuna Donanması," 445.
36. BOA, MD 26/668.
37. Kılıçaslan, "XVIII. Yüzyılda Tuna Demirkapısı ve Girdaplar İdaresi."
38. Kılıçaslan, "XVIII. Yüzyılda Tuna Demirkapısı ve Girdaplar İdaresi," 71–72.
39. Kılıçaslan, "XVIII. Yüzyılda Tuna Demirkapısı ve Girdaplar İdaresi," 68–69; and Tahir Sevinç, "1695 ve 1696 Avusturya Seferleri'nde Organizasyon ve Lojistik" (PhD diss., Marmara University, 2010), 77–79. On the employment of *cerahors* in the Ruse district, see Kamil Çolak, "Ruşuk ve Çevresinde Cerehorlar, 1694–1698," *Akademik İncelemeler Dergisi* 1, no. 13 (April 2018): 369–89.
40. Evliya Çelebi, *Günümüz Türkçesiyle Evliyâ Çelebi Seyahatnâmesi, vol. 8*, ed. Seyit Ali Kahraman and Yücel Dağlı (Yapı Kredi, 2013), 170.
41. Judicial authority in Ottoman cities.
42. Gradeva, "War and Peace along the Danube," 168.
43. Sevinç, "1695 ve 1696 Avusturya Seferleri'nde," 177.
44. BOA, MD 22/524.
45. Ahmet Akgündüz, *Osmanlı Kanunnameleri ve Hukuki Tablilleri. Yavuz Sultan Selim Devri Kanunnameleri, vol. 3* (Fey Vakfi, 1991), 421–24.
46. For more information about pontoon bridges built by the Ottomans, see Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit"; and Uğur Tanyeli and Gülsüm Tanyeli, "Osmanlı Yüzer Köprüleri," *ODTÜ Mimarlık Fakültesi Dergisi* 10, no. 1–2 (1990): 5–17.
47. Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit," 20.
48. Sadık Müfit Bilge, *Osmanlı'nın Macaristan'ı* (Kitabevi, 2010), 129.
49. Gatekeeper or guardian.
50. Evliya Çelebi, *Günümüz Türkçesiyle Evliyâ Çelebi Seyahatnâmesi*, 153.
51. Husain, *Rivers of the Sultan*.
52. The *sanjakbeys* (district governors) of Vidin and Kruševac were each requested to send

- 30,000 sheep, and Smederevo 40,000, to the army's headquarters. In addition, at the planning stage of the campaign, weapons and ammunition were transported from Silistra to Ruse by land; later, however, Istanbul ordered them to be shipped via the Danube (BOA, MD 5/952, 946).
53. Kile is an Ottoman weight measurement that differed from region to region. For example, in the sixteenth century, one "Istanbul kile" was equivalent to approximately 25,6589 kilograms. Cengiz Kallek, "Kile," in *TDV İslam Ansiklopedisi*, vol. 25 (Türkiye Diyanet Vakfı, 2002), 568–71.
 54. BOA, MD 5/707, 865, 960, 1179, 1242, 1281.
 55. BOA, MD 5/942.
 56. BOA, MD 5/942, 1394, 1513, 1653, 1739.
 57. *Üstüaçık* vessels originated on the Danube but were also used on the Euphrates where they were called "Danubian *üstüaçık*." See Cengiz Orhonlu and Turgut Işıksal, "Osmanlı Devrinde Nehir Nakliyatı Hakkında Araştırmalar: Dicle ve Fırat Nehirlerinde Nakliyat," *Tarih Dergisi* 13, no. 17–18 (1963): 86. On the capacity of the *üstüaçık* ships, see Sevinç, "1695 ve 1696 Avusturya Seferleri'nde Organizasyon ve Lojistik," 176.
 58. Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, 403–4.
 59. BOA, MD 5/707.
 60. Ayşe Pul, "Osmanlı Tuna Donanmasının Üstüaçık Gemileri," *Tarih Okulu Dergisi (TOD)* 17 (2014): 307.
 61. Theodora Bakardjieva, "The Role of the Ottoman Danubian Fleet in the Military Operations in XV–XVII C. Organization and Fighting Potentialities," *XIV. Türk Tarih Kongresi*, vol. 2 (Türk Tarih Kurumu, 2002), 155.
 62. Bilge, "Osmanlı Macaristan'ında Nehir Ulaşımı," 513.
 63. Judicial authority in Ottoman cities.
 64. BOA, MD 5/1176.
 65. BOA, MD 5/670, 706.
 66. The governor of a *sanjak* (district) in the Ottoman Empire.
 67. BOA, MD 5/924.
 68. BOA, MD 5/925.
 69. Light cavalryman holding a *tımar* (fief) from the Ottoman state in return for military service.
 70. BOA, MD 5/927.
 71. BOA, MD 5/707.
 72. BOA, MD 5/1042.
 73. Commander of the *sipahis*.
 74. BOA, MD 5/1440.
 75. BOA, MD 5/1449, 1453.
 76. BOA, MD 5/1704.

77. Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit," 16.
78. BOA, MD 5/571.
79. BOA, MD 5/1488, 1640.
80. Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit," 19.
81. BOA, MD 5/1693.
82. BOA, MD 5/1618.
83. BOA, MD 5/1626.
84. BOA, MD 5/1662.
85. BOA, MD 5/1694.
86. BOA, MD 5/1744.
87. BOA, MD 5/1701.
88. BOA, MD 5/1728.
89. BOA, MD 5/1746.
90. BOA, MD 5/1798, 1834; and Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit," 19.
91. Bostan, "Osmanlı Sefer Organizasyonundan Bir Kesit," 20.
92. See Rüdiger Glaser et al., "The Variability of European Floods Since AD 1500," *Climatic Change* 101 (2010): 246, 252; András Vadas, "Floods in the Hungarian Kingdom as Reflected in Private Letters (1541–1650): Sources and Possibilities," in *Anuarul Scolii Doctorale. "Istorie. Civilizație. Cultură V,"* ed. Nicoara Toader (Universitatea Babeș-Bolyai Facultatea de Istorie și Filosofie, 2011), 88–89.
93. For instance, on June 3, 1566, janissaries of the infantry failed to cross the Danube near Belgrade due to the raging flood. BOA, MD 5/1784.
94. Tanyeli and Tanyeli, "Osmanlı Yüzer Köprüleri," 11.
95. *Reaya* referred to taxpaying subjects in the Ottoman Empire.
96. The archival document indicates that the bridges were established between the port of Holovnik (Turnu Măgurele) and Eflak (Wallachia). See TKGM.d. 58, folio 20A. Turnu Măgurele was located in Wallachia and was under Ottoman authority. The description of the bridges does not provide information on their exact location. However, it can be inferred from a map drawn by Luigi Ferdinando Marsigli in the eighteenth century. On this map, Turnu Măgurele is indicated on the banks of the Olt River. Therefore, the bridges could have formed a route over the Olt, connecting the city's port with the opposite shore of the river. See Luigi Ferdinando Marsigli, *Danubius Pannonico-Mysicus*, vol. 1 (Den Haag–Amsterdam, 1726), Section XVII.
97. TKGM 58, folio 20A. *Avarız* is a generic term used for extraordinary levies collected during wartime. Before the seventeenth century, it was a contemporary tax. Later, however, it became a regular levy.
98. TKGM 58, folio 20A.
99. Agricultural workers paid on a daily basis.
100. TKGM 58, folio 20A.

101. Similarly, the Ottoman state benefited from local experience and know-how in relation to irrigation and construction activities around the Nile. See Mikhail, *Nature and Empire in Ottoman Egypt*, 3.
102. TKGM 58, folio 29B.
103. TKGM 58, folio 19A.
104. Cengiz Orhonlu, *Osmanlı İmparatorluğu'nda Derbend Teşkilâtı* (Eren, 1990), 13.

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A YOUNG STATE EMPOWERED BY TECHNOLOGY?

Floods and the Politics of Responsibility in Wallachia During the 1840s

LUMINITA GATEJEL

INTRODUCTION

Spring was a dangerous time for those living on the shores of the Danube. When the frozen river started to melt, flooding frequently occurred, and sometimes the discarded water and ice caused catastrophic damage. The city of Giurgiu on the left bank of the Danube, which passed from Ottoman to Wallachian rule after the Russo–Turkish War of 1828–1829, faced raging water in late winter and early spring almost every year. For instance, in February 1837, ice blocks melted and pushed the Danube’s waters into the moat of the former fortress. The high waters were on the verge of entering the city, but then they retreated a couple of days later.¹ In January 1840, however, the water level rose again and flooded the city on this occasion.²

Published and archival sources offer few details about the extent of the damages and the rescue measures in the flood’s immediate aftermath. Since two of the four city neighborhoods had been flooded, and several inhabitants had hastily left their houses, the chair of the city council, Petre Serghie, ordered ten boats to save those stranded. He further pleaded with those homeowners whose properties the flood had spared to take in the homeless temporarily. The floods had also severed communications with the

neighboring villages from which the city received most of its provisions. Luckily, the city bakers responded to an inquiry from the same chair asking whether the city had enough flour in storage to feed the entire city for a month and a half.³ These accounts lacked any reference to compensation or donations that those affected may have received to repair their houses or replace damaged goods.

In the archives, one can find a series of petitions written by people in the township and addressed to the prince of Wallachia, asking him to order engineering works that would prevent future flooding. These pleas, which most property owners in the town—including the city council members—signed, do not include any requests for personal damages, although they do mention destroyed and still-unhabitable houses. Instead, the supplicants focused their efforts on prevention measures rather than on remedying past damages. This lack of personal requests could be either a sign that concepts of property insurance were missing from public discourse or that state institutions were not considered responsible for damages due to natural disasters. There were hints, however, that the signatories believed a focus on such remedies could only provide temporary solutions, while sturdy engineering constructions, as one petitioner wrote, “could permanently alleviate this evil.”⁴ Thus, one month after the catastrophic waves hit, the township of Giurgiu pleaded with the prince to order the government to build and pay for substantial works along the Danube that would prevent future floods from inundating the city.

This chapter argues that the mitigation of these floods redefined social and environmental relations inside the principality of Wallachia. The 1829 Treaty of Adrianople allowed the principality, which formally remained an Ottoman province, to gain more political autonomy and embark on a state building mission predicated on attaining internal coherence, centralization, and modernization. One way to achieve these goals was to build material works that would make governing more efficient and solidify the state’s presence in this newly integrated region.⁵ This chapter analyzes how technical know-how and administrative reforms transformed the principality into a modern bureaucratic state that forged new bonds with its citizens. To explain this change, I apply the concept of “disturbance,” defined as a pattern of recurring events that reconfigured the human–nature relations in the principality of Wallachia at this specific moment in time.⁶ Originally a term from (landscape) ecology, “disturbance” will be used here to gauge changes within society by analyzing how perceptions of the local environment as threatening altered the relationship between riparian communities, central authorities, and the Danube. By calling the seasonal pulse of the Danube “evil,” the local population invited the central government to implement a disaster management infrastructure that separated them from the Danube, laying the grounds for a modern engineering approach that confined the Danube behind dams.

In the flood’s aftermath, the shores of the Danube became a site in which different social actors negotiated power and meaning. In these interactions at the local level, a

new state formation emerged that allowed central authorities to expand into the previously autonomous domain of disaster management. This enabled the government to impose its own knowledge system, to reorder territory, and ultimately to reconfigure power relations linked to the Danube and the population living near it.⁷ The Danube, like all major rivers, became a key site in which central authorities demonstrated a greater presence as part of their aim to change nature for the benefit of humans.⁸ Nevertheless, by welcoming the presence of the central authorities, local inhabitants actively supported this process of state expansion. Such an invitation for central authorities to act locally may seem to contradict some of the existing literature on how modern states expanded into peripheral regions. Inspired by James Scott's works, some of the literature has either focused on top-down coercion or on the multiple tactics local populations used to stay under the radar of central governments.⁹ However, scholars have long criticized Scott's binary categories of "state-society" and "power-resistance."¹⁰ With regard to schemes that optimized the population's well-being, Tania Murray Li suggested one cannot separate power from resistance and one has to think of them as intertwined. The consequences are that "officials and other parties that seek to govern need to be every bit of creative in negotiating their own work regimes."¹¹

In this vein, scholars have pointed out cooperative approaches to state-building in which both central and local representatives willingly participated.¹² Because of unequal access to resources and workforces, such partnerships were often asymmetrical but they nevertheless gave local actors some agency in shaping this relationship.¹³ The citizens of Giurgiu, depleted by the recent catastrophe, went further and agreed to defer all responsibility to the central government. This case study shows that state formation happened differently in regions that lacked strong local coping mechanisms because local actors quickly shed any reservations they had about central interventions. More so, it also suggests that migration and so-called population exchanges erased most of the knowledge and practices riparian communities applied to cope with a pulsating river, thus allowing for more outside involvements. From the perspective of the government and its technical bureaucracy, a disaster offered a unique opportunity to reorder a local society in line with its own expectations and to impose a new form of technocratic governance that aimed at mastery over nature.

RUSSIAN EXPANSIONISM AND RATIONAL GOVERNMENT ON THE LOWER DANUBE

Many disasters emerge out of recurring events that only occasionally fulfill their destructive potential. Floods can evolve from being a slow-onset phenomenon to an event that strikes rapidly. Still, those witnessing floods usually describe them as approaching

suddenly and seemingly out of the blue. Research on the history of disasters, however, has shown that even if those affected by a catastrophe perceived such events or processes as arising suddenly and unexpectedly, they usually have a longer history that can be traced back to past social or political shifts.¹⁴ If one were to attempt to place the Giurgiu flood within a larger historical process, one would find it inextricably linked to the Russian expansionist policy along the Lower Danube in the early nineteenth century; this policy had long-lasting consequences for the river's use and management. The Treaty of Adrianople, signed by Russia and the Ottoman Empire in 1829, changed the status of the Lower Danube from being a *de facto* closed Ottoman river to being an international waterway on which navigation was declared free to all ships irrespective of their flag.¹⁵ Thus, the First Austrian Steam Navigation Company established the first regular steamboat connections from Vienna to Constantinople and Odessa.¹⁶ Furthermore, the treaty opened up the Danube frontier to foreign trade, generating new wealth by boosting the export of agricultural products.¹⁷ In particular, the treaty lifted the export embargo on the Danubian principalities, which laid the grounds for a flourishing grain trade that linked the ports on the left (Wallachian) bank of the river with the rest of Europe.¹⁸

An unintended effect of Russia's expansionist policy along the Danube was the emergence of a modern Romanian nation-state in the mid-nineteenth century.¹⁹ In its pursuit to push the Ottoman Empire behind the Danube line, the Russian Empire gained a tighter grip on the principalities by annexing Bessarabia (northeastern Moldavia) in 1812 and the Danube Delta in 1829.²⁰ Without aiming for further territorial gains, the policy that Russia pursued after peacemaking sought to actively shape the administration of Moldavia and Wallachia. The Russian army did not retreat; instead, they stayed on to supervise a reform program that would transform the nature of government in the two provinces. After negotiations with the local political elite, the commander in chief of the occupying army, General Pavel Dmitrievich Kiselev, issued two constitutions known as the Organic Statutes. Besides introducing the rule of law, the statutes implemented several administrative measures to improve the efficiency of the government of the two principalities and to discipline the population.²¹ From a Russian perspective, the statutes were a continuation of imperial expansion by other means. They aimed to maintain hegemony in two principalities that could offer protection in their function as buffer states.²²

These reforms embodied a mindset typical of early modern statehood, and they can be interpreted as an application of "enlightened despotism" to a subordinate state. Yet, against all odds, they played a significant role in the political emancipation of Moldavia and Wallachia. More so, they initiated a process of modernization and Westernization in the two principalities, which ultimately led to their full political independence. To ensure the vitality of the new government, the statutes created a firm legal background

that triggered comprehensive institutional reforms. Thus, the new constitutions redefined the prerogatives of the princes and of the legislative assemblies, regulated social relations, reorganized the public administration, and promoted public welfare.²³

The statutes, which were written into law in 1831 in Wallachia and in 1832 in Moldavia, introduced the separation of powers for the first time without entirely replacing existing hierarchies. The boyars' ruling elite retained most of the privileges, for instance exemption from taxes and exclusive voting rights. In addition, it received property rights over the domains it had previously "administered." New fiscal policies were designed to curb economic output and improve the status of the emerging bourgeoisie. In general, administrative operations became more orderly and predictable. Both states relied on a strong executive that gave the ruling monarch considerable powers. Legislative assemblies only had limited influence on the political process because their initiatives could be vetoed by both the prince and the two suzerain powers—the Ottoman and Russian Empires. The concentration of powers in the prince's hands extended the central bureaucracy at the expense of the regional and local administration. It therefore extended a unifying rule over the entire territory and tied autonomous regions close to the political core.²⁴

GIURGIU'S ADMINISTRATIVE INTEGRATION INTO WALLACHIA

The frontier along the Danube played a key role in the postwar settlement between these two belligerent empires and in the reform process that followed. First, the Ottoman Empire was forced to renounce three fortresses (Giurgiu, Turnu, and Braila) that it still held on the left bank of the Danube, which were later integrated into the Wallachian principality. Second, the Danube's *thalweg* became the new official boundary between the two states and a commission negotiated the fate of the adjacent islands and side channels.²⁵ And third, the plague epidemics that ravaged Russian troops during combat made sanitary problems a pressing matter immediately after the war. Thus, the Russian administration established systematic quarantine regulations. These transformed the river into a cordon sanitaire that halted unwanted mobility from the Ottoman right bank. In this defensive system, the three fortresses operated as the main quarantine stations that scrutinized and controlled traffic across the Danube.²⁶ In sum, these concerted measures marked the definitive closure of the Ottoman frontier in Europe and its replacement by a system of fixed, modern borders.²⁷

This transformation deeply impacted localities along the Danube and particularly the former Ottoman fortress of Giurgiu where Russian and Wallachian interests overlapped. To rejuvenate the city, Russian soldiers tore down the walls of the fortress and

military engineers drew a plan of the city that served as a base for future urban development. Furthermore, Muslim city dwellers were forced to leave the city and settle in Rumelia on the right side of the Danube. They were not permitted to own property in Wallachia and had to sell their properties to Christian subjects within eighteen months. Count Kiselev specified in a circular that Muslim owners who had fled during the war and who had not managed to sell their properties within the specified time limit lost all rights over them.²⁸ The immediate result of this expulsion was a significant reduction in the population and a temporary economic decline. Over the next few years, however, new Romanian-speaking Christian families moved to Giurgiu from within the principalities and Slavic-speaking migrants crossed the Danube, and these people bought the vacant properties. In 1833, according to the Orthodox Church records, 779 families lived in Giurgiu, which roughly correlated to 3,500 inhabitants and a few remaining Muslims, Jews, and Armenians. The entire city population can thus be estimated at just over 4,000 residents, which successfully compensated for the Muslim expulsion.²⁹

Besides cheap property and land prices, what attracted these families to Giurgiu was the concerted local and central measures taken to improve the town's economic outlook by extending the urban infrastructure. In October 1831, an "improvement committee" made up of the local gentry, town representatives, and the Austrian engineer Moritz von Ott established a comprehensive plan to turn Giurgiu into a modern city. Within the next couple of years, the city council supervised the construction of several new public buildings. Of utmost importance to the Russian administration, the quarantine building was one of the first projects tackled. In addition, port facilities were erected to handle transactions with goods and passenger traffic. Inside the city, mostly foreign architects planned, while local handymen and peasants erected new army barracks, a prison building, a public garden, and the first public boys' school of Wallachia.³⁰ The new property owners shared responsibilities for improving the city's infrastructure. Those who bought houses that had been damaged in the war were bound by contract to rebuild them at their own expense. Those who bought vacant plots agreed to build town houses by the end of 1835. In addition, all home and shop owners were charged for the road to be paved in front of their properties. In the first decade of Wallachian rule, Giurgiu grew to have four neighborhoods distinguished by colors (red, blue, green, and yellow) that branched out from the city center.³¹

Descriptions by foreign travelers who arrived in Giurgiu on steamboats captured both the magnitude of the changes and the state of limbo the city was in. For some travelers, with war damage still visible, decay and destruction prevailed, and the city's provincial vibe and air of neglect did not make an overnight stop worthwhile. Others, on the contrary, emphasized the massive transformation the city was undergoing, and although it remained a provincial town, recently erected buildings gave Giurgiu a modern

European character. Travelers who left the steamboat to continue their journey to Bucharest praised the new road that linked the Danube to the capital.³² All in all, war and the resulting reforms set in motion a process in Giurgiu that reshaped administrative practices and integrated new knowledge, often through transnational networks of experts. This process aimed to integrate the town and its surroundings into the new state and into European communications networks.

PLEASE HELP US, GRACIOUS LORD!

In the spring of 1840, at the height of this transformation, disaster hit. Official and popular reactions to the flood were inextricable from the political and social reorganization taking place in the principality of Wallachia at that time. For the government in Bucharest, the flood represented an opportunity to prove itself in a newly acquired territory. For the city council, meanwhile, it was a chance to improve the city's infrastructure to safeguard its residents' well-being. For residents, the flooding came with the prospect of their needs becoming visible and relevant to the local and central authorities. These priorities impacted the search for causes, explanations, and fixes to the flooding.³³ In a series of petitions to the prince of Wallachia, the city dwellers described in ample detail the damages and disruption they suffered, and they asked the head of state for help. In March 1840, two months after the water flooded the city that year, the city dwellers wrote a collective petition to Prince Alexandru II Ghica, in which they asked him to intervene:

The floods of the Danube destroyed our houses; some of us were homeless for a long time, left to endure the cold weather with our innocent children. After the water retreated, we returned to our homes only to find them broken and wet. The floods also destroyed the army barracks and damaged the school that made our sons happy. We also believe that this suffering won't be the last. We are convinced that our city council would not have ignored this damage. However, we know that the council has no money, because it had spent it on numerous projects to improve the city. More so, at the moment they are in debt. This evil only Your Highness can erase. This is why we beg you to order which part of the budget should cover the costs of engineering works that would prevent the future flooding of the Danube.³⁴

The signatories acknowledged in their letter that the city did not have enough resources to solve this problem locally, and so they asked for outside help. Further, they recognized the recurring nature of flooding, and they pleaded for a long-term solution that would keep the Danube out of the city once and for all.

Because the petition remained unanswered, two more petitions followed early the next year. The second of the three petitions stated:

We are grateful for the fatherly benevolence that you have shown this city, for the care of Your Majesty. We have addressed a humble petition to our local council, which forwarded it to the Department of the Interior which, in turn, informed you about our grievance. The care you bestowed on our town has emboldened us to ask again for your help. . . . The flooding of the Danube is an event we confront every year. To overcome this evil is again our plea, and we ask for your mercy. Please, order those you think are best suited to eradicate this evil, and which resources should be used for this purpose.³⁵

The third petition reiterated some of the previously mentioned tropes but also added a few new details:

This is the third time we kneel before Your Highness (*alergam la piciorile Înălțimii Voastre*) and ask you to think wisely about the best way to get rid of the evil that the floods of the Danube are causing. We had to leave our houses that were so damaged we could not live in them anymore. The shelters for our animals were destroyed, and our work of several years also perished in the floods. We are afraid that this will not be our last suffering, and we fear an even greater misfortune. If the situation does not improve, we would have to leave this town to which we all recently moved from everywhere in the country, trusting that you would take care of us like a father. If we stay, we constantly fear for our lives. We are convinced that once you find out about our misery, you will have mercy on us and will improve our situation.³⁶

In these letters further reasons emerged regarding why the town residents placed all their hopes in the central government—and specifically in the figure of the monarch—instead of looking for local solutions. As newcomers to the city of Giurgiu, most residents had no previous experience of living alongside a large river, and they were unaware of its seasonal changes and its related hazards. During the short period in which they had lived in Giurgiu, they had not fully adapted to living along an unregulated river, and those who had such experience had been forced to leave the city. In addition, because the city was in the midst of a major reorganization, the newcomers had not been able to build and sustain coping mechanisms after a catastrophe. But more importantly, these petitions indicated that the new inhabitants did not even attempt to coexist with the river but rather aimed to shield the city from the unruly water. Thus, for them, the flooding did not result from the river's regular rhythms and routines; instead, they perceived it as a threat to their livelihood and as something

disturbing their daily routine. They used a moral and a biblical term to describe the high waters of the Danube as an “evil” force that should be kept at bay. In this perspective, city dwellers did not even attempt to adapt to the seasonal rhythm of the Danube, aiming rather at breaking it.

Furthermore, the petitions appealed to the prince’s benevolence, which reflected a political system organized around a strong executive toward which groups and individuals gravitated. They voiced their grievances as supplicants and not as citizens with rights and duties. They addressed the prince as their “lord” and “father” because in their mind he was personally responsible for their protection and well-being. It would be short-sighted, however, to view this patriarchal bond between monarch and residents as pertaining to an absolutist ruling. Rather, it captures a state in transition where pre-modern and modern elements have blended into each other. The plea for protection addressed to the monarch was indeed reminiscent of a political system forged around personal relations, but what followed was an opportunity for a modern state apparatus and its experts to step in and search for a viable technical solution. In other words, the flood set the scene for the prince to present himself as a benevolent ruler who cared for his subjects. Yet after he accepted the petition, the stage belonged to the engineers and other technical professionals employed at the Department of Internal Affairs.

Other than the monarch, the engineers justified their presence at Giurgiu in terms of the specific knowledge and skills they had acquired during their training and work. As state employees, they represented an impersonal form of government that aimed to solve social and technical problems through the application of scientific methods. Thus, engineers helped to transform disasters into an object of knowledge, and they added “control of nature” to the responsibilities that fell under public governance.³⁷ This approach entailed technical experts analyzing the flood in a systematic manner.³⁸ First and foremost, they searched for causes to understand how such events could be best prevented in the future. One such expert was the French engineer Achille Thilaye, employed in the engineering unit at the Department of Internal Affairs, who came to Giurgiu in late autumn of 1841 to investigate how the catastrophic events unfolded. According to his calculations, the Danube flooded the land via three different spots, marked A, B, and C on his map (see figure 2.1). Only the water entering through spot B affected the city; there, the water found a gap in the walls of the former fortress. It first filled up the moat that encircled part of the city and then spilled over into inhabited areas in the northern and western neighborhoods. The floods spared the city center, while the water that entered through the other two spots spread over the pasture. Thilaye singled out a gap in the fortress wall through which the water passed as the cause of the flooding, and he blamed the residents who had carried the stones away. In addition, the steep gradient of the pavement from the fortress toward the town ensured the flood would spread easily once it had reached the town.³⁹

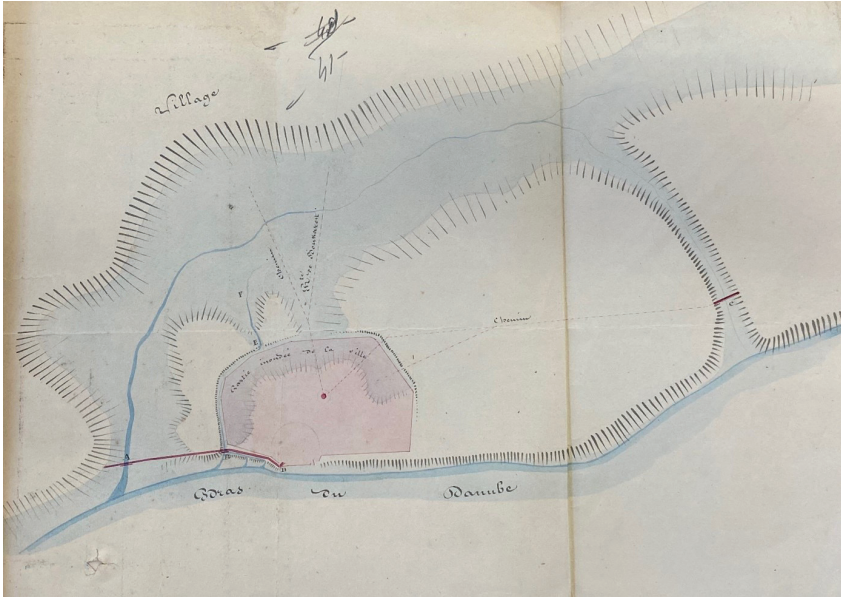


Figure 2.1 Flood protection measures designed by the French engineer Achille Thillaye, 1841. Used with the permission of the Romanian National Archives (Arhivele Naționale ale României, fond Ministrul Lucrărilor Publice, inv. 1305, dosar nr. 37/1840).

In other words, he considered this disaster as one provoked by human error. Since the old fortress was gone, civilian engineers thus had to step in and avert the damages by erecting a new defensive mechanism. To protect the city from future flooding, Thillaye envisioned a dam along the left bank of the Danube that should extend from the quarantine building out alongside the ruins of the former fortress. This dam would also protect the new road that connected Giurgiu with Bucharest, the capital (see figure 2.1, marked in red on the plan). Further, it was imperative to prevent the removal of more stones from the old fortress, and the steep gradient of the pavement had to be leveled too.⁴⁰

Nothing came of these plans and in March 1843, the city council of Giurgiu wrote a fourth petition, this time addressed to the new prince of Wallachia, George Bibescu:

In the last few years, the trade in Giurgiu increased along with its population. However, one thing upsets this positive development, namely the fear of a new flood that would damage our house and fields again. And although engineer Tillaye has pieced together an engineering plan to protect the town, the department has not commissioned it yet. Your Highness, we humbly beg you to help us and eradicate this evil once and for all.⁴¹

It was only then that things gained momentum. First, the minister of internal affairs (Marele Vornic al Treburilor din Lăuntru) ordered the state engineer to examine Til-laye's plans and to find the cheapest way to put these plans into effect to prevent floods from entering the town once and for all.⁴² At the same time he ordered the chair of the country council of Vlașca, to which Giurgiu belonged, to talk to all those with experience and knowledge. The aim was to find the best way of carrying out the plan with the modest means at their disposal, that is, to procure the necessary material and to employ the artisans.⁴³ Thus, almost four years after the flood, the city and the government in Bucharest were ready to start building the protective dam.

BUILDING A DAM AND REORDERING THE STATE

In June 1845, after the new Wallachian state engineer, Giovanni Balzano, inspected the site, he put together a more detailed plan on how to move forward. His "project to defend the city of Giurgiu and its surroundings from flooding caused by the high waters of the Danube" consisted of three dams (barrages), made from firm earth, that were 120 toises⁴⁴ long in total. One thousand thick tree trunks reinforced the dams and pebbles secured the dam's foundations. A further dike (digue) that was 930 toises long and 2 toises high would complement the dams. And finally, a wall that was 20 toises long would secure the quarantine building. Balzano calculated that the entire project would cost 20,550 piastres and would necessitate a total of 21,864 oxen wagons and 42,800 persons. Another of his estimations stated that the project could be completed within a four-month period, or within one hundred working days, if 428 men with 218 carriages were employed daily.⁴⁵ Prince Bibescu immediately agreed to the plans and ordered the execution of the project—it would eradicate (*stirpi*) flooding from the city of Giurgiu once and for all.⁴⁶ While the engineer worded his project in military terms, the prince chose a medical metaphor to back his decision. They both treated the river as an enemy or as an intruder, and they shared the belief that one can target the Danube head on and keep it permanently out of the city.

From the outset, it became clear that amassing all the necessary material and workers to the site would be a very complex operation that would test the new state's robustness. At the same time, the project benefited from a reform program that ensured cooperation among institutions and reorganized certain domains. Joseph Tempian, a Habsburg army officer from the unit of bridge builders, which was familiar with building fortifications, took over as construction manager in line with Balzano's orders.⁴⁷ The first problem he encountered on the job was the absence of appropriate logs. He and the chair of the county council searched the nearby woods, but they were unable to find trees thick

enough. He then extended his search and was finally able to find proper tree trunks in the forest of Brăniștari situated three *poște* (about 60 km) further away, which belonged to the metropolitanate. Although the trees were more difficult to transport, he asked the department to request these logs from the metropolitanate.⁴⁸ This scramble for resources reflected the striving of the state of Wallachia to renegotiate the relationship between central authorities and other powerful stakeholders like the Orthodox Church, which had operated independently from the state until then. This did not mean that the state questioned the church's tenure over the land—rather, it asked the church to contribute to the state-building process that the central government pursued. Inadvertently, the request that the metropolitanate support the engineering project represented a push toward more political centralization in the name of a greater common good.

This episode reflects a broader debate over how states should deal with recovery measures after disasters: Was it the responsibility of the entire body politic or only the responsibility of those directly affected by the disaster?⁴⁹ The prince's intervention made flood protection an issue for the entire state, even if the town of Giurgiu was the entity that immediately benefited from the project. In other words, even if the dam protected primarily local residents, the concept of public infrastructure was about to emerge as a clearly defined domain of the state. Shortly before work started on the riverbanks in Giurgiu, Prince Bibescu passed several new decrees that made the construction of a communications network and infrastructure a priority during his rule. His interest in Giurgiu arose not only from the local population's pleas but also from his government's interest in developing the local port as an outlet for foreign trade and traffic. In addition, its strategic position as the closest land connection between the capital and the Danube made Giurgiu highly relevant for the national communications network.⁵⁰

But a new law that reformed the system of forced labor in Wallachia had the biggest impact on how the dam was built. Decree 431 from May 13, 1843, stated that all peasants had to work for six days a year without exception to build roads, using either their oxen wagons or their hands if they did not own animals. Their employment would be within a three-*poște* radius (about 60 km) away from their residence.⁵¹ This law reformed the ancient institution of peasant servitude and organized it in line with the needs of a modern state striving to expand its grip over the newly acquired territory. The term "road building" should be understood broadly. It referred to public works that the government commissioned to either improve communications within the principalities or the well-being of its citizens. In 1847, Bibescu used this law to provide the newly established Office of Public Work (*Direcția Lucrărilor Publice*) with a steady stream of workers.⁵² To be clear, the peasants were the only social class prescribed mandatory workdays to erect public construction projects. Thus, the expansion of physical networks across the state territory was made possible by the exploitation of those who already bore the greatest physical and fiscal burdens.

In September 1845, Balzano reported that work had just started at the first levee with 650 men and their carriages. In spite of the delay, he still hoped that work would pick up pace within the next couple of weeks and they would be able to finish before the weather deteriorated in the autumn.⁵³ In practice though, using *corvée* workers was not always the most reliable system, and it was a highly bureaucratic process. At the beginning of each week, between six hundred and seven hundred workers had to arrive at the construction site and leave after six workdays. After one cohort of workers left on a Saturday evening, a new one had to be ready to start on Monday morning. Thus, Tempian, as the construction site manager, had to make sure that the councils in the nearby counties provided him with enough workers each week. He also had to compile long lists that confirmed to each worker that they had completed their duty. Sometimes lists went missing or were incomplete.⁵⁴ This tedious process of writing down the name of every worker reflected the practice of contractual governance that replaced personal influence and ties of patronage with impersonal paperwork.⁵⁵ In other words, even if the relations present in this type of forced work had a genealogy that stretched back to premodern bonds of servitude, how it was organized in the 1840s was distinctly modern. This practice, while still exploitative, involved a bureaucratic process that recorded the working hours without establishing personal relations with the peasants summoned to the site. It further established that wealthier peasants could pay another villager to take on their duty.⁵⁶

Tempian's weekly reports from the construction site documented in detail the pains and hardships he encountered on the job. As the only supervisor on site, he complained of being stretched thin. Since the three construction sites were a half-hour horse ride away from one another, he wasn't able to supervise the workers all the time.⁵⁷ Still, he noticed that his assistant had allowed old people (those over sixty) and children (those less than twelve or thirteen years old) to work at the site, which the Department of Internal Affairs had explicitly forbidden. Although he had warned his assistant about this several times, in just one week he encountered thirty people who were older than sixty and fifteen children, which confirmed that abuse was endemic on the construction site.⁵⁸ After such a stressful year, in January 1846 he sent Balzano a medical document that certified that he had fallen ill with fever, and he asked for monetary compensation during the winter.⁵⁹ Thus, progress on the dam was achieved only at great personal cost, and it often pushed the limits of material and human resources in illegal ways.

THE PURPOSE OF PUBLIC WORKS OR WHO DOES THE DAM BELONG TO?

While resting over winter, a conflict sparked between Balzano and the city council regarding the best way to integrate the new constructions into the existing urban landscape.

In a furious letter, Balzano alerted the department, informing them that some townspeople kept removing stones from the partly destroyed walls of the old fortress. To his mind, it was essential for the remaining walls to stay in place as they complemented the new dam and protected the town from future floods. He called out the illegal removal of stones for exclusively personal needs, and he asked the ministry to curtail this misuse of public resources.⁶⁰ Yet the activity that Balzano singled out was not clandestine but was instead a response to a request from the city council's chair to the department to allow the townspeople to use these stones to pave their streets.⁶¹ Strictly speaking, this particular clash was about access to scarce building material in a place where multiple construction and modernization projects were unfolding at the same time. But as the frictions between the state engineer and the local city council continued into the next year, broader issues concerning the relations between the central and local authorities, Balzano's status as an expert, and the overall purpose of built infrastructure emerged.

When works resumed in April 1846, Balzano was stunned to find out that Tempian disregarded his direct order, and instead of covering the dam with firm earth, he had used sand and gravel. Tempian wrote in his defense that he had followed the city council's instructions—it wanted to use the new dam as a city promenade. He apologized to Balzano and explained that it was not clear to him which orders to follow.⁶² Still, this disobedience cost him his job.⁶³ The city and Balzano had incompatible visions on how to use the dam after it was finished. The state engineer viewed the dam as fulfilling a single purpose—flood protection. By committing his knowledge and reputation to this unique goal, he spoke out against using sand as a cover-up because high water would easily wash it away. In addition, the city council instructed that five hundred willows should be planted along the dam promenade, even if Balzano was skeptical that this measure would hold off a flood.⁶⁴ As an engineer and a technical expert, Balzano considered the dam the main piece in a civilian defense system that would keep the Danube's waters out of the city. More so, since the central government had built and paid for the dam, it was up to its experts to decide how to proceed without local interference. In practice, though, Balzano and his men left the city to focus on other projects, and they left the local authorities in charge of the dam. The city of Giurgiu regarded the dam as a recreational site that could appeal to locals and visitors alike—as a new piece of public infrastructure that completed its ongoing urban transformation.

In spite of these conflicts, all sides involved considered the dam project a major success. In July 1846 during the official inauguration ceremony, Atanasie Stanov, the city council chair and Ion Cătuneanu, the county council chair, thanked the prince for his gratitude.⁶⁵ In December 1846, the prince gave an address at the opening session of the Wallachian parliament (*Adunarea Obștească*) in which he summarized his government's accomplishments that year. He mentioned that the city of Giurgiu had been finally cured (*s-a mîntuit*) of the constant threat of flooding, and he expressed his

conviction that the settlement would progress and prosper.⁶⁶ And finally, on November 24, 1846, Balzano handed the department his final report, which included a short technical description. The levee was 654 *stânjeni*⁶⁷ long and two feet higher than the highest measured waves of the Danube. Three additional stone barriers, fifty *stânjeni* long in total, protected the fortress ruins and prevented the water from entering the moat. A smaller wall twenty-five *stânjeni* long shielded the quarantine building and the ship docks from erosion (*mancătura apei*).⁶⁸ For the dam to function properly, he implemented a system for monitoring the water levels. An infantry soldier (*dorobanț*) would guard the construction day and night and immediately inform the local administration if the water level rose. He would also protect the dam from damages that humans and cattle might cause.⁶⁹ Such measures had been written in the Organic Statutes, and they summoned settlements along the Danube to form patrols (*pichete*) that would both protect the border and observe the water level. In 1843, in an attempt to professionalize and unify disaster protection, Prince Bibescu replaced these villagers with paid soldiers.⁷⁰ Taken together, these measures and the completed dams represented the first modern disaster management infrastructure in Wallachia.

The dam was therefore not only part of a larger effort to reshape and secure the city of Giurgiu, but it was also connected to larger efforts to contain the Danube within its main channel. In April 1847, the government announced that wooden planks would be used on a large scale to prevent the Danube from flooding, especially in spring when the ice melted. Polcovnic (Colonel) Banov explained that in 1844 and 1845, a pilot project of 194 poles had successfully withstood the ice blocks that the Danube had deposited over its banks.⁷¹ Another report from the county council of Ilfov (situated east of Giurgiu) from April 1844 detailed consultations between local authorities and the engineering section within the Department of Internal Affairs on how to further extend and improve such projects.⁷² All these attempts to secure and strengthen the banks of the Danube formed a coherent policy that claimed the Danube's floodplains were an area of core economic and strategic importance for the young state of Wallachia. These concerted efforts formed a wide net of measures, and they integrated information flows, albeit with a core focus on important areas like the city of Giurgiu.

CONCLUSION

Floods are seldom commemorated in history textbooks, although they offer valuable insights into how communities and societies responded to and coped with tremendous losses. Perceiving the flood of 1840 as a "disturbance" rather than a "natural" event, Giurgiu's city dwellers set in motion a process that reshaped community life and official politics in the young state of Wallachia. The Danubian town's predicament offered the

central government and its cohort of technical experts an opportunity to make forays into what was both a peripheral region and a domain that was previously handled locally. By making disaster management along the main border river an object of government, the central state imposed a new system of scientific knowledge in order to build material infrastructures that aimed to keep the raging waters out of the city. By becoming responsible for flood control, the central authorities not only bolstered their presence locally but also ultimately rearranged power relations that involved the Danube and the population living nearby.

This endeavor of separating water from land relied on strong local support. As a new community of city dwellers, they were not accustomed to the Danube's seasonal rhythm, and they did not know how to protect themselves from the recurring spring floods. After the first serious damages, however, they did not even attempt to adapt to the unpredictable environment. Instead, they asked the government to intervene to control the river's flow. This plea not only tipped the power balance toward Bucharest, but it was also the starting point for a powerful coalition of local and central actors that shared the goal of transforming a mighty river for the benefit of humans. And although the residents of Giurgiu addressed their grievances to the monarch as supplicants, the central state they encountered at the construction sites and in the institutions that oversaw the new dams was a modern bureaucratic apparatus that implemented a uniform and impersonal form of government in the name of technoscience. The result was a disaster management infrastructure that reshaped the human–environment relationship along the Wallachian Danube.

NOTES

1. Scarlat A. Stăncescu, *Din trecutul orașului Giurgiu* (Unires, 1935), 206.
2. Arhivele Naționale Istorice Centrale (ANIC), Ministerul Lucrarilor Publice (MLP), 1830–1944, dosar nr. 37/1840.
3. Stăncescu, *Din trecutul orașului Giurgiu*, 107.
4. ANIC, MLP, dosar nr. 37/1840.
5. On state building and infrastructure, see: Martin Kohlrausch and Helmuth Trischler, eds., *Building Europe on Expertise: Innovators, Organizers, Networkers* (Palgrave Macmillan, 2013), 50–52; Dirk van Laak, “Infrastrukturen und Macht,” in *Umwelt und Herrschaft in der Geschichte. Environnement et pouvoir: une approche historique*, ed. François Duceppe-Lamarre and Jens Ivo Engels (Oldenbourg, 2008), 106–14.
6. Paul Warde applies this concept to explain how the regulation of woodland ecology in early modern Germany coped with various disturbances, such as timber shortages, population growth, or grazing pressure. Paul Warde, *Ecology, Economy and State Formation*

- in Early Modern Germany* (Cambridge University Press, 2009), 13–25.
7. For more on the concept of state formation, see: Christian Krohn-Hansen and Knut G. Nustad, “Introduction,” in *State Formation: Anthropological Perspectives*, ed. Christian Krohn-Hansen and Knut G. Nustad (Pluto Press, 2005), 3–26.
8. Constantin Ardeleanu, *The European Commission of the Danube, 1856–1948: An Experiment in International Administration* (Brill, 2020); Luminita Gatejel, *Engineering the Lower Danube: Technology and Territoriality in an Imperial Borderland* (Central European University Press, 2022).
9. Most famous in this regard: James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (Yale University Press, 1999).
10. See for instance the special issue: K. Sivaramakrishnan, “Moral Economies, State Spaces, and Categorical Violence,” *American Anthropologist* 107, no. 3 (2005): 321–30.
11. Tania Murray Li, “Beyond ‘The State’ and Failed Schemes,” *American Anthropologist* 107, no. 3 (2005): 389.
12. For a cooperative approach to building a new flood mitigation system see Robert Shields Mevissen, “Forged in the Floods: Transnational Networks in the Habsburg Monarchy,” *Water History* 12 (2020): 272.
13. Warde, *Ecology, Economy and State Formation in Early Modern Germany*, 22–25; Jörg Ganzenmüller and Tatjana Tönsmeier, “Einleitung,” in *Vom Vorrücken des Staates in die Fläche: Ein europäisches Phänomen des langen 19. Jahrhunderts*, ed. Jörg Ganzenmüller and Tatjana Tönsmeier (Böhlau Verlag, 2016), 7–31.
14. Gerrit Jasper Schenk, “Katastrophen in Geschichte und Gesellschaft: Eine Einführung,” in *Katastrophen. Vom Untergang Pompejis bis zum Klimawandel*, ed. Gerrit Jasper Schenk (Jan Thorbeck Verlag, 2009), 12.
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FREE FROM HINDRANCES

Shipping and Fishing Mobility Systems in the Danube Delta Region (1856–1914)

CONSTANTIN ARDELEANU

TWO VIEWS ON THE DANUBE DELTA

In the late nineteenth and early twentieth centuries, the Danube Delta, located in Romania's and Europe's southeastern periphery, was a hub of scientific and technological innovation designed to fully embrace the region's economic potential. On the one hand, the hydraulic works coordinated by the European Commission of the Danube (ECD)—one of the world's pioneering international organizations—resulted in safer shipping along the Sulina branch of the Danube. On the other hand, the Romanian technocratic elites designed hydraulic, hydrobiological, and managerial approaches that sought to maximize the productivity and resilience of some of the country's largest fishing grounds.

Two gifted personalities came to embody two different views of the Danube's role as both a European waterway and a reservoir of aquatic life. The first was Sir Charles A. Hartley (1825–1915),¹ the British engineer who, as an ECD employee, “tamed” the tortuous river, while the second was Grigore Antipa (1867–1944),² the Romanian naturalist who, as director of the State Fisheries Service (SFS), “rationalized” the river's fishing industry. Beyond the differences in their epistemic focus and professional background, both men—and the institutions they served, one transnational, the other national—came to share common beliefs about the maritime section of the Danube and especially its delta, which they viewed as a complex system. Both placed rationality and economic efficiency at the forefront of their plans, and they aimed to remove the various “hindrances” of a region that suffered due to natural shortcomings and

artificial intrusions in the environment's self-regulating mechanisms. Both started their long and prodigious careers in the Danube Delta and would disseminate their knowledge and expertise on hydraulic river works and hydrobiology the world over. Both worked for institutions that derived great credit from these men's epistemic views and technical accomplishments. Hartley was the mind who designed and executed the works coordinated by the ECD, an organization that mobilized significant transnational resources—human, financial, and technological—to “civilize” a river section that seemed crucial for Europe's provisioning with grain and thus its food security by the mid-nineteenth century. Meanwhile, Antipa was an artisan of the SFS, a state institution that, with incomparably poorer resources, similarly aimed to implant Romania's civilizing mission in a region whose natural wealth was viewed as equally crucial to feed the nation.

By the time Antipa started his studies in the delta and the SFS embarked on its hydraulic projects in the early twentieth century, the ECD had already completed most of its major infrastructural works and was only conducting maintenance dredging at some sensitive river sites. The ECD had a special status as an organization acting completely independent of Romania's sovereign rights along the maritime Danube,¹ and shipping overshadowed any other use of the river in terms of status. Within this framework of asymmetrical power relations, the SFS's technical team had to design technical solutions adapted to the deltaic system already transformed by Hartley and his subordinates. The two hydraulic programs were incongruous at times, but until the First World War, political interests prevented them from being in open competition. For the narrative discussed here, this observation is relevant for understanding how rivers have been shaped and reshaped by various actors pursuing different, sometimes competing, economic outcomes while aiming to ameliorate what they regarded as defects in the deltaic system.

This chapter will analyze the “hydraulic mission”² of these two institutions (the ECD with its transnational civilizing mission aimed at the European periphery, and the SFS, which was tasked with rationalizing a Romanian backwater³) in the late nineteenth and early twentieth centuries. The focus here is on understanding their ideologies regarding the amelioration of nature's “flaws” and the practicalities of constructing competing infrastructures to realize the Danube's full potential as an arterial thoroughfare and a source of hydrobiological wealth. I will rely on a variety of primary sources—archival and published memoranda and brochures—to refer to the various natural or artificial obstacles (referred to as “disturbances” in this volume; see the introduction) that needed to be removed to remedy the problems that ships and fish encountered along their mobility routes. This chapter will also play with the different scales and layers of river transformations; it will move back and forth between the local, regional, national, and transnational levels. Finally, it will disentangle the Danube and insist on the

asymmetries or irregularities of a river that divided its waters into numerous branches and subbranches and followed both the laws of nature and the commands of increasingly potent hydrocrats. Theoretically, this chapter is equally an exercise in historical institutionalism (viewed from the perspective of institutional leadership),⁶ with the ECD and the SFS portrayed as innovative organizations that contributed to the production of knowledge and to its deployment to build mobility infrastructures in the Danube Delta, and a river history inspired by environmental and science and technology studies.⁷ Security, as both an objective state and as proactive actions taken to enforce that ideal state, is another key concept that links to river disturbances. This is because both institutions aimed to remove sources of uncertainty—natural and artificial—and turn the Danube into a secure, predictable, and economically viable infrastructure facilitating the movement of ships and fish.⁸ Shoals, shallow channels, and narrow bends, but also river works completed by various stakeholders (international and national, institutional and private) and the “moral flaws” of the region—which derived from the weak state control in Romania’s eastern borderland—will be detailed alongside the two institutions’ hydroameliorative projects.

I will first focus on how the ECD transformed the deltaic system along the Sulina Channel, and then I will present the context in which the Danube Delta became a space of interest for Romania’s epistemic elites, as part of the country’s mission to civilize and develop what it viewed as its most backward periphery. Finally, I will refer to the epistemic infrastructure that underpinned all these hydraulic corrections; this infrastructure used cartographical and quantitative means to organize and represent the deltaic space.

FROM RUSSOPHOBIA TO A QUEST FOR DEPTH

The Danube’s transformation began in the post–Crimean War context. Hartley first explored the Danube Delta in 1857 when he was invited to become the ECD’s engineer in chief. In previous decades, after Russia had annexed the delta in 1829, navigation in the direction of the Danubian grain outlets of Moldavia and Wallachia became increasingly difficult. The Sulina mouth, which was the only navigable gateway for seagoing commercial vessels, became the focus of commercial and diplomatic disputes, and Russia was accused of seeking to disrupt Danubian trade so that its own ports in the Ukrainian regions of the empire would profit. After the Crimean War, the victors addressed the Sulina issue. Russia returned the Danube Delta to the Ottoman Empire, and the ECD was tasked with carrying out the hydraulic and administrative works needed to remove navigational obstacles along the maritime Danube.⁹

In the Russophobic environment of those years, it was widely believed that simple engineering works were sufficient to clear the passageway. After gathering preliminary data about the region's hydrography and climate, Hartley understood, however, that the ECD faced a huge technical challenge. He supported hydraulic works on the southernmost (St. George) branch of the river, which was best suited for medium and long-term improvements, but European commissioners and their governments chose the Sulina, whose navigability could be improved more quickly and easily with fewer costs.¹⁰

The Sulina was the smallest of the Danube's three branches, and it carried only about 7 percent of the river's waters into the Black Sea; thus, it had the advantage of a proportionally lower quantity of alluvia being deposited at its mouth. The Sulina stretched for about forty-five miles after it branched off the larger St. George arm; it was a tortuous channel, and the navigable waterway was encumbered with innumerable obstacles—from wrecks and shoals to narrow bends. Over the next fifty years, Hartley and his technical team completely transformed the Sulina branch. To do so, they used modern technology to harness some of the delta's hydrographic energy and direct it toward Sulina, which resulted in significant environmental mutations throughout the entire deltaic system. While the Sulina branch's flow made up 7 percent in 1856, it accounted for 9 percent in 1905 and 14 percent in 1928, while the St. George branch reduced from 30 to 24 and 21 percent, respectively.¹¹ The Sulina branch gradually "cannibalized" its parent branch; the changes favored siltation processes along the St. George branch and its mouth, which ruined its previously superior navigational prospects.

Regulating the course of the Sulina branch was a long technopolitical endeavor partly dictated by the revolution in shipbuilding technology that fueled the transition of the world fleet from sail to steam. With larger vessels calling at the Danube, the ECD continually upgraded its standards on how deep the navigable waterway had to be to make navigation safe and economical. If, in the 1850s, twelve feet of water seemed sufficient at the mouth and along the Sulina branch, fifty years later the ECD aimed to secure at least twenty feet, with the river pushed to its natural limits. To comply with such demands, Hartley coordinated several regularization projects that insulated the Sulina branch from "malign" contacts with the rest of the delta; this thus limited ties within the deltaic ecosystem along the highly engineered Sulina transportation highway. The navigable channel (or canal after complex works) was a security corridor within a "sea of bogs," a marshland in which the ECD showed little interest.

In 1907, with reference to his predecessors such as John Stokes¹² and to the ECD's rationalizing ideology, the British commissioner Henry Trotter summed up the results of the organization's hydraulic program: When tasked with clearing the mouths of the Danube of "impediments" that obstructed navigation, the ECD "corrected" both the physical and the moral "evils" of that peripheral region. As Trotter put it,

[Under European coordination] in the last fifty years an extraordinary change has been produced. The minimum depth of water over what was once the Sulina bar now generally stands at 24 feet instead of 9; and the depth in the Sulina arm has a minimum of 20 feet instead of 8. All sharp bends and circuitous curves have been eliminated, with the result that the navigable depth of the stream between the St. George's Chatal and Sulina has been shortened by one-fourth of its length, i.e., from 45 to 34 miles.¹³

It was indeed a remarkable quantitative and qualitative success, at least in relation to depth and length, two of the most important dimensions for seafarers. But, as I will mention below, equal progress was made along the width and time coordinates in this four-dimensional game to ameliorate nature's "deficiencies" as part of a very clear vision of political economy.

FLOODS AND THE SPACE-TIME (DIS-) CONTINUUM ALONG THE SULINA CANAL

I will leave aside the construction of the Sulina piers, a process in which Hartley moved the natural sandbar that formed at the mouth of the Danube (which ran into a tideless sea—the Black Sea) into deeper sea.¹⁴ Here, I will instead detail the main correction works completed along the Sulina branch. Two main issues obstructed river navigation—shoals and narrow bends—and the ECD tried to find proper technical solutions for balancing the depth and width of the river along the Sulina branch. Shoals tended to form at different junctions of the waterway or in "places where it [the river] was abnormally wide," so such sites were engineered as a priority.¹⁵ As early as in 1857, the very first hydraulic work of the ECD involved dredging the shoal at Ilgani (Argagnis), where *gârla* Păpădia (Papadia)—a creek meandering through the deltaic marshes—intersected with the Sulina arm. The mouth of the Păpădia was blocked off, which provided temporary relief. In 1862 and 1863, Hartley strengthened both banks of the waterway with a combination of timber and stone dikes and groins, thus reducing its width from 700 to 500 (and later, in 1868, to 400) feet.¹⁶ New hybrid riverbanks emerged out of such artificial structures, and they were soon coated in natural sediment. Correcting width to control depth became one of the preferred methods employed wherever shoals obstructed navigation, and during the following decades, as deltaic hydrography became better understood, the Sulina branch was straitjacketed by prolonging the old groins or by building new ones, up to 400 feet long in the branch's upper part and 500 feet in its lower part.¹⁷

Bank erosion was a similar issue, and the very entrance to the Sulina from the St. George branch was highly problematic because of its awkward angle. A revetment was built along the right bank to strengthen it, while a spur of rubble stones thrown into the St. George branch was meant to guide waters in the optimal direction. As navigation insecurity continued, in 1880 a completely new entrance was excavated at a milder angle for seafarers, and by 1882 the old entrance had been closed off by a stone dike. This new doorway removed yet another defect of the natural course, which was ready to be rationalized all the way to its mouth in the Black Sea.¹⁸

In 1865 the ECD had already planned to deepen the entire branch to a minimum of fifteen feet. To accomplish this, eleven shoals were eliminated over the next decade, and Hartley also started to correct—through a combination of hand excavation and machine dredging—some of the sharpest bends that imperiled the circulation of larger ships. Systematic cutting works were conducted in the 1880s and 1890s, as the organization provided Hartley and his trusted collaborator, the Danish engineer Charles (Karl) Kühl, with all the financial means they needed. Large-scale excavations were conducted along the branch until 1902, and Sulina was straightened, deepened, narrowed, or widened as needed to obtain an almost standard breadth. The excavated material was used to strengthen and elevate the riverbanks, so height was also added.¹⁹

This drive toward rectilinearity gradually insulated the watery canal from its environment. To remove one of the most burdensome bends, engineers cut not only through marshlands but also through the Obretin Lake, which artificial banks divided into two. The loss of water into “old” (or “dead”) portions of the branch was minimized as the waterflow was directed to follow the rationalized new artificial canal.

But this regulation of space was a mere rationalization designed to limit more unpredictable variations in the river’s temporalities. “The volume of water discharged by the Sulina arm,” Hartley reported, “varies from 1 to 13, and the velocity of the current varies from ½ mile to 4½ miles an hour, the weight of sediment carried in suspension varies from a minimum of 12 grains to a maximum of 840 grains per cubic foot of water, or 1 to 70.”²⁰

With such huge seasonal and annual variations, flows of water through the delta were determined by climatic conditions across a much larger geographical space. The river was frozen for two to three months every year, and the ice would break up in March, which resulted in seasonal land floods that culminated in May. Rather than being permanent, the obstacles in the Sulina branch and at its mouth were produced and reproduced annually, usually at critical sites (bends and junctions) along the waterway, exacerbated by the severity of the floods (see the chapters by Gertrud Haidvogel, Severin Hohensinner and Martin Schmid, Luminita Gatejel, Stelu Șerban, Robert Nemes, and Stefan Dorondel in this volume for the relevance of floods as a topic of analysis in environmental studies). Shoals were dynamic hindrances, as they increased during floods

and gradually wore down at low water. Sometimes, however, the increased flow velocity during floods would have positive effects, as it could displace shoals and clear the passageway. The river had its own powerful agency, but as a self-regulating system its natural time rarely coincided with the temporalities of capitalism.²¹ The Sulina bar itself, the greatest of the branch's physical hindrances, could not be resisted when floods unleashed the river. In 1861, when extraordinary high floods submerged the lower part of Galați and inundated the delta, "the swollen waters, being confined between the two piers, and directed in a proper line, instead of causing a diminution of the depth, fairly swept away the remains of the [Sulina] bar on to the south bank and into deep water."²² Trotter could rightly note that "nature came in a very marked manner to the aid of the engineer."²³

A straitjacketed river also became a bit more resilient to the erosive effects of time during the annual spring floods: "In the trained part of the river," Köhl reported, "the flow during flood is now concentrated in such a way that the river-bed is rarely raised by deposit during high floods, as was formerly the case. Rack eddies no longer exist, and the great irregularity of the current over the shallows has ceased, resulting in very steady depths, as is shown by the monthly minima of the Sulina branch."²⁴

All in all, except for some extreme years, Hartley and his team managed to "tame" the river. They turned a tortuous beast (a "malicious serpent," in the words of the then Romanian prime minister, Dimitrie A. Sturdza), into a rationalized highway whose rectilinear dimensions, with an almost constant depth and width, provided navigators with safe and regulated shipping conditions.²⁵ Their use of a geometric vocabulary, with the ideal Danube imaged as a perfectly shaped rectangular prism free of hindrances (shoals, shallow channels, narrow bends, etc.), made their improvement program simple enough to be imagined by everyone. Hartley was much treasured in Romania and in Europe for the success of his hydraulic works. But "the father of the Danube," as his Romanian admirers dubbed him, was rather the father of Sulina, the smallest of the three main deltaic branches. And to correct it, he mobilized the resources and expertise of Europe's greatest imperial powers.

"VANDAL CAPITALISM" AND THE SOURCES OF AN ENVIRONMENTAL AND ECONOMIC CRISIS

From the perspective of a young natural scientist interested in developing the fishing resources of Romania's Danube Delta, things looked rather differently, however. In 1894, Grigore Antipa published the first of his numerous studies on the state of Dobrudja's

fisheries. The brochure was the result of almost two years of research in the area of Lake Razim (Razelm), a lagoon south of the Danube Delta proper. In 1892, Antipa had been appointed director of the SFS, and ever since he had focused on modernizing Dobrudja's fisheries, which he considered one of Romania's most precious forms of wealth. Throughout his field research, Antipa tried to understand the factors that harmed the formerly significant local fishing industry. Although the statistical data was relatively precarious, he concluded that Dobrudja's fisheries had lost most of their fish stocks; this was, Antipa believed, an economic, social, and environmental emergency that needed to be urgently tackled and resolved.²⁶

The causes for this alleged aquatic depletion were complex, and Antipa divided them into two categories: artificial and environmental.²⁷ His report made it clear that without rapid state involvement the fisheries would soon be completely ruined. The Danube Delta—like, in fact, all of Dobrudja, a province that was integrated into Romania in 1878—needed an intervention from the center. The establishment of “rational” management at the local fisheries was deemed urgent, as they were plagued by rapacious private administrators who earned a fortune by overexploiting the state's fishing domains and the labor of underpaid local fishermen. To Antipa, the situation was tantamount to ecological “vandalism.” As private capitalist entrepreneurs had little interest in investing to secure the region's environmental and economic resilience,²⁸ state involvement was crucial for rescuing and developing Romania's fisheries. The state was the only rational actor who possessed the necessary resources—human, material, scientific, and technological—to save the situation before it was too late. Antipa proposed the full rationalization and bureaucratization of the fisheries' management, and the drafting of modern legislation and enforcing of strict fishing regulations—“soft infrastructure” in modern parlance (see below)—designed to ensure the survival and sustainability of Romania's fishing industry. He detailed the economic, social, political, administrative, and ecological policies that needed to be imposed for a revolution to occur in the administration of Romania's state fisheries.

Antipa did not ignore the fisheries' question of how natural factors acted. The case of Lake Razim clearly proved that the entire region functioned as a set of fine environmental mechanisms; a system that had to be perfectly tuned to suit both human and natural needs. Coastal lakes such as Razim were natural connectors—organic contact zones between the Danube and the Black Sea. Razim's ecological problems derived from the fact that the lake's connections with the river and the open sea had been deteriorating because of the gradual closure of the highway—the Dunavăț channel—that linked it to the Danube. Clogging was a natural process, especially for a deltaic subbranch such as Dunavăț, which meandered with its forty-seven bends along a course forty-five kilometers long. Nevertheless, nature's actions had been accelerated by the (dis)interest of local entrepreneurs who had been unable or did not know how to manage the vital

resource of the Danube's waters. The lower freshwater supply into Razim contributed to the gradual closure of its gateway into the sea. Thus, with worsening hydrological and hydrobiological mobility routes and increasingly salty waters, the lake ceased to be a productive fishing ground.²⁹

The revival of Razim's fisheries involved complex interventions in the larger organism of which the lake was a suffering part. The solution was, as with well-targeted medical treatments, a fine dosage meant to treat the cause, but without hurting other organs or functions of the system. The main priority was to open the Dunavăț channel, whose freshwater input into Razim was to revive the lake's role as a contact zone between the Danube and the Black Sea. To do this, the mouth of the Dunavăț had to be reopened. Its banks had to be reinforced, some bends had to be removed to preserve the stream's flow, and silt had to be cleared from the channel's bed. The freshwater surplus would reopen the lake's seaward gateway, and better water circulation would bring about an increase in the mobility—and richness—of fish life in the lake and beyond it.³⁰

Antipa systematized his ideas in 1895 when he published a detailed report on the state of Romanian fisheries, with concrete proposals for administrative policies and hydraulic projects to be imposed in Dobrudja. He insisted on "the immense importance of fisheries for Romania's national economy" and presented various measures designed to develop fishing, an industry that the country needed to feed its growing population with foodstuff that was nutritional, healthy, and cheap. One measure was to increase the surface of the fishing domains by carrying out hydraulic works aimed, as in the case of Lake Razim, at reestablishing the fisheries' broken links with the Danube—the most important highway for fish mobility, life, and resilience.³¹ Antipa's projects were highly ambitious, and to make them work, he looked closely at the infrastructural works of the supstate actor that had been busily engaged in transforming the Danube Delta region: the ECD and its celebrated mastermind, Hartley.

THE INFRASTRUCTURE OF AQUATIC LIFE

Antipa was one of those who honored Hartley's accomplishments yet also revealed the faults of Hartley's hydraulic works. The main problem, Antipa maintained, was that vital hydrobiological links within the deltaic system had been broken. By blocking off several small creeks (*gârle*) that intersected with the Sulina branch, and by only keeping open those that discharged into the navigable waterway (and thus increased the canal's flow and depth), the ECD added to one of the organism's chronic diseases: the flow of water between the three branches that carried the river water into the Black Sea. Fishermen contributed to the problem just as much, as they often diverted or blocked creeks to more easily catch the fish. To local people, the delta was already an ecosystem

shaped by centuries of human activity, and Antipa had many critics among the community of fishermen and fishing entrepreneurs whose businesses were seriously affected by the SFS's environmental and economic policies.³² Although Antipa greatly respected the knowledge of local stakeholders, he was also convinced that they could not comprehend (or were not interested in) the functioning of the larger deltaic organism. In his mind, scientifically produced knowledge was clearly superior to the local fishermen's traditional knowledge.³³ (See also in this volume the chapter by Deniz Armağan Akto and Onur İnal for the importance of local knowledge and experience in the Ottoman Empire's works to overcome disturbances generated by the Danube.)

Like capillaries within a living body, the creeks transported vital nutrients to the deltaic tissues. Insufficient circulation of the river flow within the system resulted in stagnant ponds. These were perfect environments for the proliferation of parasitical plants that, through rapid decomposition, infested the water and made it difficult, if not altogether impossible, for fish and other aquatic organisms to survive.³⁴

Thus, beyond their destructive force on human communities, Antipa viewed floods as veritable godsend that nourished the land with nature's own organic nutrients. With fiery debates raging among national epistemic and technocratic elites over attempts to turn Romania's vast floodable plain into agricultural land by constructing levees there,³⁵ Antipa defended the natural refertilization of land through seasonal cycles of floods. While he agreed with the measure's socioeconomic necessity for the Wallachian plain (but advised constructing submersible levees that permitted a regular overspill of the river's waters), he was completely against any attempts to gain any new agricultural land in the Danube Delta. Far from being a marshland that, through drainage, could accommodate the more rewarding grain cultivation (Romania's largest economic sector), the deltaic system was a better fit for aquaculture, a traditional activity in the region. The delta needed better water management, which had suffered because of insufficient regulation and coordination between interested actors. To ensure that the nation could be fed with a hygienic, nutritive, and cheap food, the water flow through the labyrinth of deltaic creeks that crisscrossed the delta, and supplied the deep, permanent lakes where fish usually thrived, also had to be improved.³⁶

The SFS proposed several hydraulic works to this effect: Closed creeks had to be cleared and deepened and new ones were to be excavated to connect the largest lakes in the region with the Danube. The first hydraulic projects were designed for the southern part of the delta, which housed some of Romania's largest fisheries. A canal that followed the silted Dunavăț subbranch was excavated to bring fresh water into the Razim. This canal, dubbed King Charles I, opened in 1906 and was almost twenty-eight kilometers long (more than half of it was artificial). It was eighteen to twenty meters wide and two meters deep, and thus navigable for fishing vessels. Hydraulic corrections were made in the lake itself: Razim was separated from its southern part, called Sinoe. Razim

was used for the aquaculture of freshwater fish, while the Sinoe continued to house salt-water species. If, previously, the lake of almost ninety thousand hectares had an annual production of about forty tons of fish, the reborn Razim fisheries amounted to an average of thirty thousand tons. This quantity consisted mostly of commercially productive species, such as carp and pike.³⁷ Two more canals, proof of Romanian technological civilization for those who made them, had been dug out by the First World War: the Queen Elizabeth canal and the Prince Ferdinand canal took fresh water into two other large fishing estates, the Babadag and Dranov lakes, and opened them up for rational and national exploitation.³⁸

The SFS then turned its attention to the two regions above and below the Sulina canal, where water circulation also suffered because of the ECD's works. The SFS drew up hydraulic plans to enhance connectivity along different creeks feeding the deltaic system. Some needed to be cleared of silt, while others had to be closed off or diverted to avoid the loss of water that "flowed uselessly into the sea."³⁹ Two large creeks were opened from the Sulina canal to the Caraorman area, and water was taken to the Roșu, Roșuleț, Puiu, and Lumina ponds, which lacked freshwater supplies and so fish had started to "degenerate." Other capillaries supplied Lake Obretin, which had been split in two during the ECD's large engineering works, while north of the Sulina branch, the SFS eyed possible improvement works along some of the largest creeks, such as the Șon-tea or Lopatna subbranches, which were affected by the "old Danube's" closing off.⁴⁰

The specter of war put a stop to these infrastructural works, but the works also depended on other factors. With the Chilia branch—a contested border between Romania and the Russian Empire after 1878—hydraulic works in the delta's upper section were politically more complicated. As an internationally regulated waterway, hydraulic works in the Sulina also posed political problems,⁴¹ but the SFS intervened without affecting the canal's navigability. It can be concluded that the ECD's and the SFS's infrastructural projects created new environmental connections and ruptures, and the special status of the Sulina canal—guaranteed by a European organization—allowed the unimpeded circulation of both ships and fish.

ON SOFT AND EPISTEMIC INFRASTRUCTURES

Recent debates over infrastructure—both in academic and political milieus—have highlighted the relevance of "soft infrastructure,"⁴² a rather fluid concept that refers to those services and institutions that, while different from brick-and-mortar "hard infrastructure" (such as roads or bridges), are no less crucial for the workings of modern society. When completing their hydraulic projects in the Danube Delta, the ECD

and the SFS invested significant resources in developing a region that had been completely peripheral to all of the polities it previously belonged to. The ECD built communications facilities (telegraph lines), sanitary establishments (the Tulcea and Sulina hospitals), and administrative headquarters (in Sulina) necessary for its employees and beneficiaries,⁴³ whereas the SFS was a harbinger of Romania's project to civilize what the center regarded as a vast wilderness that needed support for its integration into the motherland's national body. Whereas the ECD organized and ordered—through its regulations—economic practices along the maritime Danube and especially in the port of Sulina, the SFS's agents removed insecurity within the deltaic *terra incognita*, “a haven of villains and deserters.” As part of its civilizing project, the SFS populated the delta with Romanian colonists who were provided with model villages or model fishing establishments.⁴⁴

But both hard and soft infrastructures generally depend on an “epistemic infrastructure”⁴⁵ formed by gathering a corpus of knowledge about that particular space. This knowledge is then structured and published in technical reports or represented symbolically and mathematically as maps and quantitative data.⁴⁶ A specific feature of the Danube Delta is that the region was mapped and engineered at almost the same time, in a rapid and convoluted succession of scientific surveys and hydraulic works.

There is a rich literature on the ECD's cartographic activity, so there is no need to pursue the topic further.⁴⁷ It is worth mentioning, however, that these maps charted not only how the institution's draftsmen represented spatial realities on the ground, but also how they illustrated the ECD's own priorities. In 1856, the ECD relied on a couple of very general maps, so its first hydraulic program was based on preliminary bathymetric measurements and hydrographical surveys. A triangulation of the Sulina mouth was completed in 1861, and accurate maps were produced only for those areas important for river navigation. When French commissioner Édouard-Philippe Engelhardt (1828–1916) proposed the triangulation of the entire delta in 1865, he referred in detail to how little was known about the region, and how important such research would have been for both hydraulic improvements and for larger comparative research purposes: At the time there was “no detailed map of the vast lands in-between the various branches of the Lower Danube.” This made this region, “criss-crossed by numerous canals, covered with lakes and marshes,” almost unknown. Engelhardt stated:

From the technical point of view, the engineer responsible for carrying out correction works in one or other of the river branches would undoubtedly benefit from knowing the general economy of the waters which divide or converge there, and it would be important for him to be able to assess the influence on the main branches' regime played by inland lakes, which seem to act as spillways and flow regulators.

Engelhardt emphasized the importance of completing the topography in this part of the European continent, as only basic observations had been made at that time because of access difficulties, with many geographical errors present. Not least of all, a detailed trigonometric survey would verify theories on the formation of the delta, and this “would enrich comparative geography with an authentic history of the changes which the configuration of the Danube Delta has undergone.”⁴⁸

Although the ECD preserved its technical and political interest in the Chilia and St. George branches of the river, most of its cartographical products illustrated the Sulina mouth and branch and the organization’s hydraulic works along the navigable waterway. In 1867, the technical report drafted by Hartley was printed by a Leipzig publisher in the form of an atlas, accompanied by 164 high-quality maps and charts drawn by two of Hartley’s trusted aides: Robert Hansford and M. L. Dollfus de Meric. A similar atlas was published in 1873, and further technical memoranda followed over the coming decades, each accompanied by detailed maps, tables, and high-quality plates. They contributed to keeping hydraulic experts updated on the progress of the ECD’s works and were also used to consolidate and legitimize its claims as the *de facto* technopolitical authority in the Danube Delta.⁴⁹ But, as mentioned above, geographical and hydrographical realities within the deltaic system remained very general in relation to all these cartographic products. In 1870 the Ottoman commissioner, Ismail Kemal Bey Vlora, convinced his colleagues to budget the funds necessary to draft detailed maps of the St. George and Chilia branches of the river. These were useful for the ECD’s works, but also for the economic development of those regions.⁵⁰ With improved financial means, the organization would later fill in the gaps and start conducting annual surveys beyond the Sulina branch.

When the SFS started to ameliorate the delta in the 1900s, it relied on the ECD’s maps and on a topographical survey hastily completed by Romanian army experts in 1880–1882, soon after Romania acquired Dobrudja. To Antipa, civilizing and rationalizing the country’s deltaic periphery also entailed studying it closely and making a complete inventory of its lakes, ponds, creeks, and islands. The SFS lacked the financial and human resources to complete a large-scale mapping project, and so it started small. Its agents were also tasked with sketching the deltaic environment they were responsible for; in so doing, they came to symbolically possess the region by inscribing it onto such roughly produced maps.⁵¹ The Dunavăț or King Charles I canal was excavated on the basis of such preliminary surveys, and it was only in 1909 that the SFS embarked on the production of a large-scale hydrographical map of the entire Romanian Danube Delta. Ion G. Vidrașcu, the director of the SFS’s technical division, coordinated a team of engineers, topographers, surveyors, draftsmen, and workers who triangulated an area of about 430,000 hectares. A large-scale version (1:10,000) included all important physical elements (lakes, ponds, marshy areas, islands, and creeks) that were relevant for the hydraulic projects planned in the region, while a smaller-scale map

(1:50,000) was useful for more general analysis of the water regime in the deltaic system, among other things.⁵² To Antipa, this was material proof of Romanian civilization, and it marked the final steps that established the country's full sovereignty over a land with unknown "beauties and sources of wealth."⁵³ It also confirmed his theories on the genesis and evolution of the Danube Delta, as well as the need to improve fishing through better water management within the delta's intricate envirotechnical system, to use the term coined by Sara Pritchard.⁵⁴ This was also the first floodability map—a map that assessed flood risks—of the region. Bathymetric and hydrographical curves quantified depth and elevation relative to sea and river levels. The variation of the level of Danube's waters was divided into ten points called hydrogrades. Hydrographs were set at zero hydrogrades for extreme low waters and ten hydrogrades for the extreme high-water level recorded in 1897. Three hydrogrades corresponded to low waters, five to middle waters, and seven to the high spring waters that spilled over the banks.⁵⁵ The SFS's hydraulic projects and its civilizing mission to transform the region through colonization and economic modernization would rest upon this map and the mathematical values inscribed onto it.

This drive toward quantification was visible throughout many of the SFS's activities, which corresponded to the logic of state modernization postulated by James C. Scott.⁵⁶ Making a space legible can entail mathematical and symbolic representations that form part of modernity's rationalizing and civilizing ethos. Antipa's success as an administrator came from his heavy reliance on statistics (and on science generally) to prove the need for technical intervention, to show the feasibility of his plans, and to gauge their socioeconomic impact.

The ECD was equally busy at collecting quantitative data and producing statistics. Since the 1860s, its hydrocrats had published detailed statistical accounts on the maritime Danube, with data on shipping, trade, taxes paid by seafarers, shipping accidents, and so on, and on the hydrography and climatology of the region. It gathered and published detailed bathymetric records, data on the speed of the stream, the quantity of alluvia in suspension in the water, the direction and duration of prevalent winds, the state of the sea, the average temperature and precipitation levels for Sulina, and the period when the river was filled with ice.⁵⁷

For both institutions, maps and statistics were arguably instruments of communication, persuasion, and power: They served and projected these institutions' interests with other stakeholders.⁵⁸ But they were also epistemic infrastructures on which the two institutions based their technical and normative works. Their representations of navigational obstacles on maps or their quantification and hierarchization of nature's defects definitely convinced decision-makers of the physical practicability, financial feasibility, and economic profitability of many of these hydraulic projects.

CONCLUSION

Visiting the Sulina canal and meeting Hartley in 1893 would leave a lasting impression on Hubert Lyautey, the French army marshal who rose to global fame as a colonial administrator in Indochina, Madagascar, and especially Morocco.⁵⁹ Lyautey stated, “Hartley is the man who made the Danube. Before his day it was a dead river, spilling its waters into a sand-blocked delta. Hartley spent the whole of his life in re-fashioning that river, in building dikes and channels and dams and in the end opened it to a great European traffic.” This huge transformation exemplified the civilizing mission of any colonial administrator and made Hartley a veritable role model for the French “empire builder.”⁶⁰

To Antipa, Hartley was a great technocrat who knew and understood the river better than anyone else. Hartley had indeed managed to transform the maritime Danube into a safe canal for navigation and trade, but with transformations that affected the delta’s hydrobiological resources. Antipa’s mission was to remake the river in order to restore the prosperity of its fisheries. Antipa understood the political relevance of the ECD—as a shield against Russia’s and Austria-Hungary’s hydroimperialism⁶¹—so his hydraulic projects did not openly question the ECD’s works; he rather tried to complement them and used the knowledge and expertise already produced by the international organization to produce an even more ameliorated version of nature.

If Hartley mobilized the huge resources of an imperial technopolitical organization that transferred technology to a geopolitically hot European periphery, Antipa acted as the agent of a technonationalizing project that intended to implant Romania’s civilization into a newly acquired territory that needed to be controlled and integrated into the motherland’s body. Both ideologies aimed to enhance nature, and both were nourished by economic interests in exploiting the river’s physical and hydrobiological resources (in relation to continental and national food insecurities) and in civilizing backward or anarchical spaces.

The imperial and national projects focused on different features of the deltaic system, but they were similar in their deployment of human capital and know-how to remove the innumerable natural and artificial sources of insecurity, that is, disturbances, that encumbered a more efficient capitalist exploitation of the river. Understanding the Danube with its seasonal floods, predominant currents, and winds was part of a long—transnational and national—process of knowledge production and a prerequisite for a successful engineering program. Technology was the solution used to rationalize nature, which was then manipulated, controlled, and governed so as to free the river of all natural and artificial sources of insecurity.

NOTES

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2. A general account of his life and work can be found in Ștefan Negrea, *Pe urmele lui Grigore Antipa* (Editura Sport Turism, 1990).
3. Details in Constantin Ardeleanu, *The European Commission of the Danube, 1856–1948: An Experiment in International Administration* (Brill, 2021).
4. F. Molle, P. P. Mollinga, and P. Wester, “Hydraulic Bureaucracies and the Hydraulic Mission: Flows of Water, Flows of Power,” *Water Alternatives* 2, no. 3 (2009): 328–49.
5. For recent discussions on “national projects,” see Ștefan Dorondel and Stelu Șerban (eds.), *A New Ecological Order: Development and the Transformation of Nature in Eastern Europe* (University of Pittsburgh Press, 2022).
6. Orfeo Fioretos, “Historical Institutionalism in International Relations,” *International Organization* 65, no. 2 (2011): 367–99.
7. Some of the most seminal works are Richard White, *The Organic Machine: The Remaking of the Columbia River* (Hill and Wang, 1996); Mark Cioc, *The Rhine: An Eco-Biography, 1815–2000* (University of Washington Press, 2002); David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (Norton, 2007); Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Harvard University Press, 2011); Peter Coates, *A Story of Six Rivers: History, Culture and Ecology* (Reaktion Books, 2013).
8. Barry Buzan, Ole Waever, and Jaap de Wilde, *Security: A New Framework for Analysis* (Lynne Rienner, 2013). See recent contributions on the historicization of security in Beatrice de Graaf, Ido de Haan, and Brian Vick (eds.), *Securing Europe After Napoleon: 1815 and the New European Security Culture* (Cambridge University Press, 2019).
9. See the context in Luminita Gatejel, “Building a Better Passage to the Sea: Engineering and River Management at the Mouth of the Danube, 1829–61,” *Technology and Culture* 59, no. 4 (2018): 925–53 and *Engineering the Lower Danube: Technology and Territoriality in an Imperial Borderland* (Central European University Press, 2022); also in Ardeleanu, *The European Commission of the Danube*.
10. Details in Gatejel, “Imperial Cooperation at the Margins of Europe: The European Commission of the Danube, 1856–65,” *European Review of History: Revue européenne d’histoire* 24, no. 5 (2017): 781–800.
11. *La Commission Européenne du Danube et son œuvre de 1856 à 1931* (Impr. Nationale,

- 1931), 216–17.
12. John Stokes, “The Danube and Its Trade,” *Journal of the Society of Arts* 38, no. 1954 (May 2, 1890): 559–83.
13. Henry Trotter, *Despatch by Lieutenant-Colonel Sir Henry Trotter Reporting upon the Operations of the European Commission of the Danube During the Years 1894–1906* (H. M. S. O., 1907), 1–2.
14. Charles Hartley, “Description of the Delta of the Danube and of Works Recently Executed at the Sulina Mouth,” *Minutes of the Proceedings of the Institution of Civil Engineers* 21 (1862): 277–308; Hartley, “On the Changes That Have Recently Taken Place Along the Sea Coast of the Delta of the Danube, and on the Consolidation of the Provisional Works at the Sulina Mouth,” *Minutes of the Proceedings of the Institution of Civil Engineers* 36 (1873): 201–53; Charles Henry Leopold Kühl, “The Sulina Mouth of the Danube (Includes Plates and Appendices),” *Minutes of the Proceedings of the Institution of Civil Engineers* 91 (1888): 329–41.
15. Charles Henry Leopold Kühl, “The Sulina Branch of the Danube (Includes Plates and Appendices),” *Minutes of the Proceedings of the Institution of Civil Engineers* 106 (1891): 238–47 (here 239).
16. Details in the ECD’s official reports: *Mémoire sur les travaux d’amélioration exécutés aux embouchures du Danube* (Galați: Imprimerie de la Commission Européenne du Danube, 1867); *Mémoire sur l’achèvement des travaux d’amélioration exécutés aux embouchures du Danube* (Leipzig: Imprimerie F. A. Brockhouse, 1873).
17. Kühl, “The Sulina Branch,” 240.
18. *Mémoire sur les travaux d’amélioration du cours du bas Danube exécutés pendant la période 1873–1886* (Galați: Imprimerie J. Schenk, 1888); Kühl, “The Sulina Branch,” 242; Hartley, *A Biography*, 473–75.
19. *Note sur les travaux techniques de la Commission européenne du Danube (1856–1905)* (Socec, 1906); *Note sur les travaux techniques de la Commission européenne du Danube 1856–1911* (s.c., 1912); detailed accounts of the ECD’s technical works can be found in Dimitrie A. Sturdza, “Însemnătatea lucrărilor Comisiunii Europene de la Gurile Dunării, 1856–1912,” parts I–III, *Analele Academiei Române. Memoriile secțiunii istorice*, 2nd series, 35 (1913), 185–342 and in *La Commission*, 211–23.
20. C. A. Hartley, “Inland Navigation in Europe,” in *The Theory and Practice of Hydro-Mechanics: A Series of Lectures Delivered at the Institution of Civil Engineers, Session 1884–85* (London: Thomas Telford, 1885), 149–50.
21. Gatejel, “Building a Better Passage,” 942–43.
22. Hartley, “Description of the Delta,” 291.
23. Trotter, *Despatch*, 3–4.
24. Kühl, “The Sulina Branch,” 244.
25. National Archives of Romania, Galați Branch, Protocols of the European Commission

- of the Danube (hereafter PECD), Protocol 630, part 1, 13 May 1901; Sturdza, "Însemnătatea lucrărilor Comisiunii Europene," 276.
26. Grigore Antipa, *Lacul Razim: starea actuală a pescăriilor din el și mijloacele de îndreptare* (București: Imprimeriile Statului, 1894), 3–4; the historical context of the local fishing industry in Constantin Ardeleanu, "Fishing in the Lower Danube and Its Floodplain from the Earliest Times to the Twentieth Century," in *The Inland Seas: Towards an Ecohistory of the Mediterranean and the Black Sea*, ed. Tonnes Bekker-Nielsen and Ruthy Gertwagen (Franz Steiner Verlag, 2016), 309–40 (here 333–34).
 27. Antipa, *Lacul Razim*, 7–8.
 28. Antipa, *Lacul Razim*, 8.
 29. Antipa, *Lacul Razim*, 9–12.
 30. Antipa, *Lacul Razim*, 13–14.
 31. Antipa, *Studii asupra pescăriilor din România* (București: Imprimeria Statului, 1895). Antipa's own assessments of his policies' results can be found in Antipa, *Legea pescuitului și rezultatele ce le-a dat: un răspuns atacurilor ce i s-au adus* (București: Institutul de Arte Grafice și Editură Minerva, 1899) and *Exploatarea în regie a Pescăriilor Statului. Memoriu prezentat D-lui Ministru al Domeniilor* (Imprimeria Statului, 1905).
 32. See for instance I. C. Atanasiu, *Pescăriile Statului din județul Tulcea* (Tipografia Dobrogea, 1911), which started a dispute between Antipa and his critics.
 33. For a similar situation in the contemporary Danube Delta, see Ștefan Dorondel and Veronica Mitroi, "Nature, State and Conservation in the Danube Delta: Turning Fishermen into Outlaws," in *The Nature State: Rethinking the History of Conservation*, ed. Wilko Graf von Hardenberg et al. (Routledge, 2017), 194–212 (here 204–5).
 34. Antipa, *Câteva probleme științifice și economice privitoare la Delta Dunărei* (Librăriile Socec, 1914), 52–4.
 35. For recent discussions on the opposing views of Antipa and of the engineer Anghel Saligny, see Stelu Șerban, "State, Technology and Environment on the Lower Danube: Bulgaria and Romania Before the Balkan Wars," *Journal of Balkan and Near Eastern Studies* 21, no. 2 (2019): 204–21.
 36. Antipa detailed his views in *Regiunea inundabilă a Dunării: starea ei actuală și mijloacele de a o pune în valoare* (Inst. de Arte Grafice Carol Göbl, 1910) and *Trei memorii privitoare la ameliorarea regiunii inundabile a Dunărei* (Imprimeriile Independența, 1913); there is an abstract on the significance of floods in Antipa, *Pescăria și pescuitul în România* (Librăriile Socec, 1916), 212–19; Antipa's close collaborator at the SFS, Ion G. Vidrașcu, studied in detail how to balance the construction of embankments and to use the nutritive effects of floods: *Istoricul îndiguirilor fluviale și maritime* (Tipografia Curții Regale F. Göbl, Fii, 1911).
 37. Antipa, *Regiunea inundabilă a Dunării*, 238–39; Antipa, *Câteva probleme științifice*, 43–51; also see Ion G. Vidrașcu, "Lucrări tehnice pentru valorificarea pescăriilor

- dobrogea,” in *Dobrogea: cincizeci de ani de viață românească*, ed. C. Brătescu (Cultura Națională, 1928), 428–29.
38. “Discursul d-lui inspector general Antipa la inaugurarea canalului ‘Regina Elisabeta,’ în ziua de 13 Octomvrie 1913,” *Monitorul Oficial* 165 (October 23/November 5, 1913): 6885–86; “Parte neoficială, București, 6 maiu,” *Monitorul Oficial* 27 (May 7/20, 1914): 1364–65.
 39. Antipa, *Câteva probleme științifice*, 60.
 40. Antipa, *Pescăriile statului din Tulcea* (Imprimeriile Independența, 1911), 44–45; Antipa, *Câteva probleme științifice*, 51–60.
 41. Some disputes emerged after the First World War when Romania was openly critical of the ECD, and the transnational institution was held accountable for the results of its works, which resulted in the drying up of some ponds, which generated a loss for the Romanian fisheries—National Archives of Romania, Galați Branch, European Commission of the Danube Fund, Romania’s Delegate, 69/1920.
 42. Alberto Portugal-Perez and John S. Wilson, “Export Performance and Trade Facilitation Reform: Hard and Soft Infrastructure,” *World Development* 40, no. 7 (2012): 1295–1307.
 43. See *La Commission*, 329–49.
 44. Antipa, *Câteva probleme științifice*, 63–68; also see Library of the Romanian Academy (BAR), Arhiva Grigore Antipa, I mss 7, *Studii și propuneri pentru alimentarea bălților și colonizarea grindurilor din Delta Dunării* (December 4/17, 1913).
 45. The concept is rather loosely used, in reference to the “libraries, archives, museums, galleries, zoos, aquaria, and other systematic collections that enable individuals and societies to know what they know and to do what they do”—Margaret Hedstrom and John Leslie King, “Epistemic Infrastructure in the Rise of the Knowledge Economy,” in *Advancing Knowledge and the Knowledge Economy*, ed. Barian Kahin and Dominique Foray (MIT Press, 2006), 113–34.
 46. For “mathematical cartography” in the Danube Delta, see Ștefan Constantinescu and Mihnea Tănăsescu, “Simplifying a Deltaic Labyrinth: Anthropogenic Imprint on River Deltas,” *Revista de Geomorfologie* 20 (2018): 66–78. See also the authors’ view in Tănăsescu and Constantinescu, “The Human Ecology of the Danube Delta: A Historical and Cartographic Perspective,” *Journal of Environmental Management* 262 (2020): 110324.
 47. Ștefan Constantinescu, Liviu Giosan, and Alfred Vespremeanu-Stroe, “A Cartographical Perspective to the Engineering Works at the Sulina Mouth, the Danube Delta,” *Acta Geodaetica et Geophysica Hungarica* 45, no. 1 (2010): 71–79; Marius Budileanu, “Tipuri de produse cartografice specifice gurii Sulina, din perspectiva Comisiunii Europene a Dunării,” *Geographia Napocensis* 7, no. 2 (2013): 59–70; Constantinescu, “Various Approaches to the Danube Delta: From Maps to Reality,” in *The Bio-Politics of the*

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48. PECD, Protocol 172, April 25, 1865.
 49. A discussion of this relation in Jordan Branch, *The Cartographic State: Maps, Territory, and the Origins of Sovereignty* (Cambridge University Press, 2014).
 50. PECD, Protocol 247, November 7, 1870.
 51. Antipa, *Câteva probleme științifice*, 65–74.
 52. Ion G. Vidrașcu, *Memoriu relativ la metoadele întrebuițate la ridicările geodezice, topografice și hidrografice din Delta Dunărei* (Tipografia Curții Regale F. Göbl, Fii, 1914).
 53. Antipa, *Câteva probleme științifice*, 5.
 54. Pritchard, *Confluence*, 19.
 55. Antipa, *Câteva probleme științifice*, 13–14.
 56. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (Yale University Press, 1998).
 57. Taken from the navigation statistics for 1868, appendix 1 to PECD, Protocol 232, April 26, 1869.
 58. Denis Wood and John Fels, *The Power of Maps* (Guilford Press, 1992); Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (University of California Press, 2002), 9.
 59. Michael P. M. Finch, “Imperial Connections: Frederick Lugard, Charles Hartley, and Hubert Lyautey’s English Influences,” *Journal of Imperial and Commonwealth History* 46, no. 6 (2018): 1044–66.
 60. Hubert Lyautey, *Lettres du Tonkin et de Madagascar (1894–1899)*, vol. 1 (Colin, 1920), 291; references also in Hartley, *A Biography*, 586–89.
 61. Antipa, *Problemele evoluției poporului român* (Cartea Românească, 1919), 373–74.

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A WATERSHED CRISIS

Hydrology and the Politics of Revisionism in Post-Trianon Hungary

STEVEN JOBBITT

INTRODUCTION

On June 4, 1920, the government of Hungary signed the Treaty of Trianon. From the Hungarian point of view, the treaty was both excessively punitive and thoroughly unacceptable. Shocked by the loss of two-thirds of Hungary's prewar territory and one-third of its population, scholars, politicians, and the general public alike scrambled to come to terms with their country's dismemberment. Hungarian critiques of the treaty emerged even before it was signed, and subsequent calls for the wholesale revision of Trianon were often punctuated with the demand: *mindent vissza!* (everything back!).¹

Geographers, hydraulic engineers, and other earth science experts were on the front lines of the revisionist campaign that was waged by the Hungarian state between the wars, both internationally and at home. As in other nations throughout Europe, geographers in particular had become prominent figures in nationalist politics in Hungary since the fin de siècle, and though their discipline was still relatively new, they had at their disposal a host of tools that they could deploy in support of the political and geopolitical goals of the state.² In recent years, historians and historical geographers have begun to examine very closely the role that both geographers and geographical discourse played in Hungarian revisionist arguments in the 1920s and 1930s. Much attention has been paid, for example, to the way ethnic geography was mobilized in defense of Hungary's territorial claims, with particular focus given to the cartographical techniques employed by Pál Teleki in the production of his infamous "Carte Rouge"

(produced for the Paris Peace negotiations, this map employed what some consider to be dubious cartographical “tricks” to convey the predominance and distribution of ethnic Hungarians within the prewar Kingdom of Hungary).³ Scholars have also looked critically at the contributions that regional, historical, physical, and economic geographers made to revisionist discourse between the wars and have even begun to probe the important transnational roots of the geographical arguments employed by Hungarian geographers in the name of territorial revision.⁴

Lesser known are the hydrological arguments against Trianon that were mobilized between the wars, not just internationally, but also domestically. With an eye to the deeper history of these arguments in Hungary, this chapter examines the place of hydrology within Hungarian revisionist discourse and argues that the hydrological dimension of irredentist reasoning, especially as this intersected with arguments grounded in emergent principles of watershed management, was central rather than peripheral to the thinking of key Hungarian revisionists to the end of World War II.⁵ The conceptualization of Hungary as a hydrological unit was powerful, not just because the pre-Trianon Kingdom of Hungary could be mapped and presented more or less accurately as a unified watershed on a national scale, but also because the close relationship between river regulation, modernization, and the perceived civilizational level of the Hungarian nation had become a central feature of the national imaginary by the beginning of the twentieth century.

From the practical perspective of river regulation and watershed management, Trianon represented not just a significant territorial loss, but also a sizable disturbance to the infrastructure and organizational base of a hydrological regime that had radically transformed the Carpathian Basin since the mid-nineteenth century, and that had contributed to the evolution of intersecting local, national, and imperial imaginaries in Hungary in the decades leading up to World War I. With the forfeiture in particular of mountainous territory to the newly formed Czechoslovakian state to the north and to the enlarged Romanian state to the east, Hungary lost control over the headwaters of rivers that fed not only the Danube directly, but also the Tisza, the Danube’s largest tributary and a symbol of Hungary’s modernizing efforts in its eastern reaches. As Zoltán Hajdu notes, with the dismemberment of Hungary and the loss of its Carpathian headwaters, Hungary was reduced quite suddenly at the end of the war from a more or less integrated “basin-state” to a “basin-bottom state.”⁶ Given the central role that rivers and their regulation had played in the emergent conceptualization of Hungary as an organic unity commensurate with the environmentally and geographically determined borders of the Middle Danube, the treaty imposed on Hungary created a host of practical and symbolic problems from a hydrological point of view, ones that Hungarian geographers and hydrological experts were quick to respond to politically, scientifically, and emotionally.⁷

Examining some key examples of how hydrological arguments were publicized and politicized internationally and domestically after World War I, this chapter explores the ways in which the territorial implications of the Trianon treaty were portrayed and more broadly understood by geographers and hydrological experts as a natural disaster or “disturbance,” one that, to its Hungarian critics, not only flew in the face of both history and the laws of nature but also blocked or at the very least complicated what François Molle et al. call the “synergetic relationships” between “flows of water . . . created or modified by water infrastructure” and “flows of power and influence” on both a national and regional scale.⁸ Tying national, civilizational, and material progress to Hungary’s ability to “control, tame, redirect, and harness . . . the flow of the river” (see the introduction to this volume), Hungarian revisionist geographers channeled the technical discourse and hydraulic concerns of water management experts and bureaucrats to highlight the danger that they believed Trianon posed to the nation and its people, especially where flooding was concerned.

The first section places Hungarian hydrological thinking and the notion of Hungary as a river-basin state into historical context to better understand why the dismemberment of the nation resonated with Hungarians as it did, and why the emergent notion of Hungary’s hydrological unity was considered a good argument against the territorial fragmentation that the treaty demanded. Unlike Romania, Serbia, and Bulgaria—whose hydrological regimes remained relatively underdeveloped until the twentieth century when compared to Western European states⁹—Hungary had a long tradition of state-backed hydrological management, and despite its junior position within the Habsburg Empire, had drawn on the knowledge and expertise of Hungarian-born (and trained) experts since the early nineteenth century, if not earlier. Though water management for most of the nineteenth century was organized primarily on a local scale, the modernizing state nevertheless laid the groundwork in the decades leading up to World War I for infrastructuring on a national and even imperial scale through educational reforms, legislative acts, and centralized planning, especially after the political compromise in 1867 that created the Austro-Hungarian Dual Monarchy.¹⁰ Hungary’s hydrological priorities may have differed somewhat from the heavily industrialized nations in Northern Europe, where pollution management was a chief concern alongside flood control and hydropower generation, and from Southern European states like Spain, where dam construction and the question of water supply was “the most salient feature,” but Hungarian experts shared in the scientism of the era and in the increasingly utopian schemes linking river-basin development to social engineering that would come to define the “high modernism” of the twentieth century.¹¹

The second section examines the revisionist responses of some of Hungary’s most prominent geographers and hydraulic engineers in the immediate post-Trianon period. Pointing to the ruptures in the nation’s water management infrastructure, Hungarian

revisionists highlighted the potential damage that the new borders would have not just on hydraulic flow in the rump state, but also on the intersecting social, political, and material flows that in their view had long been connected to Hungary's hydrological regime. Faced with both practical problems and existential concerns, the Hungarian elite recommitted itself to what some scholars usefully call the "hydraulic mission" of the modernizing state and doubled down on the logic of large-scale water management planning that had come to define the development of Hungarian infrastructure in the second half of the nineteenth century.¹² It was within this context that the concept of the Carpathian Basin as a natural Hungarian space imbued with unique political, cultural, and civilizational capacities gained widespread scientific and propagandistic purchase.¹³ Though the notion of Hungary as an integrated river-basin state had emerged in the decades leading up to World War I, it was only in the wake of Trianon that it took hold as a central metaphor for thinking about the interconnected flows that animated and sustained the Hungarian nation.

The third section seeks to complicate the revisionist story by exploring some of the more pragmatic responses to Hungary's hydrological problems between the wars. Trianon was, of course, devastating and disruptive on so many levels, but for Hungary's hydraulic experts and forward-thinking hydrocrats, the forced rupture with the nation's hydrological past also opened up the possibility for a new beginning, one in which the blind spots, mistakes, and tensions of the nation's prewar hydrological regime could be addressed (as Robert Nemes writes in his chapter in this volume, disturbances are "'thick with politics,' in that they force people to think seriously about how they relate to each other, to nature, and to infrastructure"). Rooted in state-centric thinking, the development of hydraulic infrastructure prior to World War I (and with this also the evolution of the Carpathian Basin concept as a civilizational and organizational principle) rarely took local needs or practices into consideration and instead privileged private interests over public ones.¹⁴ A careful rethinking of the way in which social, political, economic, and hydraulic "flows" were managed would go a long way, some argued, in mitigating the multiple tensions that infrastructure development had generated. From a purely scientific and technological perspective, moreover, the infrastructural "reset" imposed by Trianon triggered critical discussions around the unintended but often devastating ecological consequences of the large-scale hydraulic engineering projects that had come to define Hungary's waterscape by the fin de siècle. Though ultimately scuttled by the high modernist projects pursued by Hungary's conservative-nationalist authoritarian regime between the wars, the hopeful thinking and reform-oriented spirit expressed by some of Hungary's key water management experts in the 1920s and 1930s speaks volumes about the tensions and disturbances (both natural and sociopolitical) that were embedded within the nation's hydrological regime.

A SIZABLE DISTURBANCE: CONTEXTUALIZING THE HYDROLOGICAL IMPACT OF THE TRIANON TREATY

When the Treaty of Trianon was signed in 1920, modern river regulation and flood control work on the Hungarian section of the Danube and its tributaries had been underway for almost two centuries. Though the advent of state-sponsored hydraulic engineering projects in Hungary could arguably be traced back to the reign of King Zsigmund (Sigismund) in the early fifteenth century,¹⁵ or to King Mátyás (Matthias Corvinus) in the second half of the fifteenth century,¹⁶ it was only in the wake of the Habsburg reconquest of Hungarian territories from the Ottoman Empire at the end of the seventeenth century that the centralizing power of the modern (or modernizing) state was brought to bear on Hungary's rivers. As early as 1722, for example, Emperor Charles III engaged Belgian engineers to prepare water management plans for the Great Hungarian Plain and began to seriously consider the provisions that would be required to improve navigability and facilitate trade along the Kingdom of Hungary's primary water routes.¹⁷ It was only under Maria Theresa and Joseph II in the second half of the eighteenth century, however, that the administrative infrastructure necessary to begin large-scale river regulation and flood control work in the Habsburg lands—including the Kingdom of Hungary—was first established. By the beginning of the nineteenth century a decree compelling all Hungarian counties "to employ engineers to survey lands, drain marshes, and build roads" had been issued, and by 1811 an order to establish a separate office of waterways for Hungary had been passed.¹⁸ Though implemented to serve Austrian imperial interests above all else, these early Habsburg interventions provided an important basis for the development of a modern hydrological regime in Hungary over the course of the long nineteenth century.¹⁹

Of central importance to the evolution of river regulation work in Hungary were the many flood control and drainage societies founded during the nineteenth century. Governed by a law passed by the Hungarian Diet in 1807, these societies were comprised of local landowners and the representatives of town and county councils.²⁰ Though supported by the state, these societies assumed primary responsibility for raising funds and for seeing local river regulation and water management projects to their completion. By the eve of World War I, a total of seventy-nine flood control associations (*ármentesítő társulat*) were operating in Hungary, of which thirty-eight were in the Danube Valley and forty-one were in the Tisza Valley. The work of these societies was complemented by a further 132 water use corporations (*vízhasználati társulat*), which were local bodies responsible for riverbed management, drainage, irrigation, industrial water use, and other related tasks. As Robert Shields Mevissen notes, the increasing popularity of recreational pursuits and the demand for public spaces along newly regulated riverfronts

gave rise also to numerous beautification associations and recreation societies in major urban centers and towns along the Danube, a phenomenon that would quickly become widespread along Hungary's other regulated rivers.²¹

From the outset, the regulation and development of Hungarian rivers created a demand for hydraulic engineers and earth science specialists, experts and practitioners who quickly assumed important roles within Hungary's emergent hydrological regime. Supported by the establishment in 1782 of the *Institutum Geometricum* in Buda (the forerunner to the Budapest Technical University) and mobilized by the intersecting interests of imperial officials, nation-building politicians, modernizing landowners, and local elites, successive cohorts of Hungarian engineers turned their collective attention and considerable energies to the taming of the Middle Danube and its many tributaries within the Kingdom of Hungary, and to the reclamation of territory within the Great Hungarian Plain that had been depopulated and left deliberately inundated for defensive reasons by the region's Turkish occupiers for much of the sixteenth and seventeenth centuries.²² Leading hydraulic engineers like Pál Vásárhelyi (1795–1846) in the first half of the nineteenth century and Jenő Kvassay (1850–1919) in the decades prior to World War I were well-known public figures in their own time and were even celebrated as Hungarian heroes, especially in the wake of Trianon when Hungary's hydrological situation assumed a central place within revisionist politics and discourse.²³

The chief figure behind water regulation works in Hungary was Count István Széchenyi (1791–1860), a reform-oriented aristocrat who has maintained a central symbolic role in every political regime in Hungary since the mid-nineteenth century, and who is widely regarded even today as “the Greatest Hungarian.” A leading advocate for social, political, technological, and economic modernization during Hungary's Reform Era (1825–1848), Széchenyi regarded the regulation of Hungary's rivers to be central to the broader project that he envisioned for the emergent nation. Key to Széchenyi's original hydrological vision was the Danube. From his perspective, “no other Christian nation had waters in such a sad state as the Danube,” and it was in this light that he devoted significant attention to the development of the river in the decades leading up to the liberal revolution of 1848.²⁴ Given that the flow of the river was unpredictable and at times devastating, Széchenyi promoted targeted investment in infrastructure in order to minimize natural hydraulic disturbances and to ensure the productive use of the Danube and Hungary's other major rivers. As Stefan Dorondel and Luminita Gatejel suggest in the introduction to this volume, such efforts to redirect and even “repair” the Danube's “natural inconveniences” were regarded as critical by figures like Széchenyi, primarily because the technological and infrastructural interventions on the part of the state and other local actors were tied directly to “promises of modernization, freedom, and prosperity,” and were thus regarded as critical to maintaining intersecting circuits of “capital and material flows.”²⁵

The large-scale regulation work that Széchenyi promoted and oversaw on the Danube aimed primarily at improving river transportation with an intent to boost the country's economy. Early achievements in the 1830s in this regard led to the establishment of the Danube Steam Shipping Company and also to the improvement of shipping conditions on the Danube's "treacherous lower reaches."²⁶ Though improved navigation was of central importance to Széchenyi, he was also adamant that river regulation work on the Danube should aim at broader hydrological goals, chief among them the implementation of flood-control infrastructure that would reduce the "curse of flooding" in the Middle Danube basin and measures that would enhance irrigation networks in Hungary. Nature, he noted, had blessed the Hungarian nation with hydrological gifts that, if managed properly, would be "a great blessing for our country in the future."²⁷

Perhaps nowhere was the curse of flooding and the need for river regulation more evident and more pressing for Széchenyi and his contemporaries than in the Tisza Valley. As the largest tributary of the Danube in terms of both its length and the size of its drainage basin (which was just over 157,000 km²), the Tisza and its eight major tributaries (the Bodrog, Sajó, Bódva, Hernád, Szamos, Kraszna, Körös, and Maros rivers) drained the vast arc of the Carpathian Mountains, its watershed on the southern and western slopes almost entirely commensurate with the northern and eastern borders of the Kingdom of Hungary itself. Given the precipitous gradients of these rivers as they cascaded out of the Carpathians, the upper reaches of the river system were (and still are) prone to flash flooding, with the Upper Tisza and the Körös particularly dangerous in this regard (the water levels of these rivers in their upper reaches have been known to rise as much as eight to ten meters or more within twenty to thirty hours following intense rainfall).²⁸ Converging on the lowland expanse of the Great Hungarian Plain, the Tisza carves its way south through a catchment of roughly 46,000 km² (or just over half the total land area of post-Trianon Hungary) and eventually empties into the Danube just north of Belgrade. Prior to extensive river regulation, the lower Tisza was a meandering—or, as the late-nineteenth-century writer and hydraulic engineer Béla Gonda called it, "unruly"²⁹—river, characterized as it was by its shifting bed and by its many "sinuous loops," side arms, fens, backswamps, and oxbow lakes.³⁰ Inundation was a common occurrence, though whereas flooding on the upper reaches of the Tisza and its tributaries could last as few as five to ten days, flooding on the downstream sections of the river could be between fifty and one hundred and twenty days in duration and could temporarily cover an area up to 30,000 km².³¹

Major flooding in the Tisza basin in 1816 and again in 1830 prompted a detailed survey of the river by Sámuel Lányi between 1834 and 1848, with more serious flooding in 1845 providing the final impetus for a "comprehensive reclamation project in the Tisza Valley."³² Lányi's work was particularly alarming, as it revealed that, as a result of increased siltation caused by deforestation, rough grazing, and intensive agricultural

practices, a growing number of settlements, and in particular those located on the high water plain that had avoided inundation in the past, were in danger of flooding.³³ The dire situation in the Tisza Valley drew Széchenyi's attention as well, and after personally touring Szolnok and some of the other towns in the northeastern corner of the Great Hungarian Plain that were devastated by the 1845 flood, he founded the Tiszavölgyi Társulat (Tisza Valley Company) in 1846, entrusting its leadership to Vásárhelyi. Though Vásárhelyi's tenure as head of the company was short-lived (he died of a heart attack in Pest in April 1846), the comprehensive plans for the regulation of the middle section of the Tisza that he drafted in 1845 and presented in full the month before his death became the de facto basis of river regulation and flood control work in the Tisza Valley for the rest of the century.³⁴

Serious flooding in the Tisza Valley in 1855, 1867–68, 1879, 1881, and 1888, coupled with major inundations along upper sections of the Middle Danube in 1862, 1876, and 1883 ensured that public attention would remain fixated on hydrological issues in Hungary to the turn of the century and beyond.³⁵ With the general support of Hungary's nation-building elite, major regulation work was completed on the Budapest stretch of the Danube between 1871 and 1875, and by 1910 work to straighten both the Danube and the Tisza to improve navigation and facilitate flood control had mostly been completed.³⁶ Regulation work on the Tisza River and its tributaries was perhaps most impressive in this light. By the outbreak of World War I, the length of the Tisza had been reduced from 1,419 km to 966 km. One hundred fourteen cuts measuring a total of 136 km had been made to eliminate 589 km of meanders, which represented a 32 percent reduction of the full length of the Tisza. The overall bed slope was also increased from 3.7 to 6 centimeters per kilometer, ensuring a higher rate of flow with the intention to mitigate siltation, especially in the slower-flowing downstream sections of the river.³⁷ Similar efforts on several of the Tisza's tributaries resulted in a total of 322 cuts and a combined reduction in river length from 1,398 km to 670 km, while downstream sections of the Danube below Dunaföldvár were shortened from 494 km to 417 km.³⁸ As on the Danube, a comprehensive system of embankments, artificial channels, and drainage canals was constructed along the Tisza and its tributaries, a project that, as scholars focusing on this period have pointed out, constituted some of the "most radical contemporary interventions" in modern European environmental history.³⁹

In the narrowest sense of the term, river regulation in Hungary over the course of the long nineteenth century dealt with three key issues: the stabilization of riverbeds and embankments, improvements to navigation, and—perhaps above all else—flood control.⁴⁰ But in the broader sense, regulation work also included canalization, irrigation, the development of hydropower, and the management of Hungary's inland waters more generally. In a lengthy historical overview of river regulation in Hungary published in *Vízügyi Közlemények* (Water Management Review) in 1929, Elek Schmidt

noted that the combined floodplain of the Danube and Tisza valleys alone—an area roughly 34,200 km² in size—was completely transformed by the efforts of Hungarian engineers and hydrological visionaries.⁴¹ After decades of dedicated work that led to the reclamation of marginal land and the building of infrastructural capacity, an area larger than the Netherlands had been brought into cultivation. Where once the ravages of flooding had prevented development and “swamps and puddles” had hindered progress and spread disease, homesteads [*tanyák*] and villages now flourished and “undulating crops” promised a bountiful harvest.⁴² Having mitigated against natural disturbances by taming its waters and transforming its watersheds, Hungary had very much become a river-basin state, one whose hydrological achievements rivaled and even surpassed those of its hitherto more advanced and developed European neighbors.

Though the idea of the Carpathian basin (*Kárpát-medence*) in Hungary only really “began to flourish in the 1920s and 1930s, especially in geography,”⁴³ the link between the Hungarian state and major rivers in the region (in particular the Danube and the Tisza, as well as the Sava and Drava in the south) had been made as early as the sixteenth century, and by the end of the eighteenth century and especially by the early nineteenth century geographically minded thinkers had begun to make increasing reference to the Carpathians and some of Hungary’s southern rivers as the basis of “strong, stable, and natural borders.”⁴⁴ Over the course of the nineteenth century, however, and in light no doubt of the growing scientific approach to state building and the link that Hungarian leaders and luminaries like Széchenyi made between river regulation and modernization, terms like “the Hungarian basin” and “the basin of the Middle Danube” not only became increasingly common and widespread, but also synonymous in the way they were used. As Péter Balogh notes, emergent notions of Hungarian empire in the decades leading up to World War I also intersected with hydrological conceptualizations of Hungarian space, with the concept of the “Central Danube basin” and the “Hungarian empire” in use by geographers and natural scientists by the turn of the century.⁴⁵

The colonial-imperial fantasies that were tied increasingly to Hungary’s regulated waterways by the fin-de-siècle ran parallel with Hungarian nation building and the evolution of Hungary’s national self-image. The Danube was, of course, important in this respect. As shipping improved and as river regulation more generally became a popular source of national pride, Hungarians began to recognize the efforts to improve their stretch of the Danube as a uniquely Hungarian project. Perhaps even more central to the relationship between hydrology and national self-image, however, was the Tisza River and its catchment area. According to Woldemár Lászlóffy, a leading hydrological expert in the interwar period whose long career stretched into the 1980s, the Tisza, rather than the Danube, was Hungary’s most significant river. Though the Danube was both longer and more voluminous than the Tisza, and though as an international waterway it connected “Hungary with the world,”⁴⁶ the Tisza and its tributaries not only

fed the lower reaches of the middle Danube as it flowed through the Carpathian basin, but more importantly was also a lifeforce that dominated the topography and hydrology of Greater Hungary. As a river system whose waters irrigated the Great Plain and thus provided the nation with its “daily bread,” the Tisza and its regulation was intertwined with the history of Hungary and its people and became increasingly central to the technocratic, nation-building narratives that began to dominate scholarly and political discussions from the middle of the nineteenth century. Tamed and controlled, the Tisza “brought blessings to those living on its banks,” Lászlóffy argued. Wild and unregulated, however, it could “threaten their very existence.”⁴⁷

In light of arguments like Lászlóffy's it is perhaps not surprising that, for many Hungarians, and especially for Hungarian revisionists, the territorial losses dictated by the Treaty of Trianon represented not just an affront to their territorial sovereignty but also an immediate existential threat to their nation. Ignoring the “laws of nature,” the treaty tore the Carpathian basin and its constituent watersheds apart and left Hungarians uncertain about their future. As Lászlóffy himself wrote in a lengthy essay published in German in 1932, the division of the nation's territory between five states (including rump Hungary) was not only deeply unfortunate and unjust but also increased flood risks in Hungary greatly. The prewar “uniformity” of water management in Hungary, he argued, had been “completely destroyed.” Moreover, given that the responsibility for flood control and river regulation work in the mountain regions was now in the hands of administrators with a completely different set of interests than those of the Hungarian lowlands, what guarantee would there be that water and land use policy in the successor states would be enacted in ways that would be beneficial to Hungary? The disruption caused to several of the flood control associations that had operated in the Kingdom of Hungary since the nineteenth century was, for Lászlóffy, a clear reflection of the bigger problems facing truncated Hungary as a whole. Of the seventy-nine associations in operation in Hungary prior to Trianon, he noted, fourteen had been severed by the new borders, with two divided between three states.⁴⁸

The fears of Lászlóffy and his colleagues regarding Trianon were by no means unfounded, at least in purely hydrological terms and from the more comprehensive perspective of watershed management. The territory that remained to Hungary after Trianon was situated in the lowest part of the Middle Danube basin, a fact that was of particular concern to Hungary's hydraulic engineers given that an estimated 96 percent of Hungary's surface waters and floods now originated on foreign territory.⁴⁹ The Tisza Valley watershed was of particular concern. Whereas Hungary had virtually complete control over it prior to the war, the terms of the Trianon treaty meant that Hungary retained control of just under 30 percent of the watershed, while 18 percent went to Czechoslovakia, 46 percent to Romania, and 6.5 percent to Yugoslavia.⁵⁰ Writing of contemporary flood risks in Hungary—and in particular on the Tisza—István Kránicz

has noted that, with respect to annual flow, “of the 120 billion cubic meters per year of surface and subsurface waters that leave Hungary along the southern border, only six billion cubic meters per year originates on its territory.” Even today, an estimated 52 percent of Hungary remains endangered not just by floods, but also by “excess waters,” a fact, he writes, that continues to represent “a unique, incomparable flood risk in Europe.”⁵¹

None of this, of course, justifies the defensive and often aggressive tone of revisionist propaganda and agitation between the wars, especially as this intersected with disparaging assessments of the cultural and civilizational capacities of Hungary’s neighbors in the successor states. But it does help us to better understand the centrality and perceived power of hydrological reasoning in post-Trianon politics, especially when examined within the deeper historical context outlined above. Trianon, in short, presented state- and nation-builders in rump Hungary with a serious set of hydrological problems, ones that were not only impossible to ignore, but which provided rich fodder for revisionist arguments to the end of World War II.

REVISIONISM AND THE POLITICS OF HUNGARY’S LOST HYDROLOGICAL UNITY

In 1919, the Hungarian Territorial Integrity League—which had been established by Count Pál Teleki in 1918 in the context of the Paris Peace Talks—issued an English-language pamphlet titled *Waterways, Hydraulic Powers, and the Territorial Integrity of Hungary*. Written by the hydraulic engineer Edward (Ede) Viczián, the pamphlet highlighted the harmonious interplay between hydrology and civilization in the historic Kingdom of Hungary, underscoring not only its “hydrographical unity” but also—albeit mostly indirectly—the purported ecological balance of the Danubian Basin as an ideal watershed unit.⁵² Encircled by “the great evergreen wreath” of the Carpathians in the north and east and by the Balkan mountains in the south, Hungary was “one of the most beautiful creations in nature,” especially “in respect to her water system.”⁵³ The planned dismemberment of the country, Viczián asserted, would not only be a violation of God’s work and the laws of nature, but would also disrupt the achievements of human agents who had rendered the often inundated lowland regions of the Carpathian Basin habitable, functional, and prosperous. To dismember the Kingdom of Hungary would therefore “disturb the unity and harmony of the nation’s regulation work.”⁵⁴ Underscoring notions of watershed management that were growing in popularity both globally and regionally at the time, Viczián concluded that it was necessary for Hungary to maintain administrative control over river regulation and flood control within the uniform water system that was the Carpathian Basin. Failure to do so, he concluded, would not only be disastrous from an environmental point of view but

would also have dire economic and ultimately cultural consequences for the entire region. No one, he warned, stood to gain from Hungary's dismemberment. Instead, Hungary's loss of control over its waterways would be a "loss to humanity."⁵⁵

Viczián's arguments were, of course, informed by his understanding of hydrology and the science behind hydraulic engineering. But they were also shaped by nationalist and civilizational narratives that had evolved over the course of the nineteenth century and that prior to World War I had crystalized into notions of Hungary as a river-basin state. Combined, they provided potent arguments that, at least from the Hungarian point of view, were unassailable not just from a scientific perspective but also from a combined cultural, political, and economic point of view. As Teleki himself wrote in an English-language pamphlet published in 1919, "Hungary represents one of the most striking morphological unities on the physical maps of Europe." Any topographical, tectonic, or geological map, he noted, will show the same thing; namely that Hungary is a "well equilibrated unity," one that, more than any other European nation, could be said to rival France in terms of its geographical harmony.⁵⁶ But beyond geography, Teleki argued that it was Hungary's purported political genius and elevated cultural capacities that had brought the Kingdom of Hungary's "different but well harmonizing natural regions" into a workable "symbiosis." As "one of the richest countries of Europe," Hungary was a nation whose potential would be fully unleashed only if its territorial integrity were preserved and its program for the future allowed to unfold.⁵⁷

Though his pamphlet was devoted ostensibly to political and economic geography, Teleki's arguments were grounded in a morphological assessment of Hungary's viability as a river-basin state and made clear reference to the hydrological "realities" that justified its territorial integrity and determined its place within Central Europe more generally. Describing the Kingdom of Hungary as a "well combined synthetic region," he pointed to the geographical and hydrological importance of the Danube as "Europe's unrivalled highroad," arguing that it not only connected East to West but also connected Hungary to "a series of great basins of well-defined hydrological units."⁵⁸ Straddling the Danube just below the point where the river temporarily changes its west-east course to travel south, Budapest in particular was situated on "a spot of exceptional geographical weight," one that was fed by the Danube and that stood at a place where various flows from different natural regions converged.⁵⁹ Echoing Viczián's claims that the dismemberment of the Hungarian state would be of benefit to no one, Teleki concluded that "the division of Hungary would separate geographical regions which are dependent on each other. It would create boundaries where nature laid down the foundations of commercial intercourse and mutual economic life. An impossible and indurable [*sic*] state of affairs would arise, and sooner or later natural tendency would join these parts again. To disregard the laws of nature today would only mean another forced solution in the near future."⁶⁰

Such thinking informed the revisionist arguments of many of Hungary's top geographers between the wars, not least of whom was Teleki's friend and colleague Jenő Cholnoky. Originally trained as a hydraulic engineer, Cholnoky was Hungary's most prolific interwar geographer and a tireless proponent of Hungarian revisionism, particularly in his role as a member of Teleki's peace preparation team in the immediate postwar period, but also as a public intellectual. Like Viczián and Teleki, Cholnoky's revisionist responses to Trianon were grounded in largely laudatory assessments of Hungary's morphological and cultural advantages. In *Critical Remarks on the New Frontiers of Hungary*, for example—a lengthy essay offered as an appendix to notes prepared for the Paris Peace Conference—Cholnoky declared: “With its excellent frontiers, the whole great Carpathian basin is remarkably uniform. All its rivers (except the little Pórád, which carries its waters to the Vistula) flow towards its main artery, the Danube. Other exceptions are the Olt and the Zsil, for these latter rivers flow into the Danube outside the territory of Hungary.” According to Cholnoky, the centripetal hydrological forces that had rendered the Carpathian Basin a perfect cradle of civilization were further enhanced by Hungarian ingenuity and enterprise. Hungary's network of railways and roads, in fact, only served to reinforce “the absolute interconnection of this [natural] unity.” As the nation's central nodal point, Budapest served as the key hub from which all networks of importance emanated and returned. Echoing Teleki's assessment, Cholnoky wrote that it was as if the nation's capital lay “at the center of a spider's web.” According to Cholnoky, this was not a recent development, but instead had been constant through the entire course of Hungarian history. The networks that were connected to each other through the nation's center were, he argued, “not artificial, but the result of natural evolution.”⁶¹ In the same way that all rivers and streams led to the Danube, so too did all roads and rail lines naturally lead to Budapest.

Like Viczián, Cholnoky argued that territorial dismemberment would not only constitute a major disturbance to existing national infrastructure and networks, but would also have a devastating impact on existing hydrological systems and infrastructure in the Carpathian Basin more broadly and would thus cripple Hungary from an environmental no less than economic and cultural point of view. In this light, Cholnoky's *Critical Remarks on the New Frontiers of Hungary* presented a critical overview and distinctly unfavorable hydrological assessment of the new borders proposed and later implemented by the Trianon treaty. In short, the new boundaries were “geographical absurdities” that would not last, largely—if not exclusively—because they contravened basic hydrological principles. Drawing on arguments that had evolved alongside the river regulation and flood control projects of the nineteenth and early twentieth centuries, Cholnoky argued that the organic connections established along the highland tributaries that fed both the Danube and the Tisza trumped—or at least should trump—ethnographical considerations. River valleys divided along ethnographic or

linguistic lines would “bring misfortune” not only to the Hungarians who typically inhabited the lower reaches of these tributaries, but indeed to all inhabitants of the watershed. Equating Trianon’s artificial division of the river valleys of the Carpathian basin to a “geographical caricature,” Cholnoky asserted that there were geographical factors of much greater importance than language and ethnicity that “bind the upper valley of a river indivisibly to its lower course,” especially when these valleys are “broad enough [and] basin-like to support a denser population and make traffic easy.”⁶²

From the point of view of flood control and watershed management more generally, Cholnoky was especially critical of the long northeastern stretch of the new frontier that separated Hungary from its former Ruthenian and Transylvanian possessions, primarily because the Trianon border severed the Tisza from the headwaters of its tributaries in the Carpathian Mountains. He was especially concerned that the Czechoslovaks would exploit the forests of these river valleys “ruthlessly,” adding that “not only the population of this district will be ruined . . . but the Alföld [Great Hungarian Plain] will also be endangered . . . through the great increase of the Tisza floods.” As he concluded: “On this territory no reasonable frontier can be fixed except on the watershed of the Carpathians.”⁶³ With regard to the new border with Romania, he added: “The inhabitants of the plains have always been lords of the mountainsides sloping towards them. Thus is the natural state of affairs.”⁶⁴ Nowhere was this supposedly natural state of affairs more apparent than in the history of river regulation and flood control work in the eastern half of the former Kingdom of Hungary. Pointing to the efforts of Hungarian flood prevention and river regulation associations in the region, Cholnoky stressed that Trianon’s “mutilation” of the flood area, and in particular the loss of dams and the “cutting through” of canals, would seriously endanger the work of these associations.⁶⁵ The purportedly low-civilizational level of the “primitive” Romanian inhabitants who would become de facto stewards of the land and its resources was also a primary concern. Insisting that Romanians “could never build, only destroy,” Cholnoky wrote: “If there were a real desire to make this region flourish in the interest of European peace and civilization, then it should not be placed under Romanian rule, but rather the Orthodox Greek Romanians should be transferred from here and resettled in their original home in the Balkans.”⁶⁶

Reflecting in turn on part of the new northern border between Pozsony (Bratislava) and Esztergom, Cholnoky again pointed to the central problem of flood control, noting that previous river regulation work would now be in peril, as the left bank of the river was under the control of the Czechoslovaks, whereas prior to Trianon both banks had been under Hungarian jurisdiction. In the decades leading up to World War I, he wrote, eight companies devoted to flood control had been established along this section of the Danube: four on the left bank and four on the right. Together these associations had erected 862 kilometers of embankments and had invested approximately 59

million crowns in flood control and drainage works, thus “saving” a vast area from the scourge of inundation.⁶⁷ The task of flood prevention, therefore, would be met with “insurmountable obstacles” if the left side of the river were lost to Hungary. “It is impossible to imagine that the work of the regulation of the river Danube could be successfully carried on,” he argued, “if the Hungarian Government has not the right of disposal on both shores of the river. The newly formed [Czechoslovak] state may introduce new preventative measures, without considering the interests of the population on the banks of the receptive river, or new measures in forestry which may cause such dangers all along the Danube, as would make all economic life impossible in that district.”⁶⁸ Such fears, he noted, were based on past experiences, when for example riverbed regulation in Lower Austria was undertaken “without regard for Hungarian interests,” thus negatively influencing water levels and agricultural capacities downstream.⁶⁹

For revisionist geographers like Cholnoky and many others, critical analyses of the hydrological implications of the Trianon treaty were both powerful and infinitely rational. Judging from the confident language of their arguments, it is clear they felt that these analyses would prove compelling to their colleagues in other countries and to the international community more generally. Given the global shift toward technocratic thinking and scientific resource management by the *fin de siècle*, it is not at all surprising why Hungarian revisionists may have thought this way. Hungarians were by no means alone in linking watershed management to state-building practices and civilizational discourse (the interwar period was, after all, an era of massive watershed projects globally),⁷⁰ nor were they the only ones to harness hydrological arguments to irredentist ambitions. Italy also drew heavily on hydrological reasoning during the war to make a case for extending and consolidating its Alpine borders in the northeast (some Italian geographers even used the logic of watershed management to lay claim to Dalmatia as a key headwater of the Adriatic basin).⁷¹ Slovak, Romanian, and Austrian geographers, in turn, drew on similar if slightly inverted arguments to justify the territorial extension of their “mountain” states into surrounding lowland regions. Interwar Romanian scholars, for example, invoked physical-geographical and ecological arguments alongside historical and cultural ones in order to reimagine the national geo-body as a “mountainous citadel,” one in which the mountainous terrain of newly acquired Transylvania was “inextricably tied” to the Wallachian plain to the south of the Carpathian Mountains and to the Pannonian (or Danubian) basin to the west.⁷²

In the end, despite the arguments of Hungarian revisionists, geopolitical considerations outweighed hydrological ones, and the collective efforts of Hungarian state officials and groups like the Hungarian Territorial Integrity League were obviously unsuccessful in preventing the inevitable. This did not dissuade Hungarian geographers, hydraulic engineers, technocrats, and others from clinging to hydrological arguments throughout the interwar period, however. There were, in fact, multiple stories

and reports published in national and regional newspapers throughout Hungary that outlined and reflected upon the hydrological consequences (both actual and potential) stemming from the Trianon treaty. From the point of view of ecological science and watershed management, the arguments presented to the Hungarian public were sophisticated and clearly assumed a level of literacy around these issues that revisionist geographers could draw on and mobilize to substantiate their claims.

Beyond simply lamenting the loss of culturally significant landscapes and waterways, newspaper reports dove into interconnected issues like integrated flood control, river regulation, and canalization projects, engaging readers not only in the rich history of such endeavors but also in what had been lost as a result of Trianon. The names and achievements of some of Hungary's most famous nineteenth-century hydraulic engineers were front and center in many of these stories, with Hungary's dismemberment often presented as an affront to the "genius and tireless efforts" of the nation's hydrological heroes.⁷³ Hungarian foresters were cast in similarly positive terms, not only because they were responsible for creating "one of the most developed and well-equipped" forestry services in the world, but also because their "advanced scientific practices" were widely believed to have maximized economic output while limiting ecological harm. Fears that the loss of the Carpathian headwaters would result in a host of environmental problems in rump Hungary were stoked months before the Treaty of Trianon was even signed. As a newspaper article published in February 1920, for example, reported: "Widespread deforestation of the worst kind has devastated Transylvania in the short year it has been under Romanian occupation."⁷⁴

Concern over flooding, drought, and soil desiccation caused by the poor stewardship of former Hungarian territories was clearly a source of great anxiety for Hungarian revisionists. So, too, were questions of pollution and the quality of drinking water. Though drinking water had long been an issue in rural areas of the Great Plain (and remained so between the wars), an article published in 1930 in *Budapesti Hírlap* under the title "Budapest's Trianon: Dirty Drinking Water" is a good example of how these concerns overlapped with the politics of revisionism in the interwar period. Pointing to the work of the International Danube Commission that had been established after Trianon to regulate the upper and middle reaches of the Danube, the article reported on what Hungarian officials identified as the principal reason behind the declining quality of Budapest drinking water since World War I. In order to facilitate better boat traffic, the commission had authorized the construction of a spur that diverted water to one of two channels north of Budapest. This project resulted in lower water levels on the other channel, which happened to be where the source wells for Budapest's water were located. The conclusion was that this would never have been allowed to happen if Hungarian authorities were still in control of the rivers within their territory.⁷⁵

From a strictly ecological and hydrological point of view, Hungarian revisionist geographers and hydrological experts tended to make scientifically sound arguments regarding the need to preserve Hungary's territorial integrity. But, as in cases elsewhere, the discourse surrounding watershed management and hydrological practices was never just about science.⁷⁶ For Hungarian revisionists, there was a symbiotic relationship between hydrology and Hungarian culture, and accounts of this "special" relationship found their way into a variety of publications geared for popular consumption. Reports on Hungary's pre-Trianon river systems and hydrological networks never failed to situate the history of Hungarian development within a naturally occurring organic process. Defined according to a series of natural flows, this organic process was at least partly responsible for facilitating links between settlements within a particular hydrological sub-basin and, more importantly, played a formative role in connecting peripheral regions to the Hungarian heartland at the center of the Carpathian Basin. As revisionists themselves invariably claimed, Hungary's river systems united the country, and it was on this basis that Hungarian politics and culture united the people. As an international appeal published by Hungarian scholars in 1919 stated: "Nature has created and ordained [Hungary] to be a single unit, [and] it was the Magyar nation that, by a uniform organization of the whole territory, laid the foundation of culture and brought the country within the pale of civilization."⁷⁷

A MORE PRAGMATIC RESPONSE? HYDROLOGY AND THE PURSUIT OF CULTURAL ADVANTAGE

Though geographers, hydraulic engineers, and other earth scientists contributed directly and often passionately to irredentist discourse and revisionist projects, a survey of professional and academic journals such as *Vízügyi Közlemények* (Water management review), *Hidrológiai Közlöny* (Hydrological bulletin), and *Földrajzi Közlemények* (Geographical review) suggests quite clearly that Trianon cast less of a shadow over their purely scholarly and professional work than it did over their propagandistic essays and pamphlets. Whereas geographers, hydraulic engineers, and other experts in related fields often mobilized hydrological science to support and even popularize the official irredentist claims of the state, they were often much more restrained and ultimately pragmatic when it came to addressing Hungary's existing hydrological problems in the interwar period. Though Hungary's truncation had made both research and water regulation efforts more complicated and, in some cases, impossible, it also exposed several issues and crises whose origins predated Trianon and had little to do with the

terms of the treaty itself. Much like the geographer Ferenc Fodor—who, though he made important contributions to revisionist geography between the wars, nevertheless argued in a 1936 essay that it was misguided and even counterproductive to blame Hungary's woes on Trianon exclusively⁷⁸—the nation's hydrological experts assumed a critical and, in some cases, introspective stance, directing their individual and collective energies to the examination and solution of a host of longstanding water-related problems. This does not mean that they acted apolitically or neutrally from a moral or cultural point of view, but it does point to the need for a more nuanced reading of their scientific work in the wake of Trianon.

A short commentary on water management policy published by Sándor Rohringer (1868–1945) in *Vízügyi Közlemények* in 1923 is a good case in point. A leading hydraulic engineer of the interwar period, Rohringer echoed the core revisionist narrative mobilized by his contemporaries at the time, arguing that Hungary's superior management of water resources throughout its thousand-year history was proof above all else of the nation's racial superiority, cultural capacity, and legitimate right to its historic territory. By means of flood control, drainage, and the wise stewardship of nature, Hungarians had managed to conquer primeval forests and swamps to render the land both habitable and fertile. The nation's thriving culture was made possible, he argued, through water regulation work that was "unparalleled" anywhere else in Europe. Trianon, by contrast, "deprived" Hungary of vital infrastructure and natural resources, and above all else weakened the nation and threatened to undo the heroic hydrological achievements of past generations.⁷⁹

Though Rohringer agreed that the Trianon Treaty was both punitive and unjust (elsewhere he described Trianon as the product of "blind rage, revenge, and ignorance"),⁸⁰ he was nevertheless very clear about the "innumerable flaws" that persisted in Hungary's hydrological regime, ones that in some cases stretched back into the nineteenth century, and that could not in themselves be blamed on the geographically ignorant decisions of the victorious powers or the lobbying of the successor states.⁸¹ Financing, for starters, had been a perennial problem, but beyond deficient funding, water management prior to World War I also suffered from a lack of both a comprehensive national vision and the necessary political will to see important projects through to completion. Rohringer was particularly critical of Hungary's failure to develop large-scale infrastructure for irrigation, something that would better serve the needs of the nation's agricultural sector and that had become especially important given the hydrological losses associated with the nation's territorial dismemberment. He also pointed to the underdevelopment of the Danube–Tisza interfluvium as a key failure of Hungary's water management policy prior to the war, lamenting the lack of a completed canal that would link the two rivers across the Great Plain and noting that approximately 170,000 hectares of land had yet to be drained and turned over to productive use.⁸²

Though some of the failings of Hungarian water policy could be blamed on the economic shortfalls and administrative blind spots of the state, ultimate responsibility for systemic hydrological flaws fell more squarely on the organizational structure and decision-making processes of the nation's flood control and river regulation associations. Though governed by a series of laws that had been passed by Hungarian legislators since the beginning of the nineteenth century, these associations functioned more or less autonomously and tended to privilege private interests over public ones. According to Rohringer, decisions concerning the nature and scope of regulation and reclamation work also tended to be "slow and uncertain" and often served the needs of landowners rather than "the interests of the country." Considering past failings, Rohringer concluded that all land "suitable for production" must in every circumstance be protected against the ravages of excess water and flooding, "even against the will of the owner." Private interest regarding the use of water, he reiterated, should not prevail to the detriment of the greater good.⁸³

Calling for stronger government intervention, Rohringer—himself a civil servant and public intellectual in Miklós Horthy's conservative-nationalist authoritarian regime between the wars—laid out a vision for the future that was remarkably optimistic given the challenges Trianon Hungary faced both domestically and geopolitically. If anything, he argued, the goals of the nation's water policy and the tasks facing its hydrological experts "had become simpler and clearer as a result of Hungary's truncated borders."⁸⁴ Projects that had been left incomplete prior to the war or overlooked entirely could now take center stage, and problems such as irrigation and the underdeveloped Danube–Tisza interfluvium could finally be addressed. "We have lost an immeasurable amount," he admitted, "and we have to go it alone. But our losses have led us back to the source of national power, the land, which gives us new strength in the great struggle we now face between existence and non-existence. We must make the Hungarian land more beautiful and productive; we must deploy all our love and strength in ways that will restore not only our confidence and faith, but also, in the future, our old borders."⁸⁵

As Noémi Ujházy and Marianna Biró note, Rohringer was by no means alone in this sort of thinking and instead promoted a program that would see Hungarians reclaim their so-called "cultural advantage" in the region.⁸⁶ Bolstered by notions of cultural and political supremacy, figures like Rohringer shared in the widespread assumption that the peoples of the successor states would voluntarily demand the resurrection of Greater Hungary once the Hungarian nation had again proven its civilizational superiority. Concrete work, therefore, rather than the wringing of hands, was the correct response to Hungary's postwar situation. Though Trianon was, of course, widely regarded as a national tragedy, the dismemberment of the nation provided a clear opportunity for the resetting of priorities and end goals.⁸⁷

Fixing Hungary's existing hydrological issues would be no small task, however. From the point of view of flood control alone, Hungary's hydraulic engineers were beginning to come to terms with the fact that, though floods had become less frequent because of extensive river regulation work, they had generally become more violent and destructive, and would continue to be so into the post-Trianon period. Though revisionist propaganda suggested that violent flooding in the future would be due to Hungary's territorial dismemberment (and there was, of course, at least some justification for this fear), water management experts recognized that the real problem was much more complicated and that deliberate alterations of the riverbed coupled with changed land use practices, the loss of grasslands, and increased deforestation in the river valley lowlands contributed to higher flood waters when they came (on the relationship between infrastructure and flooding see the chapters by Dorondel and by Haidvogel, Hohensinner, and Schmid in this volume).⁸⁸ As Zsolt Pinke writes, "Increased flood levels were just one of the 'negative externalities' of [river] regulation," especially on the Tisza.⁸⁹

The disruption of social relations and hardening of social divides was arguably another negative externality of river regulation and flood control work in the Carpathian basin prior to the war. Despite revisionist claims that river regulation and flood control had fostered "unity and harmony,"⁹⁰ there were longstanding social divides in Hungary, many of them traceable to the agroc capitalist interests of landowners who generally controlled river regulation on a local and regional level. The implementation of hydrological interventions in Hungary's river valleys had in fact been largely undemocratic. As Pinke argues, "a narrow group of landowners who had ownership of a decisive proportion of the floodplains and who became interested in extending cropland farming, dominated the planning and decision-making [process] in regard to river regulation through flood protection associations, county administration and the government. This group used their influence to collectivize the expenses of the regulation and privatize the available revenues." As a result, the "agroproletarians" and smallholders who together constituted roughly one-third of the population of the Great Plain had largely sunk into poverty by the beginning of the twentieth century.⁹¹

Despite the government's intentions to enhance and instrumentalize the nation's "cultural advantage" between the wars, choices made by the Horthy regime in the interwar period often exacerbated existing problems and tensions, rather than resolving them. This was especially true in terms of state-backed hydrological projects, which eschewed meaningful land reforms and social reforms, and instead invested in large-scale "hydromodernization" projects like the Main Channel of the Danube Valley (which was also more popularly known as the Cursed Channel). As Ujházy and Biró argue convincingly, such projects created as much division among locals as they did excitement among the technocratic elite. More often than not they also marked a "failed utopian conquest" of nature, exposing as they did so the antidemocratic nature and

“unintended” social and environmental consequences of hydrological megaprojects.⁹² Writing in particular of the flawed conceptualization and then implementation of Vásárhelyi’s plan for the regulation of the Tisza, Tibor Bellon argues that the drastic transformation of the river and its associated landscapes exacted a steep environmental cost that was never truly for the benefit of “the people.” Noting that the embankments had been constructed “to suit the interests of local landowners rather than the hydrological conditions and the optimal channeling of flood waters,” Bellon concludes that the hydraulic promises of the past have become “the roots of problems that are still felt today.”⁹³

CONCLUSION

Regardless of the complexities and frequent messiness of Hungary’s “real existing hydrology” between the wars, revisionist arguments grounded in hydrological reasoning persisted throughout the interwar period and became prominent again as Hungary justified the reannexation of some of its lost territories between 1938 and 1941. In late November 1938, for example, just weeks after parts of Southern Slovakia and Ruthenia had been returned to Hungary as part of the First Vienna Award, Cholnoky wrote about the region’s fate, noting that this political decision corresponded to a hydrological “reality” that Hungarian geographers and hydrological experts sympathetic to the revisionist cause had long been advocating. Slovakia, he contended, belonged “naturally” to the Carpathian Basin. As a region linked to the Hungarian geo-body by way of a group of sub-basins, Slovakia was naturally oriented toward the Hungarian center. Based on the “natural flows” of the Carpathian Basin, Cholnoky asserted that Slovaks had for centuries been integrated economically and culturally with Hungarians. Recycling arguments that he had made almost two decades earlier in his essay on Hungary’s Trianon borders, Cholnoky argued that it had never made sense to annex Slovakia to their Czech neighbors, a nation that was not only outside the Carpathian ring, but which had no organic ties to Slovaks or Slovakian space. Whereas Hungarians and Slovaks had lived harmoniously with one another, according to Cholnoky, the Czechs had come as foreigners and as imperialists. Unlike Hungarians, the Czechs only ever went to Slovakia as “robbers and plunderers” and never as settlers and civilizers. Returning Slovakia to Hungary not only made sense from a hydrological point of view, it also made sense in historical and civilizational terms.⁹⁴

As a combined natural and political disturbance that disrupted the progress of the nation and the carefully managed flow of its waterways, the Treaty of Trianon presented interwar Hungarian revisionists like Cholnoky with a set of problems that hydrological science was well poised to help solve. From the point of view of morphology and

physical geography, the Carpathian basin and its constituent rivers and watersheds provided a concrete hydraulic space upon which imagined constructions of the Hungarian nation could be projected. More work needs to be done on the deeper history, contested meanings, and contemporary resonances of what might usefully be called Hungary's "hydrological imagination," but by World War I, Hungarian nation builders were able to mobilize rather comprehensive narratives that were informed by a sophisticated understanding of hydrological and ecological principles and were also largely familiar to a broad base of educated Hungarians. The broader history and extent of this awareness, as well as the transnational dimensions of the hydrological arguments that revisionists propagated, are two key aspects of this bigger story that would be worth probing further, especially given that historical and hydrological notions of the Carpathian basin have reemerged into public view in recent years, not only in the context of discussions surrounding climate change, but also in light of the basin's politicization by the political right since the turn of the millennium.⁹⁵

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NOTES

1. On the Treaty of Trianon and its impact on Hungary, see Ignác Romsics, *Dismantling of Historic Hungary: The Peace Treaty of Trianon, 1920* (East European Monographs, 2002). For a good overview of Hungary's revisionist response, see Miklós Zeidler, *Ideas on Territorial Revision in Hungary, 1920–1945* (East European Monographs, 2007).
2. See, for example, Maciej Górny, *Science Embattled: Eastern European Intellectuals and the Great War* (Verlag Ferdinand Schöningh, 2019).
3. See, for example, Dániel Zoltán Segyevy, *Térképművek Trianon árnyékában: Magyarország néprajzi térképe, 1918* [Maps in the shadow of Trianon: Ethnographic map of Hungary] (Iskola Alapítvány, 2021).
4. See, for example, Steven Seegel, *Map Men: Transnational Lives and Deaths of Geographers in the Making of Modern East Central Europe* (University of Chicago Press, 2018);

- Ferenc Gyuris, "Human Geography, Cartography, and Statistics: A Toolkit for Geopolitical Goals in Hungary Until World War II," *Hungarian Cultural Studies* 4 (2014): 214–41; and Róbert Györi and C. W. J. Withers, "Trianon and Its Aftermath: British Geography and the 'Dismemberment' of Hungary, c. 1915–c. 1922," *Scottish Geographical Journal* 135 (2019): 68–97.
5. As the Hungarian geographer Ferenc Fodor wrote in a revisionist pamphlet published in English in 1920, "the territorial evolution of states is not in the direction indicated by the nationality principle," but instead can be located in the economic unity that is shaped by the "natural integrity" of a particular territory. The stronger this natural integrity is, the more cohesive and integrated the nation will be. See Francis [Ferenc] Fodor, *The Geographical Impossibility of the Czech State* (Steiger, 1920), 10. As this chapter illustrates, Hungarian geographers were not shy about using rather blunt and at times inflammatory language when making their case in irredentist propaganda intended for foreign audiences that they felt would be sympathetic to the Hungarian situation. It is not clear from the archival sources I have examined so far, however, how the revisionist discourse of Hungarian geographers played out at international academic conferences or within bodies like the International Danube Commission.
 6. Zoltán Hajdú, "Carpathian Basin and the Development of the Hungarian Landscape Theory Until 1948." Discussion Paper #44 (Centre for Regional Studies of the Hungarian Academy of Sciences, 2004): 13.
 7. The concept of the "affective state" that Stelu Șerban employs in his chapter in this volume helps us to appreciate the emotional aspect of the Hungarian revisionist response to the Trianon Treaty. As Șerban points out, the affective state is linked "inextricably" not only to its territory but also to the infrastructure on that territory. Territorial loss not only gave rise to practical problems for Hungary but also provided the emotive base for arguments that framed Trianon as a violation of the organic integrity of the nation's body (or geo-body).
 8. François Molle, Peter Mollinga, and Philippus Wester, "Hydraulic Bureaucracies and the Hydraulic Mission: Flows of Water, Flows of Power," *Water Alternatives* 2, no. 3 (2009): 336.
 9. On the Romanian and Bulgarian cases, see Stelu Șerban and Stefan Dorondel, "The Economy of a Leashed River: State, Experts, and Politics along the Lower Danube, 1900–1940," in *A New Ecological Order: Development and the Transformation of Nature in Eastern Europe*, ed. Stefan Dorondel and Stelu Șerban (University of Pittsburgh Press, 2022), 109–29. See also the chapters by Luminita Gatejel, Constantin Ardeleanu, and Stelu Șerban in this volume.
 10. Bohemia and Moravia also developed the basis of a rather advanced hydrological regime during the second half of the nineteenth century under Habsburg rule. See Jiri Janác, "From Nature to National Networks: Hydraulic Bureaucracy and the Modernization

- of Waters in Czechia, 1890s–1960s,” in *A New Ecological Order: Development and the Transformation of Nature in Eastern Europe*, ed. Stefan Dorondel and Stelu Șerban (University of Pittsburgh Press, 2022), 132–35.
11. François Molle, “River-Basin Planning and Management: The Social Life of a Concept,” *Geoforum* 40 (2009): 487–88. On the Spanish case, see Erik Swyngedouw, “Modernity and Hybridity: Nature, Regeneracionismo, and the Production of the Spanish Waterscape, 1890–1930,” *Annals of the Association of American Geographers* 89, no. 3 (1999): 443–65.
 12. On the “hydraulic mission” concept, see Molle, Mollinga, and Wester, “Hydraulic Bureaucracies and the Hydraulic Mission.”
 13. Róbert Balogh, “A Kárpát-medence-fogalom jelentősége az antropocén korszak szempontjából: Válságtudat és antropogén tájálakítás (1910–1945)” [The significance of the Carpathian basin concept from the perspective of the anthropocene era: Crisis consciousness and anthropogenic landscape transformation (1910–1945)], *Magyar Gazdaságtörténeti Évkönyv* (2021): 242.
 14. Balogh, “A Kárpát-medence-fogalom,” 242.
 15. Elek Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon” [The development and present situation of water regulation in Hungary], *Vízügyi Közlemények* 11, no. 1 (1929): 8; Woldemár Lászlóffy, “Die Wasserführung der ungarischen Donau” [The water flow of the Hungarian Danube], *Hidrologiai Közöny* 14 (1934): 134.
 16. Ferenc Schweitzer, “Strategy or Disaster: Flood Prevention Related Issues and Actions in the Tisza River Basin,” *Hungarian Geographical Bulletin* 58, no. 1 (2009): 5. As Schweitzer writes, “The idea of the regulation of the Tisza River had been raised for the first time during the reign of King Matthias Corvinus, in the second half of the fifteenth century. It was he who issued the first decree that levees must be erected in order to protect the land.”
 17. Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon,” 10.
 18. Robert Nemes, *Another Hungary: The Nineteenth-Century Provinces in Eight Lives* (Stanford University Press, 2016), 72. See also Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon,” 11.
 19. As Nemes notes, improved navigation on Hungary’s rivers was at least in part intended to facilitate the movement of imperial troops within the Kingdom of Hungary. Nemes, *Another Hungary*, 72. Reflecting in the 1920s on this same period in the history of river regulation in Hungary, Elek Schmidt wrote that “the Austrian government only cared about our water issues when it saw its own benefits.” Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon,” 14. Like other riparian nation-states in the region that would emerge over the course of the nineteenth century, infrastructural development in Hungary both built on and was a direct response to earlier Habsburg imperial projects. Constantin Iordachi reflects on this dynamic in his chapter in this

volume. As he writes, “Newly emerging riparian states . . . such as Romania, Bulgaria, and Ukraine, launched their own infrastructural projects in the region as a way of challenging imperial domination. Despite their rhetoric of a total break with Ottoman domination and its backwardness, their infrastructural projects appropriated, in fact, Ottoman or European modernization.” On Ottoman attempts to negotiate and manage disturbances on the Danube in the early modern period, see the chapter by Deniz Armağan Akto and Onur İnal in this volume.

20. See also Nemes, *Another Hungary*, 72.
21. Robert Shields Mevissen, “Meandering Circumstances, Fluid Associations: Shaping Riverine Transformations in the Late Habsburg Monarchy,” *Austrian History Yearbook* 49 (2018): 37–39.
22. Róbert Györi, “Vadvízországtól a fokgazdálkodásig: Ember és természet viszonyának változó értékelése” [From wetlands to farm management: A changing assessment of the relationship between man and nature], *Korall* 1 (2000): 20–26; Ferenc Fodor, *Magyar vízimérnököknek a Tisza-völgyben a kiegyezés koráig végzett felmérései, vízi munkálatai és azok eredményei* [Hungarian hydrological engineers of the Tisza Valley: A record of their surveying and hydrological work to 1867] (Tankönyvkiadó, 1957); Béla Borsos and Jan Sendzimir, “The Tisza River: Managing a Lowland River in the Carpathian Basin,” in *Riverine Ecosystem Management*, ed. S. Schmutz and J. Sendzimir, Aquatic Ecology Series 8 (Springer, 2018), 543. On the history of the Institutum Geometricum see Ferenc Fodor, *Az Institutum Geometricum: Az Egyetem Bölcsészeti Karán 1782-től 1850-ig Fennállott Mérnöki Intézet* (Tankönyvkiadó, 1955).
23. On Vášárhelyi see Béla Gonda, *Vášárhelyi Pál élete és művei* [The life and works of Pál Vášárhelyi] (Budapest: Magyar Mérnök és Építész-Egylet, 1896). As Nemes writes, Vášárhelyi was regarded as “a national hero” who embodied “the technical achievements and aims” of the Reform Era in Hungary. Nemes, *Another Hungary*, 90. On Kvassay see József Udránszky, “Kvassay Jenő emlékezete” [In memory of Jenő Kvassay], *Vízügyi Közlemények* 9 (1923): 5–9. For a good example of the heroic language used, see Fodor, *Magyar vízimérnököknek a Tisza-völgyben*. Fodor’s study is especially remarkable as it was published in 1957 during the state socialist period.
24. Kálmán Szily, ed., *Gróf Széchenyi István munkái* [The works of Count István Széchenyi], vol. 2 (Stadium, 1905), 199.
25. See the introduction (I am citing pp. 1–2 from the revised draft of the introduction).
26. Nemes, *Another Hungary*, 73.
27. István Széchenyi, cited in Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon,” 21.
28. István Nagy, Ferenc Ligetvári, and Ferenc Schweitzer, “Tisza River Valley: Future Prospects,” *Hungarian Geographical Bulletin* 59, no. 4 (2010): 363. See also Dénes Lóczy, “Flood-Hazard in Hungary: A Re-Assessment,” *Central European Journal of Geoscience*

- 2 (2010): 537.
29. Gonda, *Vásárhelyi Pál élete és művei*, 7.
 30. Nagy, Ligetvári, and Schweitzer, "Tisza River Valley," 361.
 31. István Kránicz, "The 1998 Extreme Flood on the Tisza River," in *Flood Issues in Contemporary Water Management*, ed. Jiri Marsalek, E. Ed Watt, Evzen Zeman, and Friedhelm Sieker, NATO Science Series (Series 2, Environmental Security, Vol. 71) (Springer, 2000), 86. On the extent of temporary inundations on the Great Hungarian Plain, see Sándor Somogyi, *Az Alföld földrajzi képének változásai (XVI–XIX. század)* [Changes in the geographical appearance of the Great Plain (16th–19th centuries)] (Bessenyei György Tanárképző Főiskola, 1994), 22; and Borsos and Sendzimir, "The Tisza River," 541. As Tibor Bellon notes, "In the 17th–19th centuries 53% of the areas inundated in the Carpathian Basin were along the Great Plain stretch of the Tisza and its tributaries." See Tibor Bellon, "Living Together with Nature: Farming on the River Flats in the Valley of the Tisza," *Acta Ethnographica Hungarica* 49 (2004): 251.
 32. L. Szlávik, "Emergency Flood Reservoirs in the Tisza Basin," in *Flood Issues in Contemporary Water Management*, ed. Jiri Marsalek, E. Ed Watt, Evzen Zeman, and Friedhelm Sieker, NATO Science Series (Series 2, Environmental Security, Vol. 71) (Springer, 2000), 377. See also Nemes, *Another Hungary*, 85.
 33. Schweitzer, "Strategy or Disaster," 5. Schweitzer notes that mining and quarrying in the Tisza basin likely also contributed to increased siltation and higher water levels and runoff along the Tisza. See also Bertalan Andrásfalvy, "A gazdálkodás következtében végbement földfelszín változások vizsgálata a Kárpát-medencében" [Assessment of the changes on the surface of the earth in the Carpathian basin due to husbandry], in *Antropogén ökológiai változások a Kárpát-medencében* [Anthropogenic ecological changes in the Carpathian-basin], ed. Bertalan Andrásfalvy and Gábor Vargyas (L'Harmattan, 2009): 9–19.
 34. Schweitzer, "Strategy or Disaster," 6.
 35. Szlávik, "Emergency Flood Reservoirs in the Tisza Basin," 377; Mevissen, "Meandering Circumstances, Fluid Associations," 32–35. As Mevissen notes, "A massive flood in 1876 was so destructive that fifteen thousand people on the Danube stretch between Pozsony/Pressburg and Pest lost their homes" (34). Róbert Balogh argues that not all floods had to be considered "major" in order to have a lasting impact on what I call Hungary's "hydrological imagination." Balogh points to flooding on the Danube between 1910 and 1913, noting that, though they have not been included in "the canon of memory," they were nevertheless significant because of "their impact on [interwar] thinking." See Balogh, "A Kárpát-medence-fogalom," 223.
 36. Kránicz, "The 1998 Extreme Flood on the Tisza River," 86.
 37. Bellon, "Living Together with Nature," 245; Woldemár Lászlóffy, *A Tisza: Vízi munkálatok és vízgazdálkodás a tiszai vízrendszerben* [The Tisza: Water works and

- water management in the Tisza water system] (Akadémiai Kiadó, 1982), 21; Kránicz, "The 1998 Extreme Flood on the Tisza River," 86. Borsos and Sendzimir estimate that extensive hydraulic engineering in the Tisza Valley resulted in "the confinement of the natural floodplain to 5–10% of its former area." See Borsos and Sendzimir, "The Tisza River," 545.
38. Kránicz, "The 1998 Extreme Flood on the Tisza River," 86.
 39. Schweitzer, "Strategy or Disaster," 5. Borsos and Sendzimir note that "currently a 2,700-km-long line of dikes 'protects' 17,300 km² of land along the Tisza within Hungary. In total, dikes within the Tisza River valley extend for 4,500 km." Borsos and Sendzimir, "The Tisza River," 543.
 40. As Dénes Lóczy writes, "Extensive areas along both the Danube and its largest left-bank tributary, the Tisza, are highly exposed to riverine floods and, consequently, flood control has always been a central task of Hungarian water management policy." Dénes Lóczy, "Flood-Hazard in Hungary," 537. See also D. Kovács, ed., *Árvízvédelem, folyó-és tószabályozás, víziutak Magyarországon* [Flood control, regulation of rivers and lakes and waterways in Hungary] (National Water Management Authority [OVH], 1979).
 41. Zsolt Pinke observes that, between 1870 and 1914, the area of arable land grew by roughly 50,000 km², and that the majority of this expansion came from river regulation. Zsolt Pinke, "Modernization and Decline: An Eco-Historical Perspective on Regulation of the Tisza Valley, Hungary," *Journal of Historical Geography* 45 (2014): 102.
 42. Schmidt, "A vízszabályozás fejlődése és jelen állása Magyarországon," 5. Reclamation of marginal land over the course of the nineteenth century contributed directly to what Bellon has identified as a "radical transformation" of agriculture in Hungary, as well as the emergence of an enhanced transportation network, especially in the period before railways and paved roads became common. Bellon, "Living Together with Nature," 252–54.
 43. Péter Balogh, "The Concept of the Carpathian Basin: Its Evolution, Counternarratives, and Geopolitical Implications," *Journal of Historical Geography* 71 (2021): 57. As Róbert Balogh notes, the notion of the Carpathian Basin as a singular hydrological unit is complicated by the fact that it is comprised of at least two distinct basins, one constituted by the Great Hungarian Plain, and the other in the Transylvanian highlands. As he points out: "The definitional alignment of historical Hungary with the Carpathian Basin is a simplification that only comes about naturally if the conditions are examined and illustrated in a diagram that softens the differences in topography . . . and emphasizes the linearity of the edge." See Balogh, "A Kárpát-medence-fogalom," 222.
 44. Balogh, "The Concept of the Carpathian Basin," 52.
 45. Hungary's first professional geographer, János Hunfalvy, laid the groundwork for later thinking on this front. See Balogh, "The Concept of the Carpathian Basin," 53. Kvassay, in turn, saw the intensification of river regulation projects at the fin-de-siècle

- as a “second conquest of the fatherland.” See Woldemár Lászlóffy, “Das Tisza- (Theiss-) Tal” [The Tisza valley], *Hidrológiai Közlöny* 12 (1932): 208. As Róbert Balogh notes, pre-World War I geographers who promoted the Carpathian Basin idea also often advocated for Hungarian imperial expansion in the Balkans. See Balogh, “A Kárpát-medence-fogalom,” 222. On the imperial ideas and aspirations of Hungarian geographers between 1870 and 1920, see Ferenc Gyuris, Steven Jobbitt, and Róbert Győri, “Hungarian Geography Between 1870 and 1920: Negotiating Empire and Coloniality on the Global Semiperiphery,” *Annals of the American Association of Geographers* 114, no. 4 (2024): 652–70.
46. Lászlóffy, *A Tisza*, 13.
 47. Lászlóffy, *A Tisza*, 13.
 48. Lászlóffy, “Das Tisza- (Theiss-) Tal,” 208.
 49. Kránicz, “The 1998 Extreme Flood on the Tisza River,” 85. Szlávik writes: “The fundamental cause of the grave flood hazard is that the overwhelmingly flat country is situated in the deepest part of the Carpathian basin, where the flood waves rushing down from the surrounding Carpathian and Alpine headwaters . . . are slowed down, combine with each other, and often result in high river stages of an extended duration.” Szlávik, “Emergency Flood Reservoirs in the Tisza Basin,” 375.
 50. Szlávik, “Emergency Flood Reservoirs in the Tisza Basin,” 346.
 51. Kránicz, “The 1998 Extreme Flood on the Tisza River,” 86. Szlávik notes that “Flood plains make up 22.8% (21,248 km²) of the total country area of 93,000 km² . . . these plains comprise . . . [roughly] one-third of the total arable land in the country” and substantial industrial and transportation infrastructure. Szlávik, “Emergency Flood Reservoirs in the Tisza Basin,” 375.
 52. Edward Viczián, *Waterways, Hydraulic Powers and Territorial Integrity of Hungary* (Hungarian Territorial Integrity League, 1919), 12. On Viczián himself see Sándor Rohringer’s eulogy of him published in both Hungarian and German in the 1931 issue of *Hidrológiai Közlöny*. Sándor Rohringer, “Viczián Ede emlékezete” [In memory of Ede Viczián], *Hidrológiai Közlöny* 11 (1931): 5–7; and Alexander Rohringer, “Erinnerung an Eduard Viczián” [In memory of Edward Viczián], *Hidrológiai Közlöny* 11 (1931): 55–57.
 53. Viczián, *Waterways, Hydraulic Powers and Territorial Integrity of Hungary*, 3.
 54. Viczián, *Waterways, Hydraulic Powers and Territorial Integrity of Hungary*, 5.
 55. Viczián, *Waterways, Hydraulic Powers and Territorial Integrity of Hungary*, 12.
 56. Paul Teleki, *Short Notes on the Economical and Political Geography of Hungary* (V. Hornyánszky, 1919), 1. Like other Hungarian geographers, Teleki was willing to admit that Hungary’s geographical unity was neither perfect nor complete. “The practically uninhabited belt of the Carpathians,” he added, “form a splendid natural frontier on three sides, similar to the Pyrenees and the sea in France. The weakest side, which in

France is on the North-Eastern border, is [in the Hungarian case] on the South-Western side.”

57. Teleki, *Short Notes on the Economical and Political Geography of Hungary*, 14.
58. Teleki, *Short Notes on the Economical and Political Geography of Hungary*, 11.
59. Teleki, *Short Notes on the Economical and Political Geography of Hungary*, 10.
60. Teleki, *Short Notes on the Economical and Political Geography of Hungary*, 14.
61. Eugen [Jenő] de Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, Annex 1 of Note XXII presented to the Peace Conference (Victor Hornyánszky, 1921), 1. It is worth noting that Cholnoky was willing to concede that, though Hungary could claim historical and hydrological legitimacy to its southern frontier, the territory south of the Danube-Drava line did not really gravitate toward Hungary, at least not in the way that territories north of the Danube did. As he wrote: “The southern frontier of the Hungarian basin should be in reality on the Southern watershed of the Danube-district; but this would unite to Hungary territories with such foreign interests and of such foreign nature that there would be no place for any frontier here unless Magyars were living also to the south of the Danube-Drava line. The territory situated to the south of the Danube-Drava line differs considerably from the Hungarian basin in climate and mode of life alike; but at the same time it is completely separated from it by the extremely broad and thinly populated flood areas of these rivers. The fact that historically it belongs to the Hungarian basin is in any case expressed by the historical truth that in the days of the Árpád kings and the Anjous, the territory of the Hungarian kingdom extended far to the south of the Danube and the Drava” (1).
62. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 8.
63. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 21.
64. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 22.
65. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 25.
66. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 29–30.
67. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 9. To this assessment he added that the funds for flood control “were naturally provided by in greater part by the owners of the lands thus protected,” but that “they were strongly supported by the Government. The works on the central channel of the river [for navigation purposes] were carried out by the State itself, at a cost of more than 40,000,000 crowns.”
68. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 9.
69. Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 10. Arguments like Cholnoky’s contributed directly to the creation and consolidation of what Péter Martón and Kinga Szálkai have identified as Hungary’s “downstream identity.” As they argue, this identity emerged in the context of Hungary’s interwar disputes and irredentist ambitions, and it was tied directly to a host of social, political, economic, and especially hydrological anxieties articulated by scholars, politicians, professionals, and technocrats.

Using Hungary as a case study to deconstruct the upstream/downstream binary present in hydropolitical security complexes globally, Martón and Szálkai point out that Hungary's "downstream identity" and its associated insecurities (both real and imagined) fail to take into consideration that, relative to Serbia, Romania, Bulgaria, Moldova, and Ukraine, Hungary itself is also simultaneously an "upstream" country. This identity also fails to acknowledge that, though downstream communities are "asymmetrically vulnerable" to decisions made upstream, actions taken downstream can nevertheless also have upstream consequences. As they argue, "on the basis of [a close] examination of documents and discourses, it becomes obvious that the over-securitizing of Hungary's downstream position is a key feature of Hungarian water-related public discourses. The analysis also shows that neither the strategic documents nor the academic discourse contains a single reference to the upstream responsibilities of Hungary, and that a certain under-securitisation is observable in the case of upstream water-related issues." See Péter Martón and Kinga Szálkai, "Against the Current: Deconstructing the Upstream/Downstream Binary in Hydropolitical Security Complexes," *New Perspectives* 25, no. 3 (2017): 31.

70. See, for example, Molle, Mollinga, and Wester, "Hydraulic Bureaucracies and the Hydraulic Mission"; Eric Swyngedouw, "Modernity and Hybridity"; and Janác, "From Nature to National Networks."
71. Matteo Proto, "Irredenta on the Map: Cesare Battisti and Trentino–Alto Adige Cartographies," *Journal of Research and Didactics in Geography* 2, no. 6 (2017): 85–94.
72. Górný, *Science Embattled*, 130. On similar arguments made in support of the Austrian claims to the Hungarian Burgenland after World War I, see Ferenc Jankó and Steven Jobbitt, "Making Burgenland from Western Hungary: Geography and the Politics of Identity in Interwar Austria," *Hungarian Cultural Studies* 10 (2017): 14–40.
73. See, for example, "A magyar béke delegáció memorandum a határ-kérdésben," *Buda-pesti Hírlap* (February 15, 1920): 1.
74. "A magyar béke delegáció memorandum a határ-kérdésben," 1–2. The notion of non-Hungarians as poor stewards of the land was a common trope among Hungarian geographers and hydraulic engineers at the beginning of the twentieth century and was often emphasized as a justification for internal colonization prior to World War I. The notion of Romanians as incapable of managing the Carpathian forests was revisited by the Hungarian geographer Ferenc Fodor in his unpublished "biography" of his hometown of Szatmárnémeti (which had been lost to Romania as a result of the Trianon). See Ferenc Fodor, "Szatmár földje, Szatmár népe, Szatmár élete" [The land, people, and life of Szatmár], Magyar Tudományos Akadémia Könyvtár Kézirattára [Archives of the Hungarian Academy of Sciences], Ms 10.740/1 (unpublished monograph, 1954), 250–54.
75. "Budapest Trianonja: a szennyves ivóvíz" [Budapest's Trianon: dirty drinking water],

- Budapesti Hírlap* (January 22, 1930): 3–7.
76. See for example David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (W. W. Norton, 2006).
 77. “‘Appeal’ published by the University of Budapest to the universities of Europe und [sic] America, 1919,” Records of the United States Department of State Relating to the Internal Affairs of Austria-Hungary and Hungary, 1912–1929 (National Archives Microfilm Publication, no. 708) 864.00/168 (reel 3).
 78. See Ferenc Fodor, “Trianon az oka . . .” [Trianon is the reason . . .], *Fiatal Magyarország* 1, no 2 (1931): 17.
 79. Sándor Rohringer, “Vízgazdasági politikánk” [Our water management policy], *Vízügyi Közlemények* 9, no. 2 (1923): 3.
 80. Rohringer, “Viczián Ede emlékezete,” 6.
 81. Rohringer, “Vízgazdasági politikánk,” 3.
 82. Rohringer, “Vízgazdasági politikánk,” 5–7. Elek Schmidt made a similar claim in 1929 regarding the Danube–Tisza interfluvium, stressing the failure of the state to build and maintain a navigable canal between the two rivers. One of the main reasons for this failure, he argued, was that more resources had been going to railways than canals and other channelization projects since at least the last quarter of the nineteenth century. “When compared to the railway,” he proclaimed, “water regulation has long played the role of the stepchild.” Schmidt, “A vízszabályozás fejlődése és jelen állása Magyarországon,” 15.
 83. Rohringer, “Vízgazdasági politikánk,” 6.
 84. Rohringer, “Vízgazdasági politikánk,” 8.
 85. Rohringer, “Vízgazdasági politikánk,” 9. For similar rhetoric, see also Sándor Rohringer, “A pestvármegyei Dunavölgylecsapoló és öntöző társulat munkálatai” [The works of the Danube Valley Drainage and Irrigation Company in Pest County], *Vízügyi Közlemények* 9, no. 1 (1923): 47–48.
 86. Noémi Ujházy and Marianna Biró, “The ‘Cursed Channel’: Utopian and Dystopian Imaginations of Landscape Transformation in Twentieth Century Hungary,” *Journal of Historical Geography* 61 (2018): 6. On the notion of “cultural advantage,” see also Gyuris, “Human Geography, Cartography, and Statistics,” 234.
 87. Beyond flood control, questions of irrigation, navigation, water use, forestry, and hydropower were central concerns for state-centric “hydrocrats” in the interwar period. On forestry and hydropower generation in particular, see Balogh, “A Kárpát-medence-fogalom,” 219–44.
 88. Particularly significant in this regard was the introduction and then intensification of monoculture in the reclaimed lowland regions of the Great Plain. See Bellon, “Living Together with Nature,” 252–53.
 89. Pinke, “Modernization and Decline,” 100. Pinke notes that landowners whose lands had not been prone to flooding before regulation work began were now in danger of

having declining crop yields and damaged buildings. He also points out that, by the 1880s, approximately 3,000 km² of formerly floodless areas were now prone to inundation.

90. Viczián, *Waterways, Hydraulic Powers and Territorial Integrity of Hungary*, 5.
91. Pinke, "Modernization and Decline," 105.
92. Ujházy and Biró, "The 'Cursed Channel,'" 12.
93. Bellon, "Living Together with Nature," 253.
94. Jenő Cholnoky, "Néhány szó Szlovenszko sorsáról" [A few words about Slovakia's fate], *Magyar Nemzet* (November 25, 1938), 21. In his essay prepared for the peace negotiations in Paris, Cholnoky asserted that "the Slovaks will never be Czechs and will always look upon the latter as their oppressors. And it is only by oppression that this people can be retained in the possession of Bohemia." Later in the same essay he characterized Czech aspirations in the region in colonial terms, writing that "the Czechs, inflated by a spirit of imperialism, are seeking not to liberate their pretended kindred, but to find means for their own enrichment by plundering Hungary." Cholnoky, *Critical Remarks on the New Frontiers of Hungary*, 5 and 15.
95. See, for example, Martón and Szálkai, "Against the Current," 15–42; and Marco Antonsich and Kinga Szálkai, "On Great Hungary and the Importance of Minor Geopolitical Traditions," *Political Geography* 39 (March 2014): A1–A4. As Róbert Balogh argues in the conclusion of his article, "The interweaving of landscape, professionalization, energy history and the history of the national economy is a defining event of the anthropocene era in the Danube Basin, and it deserves much more attention than it has received so far." See Balogh, "A Kárpát-medence-fogalom," 242.

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FLOODS AND THE AFFECTIVE STATE ON THE BULGARIAN LOWER DANUBE

STELU ȘERBAN

THE CHAPTER DEALS WITH THE CATASTROPHIC FLOOD OF MARCH 1942 IN the Vidin region, on the Bulgarian bank of the Danube. The flood was caused by a massive ice bridge that formed and united the Bulgarian and Romanian shores around the island of Bogdan, eight kilometers lower from Vidin. The ice bridge obstructed the Danube's flow, and the right-hand bank overflowed. Consequently, the city of Vidin flooded, especially the districts inhabited by ethnic minorities that were close to the flood zone. The waters rose and flooded a number of villages on the Danube's banks upriver from the ice bridge, the last of which was Slanotrün, located fifteen kilometers from Vidin. Both Slanotrün and Vidin lie in the lowlands of the Vidin plain. Slanotrün was a small village on the edge of the plain, where the Danube's bank descends. Vidin, the main urban center in this region, lies almost ten kilometers from the Vidbol stream by a town now known as Dunavtsi, where the Danube bank rises, closing the plain.

The catastrophe's description in the local newspapers was touching. Vidin was flooded shortly after midnight on March 4, 1942. The roar of the water scared and surprised the inhabitants. These sounds were soon complemented by church bells ringing in the city, which the mayor ordered to awaken the population. The mayor's action saved lives, but it fueled further panic.¹ The inundation in Slanotrün was equally brutal:

The water came suddenly. . . . And we had a bridge, a big bridge, now it's destroyed. We went there. . . . If it wasn't for the bridge and the water had come more, the village would have drowned. There was water up to the windows. I was born in 1933

and in 1942 I was nine years old. . . . And I fled with my mother through the snow in an oxen-driven cart.²

The flooding of Vidin and the surrounding area resulted in a wave of excitement and solidarity throughout Bulgaria. The local and central authorities also responded promptly; top-level representatives helped to rebuild the affected areas and assisted the population there. In this vein, this chapter's main hypothesis is that, amid the physical destruction and emotional devastation that the flood caused, the state featured as the main player in restoring everyday life in this area affected by catastrophe. The two defining aspects of state intervention were (1) the Bulgarian government's immediate actions to assist the injured population both materially and in providing emotional support, and (2) longer-lasting plans, such as the consolidation and expansion of the Danube infrastructure. The first aspect includes state financial assistance programs for the affected population. Despite the modest amounts involved, this assistance had a strong emotional impact. Next, the Sofia government's visits to the affected area, including from King Boris III, also had a strong emotional impact.³ The second aspect includes the Danube embankment. This began modestly in the 1930s and was first received by the locals negatively, but it was then resumed after the 1942 flood on a larger scale with implicit agreement from the locals. The catastrophic 1942 flood led to the state gaining a central position in the Vidin area both in terms of everyday perceptions of the Danube and as engaged in the technological development of infrastructure by the river.

The next section is theoretical and focuses on the concept of affective states. First, I delineate a strictly imaginary representation of the state from an affective complex that includes structural elements of the state—such as territory, infrastructure, bureaucracy, affect, and everyday life. The next two sections examine the state's interventions to restore the infrastructure and help the flood victims in Vidin. The first of these presents supportive actions that various bodies of local bureaucrats completed. These were seemingly neutral interventions, but they left significant affective traces in the local memory. The other section focuses on the strictly affective presence of state representatives in the flood's catastrophic context. It includes field research data supplemented by data from local archives. The presence and agency of the affective state are discernible at this level in terms of local memory, a fact highlighted in the concluding section.

AFFECTIVE STATE

Works on the concept of liminality, such as Ernst Kantorowicz's *The King's Two Bodies*,⁴ have highlighted how charismatic people (either kings or autocrats as in the totalitarian regimes of the twentieth century) can come to embody the state and related concepts

of sovereignty and political power.⁵ This is further emphasized in the concept of a complex state that includes a territory over which a multi-institutional authority assembled at the local and central level—with different, sometimes overlapping powers—exercises its power both through a body of bureaucrats and through politicians. This latter perspective on the state is rooted in Max Weber's classical and long-standing definition,⁶ a definition repeated and updated in relatively recent works.⁷ This bureaucratic conception of the state, however, does not exclude the affective and emotional aspects through which the state acquires legitimacy in the eyes of its citizens. Infrastructure built on a territory is the material link that mediates this attachment and transforms the state from a bureaucratic body into an "affective" state. The catastrophe of early March 1942 in the Vidin area, although often referred to by the authorities as a "flood" (a seemingly neutral term), revealed the state's affective dimension.

The relationship between a state's territory and its sovereignty lies at the core of the "affective state" concept.⁸ Transnational economic or civil society actors exercise competing influences on territories in a context marked by globalization.⁹ In addition, in the case of weak or "captive" states, their territory is also fought over amid competition between local and central power poles.¹⁰ Finally, a state's territory, in areas less controlled by the central government and including isolated or marginal areas, has often been the source of a special affective attachment expressed most precisely by local populations, but in which local actors, transnational actors, or both have participated.¹¹

The set of institutions a state has at its disposal in a territory it controls includes bureaucratic and power networks, which are expanded by appointing or co-opting a trusted body of experts. Over time, these networks' stability, however, depends on the control the state acquires through the territorial infrastructure. This infrastructure-related bureaucracy is a central element of the affective state. The state is inextricably linked to the infrastructure on its territory; this observation equally applies to the expansion of "classical" states such as the Roman Empire and to the nation states of the modern period that have developed autonomously, such as the Western European ones,¹² or under conditions of relative dependence, such as in Eastern Europe¹³ or the states that appeared in the postcolonial period.¹⁴ Moreover, in the modern period, initiatives such as the extension of the transport network (road, river, rail, air), utilities (electricity), or large-scale technological changes, such as the regularization of rivers, all relate to the development of the state and its bureaucracy (for the Upper Danube see Haidvogel, Hohenstinner, and Schmid's chapter in this volume).¹⁵ In some cases, these infrastructure programs have even become real obsessions for the state bureaucracy—the transformation of rivers is a prime example.¹⁶

The state development of extensive infrastructure programs led to the emergence of a bureaucracy that is both dependent and reproduced over time, as Donald Worster pointed out in his seminal work on the Great Valley of California.¹⁷ But the use of a

territory to create infrastructures is not strictly organizational work. It involves dealing with conflicting affective reactions from both locals¹⁸ and “street-level bureaucrats.”¹⁹ The latter bring the state “to the streets” and transform it into a prosaic state that is deeply involved in everyday life.²⁰

Affectivity stems from human actors’ involvement in state infrastructure-development programs. Scholars have argued, however, that the meaning of affective influence can be reversed. On this view, infrastructures can exert a certain affective agency on the human actors around them.²¹ Brian Larkin’s poignant expression “the poetics of infrastructure” expresses this agency.²² Far from being mere materials built via technological means on a territory, infrastructures generate an affective space that goes beyond the simple calculation of budgets and strictly economic profitability.²³ The construction, for example, of a road connecting two Peruvian cities that were isolated in the Amazon rainforest has generated an entire history spanning several decades, in which the initial project was reconsidered and the actors involved multiplied. These actors included the local communities that generated their own particular histories and that also had an affective attachment to this road project.²⁴ This included the purely aesthetic attraction of modernist objects, including infrastructures,²⁵ and a bodily, prosaic experience that Brian Larkin conceptualized by appealing to the Aristotelian concept of *aisthēsis*.²⁶ Contact with new, unusual infrastructures extends and enriches life beyond their immediate usefulness; such contact encompasses the seemingly banal and rarely rationalized level of everyday affectivity, as contact with these infrastructures modifies traditional cyclic temporality by inserting a sense of progress.²⁷

It should be emphasized that this sense of progress is not linear, at least in the local social context, but implies a continuous connection of the local imagination of the state to the practices of its bureaucratic representatives. It is a local state conceived as a complex relationship between the state’s imagination and local practices, a state that, no matter how prosaic it may seem, is not simple at all. The concept of stategraphy focuses on the complexity of this relationship in at least three dimensions: relational modes, boundary work, and embeddedness.²⁸ This is not the place to develop the theoretical connection between the prosaic/affective state and stategraphy. However, I emphasize that within the concept of stategraphy, the lively, affective infrastructure theorized above plays a key role in all three dimensions of this concept. This type of infrastructure is able to both connect the imagination of the state with local political practices and to make clearer the boundary work of street-level bureaucrats, as well as to explain the local embeddedness of the state. Moreover, this relational perspective on the state sheds better light on the above statement that the progress inspired by the new infrastructures is not linear, but only modifies the local temporality in emotional and subjective aspects. The concept of disturbance falls within this interplay of human–nonhuman actors as a result of the connection with the concept of infrastructure (see

also the introduction in this volume). Moreover, in the case of affective infrastructure, disturbance explains the imperceptible change in the subjectivity of the locals both in relation to the state and in relation to their immediate natural environment (see also Nemes's chapter in this volume).

Such daily experiences with new infrastructures are a further element of the affective state, clarifying the prosaic geography of the statehood in Max Weber's definition of the state.²⁹ The concept of an "affective state" thus situates the state in everyday life,³⁰ so that the "prosaic" side to the state is present in equal measure (see also Gatejel's chapter in this volume).³¹ While political power and the state (its institutional expression) apparently invade and seize the intimate spaces of everyday life, an emphasis on prosaic and everyday affectivity reduces the effects of state power.³² In reality, it is an "intimate government" motivated by everyday policies based on people's emotions and their persistence in pursuing their personal projects.³³

BUREAUCRACY AND THE DANUBE FLOODS IN INTERWAR VIDIN

The catastrophic floods of March 1942 formed a conjuncture in which the Bulgarian state acquired an affective place in Vidin inhabitants' everyday life. The involvement of state representatives, and especially of bureaucrats, was felt with emotion. The new Bulgarian state's presence in this region, however, significantly predates the flood. A transitional period began in 1878 with its detachment from the Ottoman Empire. An autonomous principality was created in 1885, marked by the region's unification with eastern Rumelia (the present southern part of Bulgaria). This was followed by the catastrophe of defeats in two Balkan wars and in World War I, after which the Bulgarian state entered the interwar period with an ambitious economic and social development program planned.³⁴ Infrastructure, including that linked to the Danube, was also part of this program. The 1921 Water Unions Act, the first of its kind in Bulgaria and the only one in the interwar years, aimed to integrate watercourses into irrigation, electricity, and transport infrastructures.³⁵ Under special conditions, the colonization of Bulgarian-speaking refugees after the First World War prioritized an extensive embankment program along the Danube in order to recover territories on which refugees could settle.³⁶

The Vidin region was included in these infrastructure projects. At the end of the 1920s, the Danube embankment project began both upstream and downstream of Vidin: fifteen kilometers upstream to the village of Slanotrün, and twelve kilometers downstream to Vidbol, now known as Dunavtsi.³⁷ Local associations were also set up to exploit water resources mainly for irrigation purposes.³⁸ The localities were

reconfigured territorially through practices such as reordering streets and houses. A body of district engineers helped with this, and they would later play a key role in restoring the infrastructure destroyed by the catastrophe of March 1942.³⁹

All these state projects, however, were not well accepted by the local population. The reordering of streets in Slanotrün, for example, was perceived as an intrusion into the network of territorial kinship present in the village.⁴⁰ The locals also had reservations about the Danube embankment projects before the 1942 Vidin catastrophe. The locals' lack of enthusiasm for these projects can be explained in terms of the goals that the central government in Sofia pursued. The initial idea of an embankment on the Bulgarian Danube dated back to the 1910s, and it did indeed serve local interests in reducing mosquito-borne diseases (such as malaria) and in protecting against floods.⁴¹ In the interwar period, however, the embankment's purpose changed drastically: It was designed to transform the Danube floodplain into stable territories for agriculture on which Bulgarian-speaking refugees would be colonized after the First World War.⁴² Nevertheless, these projects were largely compromised by a lack of funding. Moreover, the call for international financial support led to the imposition of expensive technical solutions developed by experts unfamiliar with the local context. Local financial solutions were also proposed in which the municipalities and landowners participated, but these were unsuccessful.⁴³ The dams built on the Danube were thus modest, and the municipalities and the locals were dissatisfied with them.⁴⁴ Despite the dams' small size, they generated serious discontent. Archival data show, for example, that cattle grazing near the Danube were greatly limited by bans implemented to protect the dams, and locals were fined if they violated these prohibitions.⁴⁵ In fact, over time the locals successfully adapted to the Danube waters gently overflowing on occasion. Emil Kolchev, a fisherman from Slanotrün, stated:

The water came here from the valleys. It spilled sometimes. . . . It came for three, four, five days and then it receded. . . . But the puddles were full . . . from the inundated water. . . . [It was] not only in puddles, it was also in my toilet.⁴⁶

Nistor Grigoriev, from Slanotrün too, gave an even more plastic image:

[The water came] only on the street until it reached here, where my sister was. And from here it went all over the valley. And when it came, I caught fish. And my brother's mom . . . they came and caught fish. . . . Everywhere there were valleys and hills.⁴⁷

This explains why previous floods with catastrophic effects did not leave such poignant and affective memories in the collective memory as did the catastrophe of March 1942. Ten years before, in 1932, the entire Vidin region was affected by a flood that

covered almost 6,000 hectares of arable land and destroyed the homes of 135 families in the city. The flood was followed by a malaria epidemic that sickened 795 people (4 percent of the population) in the city and 3,855 people (4.42 percent) in the entire district.⁴⁸

The apparent neutrality and strictly bureaucratic approach to the Danube issue in Vidin was also visible in the special situation of March 1942. Thus, unlike the general state of panic present among the locals, the government authorities had already foreseen a possible worsening of the weather, and they knew it could lead to the freezing and blocking of the Danube's course in the Vidin area. This was why their reaction was less emotional. In late February, Petar Gabrovski, the minister of internal affairs and public health—an emblematic figure intensely involved in the recovery from the March 4 catastrophe across all of Vidin—set up a joint committee composed of government representatives, local authorities, engineers, and architects. This committee was to react in the event of a catastrophic flood.⁴⁹ Less action was taken to raise the population's awareness about such a possible event, and so the flood caught the population by surprise. This was probably, however, the intention of the authorities so as not to create panic. The government's reaction was thus swift. On March 7, just three days after the Vidin flooding, a military authority was established to implement a general disaster recovery plan drawn up in Sofia. This plan dealt not only with Vidin but also with the other lowland areas on the Bulgarian bank of the Danube up to Silistra.⁵⁰ Despite the fact that Bulgaria was involved in the Second World War at that time, the military administration in Vidin was in charge for a relatively short period. In June 1942, a civil administration took over again with the appointment of Kiril Startsev, the former mayor of the Danube city of Ruse, a remarkable personality from the Bulgarian administration at that time.⁵¹ In fact, unlike in neighboring countries, Bulgaria's participation in the Second World War did not create a state of panic and necessity in the country. After the military catastrophe of the First World War, Bulgaria tried to adopt a neutral position in the interwar period, entering the Second World War only in 1941, but only to protect itself from a German invasion on the northern flank.⁵² Bulgaria's moderate attitude during this period is also reflected in the deportation of Jews and Roma, which did not reach the levels of other Eastern and South-Eastern European countries. Moreover, the Bulgarian government and certain public figures openly opposed these deportations.⁵³ In the case of the 1942 Vidin flood, this explains the protection of the Roma population in the city by the authorities, a situation to which I refer below.

March 1942 in Vidin was, admittedly, a period of uncertainty due to the long period in which the waters of the Danube covered the city and most of the region. While the flood began on the night of March 4, the catastrophic flooding peaked five days later, on March 9, and the waters did not recede until March 19. They left behind a thick layer of sludge mixed with the corpses of animals caught by the waters.⁵⁴ At the

maximum water level, almost the entire city was covered, leaving only three or four hundred houses in the central area above (see figure 5.1). Also, many of the adjacent localities were flooded during this period (see figure 5.2). Palliative actions by the authorities, such as mobilizing soldiers and fishermen to rescue victims by boat, or collecting funds to help victims, are thus understandable.⁵⁵ Officials in Gabrovski's ministry, for example, finalized a list of donations totaling 37,100 levs on March 13, with 143 donors. Minister Gabrovski was at the top of the list with a 10,000 levs donation, followed by Angelov, the secretary of state, who donated 2,500 levs. All the other amounts ranged from 50 to 1,000 levs. All the contributions made in this campaign were described as voluntary (*dobrovolno*).⁵⁶ Even if the amounts raised from such campaigns were symbolic compared with the number of victims, they had an important impact in contributing to the state's bureaucratic presence by constructing a strong affective and emotional component in the collective memory.

Once the flood had subsided, the state administration devised a precise plan of measures to financially support the victims, with the aim of restoring the destroyed assets. An order (*zapoved*) was issued by Minister Gabrovski to evaluate all damages and the families affected. In the city of Vidin, it was the municipality that put this order into practice by setting up a commission headed by the architect Ljuben H. Yonchev.⁵⁷ The order provided for financial aid up to a limit of 40,000 levs delivered in two installments. The first installment was provided immediately after the case became known to the authorities, and the second installment was provided when the precise damage had been assessed. Curiously, the city's Roma population (*tsiganite*) was treated differently. Their compensation was limited to 20,000 levs, also payable in two installments, but with the caveat that a future provision (*narezhdane*) would reconsider their situation.⁵⁸ There was no exclusion on general ethnic grounds because both the Turkish and Romanian-speaking populations were included in the first category of compensation. Instead, the criteria concerned the payment of taxes to the Bulgarian state, the assessment of damage in the first compensation category (this included damage to taxable goods, such as land and buildings), and the amount of tax last paid. For the Roma population none of these criteria were mentioned.⁵⁹ The Roma population of Vidin was then settling in the Bonchova district (Bonchova mahla), thanks to the efforts of the former mayor of Bŭrni Bonchev, who also named the neighborhood.⁶⁰ Thus, compensation for the Roma population was reduced not to their ethnicity but to their social situation, which was stabilizing at that time.

These campaigns to help the victims lasted over two years, and a special directorate for the city's reconstruction and recovery (*vazstanovjavane*) was established to implement the policies. This directorate was detached from the territorial systematization directorate established shortly before World War I. The initial assessment of the damage only considered the category of taxpayers, and it amounted to almost 6,800,000

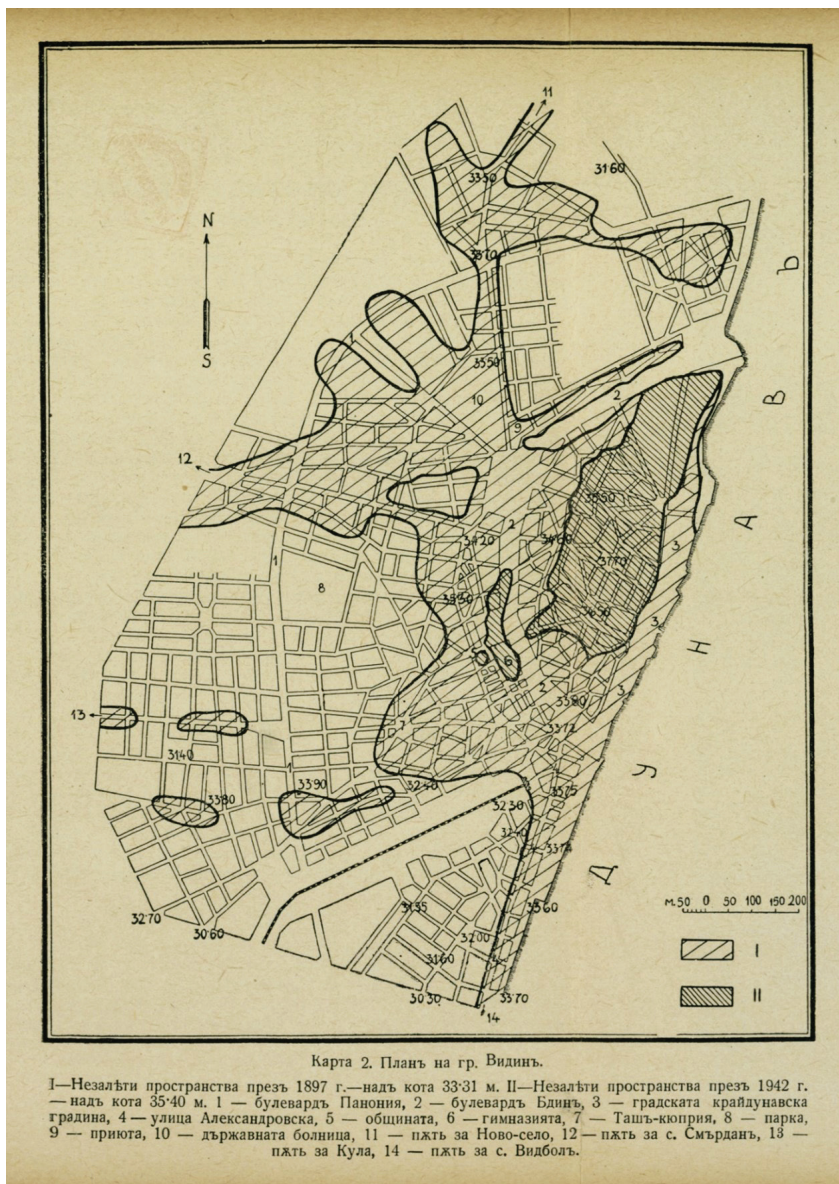


Figure 5.1. The flooded town of Vidin in March 1942. Only area II of the town remained unflooded. Source: Küncheva, "Vidinskoto navodnenje."

levs. Most of the families affected lived on one of three streets (Pjasachen brjag, 169; Preslavska, 116; and Bezdomnichka, 59). Altogether, these totaled more than 95 percent of the 345 families affected.⁶¹ Across the entire region of Vidin, however, the damage

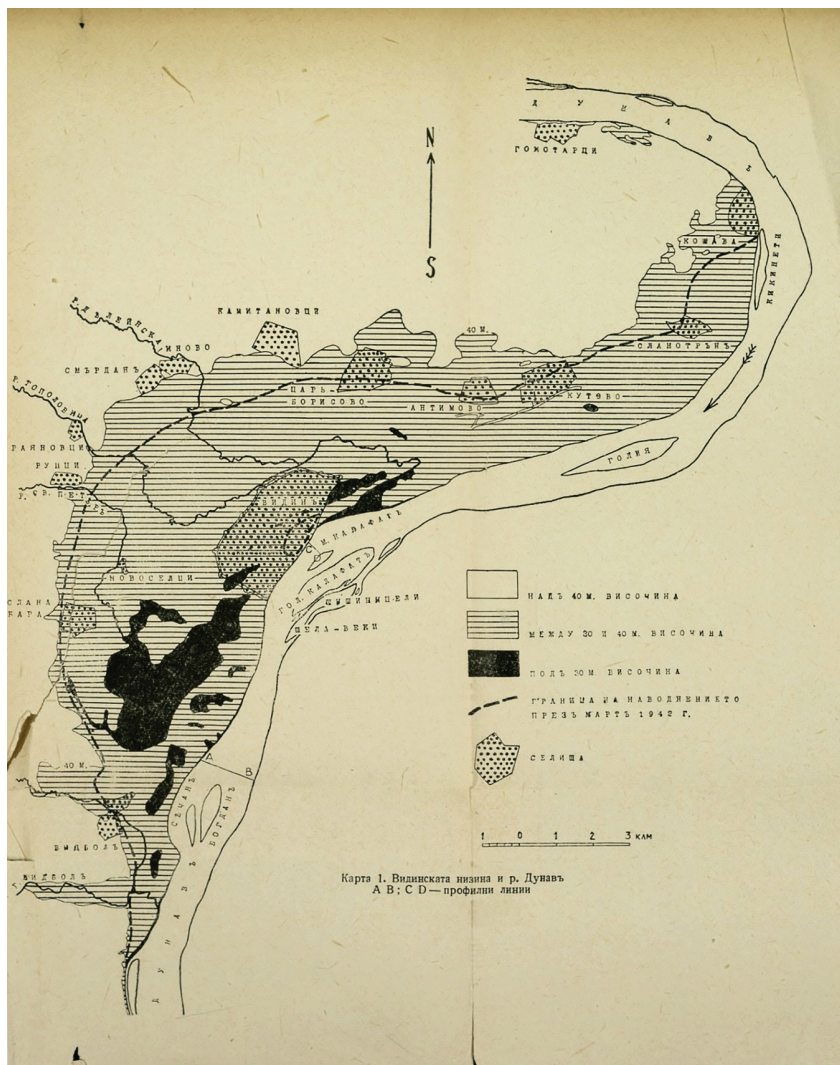


Figure 5.2. Flooded settlements in the Vidin area in March 1942.

Source: Küncheva, "Vidinskoto navodnenje."

was greater: The official data showed that 3,078 dwellings suffered damage estimated to be worth 68,000,000 levs.⁶²

Yet in Vidin, payments only started in August 1942.⁶³ Small sums were paid at first—between 150 and 700 leva—to 405 victims. This totaled 241,604 leva, and then there were large amounts allotted to forty-four victims, which totaled 565,752 leva. The same kinds of payments continued over the following months, while for the Roma in Bonchova mahla, a

hefty sum of just over 3,000,000 leva was paid in October to 344 families.⁶⁴ Amounts were also paid to some intermediaries (either municipal authorities or individuals) who organized the victims' relocation during the recovery period. In April and May 1942, sums of between 200,000 and 500,000 leva were paid to individuals in Sofia, almost 30,000 leva to the municipality of Plovdiv, and 610,000 leva to the municipality of Pleven.⁶⁵ State support via the reconstruction directorate continued until 1944, and materials were allocated to individuals for the restoration of destroyed buildings. One of the many examples of this kind was that of the dentist Zdravka Damjanova who asked for nine cubic meters of wood on August 4, 1943, to construct a new dwelling in place of a ruined one.⁶⁶ The reconstruction directorate was disbanded in 1944. The final balance sheet of the support given for reconstruction, dated from January 1944, shows that the initial assessment was relatively accurate: The total amount allocated was almost 8,900,000 leva, divided between 261 beneficiaries.⁶⁷

On the one hand, the Bulgarian state's response to the flood of March 1942 demonstrates its capacity to map and control the territory by monitoring the size and flows of population and goods through abstract policies grounded in the bureaucracy's apparent neutrality.⁶⁸ Yet this capacity was severely limited by the government officials' emotional involvement, as in Petar Gabrovski's ministry or the reactions of local bureaucrats. We are therefore not dealing with a high-modernist bureaucracy inclined to develop a discourse of power and to manipulate legibility, but with a "prosaic stateness" that highlights "the openness, porosity, heterogeneity, fallibility, unevenness and creativity of state practices."⁶⁹ It is difficult to gauge how much was strictly bureaucratic neutrality and how much emotion and compassion was present in the state representatives' actions here. The hefty sums allocated for hosting the victims in Sofia suggest that profits had also been made by some.

On the other hand, the population of the entire region was affected by the catastrophic flooding and engaged in operations to solve the problems it caused. The next section gives examples of such involvement, ranging from simple relocation until the waters receded to the reconstruction of damaged infrastructure such as dams. The state response was intertwined with the reactions of common people in a complex of political attitudes that I conceptualized in the theoretical sections through the expressions *aisthēsis* (Brian Larkin) and "prosaic or affective state." The next section clarifies how locals in the flooded villages of Vidin reacted to, understood, and put into practice the government's program of recovery from the catastrophe within the limits circumscribed by these affective states.

AFFECTIVE STATES AND THE FLOOD

Works on this topic have shown that the affectivity generated by such local catastrophes challenges the central government's fake neutrality (see also Dorondel's chapter

in this volume).⁷⁰ In the case of the 1942 Vidin flood, the affectivity I theorized earlier can be identified in memories, which span long historical periods, of local catastrophes that have pushed communities to their limits.

At first, the government tried to keep its impartiality, using the neutral term “flood” (*navodnenje*) in both official releases and in the internal circulation of documents (later archived). It seems that the government in Sofia sought to perceive the catastrophe of March 1942 in the most neutral terms possible. Similarly, as mentioned above, while there was data on the Danube’s critical situation as early as February, the authorities preferred not to inform the population about this. In contrast, the local population (the Romanian-speaking one, at least) called the event a *naboi* or *navoi*, which means a sudden and destructive outpouring of floodwaters, a term totally different from the flood term the locals understood as “the coming of the waters,” which was an unexpected annual event.

Later, raids by the central authorities in the flood zone forged affective bonds with the local population. I have already mentioned Minister Gabrovski’s visit immediately after the flood. Also, the head of the Bulgarian state, King Boris III, apparently visited the Vidin region at that time. Curiously, his visit was not a proven fact, but in local memory the alleged visit was remembered in consistent, detailed narratives.⁷¹ As one local recalled:

I heard from the elders that King Boris came here and looked from the cemetery/*grobishte* (this it was the highest place in the village) to see where the Danube spilled, and then he gathered the people and made a levee.⁷²

Other than the authorities, the Danube’s sudden flooding in March 1942 took the common people by surprise. Nistor Grigoriev, who was mentioned above, witnessed the flood. On the topic of the catastrophe in Slanotrün, he said:

1942 was the year of the *naboi* when the Danube froze and could not pass the ice water, and so it turned the water back and made the *naboi*. Here in the village, everything was covered. There were only twenty houses left above water. Our house was damaged by the *naboi*, and we had left the village, and if the soldiers hadn’t come, we wouldn’t have the sheep and the oxen. They freed a path to the sheep, and they took them out, but a pig drowned; it was left here and it drowned.

On the one hand, Grigoriev’s story clearly expressed the initial shock of the catastrophe. On the other hand, the state presence, through which soldiers helped the locals to escape this situation, must be remembered. Along with other emotive presences such

as King Boris III's visit, which the collective memory retained as real, the state affectionately impregnated everyday life in that period.

Immediately after the waters receded and the communities recovered, the state's presence there seemed to cease. The locals of Slanotrŭn, and those from the neighboring villages, had moved to stay with relatives and acquaintances in other, unflooded localities, from where they returned. There was, however, some help from the local authorities. In 1942, the Slanotrŭn municipality's budget, which then also included the neighboring village of Kutova, had expenses of 15,000 levs available for helplessness and disaster relief (*bedstvie*)—four times more than in the previous year.⁷³

The central state imposed its presence, however, in the second half of 1942. But this time, it involved the locals in the restoration of the Danube levee, which was damaged in several places, thus building on the previous affectivity it had generated. The narratives related to this event were also rich in detail. Ghiorgi Evdokimov, who worked on the restoration of the levee in 1942, recalled the event as follows:

On the first levee they have worked from all villages, with wheelbarrows . . . the second levee (meaning the one built in the socialist period—m.n.) was made with bulldozers (*bagere*) . . . the engineer Urumov was from Sofia, there were two guys to win the tender . . . it was not like now . . . they would carry out big deposits (*ieme*) of earth with oxen . . . Urumov was paying, that great poverty was . . . He went bankrupt after he finished the levee.⁷⁴

The empathy and affection with which the locals recalled the government project to restore the levee is remarkable in Evdokimov's account. Moreover, compared with the engineer Urumov, who played the role of a street-level bureaucrat in this context, a certain compassion was also present toward his company having won the government tender and having gone bankrupt, in part also as a result of the consistent payments made to the locals for their work. In such accounts, Urumov was perceived both as a state representative and as very close to the locals. On the one hand, a representative of the "prosaic" state is present here in the locals' perception. On the other hand, the locals were emotionally involved in this project, and so it became somewhat of a topic in their everyday lives.

The word *naboi* shows that the locals perceived the flood of 1942 as a profound disturbance of both the social and natural order (see the introduction in this volume), but it should be emphasized that this disturbance also determines a new perception of the state, of the political authority, and of the power that its institutions exercise (see also Gatejel's chapter in this volume). It is a question of connecting the imaginary of the state with the local political practices of its representatives, or what Thelen, Vettters, and von Benda-Beckmann call "stategraphy."⁷⁵

CONCLUSION

The center–periphery relationship has always been present in the political and territorial systems of the state; yet this relationship has been conflictual, or at least ambiguous. On the one hand, some works have addressed this relationship as conflict and as social resistance, wherein groups on the periphery riot against the state’s social and institutional framework.⁷⁶ On the other hand, marginal groups can turn the government’s bureaucracy and central authority into a local state, or what is more, into an affective state, as happened after the Vidin catastrophe of March 1942. In this situation, the central government’s authority was transformed through a “politics of the poor,” based on emotion, affectivity and prosaic attitudes (see also Dorondel’s chapter in this volume). What made it different from social resistance was an affective involvement in governmental projects and even their intimacy, as I pointed out at the end of the last section.

A second conclusion relates to the concept of an affective state. In light of the Vidin case study and following in Max Weber’s footsteps, this represents a set of institutions and authorities operating on a given territory and in relation to a visible and active population. These institutions and authorities exercised power that had affective and long-lasting effects. Indeed, it was precisely this subjectivity that built the connection between the body of citizens and the whole state. The central place that the state occupies in the memories that Vidin inhabitants had of the March 1942 catastrophe shows that it was an affective state. Whether intentionally so or not, its representatives restored infrastructure destroyed by the flood in such a way that besides the state-promoted image of being an authoritarian and powerful state—an image visible on a few occasions, such as when the military administration visited the area immediately after the flood or during visits allegedly made by high-level politicians such as King Boris III—the locals perceived the recovery from the catastrophe as their own project, and they invested their time and energy in this project affectively. Moreover, from that time onward, state institutions and government agencies constantly intervene in the relationship of the locals with their natural environment, in particular with the Danube and the floodplain that surrounds it. Framed within the concept of disturbance, this catastrophic flood changes the terms of the social contract between the government and citizens (see also the introduction in this volume).

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NOTES

1. Teodor Andreev, “Navodnenjeto, koeto postavi süshestuvaneto na Vidin pod vüpros,” <https://bulgarianhistory.org/goliamoto-navodnenje-vidin-1942/>, accessed July 20, 2022; Bogdan Minkov, “Goljamo navodnenje,” online www.vidin-online.com, accessed July 23, 2022. For a nonemotional description see Elena Küncheva, “Vidinskoto navodnenje prez m. mart 1942 god. vüv vrüzka na rezhim na r. Dunav,” *Izvestiya na seminarite pri istoriko-filogicheskaya fakultet na Universiteta Sveti Kliment Ohridski v Sofia* 2 (1943): 13–16.
2. Petar Blazhoiev, tailor, b. 1933, in Slanotrün.
3. Although the king’s visit was not a verified fact (Minkov, *Goljamo navodnenje*), it does feature in the local memory as part of consistent and detailed narratives (see below).
4. Ernst H. Kantorowicz, *The King’s Two Bodies: A Study in Mediaeval Political Theology* (Princeton University Press, 1957).
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 47. Nistor Petrov Grigoriev, b. 1921, land worker at the collective farm, worker at the railways and mines, and his daughter Tsvetanka Nistorova Kolcheva, b. 1938, tailor, both from Slanotrŭn.
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THE OTHER 1956

The Danube and Flood Narratives in Hungary

ROBERT NEMES

INTRODUCTION

The Danube River froze in 1956. This was not unusual; before global warming, this happened regularly, especially in Hungary. Contemporary studies suggested that the Danube stayed ice free only 1 year in 28, and that the ice stopped moving in 40 years out of 100.¹ But 1956 was exceptional: In January a mild winter turned bitterly cold, with temperatures reaching minus 20° Celsius. By February more than 1,000 kilometers of the river had frozen, from Orșova in Romania to Hainburg in Austria. Weeks later, the weather suddenly warmed and heavy rain fell in the Alps. At the beginning of March, however, temperatures again plummeted, creating a huge ice jam south of Budapest and causing water levels to rise precipitously. Newspapers described the ensuing struggle to break up the ice and contain the river as a “great trial, a hard war.”² Tens of thousands of people worked to shore up levees and other flood defenses. Despite their efforts, water broke through at multiple points, leaving more than 75,000 hectares of farmland under water in southern Hungary. Writing months later, a leading engineer soberly concluded that if meaningful flood protection measures were not undertaken, then the occurrence of another “catastrophe” would be “inevitable.”³

For all its drama, the Danube flood was soon overshadowed by another disturbance, the 1956 Hungarian Revolution. The flood was relegated to specialized areas of scholarship (water engineering, histories of river regulation, regional studies) but otherwise received little attention.⁴ Over the past two decades, however, Hungary’s rivers have become a rich field of interdisciplinary research, with contributions from anthropologists,

environmental historians, geographers, and sociologists.⁵ Within this historiography, important studies have appeared on floods from the Middle Ages to the modern era.⁶ Taken together, they offer key insights for thinking about the events of 1956. They show that competing political, social, and economic interests shaped how both state and local actors prepared for, responded to, and recovered from floods; at every stage, some kinds of expertise were considered more valuable than others. Particularly over the last two centuries, officials and engineers have played a leading role in river regulation and flood prevention. Although their actions have allowed the Hungarian state to assert its political power and mastery over nature, the outcomes for people living along rivers have been much more mixed. Ultimately, this scholarship leaves little doubt that floods, to borrow a phrase from Wiebe Bijker, are “thick with politics,” by which he means “a broad range of politics, from the micro to the macro scale, that is related as much to the power of humans as to the power of ideas and things.”⁷

This study looks at the many meanings and consequences of the 1956 flood in Hungary.⁸ The environmental historian William Cronon once wrote that “we need stories about stories about nature,” and, in separate sections, the chapter examines the narratives that emerged on the state, regional, and local levels about the flood and its aftermath.⁹ These stories mattered for all those involved. As the authors of a recent book on infrastructure and repair have argued: “A successful repair is not only a material accomplishment; repair also creates a shared narrative of what went wrong and how it was fixed, persuading participants that local sociotechnical order has been restored.”¹⁰ This study argues, however, that a single “shared narrative” did not emerge in Hungary in 1956. For the state authorities in Budapest, the flood was a demonstration of Hungary’s military strength, technical prowess, and socialist modernity. Regional leaders largely agreed, but they also expressed doubts about the performance of key officials and the reliability of the wider population. On the local level, people displayed a mixture of pride, acceptance, loss, and regret, even as they largely adopted the state’s vision of the future.¹¹ In this way, the Danube’s freezing and flooding in 1956 disturbed not only the normal flow of the river but social and political relations on its banks as well.

The events of early 1956 also produced a torrent of documents and images, long neglected in libraries and archives. These include daily and even hourly reports from towns along the Danube, magazine and newspaper articles, minutes of local council meetings, county records, engineering studies, petitions from affected residents, black-and-white photos, and newsreels. To make sense of this mass of material, this chapter’s three sections telescope from the state level to a county in southern Hungary, and then to a small town on the Danube. The aim is not to describe the flood from start to finish, but to reconstruct and analyze the stories that were told about it at the time. These contain the expected tropes—a raging river and stalwart defenders—along with some unexpected elements: airplanes, excavators, megaphones, a statue, and a beach.

THE STORY FROM BUDAPEST

In 1956, Hungarian moviegoers were treated to a nine-minute newsreel titled “Icy Flood” (*Jeges Ár*).¹² It provided a dramatic account of the recent Danube flood, and its producers had expertly combined black-and-white film with a confident male voice-over, rousing musical score, and varied sound effects, from the crack of ice to the boom of bombs. They used footage taken from planes, boats, bridges, and the river-bank. No individuals are named, but viewers see many close-ups: soldiers planting explosives in the ice, a truck driver dumping dirt for workers to shovel, a member of the river force speeding toward stranded civilians, and a peasant woman soberly watching a house collapse. The film ends with a call for aid to the victims, stressing that “those who embrace one another are stronger than anyone else.”

This newsreel contains images long established in depictions of floods from across the centuries: stormy waters, submerged buildings, imperiled people (and animals), bold rescuers.¹³ At the same time, it typifies the Hungarian media’s coverage of the 1956 flood and allows us to see how this disaster was viewed from Budapest, the center of political power. As a rule, journalists did not focus on top leaders; Mátyás Rákósi, the embattled First Secretary of the Hungarian Working People’s Party, was not linked to the flood.¹⁴ Instead, they emphasized the irresistible strength of Hungary’s military, machines, and modernity. This section examines the flood narrative that emerged from the center, underscoring the logic and limitations of the claims it contained.

The 1956 floods arrived more than a century after the leaders of Hungary (and before it Austria-Hungary) had committed themselves to transforming the country’s many rivers. Work was irregular and halting, but over the course of decades engineers created navigable channels by repeated dredging and by removing islands and shoals; built thousands of kilometers of levees to keep floodwaters out and increase river flow velocity; blocked side channels and streams; and drained wetlands and swamps. State officials invested considerable political and economic capital in these projects, which remained a high priority even after the Second World War and the introduction of state socialism. According to Dénes Ihrig, a highly accomplished engineer and university lecturer, the postwar period marked a paradigm shift from older strategies of river regulation and flood prevention to what he called “planned water management activity” (*tervszerű vízgazdálkodási tevékenység*), which was modern, rational, and all-encompassing in its attention to every sector of the economy.¹⁵ Writing in 1973, Ihrig took justifiable pride in the professionalization, mechanization, and measurable achievements of Hungary’s water managers in the postwar decades. And his linkage of large projects with modernity and rationality sat well not just with the aims of state socialism, but of modern states more generally.¹⁶ Amid the chaos of a huge flood in early 1956, representatives of the state and mass media would attempt to inject the same attributes into the narratives they created.

Engineers like Ihrig understood that, for all their accomplishments, floods remained a danger on key sections of the Danube. In Hungary these encompassed the stretch of the Danube from the Austrian border to the city of Győr (a region known as the Szigetköz) and much of the river south of Budapest. Both regions flooded in July 1954, and officials and engineers found both useful lessons and reasons for concern in this experience. The 1954 flood was caused not by ice but by heavy rains in Germany, Austria, and Hungary.¹⁷ Particularly in the Szigetköz, water seeped through sodden embankments, leading to dangerous breakthroughs in many places. More than 30,000 people had to be evacuated, 2,656 houses were damaged, 39,000 hectares were flooded, and costs totaled 750 million forints. In a report issued the same year, Ihrig and Woldemár Lászlóffy took stock of what had gone wrong. But they also characterized the flood as a mostly successful “test of strength” for crucial institutions. They observed that successful defense required the full cooperation of water authorities, the military, government and party organs, and economic units with essential machines and materials.

Two years later, the mass media would highlight the contributions of the same institutions in their coverage of the flood. In newspaper articles, radio broadcasts, and newsreels, the media depicted a state and its representatives responding with strength, unity, and organization. As an embodiment of these traits, the military featured most prominently. The “Icy Flood” newsreel shows artillerymen launching mortar rounds against the ice, specialist troops rappelling down a Budapest bridge to plant explosives in the frozen river, and sailors using boats to rescue civilians, animals, and furniture.¹⁸ In towns and villages up and down the Danube, soldiers directed traffic, distributed food and clothing, and used their radios to coordinate efforts on the ground. Some journalists took the military presence a step further, turning the entire struggle against the river into an armed conflict. “A hard war is being waged by thousands of people on the lower Danube,” wrote one.¹⁹ He continued: “In this great struggle, hundreds of nameless heroes are born.” Other articles used phrases such as “siege,” “battle,” and “heroic struggle”; one said that “every small village has been turned into a fortress.”²⁰ This was not a flood, but a war.

Airplanes featured prominently in this narrative. For decades, militaries had used air forces for observation and bombing during floods; during the terrible flood of 1941, Hungarian planes dropped bombs on the ice jam and flew the regent, Admiral Miklós Horthy, over afflicted regions.²¹ In 1956, Czechoslovakia, Yugoslavia, and Hungary all deployed their air forces. “Icy Flood” has an extended montage in which Ilyushin Il-10 planes take off and deploy for a bombing run; large explosions appear in the mass of ice; and a pilot looks through his bomb sight (Figure 6.1). The narrator meanwhile explains that planes bombed “without pause” and, in a later sequence, credits them with helping to break up the ice and get it moving.²² The Hungarian air force mustered 24 planes and dropped bombs as heavy as 250 kilograms. Planes were also used as spotters, and,



Figure 6.1 Bombing the ice in 1956. Source: *Jeges Ár*, directed by István Farkas (Magyar Híradó és Dokumentum Filmgyár, 1956), 2:00. Used with permission of the Hungarian Hydrological Society (Magyar Hidrológiai Társaság).

in an interview, the pilot Miklós Csallóközi described his joy at locating and thereby helping to rescue a woman and two children stranded in a wagon amid rising floodwaters.²³ In a technical article published later in 1956, however, Csallóközi conceded that the air force had not accomplished as much as had been hoped (“From several comrades I heard that the air force had not functioned as effectively as had been expected. They are correct.”).²⁴ He explained that bad weather, with snow squalls and winds reaching 140 kilometers per hour, had limited what the planes could do. But he stressed that in fact no air force in the world could have blown apart an ice mass as big as the one that formed in southern Hungary.

The other stars of 1956 were tractors, trucks, and other heavy-duty vehicles. The mechanization of the countryside had been a goal of socialist planners from the start, and they had proudly established machine stations across the country. Between 1948 and 1953 the number of tractors at these stations increased from 1,484 to 9,215.²⁵ An emphasis on heavy equipment in 1956 could thus be expected. By the end of the flood, the authorities had mobilized more than 5,000 pieces of heavy equipment; throughout they carefully tallied the number of vehicles in each area, shifting them as needed. According to a county official who directed operations in one sector, construction vehicles had been indispensable, and he singled out “the assistance of one Soviet-made excavator and two Italian-made excavators [that] had allowed trucks to carry tremendous quantities of dirt to vulnerable points.”²⁶ Conveying the same message, “Icy Flood” shows men rushing into trucks as the announcer states: “The danger was exceptionally large, but exceptional too was the defense that stood against the flood.” The trucks in the newsreel are conspicuously marked “Zalaegerszeg,” a town in western Hungary far from the Danube.²⁷ This is followed by a long tracking shot of an endless line of trucks, their beds filled with dirt, and then footage of an excavator loading dirt into waiting dump trucks. In another scene, soldiers use trucks to evacuate vulnerable settlements. The images of southern Hungarian villages shown on screen—a tottering old woman clad in black, a pig in a wicker cage, low houses with thatch roofs—depict a traditional countryside that stands in sharp contrast to the modern trucks and construction equipment summoned to combat the flood.

In reality, planes and machines could only do so much. Both official reports and the media proudly tallied the masses of men and material. An estimated 40,000 people—soldiers, local work brigades, volunteers from inland towns, truck drivers, policemen—took part in the work against the flood. Women did not appear in the photos and newsreels, except as evacuees, but written sources noted their contributions and highlighted their role in bringing tea and messages to workers on the embankments. The papers also singled out the young women and men of the League of Working Youth (*Dolgozó Ifjúság Szövetsége*), and one journalist identified two women, Erzsi Palotás and Irma Szikra, who “did not sleep for days—by day they were on the embankments,

at night they carried tea.”²⁸ But enthusiastic young volunteers were the exceptions. As an engineer explained, soldiers and the trackmen of Hungarian State Railways formed the “backbone of the defense” in 1956.²⁹ This made sense: Soldiers and railwaymen were typically young, male, fit, and used to physical labor in large groups and in the open. “Icy Floods” has multiple shots of large teams of men wielding shovels and other tools, evidence of the modern state’s ability to mobilize labor. Not everything is modern, though: In one scene, men compress the dirt with what appear to be large cabbage tampers (*káposzta döngölő*), wooden tools found in many peasant households long before the 1950s.

In 1956, the Hungarian state officials responded assertively to an unfolding disaster. They mobilized men and machines from across the country, and they used them to mitigate the damage caused by the flood. This necessarily had limits, given the extent of the disaster, but their actions—from evacuating villagers to strengthening the levees—demonstrated what modern states can do when they deploy their considerable resources. At the same time, Hungary’s mass media worked to craft a coherent narrative about the flood. It showed the strength of the Danube, but it also stressed the power and legitimacy of state institutions. This narrative emerged through small stories and fleeting images: soldiers loading peasants’ possessions into trucks, excavators from state enterprises moving dirt, sailors scanning the river for people in need. A careful reading of these sources reveals that the projections of military strength and technological power had practical limits: Airplanes looked good on film and in the newspapers but could do little against the ice. But coverage of the 1956 flood left no doubt that state officials, and not localities or individuals, would take the lead in combating natural disasters.³⁰ No less importantly, stories of the Danube flood reached wide audiences across Hungary. In this way, the mass media also helped to foster what one scholar has called a “truly *national* politics of disaster.”³¹

REPORTS FROM THE COUNTY

In Hungary, the county (*megye*) is the primary unit of regional administration. Historically, counties had played a significant role in water management within their borders.³² In 1956, much of the flooding in southern Hungary took place in Bács-Kiskun County, a flat region of wide floodplains on the left bank of the Danube. The county was new, having been created only in 1950 as part of a sweeping reorganization of internal administration, and so were its leaders. The county executive, Ferenc Dallos, had been a house painter before joining the Communist Party and had been in office for just four years. But these men had dealt with the 1954 flood, and they understood how power worked in socialist Hungary. Cooperating with Budapest, they acted energetically in

1956, achieving success in some areas but unable to prevent widespread damage closer to the Yugoslav border. This section looks at a district in which the county's intervention helped hold back the flood. In the aftermath, regional leaders would craft a triumphal narrative, but, crucially, one that made clear the need for a disciplined river and people.

For a few days in early March 1956, the northern part of Bács-Kiskun County became the focus of national attention. At its center was Dunavecse, a small town of 4,000 people on the Danube River. Ice jams frequently caused floods here, and most recently in the winter of 1941, when the town's flood defenses had failed at multiple points. Icy water rapidly destroyed 65 houses and hundreds of outbuildings, washed away roads, bent railroad tracks, and trapped people on roofs and high ground. A repeat of this scenario seemed likely in 1956. On March 6, ice jams downstream and precipitation upstream caused the Danube to rise rapidly; according to one eyewitness, in the evening it surged by two meters in one hour, filling the floodplain and approaching the top of the levees.³³ Officials on the spot called for the town to be reinforced "with full strength."³⁴ By the next day, the district had received 30 automobiles, 40 trucks, and 20 dump trucks, along with hundreds of soldiers and railway workers, who were rushed to three critical spots. Three-quarters of the local population were soon working on the flood defenses. At its peak, on March 8, the river rose to 8.25 meters, nearly half a meter above the previously recorded high.³⁵

The key to real-time flood defense was deceptively simple: build higher. All along the Danube, people hastily constructed emergency dams—called *nyúlátak* in Hungarian ("rabbit dams," after the earthen walls used to keep domestic rabbits)—to contain the surging river. These required stakes, planks, brushwood (often bundled), stones, and lots of dirt (sometimes placed in sandbags). The challenge lay in bringing these materials to the river's edge, adding them to existing levees, and creating barriers that would be impervious to erosion and seepage, both of which could cause emergency dams to collapse. A further challenge came from the blowing snow, high winds, unpredictable ice, and extreme cold, with temperatures falling to minus 12° Celsius. According to Ihrig, emergency dams proved successful in Dunavecse partly because engineers had access to road building materials and partly because they were not too wide, which made them easier to monitor and repair.³⁶ A photograph taken afterward shows a placid scene, with a lone individual and car on a clear day (Figure 6.2). It is difficult to imagine, looking at it, the frenzied work that went into the dam's construction or the fact that structures like this failed in many places in 1956.

The results could be disastrous. A later survey of the county showed that floodwaters submerged 61,000 hectares of ploughland, killed thousands of animals, destroyed 910 houses and badly damaged 313 more, ruined 13 schools, and did over 4,190,000 forints of damage to industrial enterprises.³⁷ The authorities evacuated thousands of people and calculated that they had served 232,000 hot meals and 75,000 cold meals; of



Figure 6.2 Emergency dam at Dunavecse in 1956. Source: Dénes Ihrig, "Gátvédelem és korszerűsítésének kérdései," *Vízügyi Közlemények* 45, no. 3 (1963), 255.

these 48 percent had been for workers on the flood defenses and 52 percent for evacuees.³⁸ In Dunavecse alone, county officials evacuated 110 families and provided meals for 2,000 other people, half the town's total population. Although the embankments and emergency dams largely held, floodwaters still destroyed 45 houses and did significant damage to the surrounding collective farm.³⁹ Water stood in many fields, and in places it would take weeks for it to recede.

What narratives emerged from these desperate days in Bács-Kiskun County? Or more precisely, what stories were contained in the typed reports that heads of district and county councils wrote to their political superiors in the wake of the floods? Most obviously, regional leaders echoed the story that emerged from Budapest, that of a hard-won triumph secured by a united people. Zoltán Pápay, the county official assigned to direct operations in Dunavecse between March 7 and 11, struck this note hard: "Heroic work was accomplished by troops of the Hungarian army, by the hundreds of trackmen of the Hungarian State Railways, by the truck drivers who did not know tiredness, by the neighboring villagers, as well as by the local workers; 96 strenuous hours that in the end succeeded in holding back the dam break!"⁴⁰ Pápay allowed that there had been difficulties, especially at the start: The field kitchens had made too much food (of poor quality); the roads were clogged with trucks and cars; and several women got into the wine donated to flood workers and "behaved in a scandalous

manner.” But he also underlined that, upon arriving, he had immediately brought organization and issued orders, which a car equipped with a megaphone (*megafonos autó*) broadcast in town and on the levees. In this and similar reports, an underlying theme is the regional leaders’ ability to identify problems and hit upon solutions.

Although not trained as engineers, these men felt strongly that the infrastructure on the Danube should be repaired and strengthened. This included everything damaged during the floods: levees, dams, locks, roads, pipes, and canals, as well as the people who maintained this system. In discussing repairs, county leaders were quick to blame much of what had gone wrong on the Directorate of Water Management (*Vízügyi Főigazgatóság*), a state institution responsible for river infrastructure; its engineers also provided technical expertise during the flood. County officials complained that the directorate had earlier downplayed the danger of floods and then ignored requests for equipment and soldiers when the crisis broke.⁴¹ One report claimed that water engineers had not consulted with the county flood committee and carelessly built slapdash flood defenses; another asserted that at critical moments water engineers were nowhere to be found, forcing local workers to build emergency dams “according to their own imaginations.”⁴² Dallos, the county executive, was unsparing in his criticism. The water directorate, he said, had long neglected flood defenses and not built levees to the needed height; had failed to provide decisive leadership during the flood; and needed better maps and machinery. In closing, he called for the higher authorities to inspect its cadres and to strengthen them with “party members possessing suitable organizing skills,” that is, men like Dallos himself.⁴³

This regional narrative also highlighted problems among local leaders and residents. Pápay noted that when he arrived in Dunavecse, he met only “rushing around, disorganization, confusion.” The executive council president was removed for taking the “wrong measures,” and his replacement lacked the ability to make cool, rational decisions—instead, members of the council complained that he “completely drove them crazy” (*teljesen megbolondítja őket*).⁴⁴ That a county official would criticize subordinates in his report is unsurprising; he wanted to play up his own authority and expertise. But regional leaders also hinted that the wider population might not be entirely reliable, at least during a crisis. The head of the Dunavecse district committee later wrote that on March 8, when water had begun to spill over the emergency dam, many residents panicked and wanted to flee. The day was saved, however, when, “seeing the communists’ exemplary firmness, local residents in growing numbers took part in the ongoing defensive works alongside the heroically defending soldiers at the Petőfi tree.”⁴⁵ The implication was that party members and soldiers were trustworthy, the wider population less so. In concluding his report, he called for “wide-ranging political work” to maximize the people’s willingness to work and to increase their “fulfillment of civic obligations.”

In the weeks following the flood, county leaders would create their own account of what had happened. This narrative was not for public consumption, like a newsreel; it was aimed at higher-ups within the party and political system. But it deserves our attention, and not just because it gives us access to what was said behind closed doors. Much of it told the same story as had emerged from Budapest: that of a strong, steadfast people struggling to hold back a powerful, destructive river. These men saw in their successes a validation of state socialism and a sign of patriotism. "It would be difficult," wrote one official, "to list all those people whose deeds in these days testified to their love of the homeland."⁴⁶ Behind such proclamations of solidarity, however, lay a worldview that valued hierarchy, order, and control, and this applied equally to nature and humans. As county officials contemplated the flood and what lessons should be drawn from it, they were clear about the need for a disciplined river and people, since neither were fully reliable. In other words, these men fully embraced the idea of "disaster as an administrative problem of political containment," a view that Marie-Hélène Huet has identified as a defining feature of modern disasters.⁴⁷

LOCAL TALES

In late October 1956, less than eight months after the flood, revolution broke out across Hungary. In Dunavecse, the news first arrived by radio and then with people returning from Budapest; on October 27 crowds gathered in the center of town.⁴⁸ They ransacked the council hall, throwing papers out its windows; pulled down a statue dedicated to Soviet soldiers; raided the library for Stalin's books and burned them. Over the next few days they organized a national committee and armed a national guard, re-established the smallholders' and socialist parties, removed communist leaders, and sent food to Budapest. Similar events took place in the county seat, even as Dallos impotently issued orders to quell this "counter-revolution" and "hysteria" with soldiers.⁴⁹ By mid-November, however, the forces of order had regained control across Hungary. Restored to power in Dunavecse, local leaders decried the destruction of the Soviet statue and claimed that these events had come from the agitation of "irresponsible elements" and in no way reflected the "will of the people."⁵⁰ Eleven locals received prison sentences ranging from six months to six years.

The revolution had its own causes and afterlife. It would eventually eclipse the flood and many other events from this period. At the time, it seemed to confirm regional leaders' fears about the unreliability of many locals and the need for iron discipline. But the revolution also interrupted and influenced efforts to recover and rebuild from the flood. Close examination of repair work in one small provincial town reveals yet

another narrative about the flood, one that underscores the great importance of river infrastructure and the complex relationships between people and the state.

Reconstruction in Dunavecse lasted well into 1957. It began immediately after the flood, as evacuees returned to their houses and farmers tried to cope with sodden fields. Local leaders attempted to maintain a sense of collective purpose, ordering Sunday work brigades to help clear damage caused by the water, "so that laboring peasants do not have to complete the cleanup work alone."⁵¹ Following the uprising later that year, efforts to undo the flood became intertwined with efforts to undo the revolution. In March 1957, for example, town leaders addressed both the toppled statue to Soviet soldiers and the proposed new dam and levees on the Danube. The statue—a modest pillar topped with a red star and short inscription—produced ideologically correct indignation on the executive council, with the town doctor describing those who had knocked it over as the "lowest of the low" and the council resolving that those responsible should pay the costs of its restoration.⁵² At a meeting several weeks later, Imre Majer, the long-serving president of the executive council, took the opportunity to denounce the events of 1956 ("a counter-revolution of the people's enemies, the country's former landlords and high officials") and to praise the "powerful camp of workers" for helping to uphold "order, calm, and security" over the past months.⁵³ He pledged that local leaders would work tirelessly to increase production and support economic life. As part of this, he encouraged the town to approve plans submitted by the Directorate of Water Management for the reconstruction of the dam and embankments on the Danube.

The aim was simple: to prevent future floods. Engineers thus called for strengthening, straightening, shortening, and elevating the existing levees, which would be a meter higher than before. In approving the plan, the council concluded that the new defenses would make the town "more secure," a view seconded by a visiting journalist who expressed his confidence that "the Danube would no longer flood here."⁵⁴ Left unsaid was the simple truth that, as Ted Steinberg has written, "the traditional response to natural disaster does not benefit everyone equally."⁵⁵ Already in March 1956, district officials had urged that no houses be rebuilt in the active floodplain and that towns and villages move affected residents to new ones behind the flood defenses. This scenario played out in Dunavecse. In August 1956, several residents—four men and two widows who lived close to the river—sent a handwritten letter to the Directorate of Water Management. In it they complained that they had suffered because of the flood, had not been told about the new infrastructure, stated that the town had already torn down three of their houses, and asked for the plans to be altered to preserve the remaining houses. Otherwise, they wrote, it would "block the proper development of an entire row of houses." They concluded plaintively: "It is just a question of meters and [an alteration of the plans] would produce a happy and above all peaceful future for several families."⁵⁶ The town later offered financial assistance to some of them, but they still

lost their houses and were forced to move. These poor people were perhaps treated with more consideration than the Calvinist and Roman Catholic churches. In 1957 the authorities decreed that construction of the levees and new roads required both churches to clear parts of their cemeteries, adding that work would begin on the designated date whether all the bodies had been removed or not.⁵⁷ This too was a small matter. But it was plain, as Zsuzsa Gille has argued, that under state socialism some groups (technical experts, heads of large enterprises, urbanites more generally) were better able to make their claims heard than others (churches, most rural dwellers).⁵⁸ In this and other Danube settlements, the burdens of flood control weighed more heavily on some members of the community than on others.

A much larger transformation lay behind the new levees. At a meeting in May 1957, Majer offered a broad argument for why it mattered so much. It was not a bold vision; he simply pointed out that flooding at Dunavecse threatened “the southern and southeastern part of Bács County’s productive territory” and that the projected dam and levees would be in the town’s economic interest.⁵⁹ His emphasis on farmland nonetheless represented a shift from matters that had carried weight in earlier decades: river navigation (for passengers and agricultural products), ship mills to grind grain, and the town’s beach and riverbank. Majer perhaps understood that in the wake of the 1956 flood, the economic and symbolic center of Dunavecse would move away from the river and outward to its collective farm. The Danube would become much less central to the economic life of the town.

River engineering reduced its importance in other ways too. At the end of 1957, Majer had confidently declared that “everyone” viewed it with “pleasure and satisfaction” and recognized its necessity to prevent a repeat of the near disaster in 1956.⁶⁰ But the reconstruction of the riverside carried a hidden cost. The local historian Mihály Balogh later explained: “This protective effort turned out badly: the edge of the channel rapidly began to silt up, Vecse’s famous beach deteriorated, the lively summer watersports disappeared, the guests who came here on vacation stayed away.”⁶¹ He continued: “This thoughtless ‘defense of the riverbank’ took the Danube away from Vecse, even though from Pest to Baja there was absolutely no other settlement that stood closer to the river.” Balogh’s retrospective anger at the rebuilt dam and levees is understandable, because the beach had been a fixture of local life for decades. In the mid-1960s the town leaders were still grasping for a solution.⁶² The rapid development of industry upstream only made things worse. Still in power in 1979, Majer complained that “the water is so polluted that one cannot swim in it. Here we are next to the river, but we cannot enjoy it.”⁶³

On the ground, the 1956 flood had at first encouraged an unwavering confidence in what one scholar has identified as “the general optimism with which the public has approached the ideal of environmental control.”⁶⁴ Dissonant voices came only from the margins, from poor peasants living near the river. With the passage of time, however,

other residents began to question what the introduction to this book calls “the escalating mindset” that drove work on the river and to grumble about what was happening to the Danube: the disappearance of the beach, the decline in biodiversity, the poor water quality. Local narratives about the river began to subtly change, adding notes of loss and regret. But the postwar period’s dramatic social and economic transformations, of which the town’s levees and dams were just one part, also meant that fewer people depended on the river for their livelihoods and leisure.⁶⁵ The flood defenses, which were meant to protect the town from the river, also made the river less important to the town.

CONCLUSION

In the decades after 1956, ice jams continued to cause dangerous floods in southern Hungary. But the last significant ice cover on the Danube came in the mid-1980s, and it is highly unlikely that this kind of disaster would unfold today.⁶⁶ Not that the threat of floods is gone: Scientists warn of even greater flood hazard as a result of climate change, heavy rains, continuing sedimentation, and more people living in flood protected-areas.⁶⁷ Nor has the Hungarian state abandoned military-style operations against floods. In the summer of 2013, extreme rainfall produced high waters and over-spills on rivers across Central Europe; at Budapest, the Danube reached levels never before recorded. Summoned by the government, the Hungarian Defense Force assembled 7,000 troops, hundreds of vehicles, helicopters, and medium-tracked amphibious vehicles.⁶⁸ The prime minister’s office afterward declared that “Hungary’s successful flood defence activities demonstrated the achievements of a confident and able country. All differences and conflicts disappeared on the dykes and everyone could see that we Hungarians stand firm to protect our homeland in case of trouble.”⁶⁹

This analysis of flood narratives from 1956 should make us wary of such claims. It may be true, as Huet has written, that “each natural disaster challenges both the mastery that was our goal and the political system that was put in place to serve such a purpose.”⁷⁰ Like many other chapters in this volume, however, the case examined here suggests more ambiguous outcomes. Disturbances can disquiet those in power and embolden opponents and critics. But they can also reinforce existing political structures, allowing states to trumpet their military strength and technical achievements. In Hungary, they also revealed some leaders’ resolve to tighten further their control over both the local population and the Danube. Such aspirations were often illusory, as the 1956 revolution and, more quietly, the Danube would prove. In time, some locals would regret the hidden costs of the flood protection, even if they agreed with officials and engineers on the need to control the river. All this supports the idea that floods are “thick

with politics,” in that they force people to think seriously about how they relate to each other, to nature, and to infrastructure.

The 1956 flood narratives should also remind us of how many stories about the Danube River remain to be told. Today, the 1956 Revolution occupies a large space in Hungarian collective memory, whereas the 1956 flood is a footnote in technical studies and local histories. When I visited the Bács-Kiskun County archives, hoping to uncover what had happened in Dunavecse, the situation was reversed. Records from the end of 1956 have disappeared; the revolution is present only when denounced in later documents. The 1956 flood, in contrast, is fully present in hundreds of pages generated by town councils, engineers, county officials, and ordinary people. These records have been largely forgotten. But in reading and thinking about them, we can come closer to understanding just how powerful, unsettling, and creative such disturbances can be.

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NOTES

1. Kálmán Töry, *A Duna és szabályozása* (Akadémiai Kiadó, 1952), 151–53. Töry here draws on the work of Woldemár Lászlóffy.
2. “Az árvízi hősök példája,” *Szabad Nép*, March 24, 1956, 1.
3. Dénes Ihrig, “Az 1956. évi dunai jeges árvíz Magyarországon,” *Vízügyi Közlemények* 38, no. 4 (1956): 421.
4. Gábor Faludi and Attila Szádeczky, “Az 1956. évi jeges árvíz a Duna magyarországi déli szakaszán (Dokumentumok, visszaemlékezések),” *Hidrológiai Közlöny* 82, no. 5 (2002): 293–304.
5. See the essays in Elek Bartha, Róbert Keményfi, and Veronika Lajos, *A víz kultúrája* (Debreceni Egyetem Néprajzi Tanszék, 2010) and Gergely Krisztián Horváth, ed., *Víz és társadalom. Magyarországon a középkortól a XX. század végéig* (Balassi, 2014); also Balázs Borsos, “Rivers, Marshes & Farmlands: Research Perspectives on the Ecological History of Hungary Through Examples of the Bodroghöz (NE-Hungary),” *Hungarian Studies* 23, no. 2 (2009): 195–210; András Vadas, *Körmend és a vizek: egy település és környezete a kora újkorban* (ELTE BTK, 2013); Zsolt Pinke, “Modernization and

- Decline: An Eco-Historical Perspective on Regulation of the Tisza Valley, Hungary,” *Journal of Historical Geography* 45 (2014): 92–105; Robert Shields Mevissen, “Forged in the Floods: Transnational Networks in the Habsburg Monarchy,” *Water History* 12, no. 3 (2020): 265–80.
6. Éva Judit Bodovics, “Vízhasználat és ‘árvízi kultúra’ Miskolcon a XIX. század második felében,” in Horváth, *Víz és társadalom Magyarországon*, 439–69; Andrea Kiss and József Laszlovszky, “Árvíz hullámok a Dunán? A Duna árvizei és a visegrádi ferences kolostor a késő középkorban és kora újkorban,” *Korall* 53 (2013): 36–65; András Vadas, “Long-Term Perspectives on River Floods: The Dominican Nunnery on Margaret Island (Budapest) and the Danube River,” *Natural Sciences in Archaeology* 4, no. 1 (2013): 73–82; Csaba Szalontai, “Flood Risk in Szeged Before River Engineering Works: A Historical Reconstruction,” *Journal of Environmental Geography* 9, no. 3–4 (2016): 1–12; Andrea Kiss, *Floods and Long-Term Water-Level Changes in Medieval Hungary* (Springer, 2019).
 7. Wiebe E. Bijker, “Dikes and Dams, Thick with Politics,” *Isis* 98, no. 1 (2007): 123.
 8. Although the sources all use “flood” (*ár* or *árvíz*), this term needs to be understood within its historical context. As Mark Cioc has written, “‘Flood’ is a highly anthropocentric term, rooted in the human proclivity to think of a river as having a fixed length but no prescribed breadth, with the result that the floodplain is often used for farms and settlements as if it were not part of the river system.” Cioc, *The Rhine: An Eco-Biography, 1815–2000* (University of Washington Press, 2002), 31.
 9. William Cronon, “A Place for Stories: Nature, History, and Narrative,” *Journal of American History* 78, no. 4 (1992): 1375; on the need to challenge master narratives and surface “submerged voices,” see Susan Leigh Star, “The Ethnography of Infrastructure,” *American Behavioral Scientist* 43, no. 3 (1999): 377–91.
 10. Christopher R. Henke and Benjamin Sims, *Repairing Infrastructures: The Maintenance of Materiality and Power* (MIT Press, 2020), 24.
 11. In arguing that floods can reveal and reorder relations between state authorities and local populations, this chapter echoes many other contributions to this volume, and especially the chapters by Gatejel, Șerban, and Dorondel.
 12. *Jeges Ár*, directed by István Farkas (Magyar Híradó és Dokumentum Filmgyár, 1956), 9 min., YouTube.com. YouTube also has a 14-minute version of the film, which includes text and images cut from the shorter version.
 13. John Withington, *Flood: Nature and Culture* (Reaktion, 2013), 82–116.
 14. The longer version of *Jeges Ár* contains one line giving credit to the “party and government” for mobilizing “all imaginable forces” in southern Hungary. The line was cut from the shorter version.
 15. Dénes Ihrig, “Befejezés,” in *A magyar vízszabályozás története*, ed. Ihrig (OVH, 1973), 374–75. During the 1956 flood, Ihrig directed engineering operations in southern

Hungary.

16. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (Yale University Press, 1998); for Scott's ideas applied to the Danube: Remus Crețan and Lucian Vesalon, "The Political Economy of Hydropower in the Communist Space: Iron Gates Revisited," *Tijdschrift voor Economische en Sociale Geografie* 108, no. 5 (2017): 688–701.
17. Dénes Ihrig and Woldemár Lászlóffy, "A Duna júliusi árvize," *Magyar Technika* 9, no. 11 (1954): 613–21.
18. *Jeges Ár* 1:30. On soldiers: Ferenc Földesi, "Katonák a gátakon. Jeges ár 1956 márciusában," *Honvédségi Szemle* 135, no. 2 (2007): 87–100.
19. András Török, "Megfeszített küzdelemben hősök születnek a Duna déli szakaszán," *Szabad Ifjúság*, March 11, 1956, 1–3.
20. "A Duna déli szakaszán mindkét parton tovább folyik a védekezés a jeges ár ellen," *Esti Budapest*, March 12, 1956, 7.
21. Civilian pilots likewise flew over the affected area, tracking the spread of the water, dropping medicine on inaccessible places, and spotting people in need of rescue. One pilot admitted that tears had filled his eyes as he sat comfortably in "the most modern means of transportation" and watched helplessly as people clung to their roofs as the floodwaters raged below. Lajos Raczkó, "Sportrepülőink az árvízvédelem szolgálatában," *Magyar Szárnyak*, March 1, 1941, 8–10.
22. *Jeges Ár*, 4:00. For similar claims, see András Török, "A Duna déli szakaszán is legyőzték a jeget—folyik a harc az árral," *Szabad Ifjúság*, March 9, 1956, 1.
23. Tibor Barabás, "Az áradat fölött," *Szabad Nép*, March 25, 1956, 6.
24. Miklós Csallóközi, "A jeges árvíz bombázásának tapasztalatai," *Katonai Szemle* 5, no. 8 (1956): 128–33. Ihrig also concluded that explosions (from planes, mortars, and mines) did not achieve meaningful results. Ihrig, "Az 1956. évi dunai jeges árvíz," 403.
25. József Nagy, "A szántóföldi művelés állami irányítása és a paraszti gazdálkodás feltételei az 1950-es években (1949–1956)," *Századok* 135, no. 5 (2001): 1101.
26. Bács-Kiskun Megyei Levéltár (hereafter BKML) XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai*. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem, "Feljegyzés a dunavécsei és nagybaracscai árvízvédelmi munkálatokról," p1.
27. *Jeges Ár*, 5:08.
28. Török, "Megfeszített küzdelemben," 3.
29. Pál Szászshelyi, "Az 1956. évi dunai jeges árvívről," *Hidrológiai Közlöny* 36, no. 3 (1956): 165.
30. Hungary was not alone in giving primacy to the central authorities. In 1950 the United States passed the Federal Disaster Relief Act, signaling a greater role for the federal government in responding to disasters.
31. Cynthia A. Kierner, *Inventing Disaster: The Culture of Calamity from the Jamestown*

- Colony to the Johnstown Flood* (University of North Carolina Press, 2019), 202. The nationalization of disaster also meant downplaying what was happening in other countries. “Icy Flood” briefly mentions Czechoslovakia and Yugoslavia but in every other respect defines the 1956 flood as an exclusively *Hungarian* disaster.
32. Károly Mike et al., “Víz, ami összeköt. A történetírás és a közgazdaságtan együttműködésének lehetőségeiről,” in Horváth, *Víz és társadalom*, 22.
 33. BKML XXIII.8.a. *Bács-Kiskun Megyei tanács. VB mezőgazdasági osztályának iratai. Árvíz-belvíz 1956*, “Előterjesztés a dunavecsei jeges árvízvédekezési munkálatairól...,” p1.
 34. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem, “Jelentések.”*
 35. Szász helyi, “Az 1956. évi dunai jeges árvízről,” 162.
 36. Dénes Ihrig, “Gátvédelem és korszerűsítésének kérdései,” *Vízügyi Közlemények* 45, no. 3 (1963): 254–55.
 37. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki iratok. 87/1956. Árvízi károk. 1956.*
 38. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki iratok. 87/1956. Árvízi károk. 1956.*
 39. BKML XXIII.8.a. *Bács-Kiskun Megyei tanács. VB mezőgazdasági osztályának iratai. Árvíz-belvíz 1956*, “Előterjesztés a dunavecsei jeges árvízvédekezési munkálatairól...,” p1.
 40. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem, “Előterjesztés a dunavecsei jeges árvízvédekezési munkálatairól...,” p3.*
 41. BKML XXIII.8.a. *Bács-Kiskun Megyei tanács. VB mezőgazdasági osztályának iratai. Árvíz-belvíz 1956*. “Feljegyzés a dunavecsei és nagybaracscai árvízvédelmi munkálatairól,” p1.
 42. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem, “Feljegyzés a dunavecsei és nagybaracscai árvízvédelmi munkálatairól,” p1.*
 43. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem. “Jelentés az 1-24/1956 számú utasításra a Bács-Kiskunmegyei árvíz lefolyásáról,” p13.* For the engineers’ perspective, see Faludi and Szádeczky, “Az 1956. éve jeges árvíz,” 298–303.
 44. BKML XXIII. 1.b. *Bács-Kiskun Megyei tanács végrehajtó bizottságának iratai. Elnöki jelentések. 23/1956. Árvédelem, belvízvédelem, “Feljegyzés a dunavecsei és nagybaracscai árvízvédelmi munkálatairól,” p1, 5.*
 45. BKML XXIII.8.a. *Bács-Kiskun Megyei tanács. VB mezőgazdasági osztályának iratai. Árvíz-belvíz 1956*, “Előterjesztés a dunavecsei jeges árvízvédekezési munkálatairól...,” p2.
 46. BKML XXIII.8.a. *Bács-Kiskun Megyei tanács. VB mezőgazdasági osztályának iratai. Árvíz-belvíz 1956*, “Előterjesztés a dunavecsei jeges árvízvédekezési munkálatairól...,” p2.

47. Marie-Hélène Huet, *The Culture of Disaster* (University of Chicago Press, 2012), 2.
48. Mihály Balogh, *Dunavecse* (Száz Magyar Falu Könyvesháza, [2001]), 74–75.
49. Ágnes Tóth, ed., 1956. *Bács-Kiskun megyei kronológiája és személyi adattára* (Adria, 2001), 1:36–37.
50. BKML XXIII. 723.a. Dunavecse. *Tanácsülések jegyzőkönyvei, 1956–1957*, minutes of March 28, 1957 meeting.
51. BKML XXIII. 723.b. *Dunavecse V.B. ülések jegyzőkönyvei 1956–1957*, minutes of March 22, 1956 meeting.
52. BKML XXIII. 723.b. *Dunavecse V.B. ülések jegyzőkönyvei 1956–1957*, minutes of March 8, 1957 meeting.
53. BKML XXIII. 723.a. Dunavecse. *Tanácsülések jegyzőkönyvei, 1956–1957*, minutes of March 28, 1957 meeting. Gábor Gémes, “Itt nem önt ki többet a Duna,” *Petőfi népe*, June 28, 1957, 3.
54. BKML XXIII. 723.a. Dunavecse. *Tanácsülések jegyzőkönyvei, 1956–1957*, minutes of March 28, 1957 meeting.
55. Ted Steinberg, *Acts of God: The Unnatural History of Natural Disaster in America* (Oxford University Press, 2006), xviii.
56. BKML XXIII. 723.c. Dunavecse Község Tanácsának iratai. Közigazgatási iratok. 59/1956; on aid: BKML XXIII. 723.b. *Dunavecse V.B. ülések jegyzőkönyvei 1956–1957*, minutes of September 11, 1957 meeting.
57. BKML XXIII. 723.c. Dunavecse Község Tanácsának iratai. Közigazgatási iratok. 828/1957.
58. Zsuzsa Gille, “Social and Spatial Inequalities in Hungarian Environmental Politics: A Historical Perspective,” in *Livable Cities? Urban Struggles for Livelihood and Sustainability*, ed. Peter Evans (University of California Press, 2002), 132–61.
59. BKML XXIII. 723.a. Dunavecse. *Tanácsülések jegyzőkönyvei, 1956–1957*, minutes of May 9, 1957 meeting.
60. BKML XXIII. 723.a. Dunavecse. *Tanácsülések jegyzőkönyvei, 1956–1957*, minutes of December 12, 1957 meeting.
61. Balogh, *Dunavecse*, 9, 77.
62. Imre Majer, “Egy évi számvetés,” *Petőfi Népe*, March 5, 1964, 8.
63. Zsuzsa Vadas, “Változások Dunavecscén,” *Petőfi Népe*, August 3, 1979, 3.
64. Kenna Lang Archer, *Unruly Waters: A Social & Environmental History of the Brazos River* (University of New Mexico Press, 2015), xx.
65. This point is convincingly made in Gábor Máté, “A vízhasználat átalakulása az állam-osítás és a térszerítés következtében a Völgységi-patak felső vízvidékén,” in Horváth, *Víz és társadalom*, 471–515.
66. M. Ionita, C. A. Badaluta, P. Scholz, et al., “Vanishing River Ice Cover in the Lower Part of the Danube Basin—Signs of a Changing Climate,” *Scientific Reports* 8 (2018),

- <https://doi.org/10.1038/s41598-018-26357-w>.
67. Dénes Lóczy, "Flood Hazard in Hungary: A Re-Assessment," *Central European Journal of Geosciences* 2, no. 4 (2010): 537–47; Gábor Mezősi, *The Physical Geography of Hungary* (Springer, 2016), 211–27.
 68. Kristóf Dobó and Rudolf Tóth, "The Role of the Hungarian Defence Forces Skills in the Protection Against Water Damages—The Extraordinary Flood on the Danube River 2013," *Műszaki Katonai Közlöny* 29, no. 3 (2019): 55–63.
 69. Website of the Hungarian Government. Prime Minister's Office, "Flood Defence Success Demonstrates Hungary's Strength and Confidence," June 17, 2013, <https://2010-2014.kormany.hu/en/prime-minister-s-office/news/> (accessed November 20, 2021).
 70. Huet, *The Culture of Disaster*, 7.

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SOCIALIST INFRASTRUCTURE AND ITS AFTERLIFE

Romania's Danube–Black Sea Canal

CONSTANTIN IORDACHI

INTRODUCTION

This chapter focuses on infrastructure, a concept that has been a defining element of our modern era, resonating across both the developed and the developing worlds—from China and Africa to Eastern Europe and the United States.¹ In today's globalized and interconnected world, it is no surprise that infrastructure has become a focal point of academic inquiry. Researchers are increasingly exploring how infrastructure mediates our intricate web of complex and layered connections—not only with other people, but also with nature and society at large: from electricity networks and transportation hubs to internet and communication, to name but a few.²

Building on my previous work on great powers politics and modernization at the Lower Danube,³ the chapter explores the link between geopolitics, ideology, and the physical transformation of the Lower Danube and its adjacent regions under the impact of *grand water infrastructural projects*. In particular, it focuses on the post-1945 construction, operation, and postcommunist evolution of the Danube–Black Sea Canal, undertaken by communist Romania in 1949–1953 and 1978–1984, and inspired by the great powers politics in the region, most notably the Soviet Union. The analysis employs a long-term perspective, comparing the communist strategy of modernization with

previous imperial or national plans of exploiting the Lower Danube, from the Ottoman Empire and the European Commission of the Danube to interwar and then communist Romania. It investigates the declared aims of the communist authorities in building the Danube–Black Sea Canal; the gigantic campaign to mobilize resources and work force for its construction; and the multiple ideological, economic, and ecological roles assigned to its exploitation. It is argued that the new waterway, built with Romanian technology on Romanian soil, was a major ideological, technological, as well as geopolitical “statement” concomitantly meant to consolidate the country’s autarchic economy but to also reassert its regional role and to link it with major European arteries as the terminal point of Central Europe’s corridor of access to the Eastern Mediterranean Sea. The chapter evaluates the canal’s economic but also ecological impact on the development of the Lower Danube in the communist period, at national but also local levels. In the last part of the chapter, I explore the trajectory of water infrastructure during the socialist regime’s political and economic crisis and collapse, and the transitions from communism to postcommunism. To illustrate developments during this period, I point to new hybrid “forms of life” generated by the decay of the unfinished Danube-Bucharest Canal and of the Văcărești Natural Park (the so-called Bucharest Delta).

The study of infrastructure, in general, and of socialist water infrastructure, in particular, is a challenging endeavor. As Brian Larkin put it, “Infrastructures are built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space.”⁴ “Their peculiar ontology” consists in the fact that they are “matter that enable the movement of other matter” and, as such, are concomitantly “things and also the relation between things.”⁵ As any other utilitarian mediums, infrastructure provides (tangible or intangible) bridges between us and things but it often tends to be “invisible” to the public eyes: Arguably, we *see* it—it stands out or we become aware of it, that is—only when it either breaks down or it is endowed with exceptional visual qualities and a friendly, usable interface that facilitates interaction with the public.⁶

Due to the variegated nature of material or immaterial objects that can serve as infrastructure, there are a multitude of ways to conceive of, classify, and analyze infrastructure. The literature on the topic is rich and interdisciplinary. Among other things, infrastructure can be studied as massive material “things”; “a system of substrates,” mostly underground and hidden, such as “railroad lines, pipes and plumbing, electrical power plants, and wires”;⁷ as key elements of larger technological systems (technopolitics); an extension of state power, revealing the *political* rationality behind technological projects (see governmental studies and the new field of environmentality);⁸ a mediator of the relationship between state and citizens, often leading to innovative forms of infrastructure appropriation by local communities or citizens; and as semiotic and aesthetic vehicles of cultures or ideologies, the so-called “poetics of infrastructure,” based on the relationship between technology, aesthetics, and building materials.⁹ Beyond

its obvious utilitarian functions, infrastructure is thus a major means through which political visions can be articulated and materially “objectified.” In many instances, infrastructure thus reveals “the collective fantasy of society” and offers utopian projections of its intended future.¹⁰

Methodologically, I employ an interdisciplinary approach to studying infrastructure, combining historical research with anthropological field explorations in multiple local sites at the Lower Danube. Following Star, I explore the ethnography of infrastructure, which conceives of social spaces as “hybrid systems of humans and machines bundled together through infrastructural networks.”¹¹ One of my ultimate aims is to use infrastructural case study research to better connect the micro-scale to macro-scale, national and imperial, levels of research, all fully manifest in the historical context of the Lower Danube. In doing so, I am also building on new interdisciplinary approaches to global history that depart from a strictly functionalist view of imperial infrastructure solely as “tools of empire” to provide a more complex and nuanced “infrastructural reading” of the multifaceted sociopolitical processes—involving negotiation and cooperation but also local resistance—engendered by the creation and everyday “exploitation” of infrastructural projects.¹²

Combining perspectives from river studies and studies of infrastructure, I approach rivers and canals as complex socio-natural¹³ and “enviro-technical” sites.¹⁴ Rivers have been used and abused for centuries for multiple economic ends, especially industrial ones, but also for water and irrigation supplies, transportation, fishing, agriculture, and so on, leading to peculiar hybrid outcomes between environment and technology.¹⁵ I deal with human intervention in river flows to create artificial canals and to act as international hubs and border infrastructure.¹⁶ I approach water infrastructure as disturbance, understood as short- or long-term human-induced perturbations to an ecosystem, which involves physical changes to a riverbed (on the concepts of disturbance and flow see also the introduction).¹⁷ As recent works point out, rivers and their floodplains could actually produce greater benefits for economy and the environment if we “stepped back” and allowed them to evolve naturally.¹⁸ At the same time, we should be aware that human intervention in nature is in many cases irreversible and that it has created new realities on the ground that has led to unforeseen environmental trajectories.¹⁹

In line with these new approaches to environmental history, my aim then is to go beyond the misleading dichotomy of “nature versus technology” and to account for new forms of “industrialized nature.” To exemplify such hybrid outcomes, the chapter deals with a particular, highly consequential experiment in the history of modern infrastructure, namely the “socialist infrastructure,” which has stood as a hallmark of socialism as a modernizing dictatorship. I argue that, while socialist infrastructure is an integral aspect of modern infrastructure, it exhibits several characteristics that set it apart in the global history of infrastructure. First, as distinct forms of “developmental

dictatorships,” socialist regimes promoted centralized, state-led development, combining ideologically driven social engineering with long-term economic planning. Second, although conceived as an ideological counterpart to “capitalist infrastructure,” at its inception, socialist infrastructure adopted and adapted Western developmental prototypes of the 1880s, relying on extensive industrial growth, especially of heavy industry, to achieve economic modernization and social transformation. Third, to foster rapid industrialization, socialist infrastructure prioritized economic needs over societal ones. In early socialist societies, in particular, the main emphasis was put on exponential industrial growth based on high rates of accumulation and reinvestment to catch up with the developed West. Consumption was seen as waste, an orientation that led to a peculiar economics of shortage.²⁰ Fourth, due to the rigid nature of state planning, infrastructure in socialist systems has routinely struggled with inefficiencies. While capitalist infrastructural projects tend to concentrate on areas with the highest potential for return on investment, socialist regimes have often prioritized ideological objectives over economic efficiency.²¹ As a result, capitalist infrastructure is typically more diversified, flexible, dynamic, and responsive to market trends, yet it often leads to uneven regional development. Socialist infrastructure, in contrast, consists most often of massive, state-sponsored material “things” meant to prioritize the economy rather than people’s individual needs and consumption. These features have given socialist infrastructure an unmistakable visual imprint: If stone, bronze, clay, bricks, or mortar were the emblem of past civilizations, then precast concrete was the characteristic mark of socialist infrastructure, the “utopian socialist material”²² as found in factories, dams, and blocks of flats. This peculiar visual outlook helped consolidate the identity of socialism as a peculiar strategy of modernity, indeed a world in itself, or—in the words of anthropologist Steven Kotkin—a civilization.²³

In this chapter, I am mainly interested in the rationale and modality of building large socialist infrastructural projects and their exploitation but also their “afterlife” and thus renewed “visibility” in postcommunism. I argue that the massive and largely obsolete nature of socialist infrastructural “mastodons” made the integration of socialist infrastructure into postsocialist realities particularly difficult. No wonder that, throughout the former Soviet camp, many communist industrial or infrastructural projects were abandoned, due to inefficiency or lack of resources to complete them, and fell into disrepair or were taken over by nature and turned into a peculiar combination of a natural-industrial habitat, as unmistakable marks of architectural or developmental failures. Some major projects continued operation but required environmental retrofitting, like Russia’s Baikal-Amur Mainline. In a few cases, privatization or state intervention successfully if partially reshaped the role of socialist infrastructure within new market economies, as the revitalization of Poland’s Nowa Huta illustrates. Additionally, environmental disasters such as the Aral Sea or Chernobyl required

international remediation efforts, while the failure of controversial projects like Hungary's Bős-Nagymaros Dam became symbols of anticommunist resistance and environmental protest. As we will see, such public debates over the material legacy of communism were highly acute in Romania as well, a country where the communist regime left a particularly heavy impact on the environment and on urban and rural landscapes though forced industrialization, urbanization, and rural systematization.

THE DANUBE-BLACK SEA CANAL

In 1949–1953, and again in 1978–1984, Romania's communist authorities conducted a pharaonic engineering project meant to prove the advanced capacity of the socialist economy: the building of the Danube–Black Sea Canal. Following an old idea first explored by Ottoman authorities in 1855, the canal was meant to link the Danubian port of Cernavodă with the sea harbor of South Constanta–Midia Năvodari, and thus shorten access to the Black Sea by 400 kilometers.²⁴ Why were the communist authorities so adamant in implementing this gargantuan yet inefficient economic project? What were their ideological and social-political motivations and expectations? What have been the canal's economic and geopolitical impacts and implications? To understand the communist strategy of modernization, one needs to compare the communist policies with previous imperial or national plans of exploiting the Lower Danube, from the Ottoman Empire and the European Commission of the Danube to Greater Romania. Elsewhere, I have identified several rival projects of economic modernization at the Lower Danube, implemented during the nineteenth and twentieth centuries by the Ottoman authorities (up to 1878), by the great European Powers (mostly 1856–1914), by the Soviet Union (mainly in the 1950s), and by Romania (1878–1939 and again, with vigor, in the 1980s, and in postcommunism).²⁵

Employing the stratigraphic principle used in modern archeology, this chapter explores the sequence of infrastructural modernization at the Lower Danube, made up of failed or outdated projects as well as new beginnings, from the Ottoman imperial order in the early nineteenth century to Romania's constitutional monarchy, communism, and postcommunism. Figures 7.1 and 7.2 point out the interplay among multiple layers of modern infrastructural projects in the region.

The first projects of modernization at the Lower Danube emerged as part and parcel of the British imperial expansion around the world, which promoted massive infrastructural developments, especially harbors and transportation hubs, to facilitate the integration of newer parts of the world into the capitalist world-system and thus into the orbit of the British economy. Since the area was under Ottoman jurisdiction, these plans unfolded under the banner of Ottoman-British cooperation. The British



Figure 7.1 The Carol I Railway Bridge over the Danube, which linked Dobrudja with the Old Kingdom (1895) (right); and the Cernavodă socialist railway and freeway bridge (1987), which further amplified but also appropriated, in a socialist key, Romania's modernization project at the Lower Danube (left). Drone photo: Constantin Iordachi



Figure 7.2 In the foreground, the building of a new bridge over the Argeș River as part of a highway project to Bucharest, near Grădiște; in the background, the half-demolished bridgehead of an unfinished socialist bridge over the now abandoned Bucharest-Danube Canal, industrial ruins of a bygone era. Photo: Constantin Iordachi.

presence, most manifest since the 1820s, intensified the geopolitical rivalry among the Great Powers for dominance over the Lower Danube and Eastern Mediterranean areas, mostly Russia, France, and Austria-Hungary. Enhanced imperial presence brought about unprecedented infrastructural works, as physical representations of the region's integration into the capitalist world, but also of imperial domination: roads, railways, bridges, steamships, canals, and, most importantly, river and sea harbors.²⁶ It is telling in this respect that in 1855 a French technical mission built the first modern road in Dobrudja, between Constanța and Rașova, thus pulling the region into the modern world as a proof of France's *mission civilisatrice*, according to *L'Illustration*;²⁷ while the British engineer John Trevor Barkley built the first railway in the whole Ottoman Empire across Dobrudja, from the Black Sea port of Constanța/Kjustenge to the Danubian harbor of Cernavodă, thus foreseeing the itinerary of the canal. In addition to these investments, to secure freedom of navigation and to prevent Russia from secluding the Lower Danube, the Western powers created the European Commission of the Danube, a major experiment in international law that secured the regime of Western "collective imperialism" over the Lower Danube (on the infrastructural works the ECD performed in the Danube Delta see also Ardeleanu's chapter in this volume).²⁸

If until World War I the initiatives for building the Danube–Black Sea canal originated from imperial centers, mostly the British, French, and Habsburg, during the interwar period this discussion was taken up in a new geopolitical context by Romanian authorities and their experts. At a time when Romanian diplomacy strived to limit the jurisdiction of the European Commission of the Danube and to nationalize the river, Romanian scientists started to popularize plans for the execution of the canal. To this end, they reconstructed the long genealogy of this idea, translating and publishing similar projects commissioned by the Habsburg or Ottoman authorities. Most of these studies were published in *Analele Dobrogei*; launched in 1920, this journal engaged the most important Romanian experts on Dobrudja in a permanent forum of exchange. In 1922, *Analele Dobrogei* initiated a debate over the Danube–Black Sea Canal with the publication of Herr v. Vincke's pioneering 1840 study, translated into Romanian by Constantin Brătescu.²⁹ In a footnote, Brătescu announced the imminent publication of "an interesting article on the possibility of digging a canal between Cernavodă and Constanța."³⁰ Indeed, in a subsequent article, engineer Jean Stoenescu-Dunăre³¹ argued unequivocally that "the building of a navigable canal from Cernavodă to Constanța is possible and feasible."³² He commended Vincke's study for providing "the wonderful initial spark of indicating" the benefits of such a project but downplayed Vincke's doubts about its feasibility.³³ Stoenescu-Dunăre estimated the canal's total costs at 662,804,000 lei but predicted its annual revenue at 130,000,000 lei, representing the transit of 1,000,000 tons of merchandise exported from Romania; 500,000 tons of imports to Romania; and 6,000,000 tons of goods transiting from Western and

Central Europe to “the Orient.” These overoptimistic calculations implied that the canal would amortize its costs in a few years. Stoenescu-Dunăre ended by arguing that the canal would be “a work of genuine national development,” which “would open new doors for commercial activity and usher in larger and larger horizons.”³⁴

To further prove “the great importance the former Central Powers granted to this canal,”³⁵ in 1923, engineer V. Cotov published, in Romanian translation, a 1917 brochure printed by the Hydraulic Constructions Directorate of the Kingdom of Hungary, entitled “The Plan of a Navigable Channel from Cernavodă to Constanța” (originally published in German and Hungarian).³⁶ Cotov emphasized upfront the fact that the project, commissioned by the Hungarian Public Service, “proves the great importance the former Central Powers granted to this canal.”³⁷ Cotov pointed out that, although the brochure was very technical in nature, it did not provide full technical instructions on how the locks and spills on the Danube were to be constructed. In addition, the canal’s chosen route was not backed by field documentation but followed the railway line. That solution was justified for the first 30 km of the canal but questionable for the rest of the itinerary to the sea. “A real complete project of the canal from Danube to the Sea remains to be drawn from today onwards,” claimed Cotov.³⁸ To mobilize Romania’s Maritime Ports Service to the task, Cotov emphasized the canal’s tangible benefits: “For Constanța, a canal to Cernavodă will be an unparalleled source of life. If our seaport is totally stagnating today, being left behind by the Danubian ports, this is due first of all to its lack of links with the country. The shortening of the road to the Orient by 400 km, on an international waterway of Danube’s importance, making possible the avoidance of the mouths of the river, which is naturally difficult to reach, adds to the arguments that plead for the execution of this canal.”³⁹ To further emphasize the canal’s geopolitical importance, Romanian scientists also invoked the onerous treaty imposed by the Central Powers in 1917 and their plans of economic domination in Dobrudja, and they pointed out that the canal would enable Romania’s exports to avoid the Danube Delta and thus bypass the control of the European Commission of the Danube, with its center at Sulina.

In 1927 Stoenescu-Dunăre published a second article in *Analele Dobrogei*, reiterating his faith in the canal’s economic role: “I do not think I exaggerate by persisting in my conviction that the building of a navigable canal between the Danube and the Black Sea (Cernavodă-Constanța) is possible and should be executed.”⁴⁰ He reiterated the geopolitical advantages of such a project:

Cutting out a navigable canal between Cernavodă and Constanta would suddenly turn Constanta into the head of a boulevard to the Sea and will establish our maritime port in direct connection with Rotterdam, thus serving the commercial path of Central and Western Europe. Our Seaport will thus become a significant market

of Oriental merchandize destined for the peoples of Central and Eastern Europe, on the one hand, but also for products fabricated in the European industrial countries, which search for debouches in the Orient.⁴¹

To appease resistance from Moldavian political elites, who objected that Dobruja's modernization served the interests of the national capital and not local priorities, Stoenescu reassured them that

the Sulina branch and, in the future, the Chilia branch, which connects the Danubian ports of Galați and Brăila with the maritime freight, will preserve, as always—their role as river harbors. I do not think that any serious person would entertain the idea that the execution of the navigable canal from Cernavodă to Constanța, would be aimed at the depreciation, or the decadence of the cities of Galați and Brăila.⁴²

His article advanced several modifications to the general design of the canal.⁴³ While acknowledging that “the execution of the navigable canal from Cernavodă to Constanța is a grandiose work of art which is not devoid of obstacles,” he reassured the readers that “the obstacles posed by excavation will not be insurmountable.”⁴⁴

These efforts to advance a feasible plan for the construction of the Danube–Black Sea Canal culminated in 1929 with the publication of a complete and fully elaborated project by two scientists from Timișoara, Aurel Bărglăzan and Octavian Smighelschi.⁴⁵ That study was so exhaustive that later it was to serve as the basis for the canal's implementation. Yet, if by 1929 scientific expertise was thus fully available, political support behind this project was still lacking. Although, reportedly, King Carol II supported the construction of such a canal, the economic crisis that hit Romania in 1929–1933 and then the breakout of World War II inhibited the execution of such a large-scale infrastructural plan.

The Danube–Black Sea Canal: A Stalinist Experiment in Forced Labor, 1949–1953

The geopolitical status of the Danube changed dramatically after World War Two. Both emerging superpowers, the United States and the Soviet Union, had plans for postwar river development within their own geopolitical spheres.⁴⁶ Thus, at the 1945 Potsdam Conference, the United States advanced plans to re-internationalize the Danube, together with the Rhine and Elbe, in line with their commitment to the freedom of navigation.⁴⁷ However, following the Soviet occupation of Central and Eastern Europe, the Lower Danube became a “Soviet river.” Through the 1940 annexation of Bessarabia (part of Romania in 1918–1940 and 1942–1944), the Soviet Union became, yet again,

a riparian country. In July–August 1944, Dobrudja became an area of military operations as part of the Soviet offensive against the Axis Powers. Given the province's geopolitical importance, after the war the USSR stationed a large military unit there.⁴⁸

Almost one century after its defeat in the Crimean War by the Western powers, (Soviet) Russia thus succeeded in reestablishing itself as the dominant power in the Black Sea region and could reassume its imperial geopolitical goals at the Lower Danube. To strike a decisive blow to the Western influence in the region, the Soviets opposed the reestablishment of the interwar European Commission of the Danube, which had been suspended under Nazi military hegemony.⁴⁹ Instead, in 1948 the Soviet Union convoked an international conference on the status of the river, attended by delegates from the riparian countries of Czechoslovakia, Hungary, Yugoslavia, Romania, Bulgaria, and also from the United States, Great Britain, and France. On August 18, 1948, the riparian participants, all firmly placed within the Soviet sphere of influence, signed the Convention Regarding the Regime of Navigation on the Danube as a new international legal instrument governing navigation on the Danube. They also established a *new* Danubian commission, based in Budapest, composed only of riparian states.⁵⁰ Excluded, the Allied Powers (Great Britain, France, and the United States) refused to sign the convention, thus bringing to an end the consensual, cooperative international mechanism that had functioned since 1856.⁵¹ They created a rival but rather phantomatic and inconsequential European Commission of the Danube with its seat in Rome.⁵²

In the context of the Cold War, both superpowers attached much importance to exporting complex strategies of river development, seen as efficient ways of combating underdevelopment but also as vehicles of economic integration and political-ideological domination.⁵³ The United States promoted the experience of the Tennessee Valley Authority: This pilot project of modernization implemented under the aegis of the New Deal was successful in producing hydropower, flood regulation and prevention, and improved navigation while at the same time facilitating reforestation and agricultural development.⁵⁴ In line with this approach, the United Nations Educational, Scientific and Cultural Organization (UNESCO) advanced the idea of a Danube Valley Authority to boost postwar European economic recovery.⁵⁵ Likewise, the United Nations Economic Commission for Europe (UNECE), established in 1947, set up a Danube Study Group in its Electric Power Committee to promote electrification in South-East Europe.⁵⁶

These projects could not be implemented at the Lower Danube due to stiff Soviet opposition. In 1949, in response to the US-led Marshall Plan, the Soviet Union, together with five socialist satellite countries—Bulgaria, Romania, Hungary, Poland, and Czechoslovakia—launched the Council for Mutual Economic Assistance (COM-ECON), meant to boost economic cooperation among kindred communist regimes but to also facilitate their firmer integration into the Soviet socioeconomic and political sphere. Moreover, using *Gidroproekt's* domestic experience in implementing large

water projects in the 1930s, the Soviet Union's regional involvement at the Lower Danube promoted its own strategy of "river-basin" development, centered on the implementation of large-scale water infrastructure projects facilitating transportation, communications, and hydroelectric power generation.⁵⁷

As a geopolitical bridgehead between the Balkans and the Eastern Mediterranean, Dobrudja was the main building block of the Soviet domination over the Lower Danube, enabling the USSR to access the Eastern Mediterranean basin in an attempt to counterbalance NATO's military presence in Greece and Turkey. To consolidate their domination over the province, the Soviets attempted to seal off the Lower Danube from international trade by delinking it from the world economy while integrating it more firmly with the Soviet-dominated Euro-Asian space. At the same time, the province served as a pilot project of Soviet-style river-basin modernization. Soviet advisers were dispatched to assist the Romanian government to reorganize the region economically and militarily.

Due to Soviet pressure, Dobrudja became in 1957 the first fully collectivized region in Romania, predating by five years the collectivization of the entire country (1962).⁵⁸ In addition, its economic development benefited from massive central investments. The main role in Dobrudja's economic reorganization was assigned to the execution of the Danube–Black Sea Canal. The ambitious decision to build the canal was taken in February 1948 at the request of the Soviet Union, which pledged technical and financial support. A Romanian state delegation led by Gheorghe Gheorgiu-Dej, Ana Pauker, and Petru Groza signed in Moscow a Treaty of Friendship, Cooperation and Mutual Assistance with the USSR. Paul Sfetcu, Dej's chief of staff, recounts that at this meeting, Stalin presented the Romanian delegation with a concrete technical plan of the canal.⁵⁹ "We left home with the Canal in our pocket," recalls another member of the delegation.⁶⁰ The decision was reinforced on January 25, 1949, at a COMECON meeting. Romania played an important role in the establishment of the COMECON;⁶¹ the canal was to be, at the time, the largest economic investment in COMECON countries.

As in other economic fields, works on the canal were supervised by a team of Soviet advisers. A first brigade of Soviet advisers specializing in water canals, led by General Shaposhnikov, arrived in Bucharest in spring 1949. The Soviet brigade reviewed previous studies by Romanian engineers, topometric specialists, and geologists, and drew the canal's final itinerary between Cernavodă and Capul Midia. Following this initial plan, Gheorghiu-Dej, Postecă, and Gaston Marin went to Moscow together with the brigade of councillors and attended a meeting of the Soviet Political Bureau, together with Stalin, Molotov, Beria, and Kaganovici, among others. General Șapoșnicov presented the technical study and the Political Bureau approved the project.⁶² The Soviet advisers supervised the works on the canal, mostly Shaposhnikov and Vorobiov, but also Ogorodnicov Nicolae Alexandrovici, Dudel Vadim Alexandrovici, and Boicova

Evghenia Nicolaevna.⁶³ The legal basis for their activity was provided by a contract signed between Romania and the USSR on March 30, 1950, followed by a supplementary convention on June 16, 1950.⁶⁴

Building Socialism on the “Death Canal”: Forced Labor and Political Repression

The first attempt to build the Danube–Black Sea Canal was thus a direct imposition of the Soviet geopolitical strategy of imperial domination of the Lower Danube and Eastern Mediterranean. In Romania, the Soviet decision to push through the execution of the canal coincided with the period of communist takeover and consolidation (1946–1958), characterized by the destruction of the “bourgeois nationalist” legacy and the diminution of national sovereignty under Soviet occupation, and the launching of the processes of collectivization and industrialization.⁶⁵ Political scientist Michael Shafir described the process as a “primitive accumulation of legitimacy,”⁶⁶ while Kenneth Jowitt referred to it as a process of “breaking through,” leading to “the decisive alternation or destruction of values, structures, and behaviors which are perceived by a new elite as compromising or contributing to the actual or potential existence of alternative centers of power.”⁶⁷ The Romanian Communist Party conducted a campaign of indoctrination centered on the idea of the revolutionary transformation of society. A main dimension of building the new regime was the struggle against class enemies; a new wave of repression was unleashed, aimed at purging all social categories considered hostile to the socialist project. The category of unwanted citizens encompassed various “antisocial” elements: aristocrats, landowners, kulaks, priests, unemployed individuals, and the like, who were deemed useless or ideologically harmful. Authorities launched a campaign of demonization of these undesirable categories: A series of laws denied them civil rights, confiscated their property, and even attempted their physical elimination.

It was within this sociopolitical context that the construction of the canal started in 1949. Besides aligning with the Soviet geopolitical vision and developmental model, for the communist regime in Romania, the execution of the Danube–Black Sea Canal was to serve multiple internal purposes. From an economic viewpoint, the canal emulated the tradition of large-scale Stalinist projects (see the White Sea–Baltic Canal, 1931–1933, the Volga–Moskva Canal, and the Volga–Don Canal).⁶⁸ The Danube–Black Sea Canal was to be Romania’s single largest socialist building yard, channeling most of the country’s human and financial resources. Politically, just like in Stalin’s Russia, the canal was to serve as a large forced labor camp for political prisoners. The canal offered an opportunity to step up the repression but also to release pressure from the overloaded prison system by providing a coerced and free-of-charge workforce.

Communist authorities turned the project into a building yard of utmost importance and mobilized a great number of workers in various fields, recruited throughout the country from all strata of society. Their number fluctuated greatly throughout years and working seasons, from a minimum of about 7,000 to a maximum of 15,000 workers.⁶⁹ In addition to paid workers, the authorities employed forced unpaid labor of various kinds, mostly the army but also common or political prisoners detained for political reasons, as well as common-law convicts. These categories were strictly isolated from each other to avoid ideological contamination of the “free” workers by political prisoners. Army recruits were a constant presence on the construction sites, the army serving both as a supplementary workforce and security personnel. On May 1, 1951, for example, the Ministry of Armed Forces contributed a share of 19.8 percent of the total working force at the canal with around 4,500 soldiers. Gradually, due to the increasing difficulties authorities faced in recruiting, training, and financing new workers, the importance of the army in the construction of the canal increased exponentially, with 16,000 and then 18,000 workers in early and late 1953.⁷⁰

Another category of forced army laborers was represented by soldiers mobilized in the labor detachments of the General Directorate of the Labor Service, established in 1951. This directorate was in charge of recruiting young people from an “unhealthy social origin” (bourgeois, kulaks, sons of political prisoners, or members of families with relatives abroad), who reached conscription age but had no right to carry a weapon. Those recruited in this contingent were obliged to perform “work of public interest,” often under harsh and inhumane conditions. By 1960, they numbered over 520,000 people;⁷¹ in the early 1950s, many of them were sent to sites on the canal.

The Danube–Black Sea Canal was conceived by the communist authorities as “the grave of the Romanian bourgeoisie.”⁷² In January 1950, a governmental decree and an ordinance of the Ministry of Interior stipulated the arrest of all those who “endanger or try to endanger the regime of popular democracy and the building of socialism.”⁷³ Its bureaucratic procedures emulated the NKVD practices, based on a close cooperation between the leadership of the canal and its demands, and the repressive structures of the Ministry of the Interior, its Direction of Inquiry, and the territorial units of the Securitate districts.⁷⁴ Tens of thousands of “counterrevolutionaries” “reactionaries,” “parasites,” and “enemies of the people” were arrested by way of such extralegal convictions. A committee of Security generals and colonels signed the lists of convicts without a formal trial, granting sentences from 12 to 60 months.⁷⁵ These convicts were sent to hard labor at construction sites, agricultural enterprises, mines, and factories.

The Danube–Black Sea Canal was the most important destination for forced labor.⁷⁶ The number of the political detainees working at the canal fluctuated over time from a minimum of 5,382 in June 1950 to a maximum of 22,442 in August 1952, out of a total of 30,500 workers.⁷⁷ In proportional terms, the share of the political detainees

grew in importance from about 19.2 percent of the total number of workers in 1949 to 82.5 percent in 1952.⁷⁸

The political detainees were concentrated in ten labor camps spread out along the long route of the prospective canal in arid and sparsely populated areas: Cernavodă, Saligny, Kilometer 31, Poarta Albă, Galeș, Dorobanțu, Culmea Nouă, Peninsula, Năvodari, and Capu Midia. These main camps disposed of a network of smaller satellite camps and work sites reaching out deeper into Dobrudja's countryside. These camps were delimited by triple barbed wire fences, reinforced with round-the-clock patrols and watchtowers. The high ratio of guards to prisoners (1:10) made escape highly risky if not impossible.⁷⁹ The detainees were coerced to hard labor, excavating the rocky soil and breaking or carrying heavy stones; they worked in two (twelve-hour) or three (eight-hour) shifts, including weekends and holidays, in harsh weather, without proper training, tools, technical assistance, or protection. Due to inhumane lodging, alimentary, sanitary, and working conditions, the camps had a high mortality rate.⁸⁰ An analytical report by Radio Free Europe estimated the number of victims of the canal at about 10,000.⁸¹

Socialist Failure: The Soviet New Course and the Abandonment of the Canal

Works on the canal were tacitly abandoned in 1953, after Stalin's death, due to insurmountable technical and financial problems but also to the adjustments of the Soviet developmental strategy in the post-Stalinist period under Georgy Malenkov, generically called the "new economic course." Its aims were to rebalance economic development by diverting investment funds from the key sector of heavy industry toward the less developed sectors of agriculture, food industry, the production of consumer goods, and sociocultural constructions, meant to elevate the standard of living of the population.⁸² On July 8–13, 1953, the leadership of the Romanian Workers' Party, led by Dej, traveled to Moscow, for talks with the new Soviet leadership. In this context, Malenkov criticized the Danube–Black Sea Canal, stating, "The Canal was not necessary, its implementation is a gross mistake, which was also instigated by us. The gravest issue is that your own inclination is now to deny the existing shortcomings."⁸³ Similarly, Khrushchev criticized the canal as a German rather than a Soviet developmental plan, thus alluding to the first Habsburg/Austro-Hungarian plans for building the canal and the involvement of the Central Powers in the region during World War I and of Nazi Germany during World War II: The canal, argued Khrushchev, "is a German idea. The Germans needed [an exit] to the sea for their submarines without being obliged to pass through the Soviet part of the Danube. This Canal does not unite but separates us. It is a shameful idea."⁸⁴

Soviet criticism pushed Romanian leaders to halt the project. On July 17, 1953, at a common meeting of the Council of Ministers and the Central Committee (CC) of the Romanian Workers Party (RWP), the latter's Political Bureau bluntly confirmed the seemingly "internal decision" to abandon the canal:⁸⁵ "The works of the Danube–Black Sea Canal will cease on July 18, 1953. The financial-material means, equipment and labor force will be directed to other sectors of the national economy and primarily to agriculture, food industry and consumer goods production." A meeting of the Regional and City Party Committee and the Party Committee of the Canal Building Yard consecrated the decision to abandon the canal, arguing, "The immediate task that stands in front of the canal builders is to collect in the shortest time and without losses the harvest in Constanța region." On July 18, 1953, all canal workers were sent to agricultural works in the Bărăgan plain, without official justification or publicizing the decision in the press.

On July 21, a Bucharest meeting of the CC of the RWP reconfirmed the decision to close the canal. Alexandru Moghioroș, member in the Political Bureau and vice president of the Council of Ministers, pointed out that the excavated area amounted to around two thousand hectares, but the canal's final surface had to be further expanded with an additional two to four thousand hectares. He argued that "it would be a great mistake to continue to make huge investments in this direction," since the daily investment in the canal, amounting to one million lei, was too heavy a burden on the socialist economy.⁸⁶ Allegedly, the measure was requested by the leaders of the construction site, due to the workers' feelings of "fatigue."⁸⁷ Moghioroș reassured the Central Committee that this temporary abandonment "does not mean we have given up on building the economic basis of socialism but we wish to do this in a realistic rhythm."⁸⁸

This blunt report caused consternation among party members: "The construction of the Canal was our pride and to stop things now is not so easy," argued Gheorghe Vasilichi.⁸⁹ Other participants expressed concerns that the yard's assets would be destroyed and the expertise accumulated wasted. Moghioroș replied that the policy adjustment should not be advertised "with the drums"⁹⁰ but "without panic" and "in an organized manner."⁹¹ Finally, Moghioroș urged the participants to hide or minimize the importance of this failure in building socialism:

What we have discussed here is an internal party issue. Although the comrades raised the question if this will remain a strictly internal party secret, because above all, the workers and the enterprises who worked for the Canal will most surely find it out. We must give an answer and our answer will be clear and everyone will agree with it. But we must not beat the drums, this situation must not be used by the class enemy, although the enemies will try this.⁹²

In line with this decision, communist authorities abandoned the canal and integrated the works done so far into the local irrigation installations. To alleviate political embarrassment, the authorities claimed that the project was not cancelled but simply postponed until the Romanian economy further consolidated. However, the fact that the canal was abandoned soon after Stalin's death proves, once again, that the project was imposed on Romania by the Soviet Union and that the Romanian economy could not execute it without Soviet help.⁹³ In many ways, however, the project achieved its main sociopolitical goals: In the process of building it, Romanian authorities increased their cooperation and economic integration with the Soviet Union and with other socialist states within CMEA. The project was instrumental in mobilizing the masses in the building of socialism, in popularizing the socialist ethos of work based on Stakhanovism, and in enrolling rural immigrants in the socialist economy. The socialist economy was further consolidated, although at great costs, through the transfer of technology from the Soviet Union and through enhanced experience in managing large projects, by a process of trial and error. Most importantly, however, the ruling Communist Party managed to consolidate its control over society. The canal project and the campaign of the collectivization of agriculture that took place in parallel were instrumental in building a totalitarian party-state in Romania based on both socialist indoctrination and repression. In the process, Romania's precommunist political, economic, and cultural elites were subject to extermination or ideological reeducation. The canal was thus a main site of forging the New Socialist Men and Women entrusted with the urgent task of building socialism through major infrastructural works. In the short run, however, the early socialist workers lost one of the first major battles with nature, living behind a stream of industrial ruins and disturbances to the river's natural habitat.

Dobrudja's Socialist Modernization in the 1980: Economic Autarchy vs. International Integration

The project of Dobrudja's modernization, centered on the Danube–Black Sea Canal, was resumed with vigor in 1976, when the new secretary general of the Romanian Communist Party, Nicolae Ceaușescu (1965–1989), launched ambitious plans of national economic consolidation. The decision to resume the project of the canal occurred in a different political context. If in 1949 the project had been initiated and led by the Soviet Union and was part of the implementation of the Soviet model of modernization at the Lower Danube, in 1976 the canal was an integral part of Romania's new policy of having a national path to socialism. The canal was to be built with Romanian efforts and technology, supplemented by Western credits and technological assistance, rather than Soviet. These massive national investments were meant to further consolidate Romania's grip over Dobrudja, as the Soviet initiation and close supervision of the

project in the 1950s, the building of military facilities throughout the province (such as the Soviet submarine base at Mangalia), and the modernization of the Constanța sea-port raised concerns among the Romanian leaders who feared that, upon completion of the project, the Soviets would annex the Danube Delta and let Romanians reach the Black Sea via the canal.⁹⁴

This change reflected Romania's gradual deviation from Soviet foreign policy initiated in 1958–1964 under the late rule of Gheorghe Gheorghiu-Dej, following the death of Stalin and the process of de-Stalinization in the USSR. Thus, in 1957, the Soviet advisers were gradually withdrawn from Romania. In 1958, Soviet troops left Romania, following the signing of the treaty with Austria. In 1959, Romanian leaders rejected the division of labor within the CMEA proposed by the “Valev plan,” which assigned Romania the role of agricultural supplier to more industrialized communist countries. In a culmination of this political orientation, on April 21, 1964, a bold “Statement of the Romanian Communist Party” pleaded firmly for a national path to building socialism.⁹⁵

The deviation from the Soviet model had deep internal and external consequences. In its efforts to forge a popular basis for the policy of autonomy from Moscow, the regime diminished external sources of legitimization in favor of an internal nationalist consensus: The socialist nation, rather than the world proletariat, became the regime's ideological base.⁹⁶ This policy led to the establishment of a national communist regime based on three main factors: the redefinition of the relationship between Romanian political elites and Moscow; the implementation of an ambitious program of industrial development, reflecting Romania's “national interest”; and the selective return to certain nationalist cultural traditions of the interwar period.⁹⁷

Ceaușescu continued and amplified Dej's policy of separation from the USSR for both domestic and foreign policy considerations. If in other Eastern European communist countries there occurred a gradual process of de-Stalinization marked by decentralization, in Romania the regime turned to an authoritarian direction, opting for increased centralization and populist strategies of mobilization supported by coercion. Anthropologist Katherine Verdery pointed out that communist regimes generally used a combination of three models of control over society: remunerative, coercive, and symbolic-ideological.⁹⁸ In Ceaușescu's Romania, the emphasis was put on the latter two forms of legitimization. Remunerative control was kept at minimal level; instead, with the “July Thesis” of July 6–9, 1971, the regime shifted to a symbolic-ideological control of society, promoting a primordialist discourse on Romanian national identity.

In addition, the regime moved in the direction of a charismatic style of leadership, based on an increasingly personalized power.⁹⁹ To sustain charismatic fervor, Ceaușescu relied on a policy of “simulating change/simulating permanence.” Internally, it created a facade of mobilization and change, using such formulas as “the New Economic Mechanism,” or “the New Agrarian Revolution” to foster political mobilization. In foreign



Figure 7.3 Nicolae Ceaușescu visiting the building yard of the Danube–Black Sea Canal.
Source: Photo no. #L116. Fototeca online a comunismului românesc (iicmer.ro).

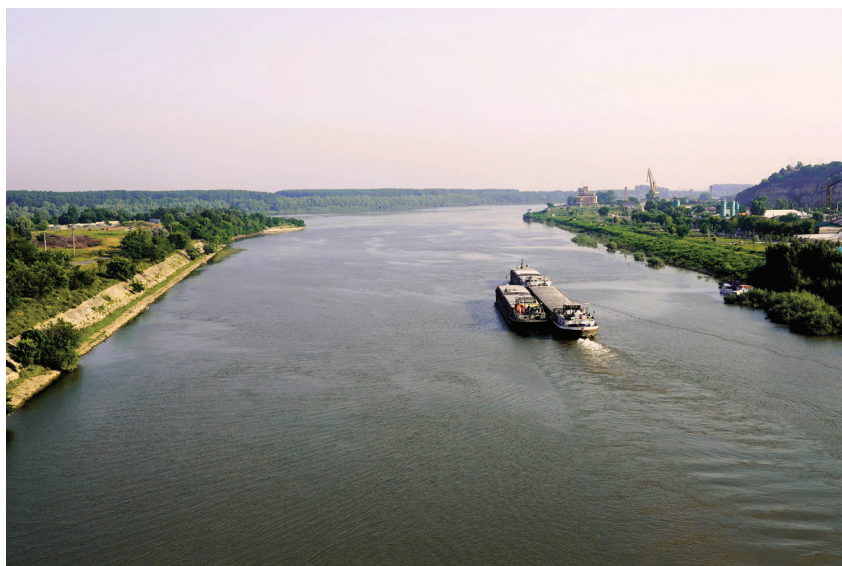


Figure 7.4 The junction of the canal with the Danube, Cernavodă. Photo: Constantin Iordachi.

policy, it simulated allegiance to the Soviet Bloc while tacitly reassuring the West of Romania's autonomous foreign policy.¹⁰⁰

The building of the Danube–Black Sea Canal was an important component of Romania's new nationalist economic and political orientation. The canal was conceived as an affirmation of the campaign of industrialization and capacity to implement major projects of modernization. Politically, the canal was to validate Ceaușescu's economic vision of expanding the capacity of the national economy, linking it more firmly with European and global trade.

Thanks to the massive concentration of resources, the canal was successfully executed by 1987. The main branch of the canal, Cernavodă–Constanta, in length 64.4 km (40.0 mi), connecting the port of Cernavodă with the port of Constanta, was built in 1976–1984. The northern branch, the Poarta Albă–Midia Năvodari Canal, in length 31.2 km (19.4 mi), connecting Poarta Albă and the port of Midia, was built between 1983 and 1987.

SOCIALIST INFRASTRUCTURE IN A POSTSOCIALIST WORLD: DE-HEROIZATION, DECAY, AND METAMORPHOSIS

Akhil Gupta highlighted the Janus-faced nature of infrastructure: Infrastructural works play a central role in transforming our material world and in articulating discourses on progress, growth, and civilization, but in the process they generate forms



Figure 7.5 The Danube–Black Sea Canal with the Cernavodă Bridge in the distance (built in 2002). Drone Photo: Constantin Iordachi.



Figure 7.6 Infrastructure on the canal: The Cernavodă Lock, the entry point to the canal (left). Photo: Constantin Iordachi.



Figure 7.7 Midia-Năvodari Lock on the terminus point of the Poarta Albă–Midia-Năvodari Canal with the Petromidia Oil Refinery and the Midia Port in the background. Photo: Constantin Iordachi.

of decay, often leading to ruination through degradation, climate change, and pollution.¹⁰¹ This dialectic is even more acute, I would argue, in the case of ideologically driven infrastructural works: As iconic symbols of a given political order, the fate of such—often pharaonic—projects are closely intertwined to that of the totalitarian regime that generated them.

The postcommunist trajectory of the canal and the bundle of adjunct subprojects it entailed (bridges, railways and highways, the Constanta harbor, the Cernavoda power plant, the Danube-Bucharest Canal, etc.) are a case in point. The execution of the canal was celebrated by the socialist regime as an exceptional achievement, a testimony of Romania's homegrown technological advancement through heroic, mostly masculinized, work. In the postcommunist period, authorities abandoned this triumphalist narrative, while continuing to exploit and to a certain extent also expand the canal's potential via additional investments in bridges, irrigations, and power plants in the Dobrudja region. These investments were more modest, however, and could not follow up on the grandiose but unfinished socialist vision of development. Many of its major components were abandoned or modified in the postcommunist period, becoming urban or industrial ruins. Among the many later examples, the most spectacular is by far the failure of the Danube-Bucharest Canal: 73 kilometers long, it was planned to link Bucharest to the Danube via the Arges River and then to the Black Sea via the Danube-Black Sea Canal. As in the case of the larger Danube-Black Sea Canal, the execution of the Danube-Bucharest Canal was based on earlier infrastructural plans. The earliest designs for such a canal were elaborated in 1880 by engineer Nicolae Cucu, followed in the interwar period by engineer Alexandru Davidescu's 1927 plan published by the Polytechnic School of Bucharest. The study was found so convincing that in 1929, the Romanian Parliament passed Law no. 2749 on the building of the Arges-Bucharest-Danube Canal and of a commercial port in Bucharest. Just like the plan for the Danube-Black Sea Canal, these goals never materialized. They were renewed with vigor in 1982, however, when the communist regime officially relaunched the plan of executing the canal, together with five locks and four hydroelectric plants. The building of the canal to Bucharest began in 1986, encouraged by the successful completion of the Black Sea Canal, but after sustained work, it was abandoned by the late communist regime in summer 1989, at a time when the rate of completion was around 60 percent. Since then, Romanian postcommunist authorities made concerted attempts to resume work in 1997, 2005, 2017, and again, with renewed vigor, in 2023, also with the help of European Union cohesion funds, as part of the EU Strategy for the Danube River. These plans have not yet taken off, however. The ruins of the canal provide a deplorable site; to social scientists, they tell the story of a repeated developmental failure in a struggling Eastern European economy.



Figure 7.8 The remains of the prospective Bucharest harbor, now in disrepair. These ruins still feed politicians' and journalists' visions of turning Bucharest into a Danubian harbor, enabling hordes of prospective Western tourists to embark on cruises linking Vienna with Bucharest. Picture by Constantin Iordachi.

Another striking example of a socialist infrastructural failure but also its unexpected afterlife, closely associated with the Bucharest–Danube Canal, is Văcărești Natural Park, a vast wetland covering 190 hectares in the southeastern part of Bucharest, merely five kilometers away from the city center (see figure 7.9). The natural area is in fact a former artificial lake cast in concrete by the late socialist regime, as part of the waterworks linked to the prospective Bucharest–Danube Canal; abandoned ever since, the area was first used as a kind of urban no-man's-land and was gradually but steadily taken over by nature. Fed by underground springs, the artificial reservoir turned into marshy lands that facilitated the growth of vegetation and wildlife. In 2016 this so-called “city Delta” became Romania's first urban natural reservation and the first protected natural area in Bucharest under the name “Văcărești Natural Park,” similar to the protected lowland in Buenos Aires, Costanera Sur Ecological Reserve (Reserva Ecológica Costanera Sur) on the Río de la Plata riverbank.¹⁰²

In Dobrudja, local communities tried to adjust to the new realities generated by the canal and to integrate it through various forms of utilitarian appropriation, from agreement or guided history tours on the canal to bicycle lanes along its shores. These attempts achieved modest success, however; instead, public reports abound of stories of environmental decay, massive degradation, and problematic maintenance,¹⁰³ resulting



Figure 7.9 Văcărești Natural Park, emerging in an empty water reservoir. Picture by Constantin Iordachi.

in ecological disturbance along the canal's course, land subsidence, silting, low water level, pollution from ship traffic, and so on.

In view of this string of problems, the ideologized story of heroic socialist achievement was unpacked in the media by various societal actors who exposed all the shortcomings of the canal as an emblem of the socialist alternative national path to modernity: outdated, inefficient, repressive, and ecologically harmful. On the one hand, the 1950s construction phase of the canal was memorialized as a site of repression and an integral part of the "Romanian Gulag." On the other hand, a plethora of press reports, documentaries, and academic works pointed to the canal's lack of economic rentability and the chaos, incompetence, disorganization, and waste of resources that marred socialist work practices. Indeed, the canal fully illustrates the inefficiency of Soviet-style economic planning, noted in the chapter's introduction: The total cost of the canal is estimated at about two billion USD; at an annually generated income of thirty million USD, its full amortization would occur in about 600 years.

Florea Dumitrescu, former minister of finance in 1969–1978, defended—in retrospect—the construction of the canal as necessary, even if it was certainly an overambitious project in 1949 and arguably also in 1976. The initial profitability calculations were based on Romania's annual investment of approximately 10 billion USD in development during the late 1970s and 1980s. The canal's cost was estimated at 1.5 billion USD, with a planned annual expenditure of 300–400 million USD—less than 5 percent of Romania's yearly development budget, making the project seem financially viable. To fund it, Romania joined the IMF and World Bank, securing about 100 million

USD in international loans, covering 5 percent of the total cost. In addition to developing its transportation infrastructure, socialist Romania planned to massively import Western technology to develop its local economy “because this was Ceausescu’s intention: to assimilate from the West but to produce in Romania.”¹⁰⁴ However, this approach backfired due to the socialist economy’s lack of competitiveness on the world market, triggering a severe debt crisis that contributed to the regime’s collapse. The canal’s unprofitability in the postcommunist transition was due, claimed Dumitrescu, to the contraction of the Romanian economy, but also to the fact that Romania’s trade was not channeled on the canal anymore, as originally projected, but took other routes.

CONCLUSION

This chapter focuses on the relationship between infrastructural projects, ideology, and imperial domination at the Lower Danube. It points out that the idea of the canal and its implementation have a long and convoluted history, closely tied with the plans of imperial domination (Ottoman, French, British, Russian, Austro-Hungarian, Soviet) and of national emancipation (see Romania, Bulgaria, and, more recently, Ukraine). Ever since the Lower Danube entered the orbit of the capitalist world economy, various great powers harbored plans of modernizing the region with the aim of taking it into possession or mastering it, from the Ottoman Empire to Russia, Great Britain, France, the Habsburg Empire, and later Nazi Germany and the Soviet Union. Each imperial actor promoted its own modernizing discourse, supported by its own set of ideological priorities and set of technical and aesthetical forms. These imperial projects were in sharp rivalry but also built on each other, so that the major infrastructural projects implemented at the Lower Danube were developed through gradual accumulation as an outcome of European “collective imperialism,” leading to *layers* of infrastructural modernization.

The chapter also shows that the newly emerging riparian nation-states in the region, such as Romania, Bulgaria, and Ukraine, launched their own infrastructural projects as a way of challenging imperial domination. Despite their rhetoric of a total break with the Ottoman domination and its backwardness, their infrastructural projects appropriated, in fact, Ottoman or European modernization projects. The apogee of these modernizing plans, harbored for around two hundred years, was reached during the communist regime in Romania in Soviet-internationalist and then Romanian-autochthonist versions. Due to its totalitarian control over society and its strategy of forced industrialization, that regime was able to mobilize unprecedented resources for implementing pharaonic projects of modernization. At a time when the world became increasingly and painfully aware of manmade environmental disasters and arguably moved into a

postmodern infrastructural age, Ceaușescu decided to launch yet another “heroic moment of modernity’s Promethean project” of regulating and subduing nature, as Kaika suggestively calls such initiatives.¹⁰⁵ The chapter documented the struggle for building this project but also their postcommunist trajectory. It is shown that, as massive industrial things, socialist infrastructural projects were mostly governmental works that served the national economy rather than ordinary people’s daily life and needs. However, in line with recent works on the social aspect of infrastructure, the chapter points out attempts at repurposing socialist infrastructural works and endowing them with new functions and meanings.

It should be noticed that the Lower Danube remained a geopolitical nodal point of local, regional, and imperial interests. After 1991, Ukraine emerged as a new, active regional actor, consolidating its position by way of infrastructural works on the Danube–Black Sea Bystroye Canal meant to turn the Ukrainian side of the Danube Delta into a major transportation hub.¹⁰⁶ At the same time, the direction of Russia’s military aggression in Ukraine since February 2022 and its geopolitical discourse on Novorossiia (New Russia) along the shores of the Black Sea reveals its attempt to reinstate its domination at the Lower Danube. The ongoing war between the two countries is, in many ways, also a infrastructural confrontation: On the one hand, Russia built the 19-km-long “Kerch Bridge” to link southern Russia to the annexed Crimean Peninsula over the sea and to thus prove its modernizing capacity; on the other hand, it started a sustained campaign of destroying Ukraine’s “threatening [*sic!*]” infrastructure, with a focus on its sea and, most recently, its new Danubian harbors at Izmail and Reni, to close the Black Sea to Ukrainian shipping and to thus eliminate Ukraine as a major actor in the world grain trade. To counter Russia’s attempt to reassert its domination at the Lower Danube, NATO is currently building its largest military base in Europe at Mihail Kogălniceanu in Dobrudja, in value 1.5 billion euros and able to host 10,000 soldiers.

At the same time, in Turkey, President Erdogan launched the megaproject of a new “Kanal Istanbul” meant to upgrade Istanbul’s economic and geopolitical importance as a “gate” between the Black Sea and the Eastern Mediterranean, a project reminiscent of the Ottoman policy in the region. In addition to these “traditional” actors—riparian countries, plus Russia, Turkey, and other European powers—China has recently emerged as a new powerful geopolitical player. Its intrusive involvement in the Balkans is done via major infrastructural projects as part of the “Belt and Road Initiative.” The projects of building a high-speed railway connecting Budapest and Belgrade and a navigable canal linking the Danube–Moravia–Vardar–Thessalonica aim at creating a direct transportation link between Central Europe and the Mediterranean Sea, bypassing the Lower Danube and the Black Sea straits. The geopolitical struggle over the Lower Danube by way of building or destroying infrastructure thus remains an ongoing transnational saga, involving riparian as well as regional and global actors.

NOTES

1. There seems to be a bipartisan agreement in the United States, from Presidents Barack Obama to Donald Trump and Joe Biden, that America's aging infrastructure needs to be fixed. The most critical was Trump, who targeted, in colorful language, America's shabby trains and airports. See Keith Laing, "Trump Takes a Shot at NYC's LaGuardia Airport," *The Hill*, Sept. 30, 2015. Yet not much materialized until 2021, when the Congress passed the Bipartisan Infrastructure Deal to "rebuild America's roads, bridges and rails." See <https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/06/fact-sheet-the-bipartisan-infrastructure-deal/> (last accessed September 26, 2024).
2. See, selectively, Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42, no. 1 (2013): 327–43; Armand Mattelart, *Networking the World, 1794–2000* (University of Minnesota Press, 2000); Susan Leigh Star, "The Ethnography of Infrastructure," *American Behavioral Scientist* 43, no. 3 (1999): 377–91; Penny Harvey, "The Topological Quality of Infrastructural Relation: An Ethnographic Approach," *Theory, Culture & Society* 29, no. 4–5 (2012): 76–92; Nikhil Anand, Akhil Gupta, and Hannah Appel, eds., *The Promise of Infrastructure* (Duke University Press, 2018); Penny Harvey and Hannah Knox, "The Enchantments of Infrastructure," *Mobilities* 7, no. 4 (2012): 521–36; Dirk van Laak, *Lifelines of Our Society: A Global History of Infrastructure* (MIT Press, 2023).
3. See mostly: Constantin Iordachi: *Citizenship, Nation and State-Building: The Integration of Northern Dobrogea into Romania, 1878–1913*, Carl Beck Papers in Russian and East European Studies no. 1607 (University of Pittsburgh Press, 2002); "Global Networks, Regional Hegemony, and Seaport Modernization at the Lower Danube," in *Cities of the Mediterranean: From the Ottomans to the Present Day*, ed. Biray Kolluoğlu and Meltem Toksöz (I. B. Tauris, 2010), 157–82; Constantin Iordachi and Kristof van Assche, eds., *The Biopolitics of the Danube Delta: Nature, History and Policies* (Lexington Books, 2014).
4. Larkin, "The Politics and Poetics," 327–43.
5. Larkin, "The Politics and Poetics."
6. Star, "The Ethnography," 380 and 382.
7. Star, "The Ethnography," 380.
8. G. Burchell, C. Gordon, and P. Miller, eds., *The Foucault Effect: Studies in Governmentality* (Harvester Wheatsheaf, 1991). On environmentality, see Arun Agrawal, *Environmentality: Technologies of Government and the Making of Subjects* (Duke University Press, 2005).
9. On these research directions, see Larkin, "The Politics and Poetics," esp. 327–29.
10. Larkin, "The Politics and Poetics."
11. Star, "The Ethnography," 377–91; Larkin, "The Politics and Poetics," 339.

12. On infrastructural reading, see Dominic Davies, *Imperial Infrastructure and Spatial Resistance in Colonial Literature 1880–1930* (Peter Lang, 2017).
13. Verena Winiwarter and Martin Schmid, “Socio-Natural Sites,” in *Concepts of Urban-Environmental History*, ed. S. Haumann, M. Knoll, and D. Mares (Transcript, 2020), 33–50.
14. Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Harvard University Press, 2011). For more on the nexus between environment and technology, see Sara B. Pritchard and Thomas Zeller, “The Nature of Industrialization,” in *The Illusory Boundary: Environment and Technology in History*, ed. Martin Reuss and Stephen H. Cutcliffe (University of Virginia Press, 2010), 69–100; Sara B. Pritchard and Carl A. Zimring, *Technology and the Environment in History* (Johns Hopkins University Press, 2020).
15. For general works on infrastructural works on rivers as disturbances, see Christof Mauch and Thomas Zeller, eds., *Rivers in History: Perspectives on Waterways in Europe and North America* (University of Pittsburgh Press, 2008); Terje Tvedt and Eva Jacobsson, eds., *Water Control and River Biographies* (IB Tauris, 2006); Ellen Wohl, *A World of Rivers: Environmental Change on Ten of the World’s Great Rivers* (University of Chicago Press, 2011). On rivers and empires, see Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (Oxford University Press, 1992); Richard White, *The Organic Machine: The Remaking of the Columbia River* (Hill and Wang, 1995).
16. Valeska Huber, *Channeling Mobilities: Migration and Globalisation in the Suez Canal Region and Beyond, 1869–1914* (Cambridge University Press, 2013); Derek Vollmer and Adrienne Grêt-Regamey, “Rivers as Municipal Infrastructure: Demand for Environmental Services in Informal Settlements Along an Indonesian River,” *Global Environmental Change* 23, no. 6 (2013): 1542–55; Kimberley Thomas, “International Rivers as Border Infrastructures: En/forcing Borders in South Asia,” *Political Geography* 89, no. 4 (2021): 102448.
17. On water infrastructural works as river disturbances, see Janet L. Stein, John A. Stein, and Henry A. Nix, “Spatial Analysis of the Anthropogenic River Disturbance and Regional and Continental Scale: Identifying the Wild Rivers of Australia,” *Landscape and Urban Planning* 60, no. 1 (2002): 1–25; Natalie K. Rideout et al., “The Beautiful and the Dammed: Defining Multi-Stressor Disturbance Regimes in an Atlantic River Floodplain Wetland,” *Frontiers in Ecology and Evolution* 9 (2021): 553094. For instructive case studies of water infrastructure, see Astrid Oberborbeck Andersen, “Water Infrastructures: The Making and Maintenance of Material and Organisational Connections,” in Maja Hojer et al., eds., *The Palgrave Handbook of the Anthropology of Technology* (Palgrave Macmillan, 2022), 721–40; Ashley Carse, “Nature as Infrastructure: Making and Managing the Panama Canal Watershed,” *Social Studies of Science* 42, no.

- 4 (2012): 539–63; Ashley Carse, *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal* (MIT Press, 2014); and Maya K. Peterson, *Pipe Dreams: Water and Empire in Central Asia's Aral Sea Basin* (Cambridge University Press, 2019).
18. Steve Jones, "Rivers Systems as Critical Natural Infrastructure" (Nov. 11, 2017), available at <https://naturalareasblog.wordpress.com/2017/11/11/rivers-systems-as-critical-natural-infrastructure/comment-page-1>, accessed July 20, 2024.
19. On the often-devastating impact of large-scale infrastructure projects implemented by way of "brute-force technologies" meant to manage natural resources, see Paul R. Josephson, *Industrialized Nature: Brute Force Technology and the Transformation of the Natural World* (Island Press, 2002).
20. János Kornai, *Economics of Shortage* (North-Holland, 1980). This approach changed beginning in the sixties and seventies, when many socialist countries adopted a "mixed approach" that accommodated various types of consumer practices, leading to a socialist version of an "affluent society." See Paulina Bren and Mary Neuburger, eds., *Communism Unwrapped: Consumption in Cold War Eastern Europe* (Oxford University Press, 2012). In countries that did not experience full de-Stalinization, however, like Romania, consumerism made only modest advancements in the 1970s, while the economy of shortage was reactivated in full force in the 1980s.
21. For a discussion of the inefficiencies of state-led, centralist development and a vision of a feasible socialism, see Alec Nove, *The Economics of Feasible Socialism Revisited* (Taylor and Francis, 2003).
22. Adrian Forty, "Concrete? It's Communist: The Rise and Fall of the Utopian Socialist Material," *The Guardian* (Feb. 27, 2019), <https://www.theguardian.com/cities/2019/feb/27/concrete-its-communist-the-rise-and-fall-of-the-utopian-socialist-material>, accessed Feb. 10, 2023; and Adrian Forty, *Concrete and Culture: A Material History* (Reaction Books, 2016).
23. Stephen Kotkin, *Magnetic Mountain: Stalinism as a Civilization* (University of California Press, 1995); Caroline Humphrey, "Ideology in Infrastructure: Architecture and Soviet Imagination," *Journal of the Royal Anthropological Institute* 11, no. 1 (2005): 39–58.
24. See, in this respect, the report on the issue prepared for Ottoman authorities by an appointed team of Austrian engineers, "Projected Canal Between the Danube and the Black Sea," *The Times*, Aug. 30, 1855, issue 22146, p. 9, col. C.
25. Iordachi, "Global Networks," 157–82.
26. See Iordachi, *Citizenship, Nation and State-Building*; Luminița Gătejel, *Engineering the Lower Danube: Technology and International Cooperation in an Imperial Borderland* (Central European University Press, 2022).
27. Camille Allard, "La Dobrouitcha," *L'Illustration*, no. 679 (March 1, 1856), 135–39.
28. On this form of "collective imperialism," see Iordachi, "Global Networks," 157–82; on

- the full history of the commission, see Constantin Ardeleanu, *The European Commission of the Danube, 1856–1948: An Experiment in International Administration* (Brill, 2020).
29. Herr v. Vincke, “Valea Cara-su,” *Analele Dobrogei* III (1922) 2, 303–8.
 30. Translator’s note in Vincke, “Valea Cara-su,” 308.
 31. Jean Stoenescu-Dunăre, “Canalul navigabil Cernavodă-Constanța. Putința de a realiza această lucrare,” *Analele Dobrogei* 3, no. 3 (1922): 388–410.
 32. Stoenescu-Dunăre, “Canalul navigabil Cernavodă-Constanța,” 391.
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THE ETHNOGRAPHY OF A FLOOD AND THE FAILURE OF INFRASTRUCTURE

STEFAN DORONDEL

Nature cannot be fooled.

—JAMES GLEICK, *GENIUS: RICHARD FEYNMAN AND
MODERN PHYSICS*

INTRODUCTION

On April 16, 2006, the inhabitants of Rast (Dolj County), Romania, a village close to the banks of the Danube River, felt that all hell had broken loose. The levee—built during socialism to protect villages along the Danube—broke as the river flow reached a historical high of almost sixteen million liters per second. Within just a few hours, the village was submerged. Eight hundred residents were evacuated by local authorities (with three thousand having already fled). By the next day, 115 houses had collapsed and a further 700 were flooded with two-meter-deep water.¹ In the following days, nearby Bistreț village was also swallowed by the waters. The levee—designed to protect the surrounding villages, a private fishery, and the agricultural enclosures (*incinte agricole*)—was breached intentionally by the authorities. The water submerged thousands of hectares of agricultural land and affected over two thousand households for many weeks.

In the days before the disaster, experts from the Ministry of Environment and Waters Management, hydrologists, levee experts, and members of the Romanian government (including the prime minister) gathered to decide how to minimize flood damages alongside owners of the large agricultural enterprises that dominate agriculture in the floodplains. The expert commission discussed the possibility of making a breach in the levee to

lower the water level before the flow reached densely populated cities downstream such as Giurgiu, Brăila, and Galați, with their important industrial complexes, and the Cernavodă nuclear factory. Remembering those terrible days, villagers from Rast and Bistreț emphasized the lack of reliable information: Rumors that emphasized the need to break the levee were the only form of “information” that circulated. The main point being negotiated was, according to the rumors, not if but where this action should best be carried out, and who would be affected. As Don Kalb and Herman Tak have pointed out, rumors about expected catastrophes are a common manifestation of dysfunctional social relations and people’s mistrust of government and political representatives.²

This chapter presents an ethnography of a severe flood, focusing on the political and economic dimensions of water infrastructure. It shows the governmental decisions to mitigate a disastrous flood were based on a deep misunderstanding of the environmental infrastructure of the Danube floodplain. Ignoring local history and the biophysical structure of the terrain only increased the power of the flood. Following Emmanuel Kreike, I use “environmental infrastructure” to recognize the floodplain’s network of canals, ponds, and backwaters as a product of both human activity and the river’s activity.³ The natural canals were often deepened or enlarged by locals in the last hundreds of years. The socialist regime built levees and a network of pipes, pump stations, and irrigation canals to reclaim land for agriculture, incorporating in the process the natural infrastructure built over centuries by the river.

The consequences and severity of a flood are often the result of political and economic decisions taken long before the event took place: decisions to construct levees, to transform the floodplain into agricultural fields (during socialist times), and to privatize the fishery and agricultural fields (during postsocialism). The retreat of the state from the rural economy and the privatization of the former state fishery meant the decision to evacuate waters from the fishery (so it could receive floodwaters) shifted from the regional government hands to private ones. The privatized lake was also an environmental infrastructure meant to mitigate the effects of contingent floods. Unfortunately, those who made these decisions deeply misunderstood the natural pulses of the Danube, the mechanics of floods, and the environmental infrastructure of the river.⁴ Thus, this “natural disaster,” as is often the case, was not entirely natural but a complex historical, economic, and political process.⁵

“NATURAL” DISASTERS, STATE, AND INFRASTRUCTURE

In *Catastrophe & Culture: The Anthropology of Disaster*, Susanna Hoffman and Anthony Oliver-Smith define “disaster” as:

a process combining a potentially destructive agent/force from the natural, modified, or built environment and a population in a socially and economically produced condition of vulnerability, resulting in a perceived disruption of the customary relative satisfaction of individual and social needs for physical survival, social order, and meaning.⁶

The word “process” is important here. A disaster is never a single, sudden, disruptive event, but is rather the endpoint of a series of historical, political, and socioeconomic interactions.⁷ Yet, as Amelie Huber et al. have pointed out, merely saying that disasters are socially constructed obscures the fact that not all people are afforded equal participation in decisions on how to avoid or minimize the effects of a disaster.⁸ Huber et al. underline that disasters result from power dynamics in which a powerful elite makes decisions and a vulnerable majority suffers the consequences. Vulnerability can be defined as “the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard.”⁹ Not all people from a flood-affected area are equally vulnerable. As has been documented in various places, poorer people cannot afford to build their houses on hills (as rich people do in certain settings), they have no decision-making power, and they bear the brunt of the impacts.¹⁰ This inequality reflects wider problems in society.¹¹ As Oliver-Smith and Hoffman put it, how a society reacts in times of crisis offers a snapshot of underlying power dynamics, social structure, and ethnic relations.¹² The case I analyze here shows clearly that several villages were exposed to the flood in order to protect the goods of a powerful politico-economic elite. As one villager declared to a newspaper reporter during the flood, “The government protected their wealth with the help of levees and put us [villagers] in the water. She [the fishery owner] protected her fish while our houses crumbled.”¹³

Levees are large infrastructures “thick with politics.”¹⁴ They are built to harness the energy of rivers, to ensure navigability for transportation of commercial goods, to reclaim agricultural land, and to protect the riparian population from floods. They are not just large technical constructions but a statement of political economy. Society thus organizes the nonhuman world through infrastructure and promotes a certain political and economic vision.¹⁵ As Howe et al. point out, while designed to mitigate risk, infrastructure may introduce new risks;¹⁶ in certain circumstances, levees can amplify the river’s force.

As anthropology’s “infrastructural turn” made salient, even if we do not often use the word directly, we live in an infrastructured world and depend greatly on infrastructure.¹⁷ And it can be difficult to separate natural environments from infrastructure. As Anders Blok, Moe Nakazora, and Brit Ross Winthereik have shown, both environment and infrastructure “exert their own world-making effects,” which sometimes go against

human designs.¹⁸ Alessandro Rippa's survey of the literature on environment and infrastructure shows that infrastructure produces new configurations in the world, shaping the relationship between humans and nonhumans and between built and nonbuilt.¹⁹ Levees are infrastructures built with earth that, in time, become habitat for many non-human species. Reservoirs are part of large infrastructural works (dams) but also home for fish and algae. Ruderal plants grow on almost all transport routes. Mangrove and bald cypress trees are essential infrastructures that protect coastal populations against bank erosion and floods.²⁰ Infrastructure is always a multispecies assemblage.²¹

This chapter contributes to a new turn in anthropology that examines situations in which built infrastructure has—under certain conditions—unintended consequences. As Lav Kanoi et al. have shown, infrastructure has unintended consequences that enable or prevent certain processes from occurring.²² In the case I discuss here, the infrastructure designed to protect the riparian population amplified the flooding, as the channelization of a river increases the speed and volume of the water. What was once a meandering, multibranched river became a water channel after the levees were constructed.²³ In a severe flood, the levee increases the river's force and the "protective" infrastructure becomes a danger to humans, their assets, and the natural environment, as the introduction to this volume points out. Those who plead for the ecological restoration of former floodplains and swamps do so for precisely these moments when all hell breaks loose.²⁴ In fact, new EU policies push against "gray infrastructure"—built with concrete and cement—instead recommending "green infrastructure," such as wetlands as a buffer zone for floodwaters.²⁵ As Kanoi et al. have pointed out, a flood can be exacerbated by an infrastructure (in their paper, a highway)—as happened with the 2011 floods in Chiang Mai, Thailand.²⁶

This chapter explores a case in which infrastructure built to protect people from flooding ended up exacerbating the river's flow. Levees and dams are vital for modern agriculture and the riparian population,²⁷ but building them changes river behavior. When floodwaters are strong, levees increase the volume and force of waters and, somewhere along the way, a levee will breach.

In most parts of the world, the state builds, maintains, and repairs large infrastructure such as levees. The state should also be the first to react when there is a national crisis. Yet, as several authors have pointed out, state agencies are suspiciously slow when acting to protect vulnerable populations.²⁸ Economic objectives and large infrastructure are the top priorities for local and national state representatives when opting for protection. This is one facet of the "political life of disasters."²⁹

A few words on methodology are in order. Ethnography is an anthropological method by which data is collected via participant observation and semi-structured interviews. In the anthropology of disasters, participant observation is rarely used, if at all. Interviewing the relevant people from local and regional administrative and

decision-making bodies *post factum* is more usual. This chapter is based on informal and semi-structured interviews conducted almost a decade after the floods—though villagers’ memories of those critical days appear to be still vivid (the mayor’s office also helps maintain the memory through a large billboard with photos of the disaster, which greets visitors in the hallway). Participatory mapping (initially a geographical method) was also used to spatialize sociopolitical processes and learn about local people’s explanations of various phenomena. The mapping process involves making visible the relationship between local people and the area, thereby emphasizing the importance of local knowledge.³⁰ To do this, I printed a satellite image of the entire village and invited different people, including the mayor and the former secretary of the mayor’s office, to draw their version of the 2006 flood over the map on a transparent film. Their drawings were later worked on by Cristina Posner in a geographic information system (GIS) program. These drawings, alongside the explanations they gave while drawing (which were recorded with their explicit consent), were crucial in understanding the mechanics of the flood.³¹ Following Anna Lowenhaupt Tsing et al., map-making is a crucial method for understanding such socio-environmental crises.³²

SETTING THE SCENE FOR DISASTER

As Mark Cioc reminds us, humans tend to forget that rivers have not only a length but also a breadth—that is, during high waters, the river will expand on the floodplain.³³ Floodplains are not merely land next to rivers; they are part of the river system.³⁴ For a long period of time, humans understood this and lived in a continual “dance with the river,” adapting to its moods and pulses.³⁵ The one billion people who currently live on floodplains around the globe—the populations most affected by floods—are proof that humans either lost this knowledge in modern times or they were pushed by poverty.³⁶ The Danube floodplain is part of this global story of transformation. Before 1965, the floodplain absorbed the Danube’s waters into its numerous swamps, ponds, lakes, and water canals, which also constituted an environmental infrastructure through which various living and nonliving agents—plants, fish, silt, and sand—moved. This patchy landscape, composed of small sandy mounds and crossed by small valleys and patches of forest, was also a “green infrastructure” that absorbed the annual floods.³⁷ In old villagers’ memories, floods were not perceived as a major disturbance to their lives but as an event that brought fish closer to their houses.

Most lakes and ponds belonged to the state but were leased to private persons or to local communities. The entire economy of the region depended heavily on fishing and raising animals in the “marsh,” as the locals used to call it. In 1949, these lakes became the property of the socialist state. From the 1950s onward, within a new socialist

political economy that planned to extend the agricultural fields, a levee was built along the Danube and the lakes and ponds were mostly drained. In 1987, there were 432,000 ha of reclaimed land in the former floodplain, out of 573,000 ha of the total floodplain, which had fifty-three polders.³⁸ Only several large lakes remained, albeit shrunken, and they were transformed into state fisheries.

Bistreț village lies on the banks of what was one of the largest systems of lakes in southern Romania. After building the levees and partially draining the lakes, a part of Bistreț Lake was transformed into a state fishery. The fishery was separated into four basins, with each basin enclosed by levees. The fishery's water surface area was 2,273 ha.³⁹ The fisheries partially maintained the role of the old ponds and lakes: it received the Danube's waters during severe floods. This is why the fisheries removed through specific built infrastructure most of the water every winter, only filling them up again in spring, after the flood season passed. The reclaimed floodplain land in Bistreț was split into various polders, several of which were used for rice fields.

After 1990, the economic transformations passed by the (neoliberal) state also included the privatization of fisheries (along with agricultural land privatization). In the southern part of Romania, however, because the agricultural land represented mostly the bottom of the former drained lakes, ponds, and channels, it remained state-owned. Thousands of hectares of agricultural land belonging to the state (which was left without a technical means of working it) were leased to the new, powerful economic elite. This elite had strong connections with central government, and some were also members of the Romanian parliament. Large agricultural enterprises emerged, some of which worked more than 50,000 ha. The state fisheries were also leased to private investors, all of whom were affiliated with different political parties.

The levees built along the Danube to protect the reclaimed land and villages were neglected by a state whose economic power had shrunk. During socialism, the levees were well maintained, but after the 1990s there were decreasing funds available for maintaining their integrity. The "protection forest" planted between the levee and the Danube, designed to obstruct the river's flow from hitting the earth levees directly, was cut in many places.⁴⁰ Animals built warrens in the levees, further weakening their structure (as we noticed ourselves while walking in the area).

The situation was similar in the villages of Bistreț and Rast. Bistreț lies on the banks of the Piscicola Dunareni enterprise—the state fishery built on the former Bistreț Lake by the socialist regime. On March 12, 2003, MS, a member of the Social Democrat Party and a close friend of the then prime minister, bought the state fishery along with all the tools, boats, machines, and fish for 142,069 euros, the price of a four-room apartment in Bucharest. Less than one year before this privatization, the fishery's state manager bought 85 tons of economically valuable fry species such as carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), and pike (*Esox lucius*) to populate the lake's waters.

Just before the privatization, which was kept secret until the last moment, the fishery manager bought 5,000 baby sturgeon—the most expensive Danube fish species—to repopulate the Danube. This was part of a government program partially funded by the EU to repopulate the river with this almost extinct fish species. Huge investments were made in the nursery and in bringing and accommodating the sturgeon. One year before the privatization, the state fishery bought a new stainless-steel table and trays that cost two million lei, a considerable sum at that time.⁴¹ At the time of the privatization, the fishery had agricultural fields to produce food for the fish, as well as its own boats, tractors, and other machines to produce food and transport the fresh fish to nearby counties and to Bucharest.

All the villagers we talked to told us that MS was never interested in running a fishery business. She bought it because it was extremely underpriced, as were many state assets sold in the first years of postsocialism. One villager said, “She came only to sell the fish, not to invest or something. They were like leeches: they left only after they had sucked out everything.”⁴² MS sold the machines, boats, and tools of the fishery, but not before exploiting the fishery down to the last fish.

This was the situation in April 2006 when the Danube’s waters rose and threatened to destroy cities, villages, and agricultural fields.

NEGOTIATING THE FLOOD

The Danube waters were so high in February 2006 that governmental experts started to think about a breach in the Danube’s levee if they were to save the large cities along the Danube and the large industrial enterprises there. Villagers from Rast and Bistreț heard rumors about a levee breach being planned next to their village. Several experts and regional and central government politicians suggested creating a breach that would flood 11,000 ha of agricultural land but would protect the cities downstream. Initially, the breach was to be made next to Gostinu village (Giurgiu County, 300 km downstream from Bistreț), but the suggestion was heavily contested by one of the most important politicians in Romania, the head of a powerful political party whose company leased over 2,000 ha of agricultural land in the area that would have been flooded. The next considered possibility was to make a breach in Dolj County, close to Bistreț village. Here, the advantage was that the village itself would have been protected by a levee that separates it from the state fishery of 2,273 ha. But it would have entailed flooding more than 11,000 ha of agricultural fields and the private fishery to tame the furious Danube waters.

In February 2006, as several interlocutors from Bistreț told us, announcements were made about the rapid rise in Danube waters. According to the selling contract, the

fishery should have already lowered the water level via an infrastructure set up during the socialist period for this precise reason. Yet, villagers told us that MS refused to switch on the pumps and lose money. In April, when the waters were already high and rumors abounded about the necessity of a levee breach, former fishery technicians (who had been dismissed) advised the mayor of Bistreț to urge MS to empty the four basins in order to absorb some of the Danube waters. As one interlocutor told us, “If there had been sixty to seventy centimeters of water in the basin instead of seven meters, the situation would have been different.” In a TV interview, the former fishery director mentioned that not only had MS refused to empty the basins, but also they had never been emptied in recent years. Six months before, the basins reached a critical point: They were already too full.⁴³ According to the villagers, MS declared that she would “not throw her fish in the river,” although at that time allegedly no fish remained in the basins. She also refused to spend her enterprise’s money on the highly power-consuming infrastructure needed to empty the basins. The villagers said she actually wanted a big, uncontrolled flood to receive compensation from the central government. MS was able to refuse to empty the basins as she was backed up at the regional and national level by a network of politicians and powerful people.

The decision to breach the Danube levee close to Bistreț was made by the central government. The village mayor, as someone who knows the place well, had nothing to say about this.⁴⁴ Upon hearing of this decision—which was not communicated officially, there were only rumors—several villagers took the initiative and tried to make a levee breach that would have directed the waters toward the lake but would have saved Bistreț and Rast villages. They said that if the breach were to be made where the powerful negotiators wished it, then only the levee separating the agricultural enclosures from the fishery would have remained between the villages and the furious Danube waters—and it was not strong enough to hold back the floodwaters. They were caught and threatened with pistols by private guards who watched the fishery.

On the night of April 14, government officials placed dynamite along the longitudinal defense levee. This levee, which runs alongside the Danube, had functioned as infrastructure protecting the villages and the agricultural fields from the floods for years. But the dynamite did not achieve the desired result because the levee earth turned into a sort of clay. The next attempt was to use a large drill. Hydrologists from Bucharest had calculated that if the Danube waters were poured into such a large agricultural area (over 11,000 ha), the flood wave would lose its force. A horde of experts with measuring tools, who took pictures and traveled in helicopters over the area, were part of the spectacle designed to assure people the government had everything under control. A technical approach to the infrastructure, which involves measuring, repairing, or surveying, has a performative role—it is a spectacle enacted by the state authorities to bring a promise of safety.⁴⁵

AN ENVIRONMENTAL INFRASTRUCTURE

Those who devised the plan ignored the terrain's geographical features and hoped the water would behave the way they planned. The flood wave first hit the levee, which resisted. It then followed the small natural ditches that still existed in the terrain, ditches that had survived the socialist landscaping completed after the levees were built. It thus changed its course and hit several villages, including Bistreț, Negoiu, and Rast. These old channels were dry, but the terrain's configuration was characteristic of any river's floodplain. Villagers remembered that in the floods of 1942 and 1944, the Danube waters passed the same way through a network of natural channels. These channels were a natural infrastructure that fed the lakes, swamps, and ponds of the floodplain with water and fish before the socialist regime built the levees. After the levees were built, large infrastructural works transformed the former bottoms of the lakes and ponds into agricultural fields by landscaping them. Yet, these small ditches remained, and it was these ditches that led the waters in unexpected directions, thereby flooding villages supposed to be safe. The small ditches acted as a "natural infrastructure," as Ashley Carse calls it, or a "biotic infrastructure," as Kanoi et al. describe it.⁴⁶ Looking at the watershed forests of the Panama Canal that contribute to the stability of the canal's water level, Carse criticizes the dichotomy between human-constructed infrastructure (which delivers various services) and natural infrastructure (which is regarded as less of an infrastructure).⁴⁷ Similarly, Kanoi et al. have shown that nonhumans are increasingly recognized as vital elements in confronting the ecological threats posed by the climate crisis.⁴⁸ They give the example, among others, of mangrove forests that defend the seashore against erosion.⁴⁹

In the case of the Danube floodplain, the canals, backwaters, and natural ditches rearranged for centuries by locals constitute the ruins of an environmental infrastructure.⁵⁰ During the socialist regime, the terrain was transformed by pipes, channels paved with concrete panels, electric pumps, and stations. As if it recognized the once bigger and more functional environmental infrastructure, the flood wave followed the old lines of movement through the floodplain. The mayor of Rast explained the spatial pattern of the flood wave over time during the participatory mapping session (see figure 8.1).

The small breach in the levees grew larger and larger and "the water flooded as a cascade," as one interlocutor put it.⁵¹ On April 24, the water pressure broke the partitioning levee that protected the fish farming and the agricultural polders, thus pouring thousands of tons of water into the floodplain, which swept through parts of Bistrețu village, the fishery, and the agricultural fields. For more than two months, the villages remained underwater (see figures 8.2 and 8.3).

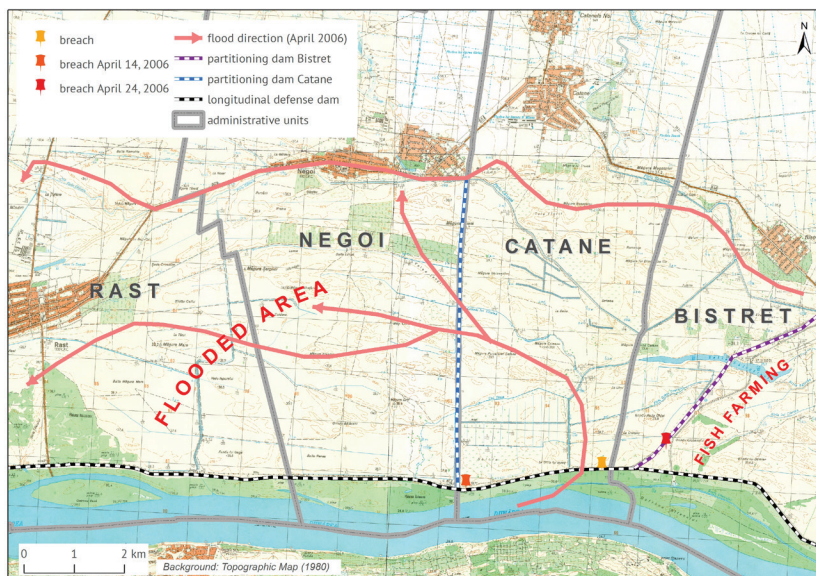


Figure 8.1 A map displaying the water's flow during the flood. Made by Marina Virghileanu based on the ethnographic story, completed as part of the research project PN-III-P4-ID-PCE-2020-1238 (PI, Stefan Dorondel).



Figure 8.2 The village of Rast was partially swept away by the flood. Photo by the Mayoralty of Rast. Published with their permission.



Figure 8.3 A village under water. The main lane of the village. Photo by the Mayoralty of Rast. Published with their permission.

The flood was not just a wave of water that swept *over* people and their houses. Many houses were flooded *from below*. That is, underground water surfaced in their backyards and their cellars. This was not a new phenomenon but rather one characteristic of the entire Danube floodplain.⁵² When the socialist regime reclaimed agricultural fields in the floodplain, they built levees to disconnect the Danube from its floodplain, neglecting the fact that there were myriads of small natural underground creeks connecting the river and the floodplains. These underground waters partially kept water year-round in several ponds and lakes along the floodplain. Building a levee meant that the overground connection between the river and the floodplain was cut, but not the underground connection. Thus, even after raising levees, draining lakes and ponds, leveling the land, and cultivating cereals, underground water continued to surface. A network of underground pipes and electric pump stations was built to evacuate the excess water,⁵³ but it continued to surface along the floodplains.⁵⁴ In April 2006, underground water surfaced again, this time not only in the agricultural fields, as it used to do, but also in the basements of many households.

After the waters withdrew, MS completely abandoned the lake, in part because of problems she had with the National Anticorruption Directorate. She claimed huge amounts of money from the Romanian state as financial compensation for “what she had already sold,” as several villagers told us. When we visited the fishery for the first time, in 2014, the former director walked us among what was by that point already the ruins of a once-thriving fishing enterprise.

The waters that flooded thousands of hectares of agricultural land remained there for more than two months. The river recreated the former floodplain that had been embanked and drained under the socialist regime. The place turned into a cornucopia for locals as fish again became abundant and affordable for anyone in the surrounding villages. The postflood environment was thus not only an invitation for other species to thrive but also democratized the locals' revenues; even the poorest could make a living.

After the water was forcibly evacuated, the levee was rebuilt, and agriculture retook its position. Locals lost interest in that part of the village land. Depleted of fish before being flooded in 2006, the abandoned fishery was revived in the few years after the flood. The large lake of more than 2,200 ha attracted birds, snakes, lizards, and insects, while reeds and rushes started to grow close to the banks, offering protection to all sorts of animals. The lake even attracted a pair of black swans, a *rara avis* in Eastern Europe.⁵⁵ The place may have been emptied of humans, but it was populated by many other species that thrived there. This is just one example of how disturbance can engender new human and nonhuman life in infrastructural ruins.

POWER AND RUINED INFRASTRUCTURE

The story of this chapter is not just about a flood but also about a postsocialist elite wielding power in their favor against a vulnerable population and the ruining of a large infrastructure. During socialism, the levees were well attended to, with grass planted over them to keep the levees strong. After the 1990s, there was less state care for the infrastructure. All the levees were weakened by moles and hamsters burrowing holes through them, and water began to permeate them.⁵⁶ The levees are now covered by "weeds," as locals call them, plants with strong and deep roots that produce cracks in the levees. This is akin to what Ashley Carse has called "weedy infrastructure."⁵⁷ For people living in Colón, Panama, weediness signifies state disinvestment in infrastructure and a disconnection from the global economy. The villagers of Bistreț and Rast interpret the weedy levee in the same way. The lack of the levees' maintenance reflects "the social relations enabled and created by the infrastructure."⁵⁸ As Akhil Gupta emphasizes, maintenance is not just a technological work activity; it is also about the politics and social inequalities embedded in the infrastructure.⁵⁹ The weedy infrastructure, combined with the political and economic power of regional and national actors, led to the event known as the catastrophic 2006 floods. The two elements, weedy infrastructure and political and economic power, are reflected in the fact that these two historical processes were joined under specific circumstances, namely, the Danube's high waters in April 2006. However, the human-made infrastructure was not just "weedy" but was also a preferred place for rodents that dig their warrens in the levees.⁶⁰ In this case,

the border between infrastructure and the environment became blurred to the point of disappearing. It is not just that “the engineered infrastructures articulate with environmental processes.” The levees are an ecosystem composed of land (albeit rearranged to serve human purposes), plants, and animals.⁶¹ The activity of the animals and plants over a levee neglected by the state contributed further to the ruination and decay of this environmental infrastructure.

The presocialist ruined environmental infrastructure seemed to have functioned better than the socialist one. It persisted through time and the deep politico-economic transformations of the floodplain, carrying the flood wave along the same route as it had done for centuries. The floodplain’s environmental infrastructure was “ruined” deliberately in a complex process of reclaiming agricultural land. This infrastructure was ruined not because the state did not maintain its functionality; it was still partially functional *despite* the attempts of the socialist regime to make it disappear. Another natural infrastructure, this time invisible, functioned as well. Floods do not manifest only as a wave advancing horizontally over land but also vertically, from below to the surface. This latter directionality renders the above infrastructure useless. Levees are built to impede a horizontal advancement of water—not a vertical one. The quantity of water that surfaced from below—not just in 2006 but also in the years before that—was a surprise to experts and state officials. The map created by Marina Virghileanu using GIS methods and cross-checked with the ethnographic interviews shows the “humidity excess” in the agricultural fields (see figure 8.4). “Humidity excess” is a neutral expression used by agronomists to designate the surfacing of groundwater and the destruction of crops in those areas. In 2006, the “humidity excess” hit more than the fields: it hit houses as well.

Locals perceive the decay of the levees as part of the same process of social and political disorder characteristic of the postsocialist era. The privatization of the state fishery and orchards is part of the same politico-economic process as the levee’s decay. We heard stories in the village about how important the fishery was for the villagers. Before it was privatized, the fishery economically supported many villagers. Several hundred people worked there not only as fishermen but also in the small factories that prepared the fish for canning. Those who worked at Piscicola had a good income (also based on poaching), but poor people, mainly of Roma origin (who had no land at all), used to poach overnight to make ends meet, too. Once the fishery was privatized, these locals lost all advantages. In 2006, villagers experienced not only the decay of an infrastructure designed to protect them, but they also felt that society as a whole had crumbled. When locals talked about the 2006 flood, they immediately invoked the privatization of the fishery and the politicization of institutions. The fishery owner’s decision not to empty the basins to avoid losing money was, in the locals’ view, the primary reason for the disaster. Had the basins been emptied, the flood wave would have been partially



Figure 8.4 The areas of “humidity excess” in the agricultural fields of Rast. Made by Marina Virghileanu based on the ethnographic story, completed as part of the research project PN-III-P4-ID-PCE-2020-1238 (PI, Stefan Dorondel).

absorbed. The lack of state-trained technicians—because they had been dismissed by the new owner—contributed further to the disaster. The disaster was also exacerbated by regional politicians who “had no idea what to do in this situation.”⁶² They were appointed to office lacking the requisite educational background, and so they panicked and obeyed central government decisions without understanding the situation or having the courage to advance the locals’ point of view. These accusations came not just from people outside of the political field but also from local politicians, such as the village mayor.

CONCLUSION: CIRCULAR THINKING

This chapter has presented the ethnography of a flood as a consequence of a deep misunderstanding of environmental infrastructure. State officials ignored the role of the floodplain as a natural buffer in case of floods and the local knowledge of flood mechanics in the region. Ignoring the differences in the functionality of environmental infrastructures was a politico-economic failure with social and economic consequences for those people without power in the village. Examining the history of the last seven decades, from the socialist technological transformations of the floodplain to the more recent privatization policies, is crucial to understanding this failure. All these politico-economic decisions to bio-physically transform the floodplain and a retractile state were the ingredients for disaster.

This chapter also emphasizes the attention ethnographers should pay to geomorphological details of the floodplain and the importance of flood and water flow mechanics. Working collaboratively, ethnography, geology, and limnology can afford us a deeper understanding of political decisions that affect people without power. The ethnography of the 2006 flood and its consequences reveals how the state and the experts who contributed to the levees’ construction engaged in a kind of circular thinking. The socialist state perceived floods as a danger to the riparian population and the state economy. Akhil Gupta has emphasized this point very well: For infrastructure to exist, a condition considered damaging must first occur.⁶³ This perception was pushed by a modern state that ignored centuries of riparian population experiences with the river. It is true that villagers were sometimes seriously affected by these floods, as was the case with the mid-nineteenth-century flood that affected the town of Giurgiu described by Luminita Gatejel (this volume); by the 1941 flood that swept away the town of Vidin in Bulgaria, analyzed by Stelu Șerban (this volume); or by the 1956 floods in Hungary (Robert Nemes, this volume). The socialist state built strong levees, 28 m wide at the base and 8 m tall, to defend against flooding—but in doing so disconnected the river from its breathing space, the floodplain.

The belief of the government and experts in the safety of infrastructure was based on one quality of infrastructure—its relationality.⁶⁴ The construction of levees associated with the construction of the underground infrastructure (pipes) and to the water channels, pumps, and stations that controlled the river's water were supposed to protect villages and towns against the Danube's pulses. But in the 2006 flood, the infrastructure designed to protect against flooding in fact maximized it. Thus, not only did the Danube waters threaten to break the levee, but the Danube also flooded land and homes from underground.

For a river, a flood is just a normal occurrence, a pulse that has repeated for millennia. The Romanian authorities perceived this pulse as threatening to the local people and economy. After the 2006 flood, not only did they repair the levee, but they also made it even stronger, as several villagers told us, to provide a barrier against future floods. There was a hope that the water would not find other ways to the village and its agricultural fields. This is a kind of circular thinking: Infrastructure is built to protect but when it fails to do it, poor people suffer. Then, a new, even stronger infrastructure is built that will only exacerbate rather than alleviate the tensions between the humans and the river. The modern states advanced a circular perception of the human-river relationship and engaged in a spiraling struggle that involved ever grander attempts to control the river—which led to the river responding even more violently. This is a struggle in which governments cannot win. As James Gleick eloquently put it, “Nature cannot be fooled.”

NOTES

1. Interviews conducted in Bistret in 2014 by Stefan Dorondel and Oana Ivan.
2. Don Kalb and Herman Tak, “The Dynamics of Trust and Mistrust in Poland: Floods, Emotions, Citizenship and the State,” in *Politics and Emotions in Central and Eastern Europe*, ed. M. Svasek (Berghahn Books, 2006), 196–213.
3. Emmanuel Kreike, *Environmental Infrastructure in African History: Examining the Myth of Natural Resource Management in Namibia* (Cambridge University Press, 2013), 1.
4. Cf. Lauren E. McPhillips et al., “Defining Extreme Events: A Cross-Disciplinary Review,” *Earth's Future* 6, no. 3 (2018): 441–55.
5. Susanna Hoffman and Anthony Oliver-Smith, eds., *Catastrophe & Culture: The Anthropology of Disaster* (School of American Research Press, 2002).
6. Hoffman and Oliver-Smith, *Catastrophe & Culture*, 4.
7. Gregory V. Button and Mark Schuller, *Contextualizing Disaster: Catastrophes in Context* (Berghahn, 2016); Hoffman and Oliver-Smith, *Catastrophe & Culture*; Franz Mauelshagen, “Defining Catastrophes,” in *Catastrophes and Catharsis: Perspectives on Disasters and Redemption in German Culture and Beyond*, ed. K. Gerstenberger and

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8. Amelie Huber et al., “Beyond ‘Socially Constructed’ Disasters: Re-Politicizing the Debate on Large Dams Through a Political Ecology of Risk,” *Capitalism Nature Socialism* 28, vol. 3 (2017): 48–68.
 9. Piers Blaike et al., *At Risk: Natural Hazards, People’s Vulnerability, and Disasters* (Routledge, 1994), 9.
 10. Lang Kenna Archer, *Unruly Waters: A Social and Environmental History of the Brazos River* (University of New Mexico Press, 2015); Blaikie et al., *At Risk*; Hugh Brammer, “After the Bangladesh Flood Action Plan: Looking to the Future,” *Environmental Hazards* 9 (2010): 118–30; Thomas Hofer and Bruno Messerli, *Floods in Bangladesh: History, Dynamics and Rethinking the Role of the Himalayas* (United Nations University Press, 2007); Ted Steinberg, *Acts of God: The Unnatural History of Natural Disasters in America* (Oxford University Press, 2000).
 11. Gabriela Da Costa Silva, “Assessing Environmental Justice of Community-Based Watershed Management: A Tool to Build Adaptive Capacity in Latin America?,” *Local Environment* 16, no. 5 (2011): 445–60.
 12. Anthony Oliver-Smith and Susanna Hoffman, “Introduction: Why Anthropologists Should Study Disasters,” in *Catastrophe & Culture: The Anthropology of Disaster*, edited by S. Hoffman and A. Oliver-Smith (School of American Research Press and Oxford, 2002), 4.
 13. “8000 Distressed People Evacuated from the Flood,” in *Gazeta de Sud*, April 26, 2006, <https://www.gds.ro/Local/2006-04-26/8-000-de-sinistrati-evacuati-de-ape/>.
 14. Wiebe E. Bijker, “Dikes and Dams, Thick with Politics,” *Isis* 98 (2007): 109–23.
 15. Anders Blok, Moe Nakazora, and Brit Ross Winthereik, “Infrastructuring Environments,” *Science as Culture* 25, no. 1 (2016): 1–22.
 16. Cymene Howe et al., “Paradoxical Infrastructures: Ruins, Retrofits and Risks,” *Science, Technology & Human Values* 41, no. 3 (2016): 547–65.
 17. See Nikhil Anand, Akhil Gupta, and Hannah Appel, eds., *The Promise of Infrastructure* (Duke University Press, 2018); Penny Harvey, Casper Bruun Jensen, and Atsuro Morita, eds., *Infrastructures and Social Complexity: A Companion* (Routledge, 2017); Kregg Hetherington, ed., *Infrastructure, Environment and Life in the Anthropocene* (Duke University Press, 2019); Brian Larkin, “The Politics and Poetics of Infrastructure,” *Annual Review of Anthropology* 42 (2013): 327–43; Susan Leigh Star, “The Ethnography of Infrastructure,” *American Behavioral Scientists* 43, no. 3 (1999): 377–91.
 18. Blok, Nakazora, and Winthereik, “Infrastructuring Environments,” 5–6.

19. Alessandro Rippa, "Infrastructure and the Environment in Anthropology," *Social Science Information* (2023), <https://doi.org/10.1177/05390184231189126>.
20. On ruderal ecologies, see Bettina Stoetzer, "Ruderal Ecologies: Rethinking Nature, Migration, and the Urban Landscape in Berlin," *Cultural Anthropology* 33, no. 2 (2018): 295–323; for levees and their nonhuman inhabitants see below; on fish and algae in water infrastructures, see Tanya Richardson, "Objecting (to) Infrastructure: Ecolitics at the Ukrainian End of the Danube," *Science as Culture* 25, no. 1 (2016): 69–95. On bald cypresses, see Bonnie J. Gordon and Stanislav Roudavski, "More-Than-Human Infrastructure for Just Resilience: Learning from, Working with, and Designing for Bald Cypress Trees (*Taxodium distichum*) in the Mississippi River Delta," *Global Environment* 14 (2021): 442–74.
21. E.g., Casper Bruun Jensen, "Multinatural Infrastructure. Phnom Penh Sewage," in *Infrastructures and Social Complexity: A Companion*, ed. P. Harvey, C. B. Jensen, and A. Morita (Routledge, 2017), 227–41.
22. Lav Kanoi et al., "'What Is Infrastructure? What Does It Do?': Anthropological Perspectives on the Working of Infrastructure(s)," *Environmental Research: Infrastructure and Sustainability* 2, no. 1 (2022): 012002.
23. Antony G. Brown et al., "Natural vs. Anthropogenic Streams in Europe: History, Ecology and Implications for Restoration, River Rewilding and Riverine Ecosystem Services," *Earth-Science Reviews* 18 (2018): 185–205.
24. Christian Damm, "Ecological Restoration and Dike Relocation on the River Elbe, Germany," *Scientific Annals of the Danube Delta Institute* 19 (2013): 79–86; Laurent Lespez and Marie-Anne Germaine, "La rivière désaménagée? Les paysages fluviaux et l'effacement des seuilles et des barrages en Europe de l'Ouest et en Amérique du nord-est," *Bulletin de la Société Géographique de Liège* 67 (2016): 223–54; Jeroen Frank Warner, Arwin van Buuren, and Jurian Edelenbos, eds., *Making Space for the River: Governance Experiences with Multifunctional River Flood Management in the US and Europe* (IWA, 2013).
25. Jesper Petersson, "Blurring the Shoreline: De- and Re-Infrastructuring and the Changing Colors of European Flood Policy," *EPE: Nature and Space* 4(2), (2021): 624.
26. Kanoi et al., "What Is Infrastructure? What Does It Do?"
27. Atsuro Morita, "Infrastructuring Amphibious Space: The Interplay of Aquatic and Terrestrial Infrastructures in the Chao Phraya Delta in Thailand," *Science as Culture* 25, no. 1 (2016): 117–40.
28. Nancy Scheper-Hughes, "The Disaster and Its Double," in *The Anthropology of Climate Change: An Historical Reader*, ed. M. Dove (Wiley Blackwell, 2014 [2005]), 217–22; Steinberg, *Acts of God*.
29. Birgitte Refslund Sørensen and Kristoffer Albris, "The Social Life of Disasters: An Anthropological Approach," in *Disaster Research: Multidisciplinary and International*

- Perspectives*, edited by R. Dahlberg, O. Rubin, and M. T. Vendelø (Routledge, 2016), 66–81.
30. Jack Rom Cadac and Jean-Christophe Gaillard, “Integrating Knowledge and Actions in Disaster Risk Reduction: The Contribution of Participatory Mapping,” *Area* 44, vol. 18 (2012): 100–109; Logan Cochrane and Jon Corbett, “Participatory Mapping,” in *Handbook of Communication for Development and Social Change*, ed. J. Scrivacs (Springer Nature, 2018), 1–9; Nora Fagerholm et al., “A Methodological Framework for Analysis of Participatory Mapping Data in Research, Planning and Management,” *International Journal of Geographical Information Science* 35, no. 9 (2021): 1848–75.
 31. The ethnographic and geographic fieldwork was carried out by two interdisciplinary teams within two different research projects, for both of which I was PI. Oana Ivan carried out ethnographic fieldwork in Bistreț in 2014 and Cristina Posner in Rast and Gostinu in 2014 and 2015. Mărioara Rusu, Violeta Florian, and Iuliana Armaș backed them up doing quantitative and geological research. The entire team participated in the participatory map inquiry. The fieldwork was carried out under my supervision (within the project PNII-ID—PCE-2012-4-0587). Cornelia Florea carried out fieldwork more recently in Rast in 2022 and 2023 under my supervision (within the project PN-III-P4-ID-PCE-2020-1238). Other team members (Stelu Șerban, Adrian Deoanica, Alexandra Ion, Gabriela Ioana-Toroimac, and Marina Virghileanu) carried out ethnographic and geographic fieldwork in the same village in 2021 and 2022. This is the reason I use “we” when I talk about fieldwork and “I” when writing this chapter. I conducted all the interviews I used for this paper in collaboration with various other members of the two teams. All team members had access to the entire ethnographic material.
 32. Anna Lowenhaupt Tsing, Jennifer Deger, Alder Keleman Saxena, and Fei Fei Zhou, *Fieldguide to the Patchy Anthropocene* (Stanford University Press, 2024), 8.
 33. Mark Cioc, *Rhine: An Eco-Biography, 1815–2000* (University of Washington Press, 2002), 33.
 34. Giuliano di Baldassarre et al., “Socio-Hydrology: Conceptualizing Human-Flood Interactions,” *Hydrology and Earth Systems Sciences* 17 (2013a): 3295–3303.
 35. Kuntala Lahiri-Dutt and Gopa Samanta, *Dancing with the River: People and Life on the Chars of South Asia* (Yale University Press, 2013).
 36. Giuliano di Baldassarre et al., “Towards Understanding the Dynamic Behaviour of Floodplains as Human-Water Systems,” *Hydrology and Earth Systems Sciences* 17 (2013b): 3235–44.
 37. Oana Ivan, *Research Report Bistreț Village* (Manuscript, 2014).
 38. Ioan Vișinescu and Marcel Bularda, “Modificări severe în regimul hidrologic al Dunării și impactul acestora asupra agriculturii în lunca îndiguită [Deep changes in the Danube hydrological regime and its impact on agriculture in the dammed floodplain],” *Anuarul*

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39. Ivan, *Research Report*.
 40. Vişinescu and Bularda, “Modificări severe în regimul hidrologic al Dunării.”
 41. Interview with the former director of Piscicola, Bistreţ, and with MD, 67 years old (a knowledgeable villager who helped us a lot in the field), July 2014. He also showed Oana Ivan and me a copy of the selling contract of the fishery.
 42. Interview with MD, 67 years, July 2014.
 43. Camelia Moise, *O privatizare . . . de succes! Piscicola Dunăreni SA* [A successful privatization . . . the Dunăreni fishery]. See https://www.youtube.com/watch?v=D_k8gokSCSc&t=2s at 5:30 min.
 44. The mayor of the village communicated this to us several times during the participatory mapping session.
 45. Adrian Deoancă, “(Dis)Connected Rail: Infrastructural Suspension and Phatic Politics in Romania,” *Transfers* 10, vol. 2/3 (2020): 152–74; Kregg Hetherington, “Waiting for the Surveyor: Development Promises and the Temporality of Infrastructure,” *Journal of Latin American and Caribbean Anthropology* 19, vol. 2 (2014): 195–211; Christina Schwenkel, “Spectacular Infrastructure and Its Breakdown in Socialist Vietnam,” *American Ethnologist* 42, vol. 3 (2015): 520–34.
 46. Ashley Carse, “Nature as Infrastructure: Making and Managing the Panama Canal Watershed,” *Social Studies of Science* 42, no. 4 (2012): 539–63; Kanoi et al., “What Is Infrastructure? What Does It Do?”
 47. Carse, “Nature as Infrastructure: Making and Managing the Panama Canal Watershed.”
 48. Kanoi et al., “What Is Infrastructure? What Does It Do?”
 49. See also Sarah E. Vaughn, “Disappearing Mangroves: The Epistemic Politics of Climate Adaptation in Guyana,” *Cultural Anthropology* 32, no. 2 (2017): 242–68.
 50. Kreike, *Environmental Infrastructure in African History*.
 51. Stefan Dorondel interview with FB, 70 years, May 2021.
 52. For more details on this phenomenon, see Stefan Dorondel and Cristina Posner, “Infrastructure, Feral Waters and Power Relations in Rural Romania,” *Critique of Anthropology* 42, no. (2022): 172–90.
 53. Ivan, *Research Report*.
 54. Dorondel and Posner, “Infrastructure, Feral Waters and Power Relations.”
 55. Interview with the former local professor of geography, Bistreţ village, August 2013.
 56. Interview with FB, 70 years, May 2021.
 57. Ashley Carse, “Dirty Landscapes: How Weediness Indexes State Disinvestment and Global Disconnection,” in *Infrastructure, Environment and Life in the Anthropocene*, ed. Kregg Hetherington (Duke University Press, 2019), 97–114.
 58. Akhil Gupta, “Infrastructure as Decay and the Decay of Infrastructure,” in *Decay*, ed.

- Ghassan Hage, 43 (Duke University Press, 2021), 37–46.
59. Gupta, “Infrastructure as Decay and the Decay of Infrastructure.”
 60. The “invasion” of jackals in postsocialist times, most probably from Bulgaria, is a matter that will be analyzed elsewhere. For more details, see Mihnea Tănăsescu, “Field Notes on the Meaning of Rewilding,” *Ethics, Policy & Environment* 20, no. 3 (2017): 333–49; and Yulian Konstantinov, “Humans, Predators, and State Projects: A Look at the Lower Danube, Northwest Bulgaria,” in *A New Ecological Order: Development and the Transformation of Nature in Eastern Europe*, ed. S. Dorondel and S. Șerban (University of Pittsburgh Press, 2022), 240–58.
 61. Carse, “Dirty Landscapes: How Weediness Indexes State Disinvestment,” 102.
 62. Interview with FB, male, 70 years old, June 2021.
 63. Gupta, “Infrastructure as Decay and the Decay of Infrastructure,” 44.
 64. Star, “The Ethnography of Infrastructure.”

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THE SPECTER OF INFRASTRUCTURE OVER BELGRADE'S URBAN OASIS

The Layered Past and the Uncertain
Future of the Great War Island

MILICA PROKIĆ

INTRODUCTION: THE CITY'S ISLAND, THE ISLAND'S CITY

*This great city has, it seems, always been like this: torn, scattered,
just as if it has never existed, but is rather eternally created, rebuilt,
and recovered. At one end it sprouts and grows, at the other it
wITHERS and decays. It always moves and shuffles, it never rests, and
it never knows peace and quiet. A city on two rivers, in a vast space
suspended by the blowing winds.*

—IVO ANDRIĆ

With these words Andrić captured Belgrade's ever-shifting texture, the windswept meeting of two rivers, the mingling of copious cultures, the many triumphs and defeats of the city's millennia-long past. At the foot of the Belgrade Fortress, the Sava River lends half of its water force to the Danube, and from a small swirl of sand that emerged at the very center of that confluence grew the Great War Island (Veliko ratno ostrvo). The island's name, as well as its past, encapsulate core aspects of this ever-turbulent



Figure 9.1 Drone photo of the Great War Island taken in 2023. Photo: Mina Prokić.

city. As if stating the larger new form the Danube takes at this confluence on its way to the Black Sea, the island currently resembles a huge green capital D, a material initial of the mighty river.

This shape may and will change again with fresh layers of time and silt. This island is moving, shapeshifting, and amphibious, located in the river and also part of it. It is shapeshifting because, as Jenia Mukherjee et al. succinctly remind us, every fluvial island is “primarily a shifting mass of sediment.” And it is amphibious, for fluvial islands exist in constant shifting between the states of “not quite firm land and not quite open water,” just like the delta environments that Franz Krause discusses employing the lens of *amphibious anthropology*.¹ Tanya Richardson understands *amphibious* as a notion “emphasizing people’s encounter with mud, and the fluctuation of milieus between solid, liquid, wet, and dry.”² As such, amphibious anthropology certainly applies to Veliko ratno.

Belgrade’s largest fluvial island, covering an area of 2.11 km², Veliko ratno ostrvo is low and flat, marshy, and often flooded by the Danube. The island is close to the two riverbanks: On one side lies the Belgrade Fortress, the old city’s stronghold. On the other side, the island is just 200 m away from New Belgrade, the part of the city that was built during the socialist reconstruction after World War II. One of Belgrade’s best loved beaches, a sandy area called Lido, is located on the island’s northern tip. Each year in early July the pontoon foot bridge is installed, marking the beginning of the summer season, enabling numerous city beachgoers to walk to the island. The bridge is removed at the end of August, just before the school year starts. Lido looks toward New Belgrade,

with the old town of Zemun (which was integrated into Belgrade in the period between the two world wars) spreading directly to the north. While Lido is visible from New Belgrade and the Zemun quay, a glance over the Great War Island from the Belgrade Fortress side offers the view of an uninterrupted stretch of fluffy woodland greenery.

The island is a remarkable ecotope, affectionately referred to as “Belgrade’s green oasis” by those who care about, enjoy, or study the island’s environment. Its main physical feature is a large canal called Veliki Galijaš, which the interplay of time, silt, and booming vegetation has cut from the Danube and turned into a lake. The lake now extends out into a smallish wetland—a major natural bird and fish spawning area—that makes the Great War Island one of the biggest urban bird habitats in Europe. Many of the island’s avian inhabitants, which include the white-tailed eagle, are species that are both endangered and extremely rare in locations so close to the bustling center of a capital city counting over 1.6 million human inhabitants. The island is also home to rare fungi, endemic orchids, and other plants. Various reptilian, amphibian, and mammalian species ranging from rare pigmy bats to wild boars live there, too. This abundance of flora and fauna is striking when compared with other urban Danubian islands, however verdant and fecund. It is also outright astonishing, given Belgrade’s current ecological problems that include problems linked to rampantly spreading urban residential and commercial developments.

Currently about two-thirds of the island is designated a nature reserve and is thus protected under Serbian law as a Landscape of Outstanding Features.³ Remarkably, *humans* also reside on the island today, staying through the warmer seasons or even living on it all year round. A small community nicknamed Urban Robinsons reside in wooden houses on stilts, unconnected to the city’s water or electricity grid and invisible from Belgrade’s riverbanks.⁴ Yet upon a first glance at its tangled, thick greenery, the island presents itself as an almost ahistorical place that offers no glimpses of human-made infrastructure, the thick woodland and shrubbery concealing the island’s human history and present alike.

An in-depth look at archival materials and at the works of historians to date seems to echo this notion. In my search at the Belgrade City Archive, I quickly learned that using their sources to write about the Great War Island resembles diving through the murky waters of the Danube itself, with only occasional glimpses and en passant mentions. Unlike the abundant materials on Belgrade, or Zemun Municipality—the local authority responsible for the island—or the Danube, which (re)shapes, floats, and floods the island, the Great War Island has received remarkably little attention, at least over the last two and a half centuries, which is how far back my search covered. This is perplexing, given the island’s central location in contemporary Belgrade and its prodigiously eventful past, which will be detailed in the following sections. Likewise, among the abundant works on the history of Belgrade, Zemun, and the Danube, no in-depth articles or books have focused

on the history of the island itself, except a historical overview within an interdisciplinary monograph *Landscape of Outstanding Features: Great War Island*, edited by Ivana Jovanović and published in January 2025. This chapter, first to focus specifically on environmental history of the island, aims to contribute to the pioneering efforts in filling this gap.

Despite this apparent historical invisibility, the island recently became a focus for developers, amid an ongoing postsocialist, wild capitalist sweep over the region.⁵ In this process, Belgrade's infrastructural growth is often indistinguishable from its devastation, with new commercial and residential developments mushrooming at a frantic pace, swallowing up both the city's green areas and wildlife. This chapter approaches the interrelation of the city, the island, its human and nonhuman dwellers, and the "specter" of the infrastructure potentially disturbing this interrelation. Without going into the fascinating and proliferating scholarship dealing with spectrality, it borrows a dictionary definition of specter: "something widely feared as a possible unpleasant or dangerous occurrence."

Regarding the interrelation of infrastructure and disturbance, infrastructure is understood in this chapter in concurrence to this volume as an "intersection of circuits of capital and material flows," "built to serve certain actors, state and private, human and nonhuman" (see this volume's introduction). As for the concept of disturbance, this chapter takes a threefold perspective. First it concurs with the river management literature approach, which, as noted in the introduction, "uses the term [disturbance] to gauge human-induced perturbations to an ecosystem." Second, it looks at how the river and the island disturb and disrupt human plans for built infrastructure. Third, it sees the not-yet materialized human-intended infrastructure as a disturbance, specter-like and looming over the dynamic and vivacious constellation of the city, its human and nonhuman inhabitants, the island and the river. Great War Island is exposed to those city dwellers who seek to exploit its potential as a prime real estate location or site of infrastructural development. To them, the island represents a *tabula rasa*—a space with no history to speak of, where revenue-making infrastructure should be, but is not yet.

To trouble this "ahistorical" notion, the island's many microhistories form the focus of this chapter. Some of these will show that contemporary plans for the island's infrastructural development are by no means a new idea. Yet, as we shall see, the island's muddy materiality has got in the way of these plans time and time again. In addition to archival material on the Danube, Belgrade, and Zemun, alongside local press and urban anecdotes, research by those who study or care about its exceptional biophysical environment inform this chapter. This includes the work of local and international ornithologists, biologists, zoologists, hydrogeologists, and activists, as well as journalists, chroniclers, and historians. By focusing on the Great War Island in this way, this chapter also aims to contribute to several lacunas in scholarships, including the budding urban islands discourse.

TOWARD ENVIRONMENTAL HISTORIES OF THE DANUBE'S URBAN FLUVIAL ISLANDS

In 2015, Grydehøj et al. noted that while the field of “mainstream island studies has often considered urban centres of large archipelagos . . . other categories of urban islands have received less attention,” including that of the “small islands within cities.”⁶ While things have started to change since then, with works such as historian Pavla Šimková's masterful monograph *Urban Archipelago* (2021), which looks at the Boston Harbor Islands as an inextricable fiber in the city's historical, cultural, economic, and environmental fabric, urban *fluvial* islands remain largely underrepresented.⁷ Echoing John Schofield and Jennifer George, who contend that there are questions often “either best addressed, or [that] can only be addressed, by studying islands,” this chapter explores what the (fluvial) urban islands tell us that urban studies overlook.⁸

Of course, this chapter also seeks to contribute to the emerging scholarship on fluvial islands globally, with South Asian scholars like Jenia Mukherjee among its leading voices.⁹ More specifically, more locally, and more pertinently to this volume, it aims to contribute to scholarship on islands of the Lower Danube, championed by scholars such as Tanya Richardson working on the human-made island gardens in places such as Vylkove in Ukraine as well as Stefan Dorondel, Stelu Șerban, Alexandra Ion, and others gathered around projects such as Danislands.¹⁰ Within this underrepresented group of islands are those that belong to the many cities and towns along the Danube. This chapter therefore focuses on the *urban* islands of the Danube, from Vienna by its source to Vylkove in the delta, as a promising category of analysis in their own right. These islands are at once astonishingly diverse and distinctively shaped by their respective cities and towns. What is more, they are part and parcel of the same (yet ever-changing) river, akin to what Stefan Dorondel notes of floodplains in this volume: “Not merely land next to rivers; they are part of the river system.” And with that, they are part of the disturbances the river experiences along its flow.

This chapter joins the scholarly pushback against the land–water binary; it looks at the Great War Island as inextricable from Belgrade on the one hand and the Danube, as a vastly complex socioecological system, on the other, perpetually shaping and being shaped by both. Mukherjee and Lahiri-Dutt remind us that “[fluvial islands] demolish a number of dearly held scientific concepts and ideas. Of these, the idea of rivers as carriers of only water is one.”¹¹ The sections that follow build on this notion of fluvial islands as challengers and disruptors of scientific concepts. They will also show not only that the Great War Island actively shaped its city and its history as much as it was shaped by it but also how, on more than one occasion, it challenged and disrupted the plans and the ideas of the cities' human inhabitants.

(IN) THE HEART OF TURBULENCE: BECOMING THE “WAR ISLAND”

Because of Belgrade’s strategic position, according to some, more than 115 wars have been fought around the city. The many attempted sieges of the city often occurred at the confluence, at the foot of the Belgrade Fortress, where a small sandbank formed in the second half of the fifteenth century. The sandbank became both a witness of and participant in battles for the city over the centuries to come. On some maps of Belgrade from later periods (see figure 9.2), two or three adjacent fluvial islands can be seen. Over the years, these probably merged into two, the larger of which became the Great War Island we know today. According to Branko Najhold, a chronicler of Zemun and Belgrade, most attacks on the Belgrade Fortress during the 1521 Ottoman Siege of Belgrade, for example, were launched from the island.¹²

In the decades to follow, however, the pulses of the river and the island were viewed not as an aid in conquest, but as disturbance by the Ottomans who “had to deal with accumulation of alluvium to improve the safety of navigation” on the Danube, one of the most important waterways of the empire, as Deniz Armağan Akto and Onur İnal discuss in this volume. In 1574, “due to floods on the Danube and Sava rivers, alluvium deposits blocked the port of Belgrade.”



Figure 9.2 The 1521 Siege of Belgrade from the perspective of the river islands. https://commons.wikimedia.org/wiki/File:Fortress_Belgrade.jpg?uselang=en#Licensing

The island had also been used as a site to attack the gates of Belgrade during the interimperial scramble for the city between the Ottomans and Austria-Hungary, which stretched over the next three centuries: For a time, the island was even divided in half between the two.¹³ The nineteenth century, in turn, saw the Indigenous Serbian population use the island to launch their attack on the city walls in the 1806 attempt to reclaim it. The island has therefore long served as a gateway: a gate into the city, shaped by the armies of its prospective conquerors, and hosting camps, cannons, and garrisons.

In her book on Belgrade in the socialist era, *Designing Tito's Capital*, Brigitte Le Normand notes that the dates chosen as the beginnings of modern Belgrade are arbitrary. A good year to use as a landmark, however, is 1867, when the Kingdom of Serbia obtained its de facto independence from the Ottomans. For Belgrade, this meant that its influence, urban area, and population began to increase rapidly.¹⁴ Despite the trials and tribulations these changes brought, including increased poverty, the city was slowly meandering toward modernity. The fact that it also enjoyed a period undisturbed by wars, sieges, or coups for a few decades—a rare stretch in its eventful history—certainly helped the process. This was, however, not to last. The entire region was hit by the Balkan Wars (1912–1913), then by World War I, during which the Great War Island was again commandeered just as in the centuries before.

World War I was one of the greatest calamities in Serbia's history. Serbia became a country with the greatest loss of human lives per capita of all the parties involved, having lost nearly a quarter of its population. Those who remained suffered from extreme poverty and devastated infrastructure. Nevertheless, it was on the winning side, and so the Kingdom of Yugoslavia was forged with the Serbian king as sovereign. The defeat of the Austro-Hungarian Empire also meant an end to the interimperial divide of the Great War Island from the previous period. With Belgrade now becoming the capital of Yugoslavia, the island was fully part of the new kingdom, and it assumed a new role in the life of the interwar city.

THE VETERAN ISLAND, A PLACE OF SOLACE

According to one version of the interwar story about the island, in the challenging post-war recovery period, now relieved of its “military duties,” the Great War Island offered shelter and solace to some citizens of Belgrade and Zemun, a small group of whom built houses on stilts rising over the silty island terrain and made it their permanent home; the predecessors of today's Urban Robinsons. In this period the island was renamed the Island of the Poor (Sirotinjska ada) because of its inhabitants' dire material circumstances. Yet, this label did not match the richness of its fertile soil, on which the community grew corn and watermelons to sell at the city's green markets.¹⁵ Another story

is that both this name and the island's human inhabitants had been there before, when Empress Maria Theresa bestowed the island on several poverty-stricken Zemun citizens who helped get her carriage out of the mud. Allegedly, those who received a parcel of land on the island, thanks to this muddy incident in the eighteenth century, cleared branches of "century-old willows and blackberry bushes" and created the first modest, fragile vegetable gardens. These were, like the rest of the island, regularly flooded by the Danube. Yet the islanders stuck around. They learned the moods of both the river and the shuffling silt; they erected the first wooden houses on stilts; and they passed their land parcels down generations. The photographs, however rare, from the late 1920s show the then treeless island divided into agricultural allotments.¹⁶

When Belgrade reassumed the role of capital city, urban development plans, and with it the fate of the island, reconfigured once more. The idea of New Belgrade appeared for the first time in 1918 at the end of the Great War.¹⁷ Interwar ideas thrown around for the "veteran" island mostly envisaged it as a park or as part of a green recreational complex running through the city, connecting Belgrade over the river to Zemun. In his General Urban Plan from 1924, the local architect Đorđe Kovaljeski viewed the island as a site for a recreational center. The plan was for the island to become connected to the riverbank by a bridge, making the former war island into a peninsula of leisure. Another idea that involved troubling the island's "islandness" was from 1928, when the Yugoslav building company Šumadija proposed the construction of a cable car, or "air tram" as they called it, that would connect Zemun to the Belgrade Fortress with the island as the middle stop. None of these plans ever came to pass.

In the meantime, the island and its human and more-than-human community apparently thrived. An article from the 1938 Serbian daily *Politika* stated that the island community grew to three hundred families, as the island provided land and sustenance to those who could not afford food or a home elsewhere in the city (see figure 9.3).

The article reported, however, that the islanders faced eviction as the city's government had plans to harness the island for agriculture. The islanders were adamant that they were not ready to leave their island. The article author supported their resolve and provided a sympathetic account of their life that detailed their material poverty. The description of life on the island also featured idyllic vignettes of swaying wooden boats on the emerald-green Galijaš lake, the plethora of fish and flowers of its wetlands, and interviews with the islanders who had reportedly lived there for generations.¹⁸

Around that period, the Belgrade government came to think that the island could offer a potable water supply for Belgrade's booming population. The island was thus surveyed as a possible water source in 1939. This was the first time that the island fell under the scope of future plans for the water management system in the city.¹⁹ While

none of these plans ever came to pass in the interwar period, New Belgrade indeed became a reality in socialist Yugoslavia after World War II.

SHAPED BY WAR

During World War II, most of the destruction Belgrade suffered was due to aerial attacks, in contrast to when the various infantries set up camp at the city gates in the battles of centuries past. At this time the island, complete with corn and watermelon allotments and stilt houses, was shaken from its placid life and quite literally shaped by war. According to the late Čedomir Janić's eyewitness testimony—a historian, pilot, the founder of the Yugoslav Museum of Aviation, and most importantly for this story, a Belgrade native who was ten years old in the autumn of 1944 when the event in question occurred—after a large explosion, two large German cargo ships making their way down the Danube sank within minutes as they passed the island. It is believed that the ships simultaneously hit underwater mines set adjacent to the northern sandy corner of the island. As the Danube swallowed the ships, silt carried downstream immediately began layering over them. Interestingly, according to Janić's testimony, as noted in the book *Belgrade Beneath Belgrade* by two local authors—the historian Vidoje Golubović and the tour guide and journalist Zoran Nikolić—before the incident the island was not as firmly positioned at the point of the Sava–Danube confluence. Rather, like many fluvial islands, it had been moving slightly from one bank to the other, swayed by its rivers. After the ships sank, however, the island seemed fixed to the exact point where it lies today. By binding two steel shipwrecks to its silty body, the island became not only materially shaped by war but was also quite literally and tangibly *made of it* and anchored by it.

Yugoslavia emerged from the war victorious, albeit again devastated. Its newly founded socialist government, assembled from Partisan guerrilla members, viewed the end of the war as a clean slate for the region. Once the end of the war was in sight, new plans were dreamed up for Belgrade. As early as 1944, the Executive People's Council (Izvršni narodni odbor) created a town planning office. The larger, newly founded Urban Planning Institute of Serbia (Urbanistički institut Srbije), took over this task the following year.²⁰ Belgrade's population then grew, as Le Normand noted, "in leaps and bounds," from 340,000 in 1946 to 426,000 in 1950. Such growth aggravated the housing shortages inherited from the prewar era, which were exacerbated by the war-time destruction.²¹ The city was once more rising from the ashes and the rubble, and so to remedy the situation, the foundations for the first blocks of New Belgrade were laid by 1948, overlooking the old Belgrade Fortress from the other side of the Sava River. The Great War Island had a tangible role to play in shaping this new part of the city.

“THE MAGNIFICENT LABORATORY OF URBANISM”

New Belgrade sprang up from what was once the bottom of the now-perished Pannonian Sea. The mostly bare, sandy, marshy plains on the northern banks of the Sava offered a perfect canvas for the new socialist government—both spatially and ideologically. The new government had ambitious plans to transform the city profoundly and to refashion it in the image of the new political and social order.²² Beyond being a “magnificent laboratory for urbanism” with superblocks, each surrounded by green spaces, providing quality communal living for the city’s booming population, New Belgrade also had an important symbolic function as the administrative and political center of the socialist Yugoslavia, incorporating the most important government buildings.²³ In one of them—the Federative Executive Council Building, which overlooks the island—the first summit of the Non-Aligned Movement was held in 1961, making New Belgrade also an important international political center. Moreover, because of its planned location, the socialist New Belgrade connected the old city of Belgrade on the one side and Zemun, bringing the two together into one city.

In this freshly charted Belgrade, (re)made by connecting the old and the new, the Great War Island “moved” from the city’s fluvial outskirts to its core, becoming Belgrade’s central spot. It was thus exposed to new challenges and influences. When the construction of New Belgrade began in 1948, the challenge its builders faced most was that of leveling the marshy, sandy plains. This task required additional tons of sand for the construction. Then, the island once again came into the view of the city planners, this time in a way that threatened its very existence, as it was a potential site for the extraction of sand.²⁴

Contrasting ideas of the island’s annihilation also circulated: of integrating the island into a new vision of Belgrade as a “magnificent laboratory of urbanism,” which would constitute “a city awash in greenery” with the island remaining one of its central spots.²⁵

In a highly quoted paper from 1985 by Miloš R. Petrović, former head of the Metropolitan Planning Unit of the City of Belgrade, the Great War Island was mentioned twice in total, as part of a “green axis drawn from the Federal Executive Council building, toward the southwest” of the city. On this axis, a large urban park was planned “with a geometrically shaped lake in its centre as well as a new botanical gardens and a solarium at the far end, surrounded by a grass-covered earth embankment.” This urban park was to be “part of the large green belt” extending from the area on the left bank of the Danube, over the Great War Island to Ada Ciganlija (another fluvial island in Belgrade on the Sava River), the Belgrade Hippodrome, and on to Topčider and Košutnjak, which are two park complexes of the old town.²⁶

Suspended between these contrasting forces and plans of sand extraction on the one hand and integration into the city’s green spaces on the other, the Great War Island’s fate

swayed toward the latter in this instance, with abundant “help” from the Danube. Indeed, in 1948 the island narrowly avoided being completely excavated to feed the foundations of New Belgrade. However, as Stevan Milinković, the head of the team completing this study, told *Politika*, the Danube kept depositing alluvial sediment with such intensity and speed that the island’s sand could not be reached through the layers of silt.²⁷ Graham Swift noted that the silt “demolishes as it builds; is simultaneous accretion and erosion; neither progress nor decay.” With these properties, the silt saved the island by caking it with protective and augmentative layers carried by the swelling Danube. In so doing, it demolished the excavators’ aspirations while co-constructing the island in unison with the river.²⁸

In the same year when the first foundations for New Belgrade were being laid, a new crisis descended on Yugoslavia—a rift between Tito and Stalin, which resulted in Yugoslavia’s expulsion from the Eastern Bloc. This disrupted Belgrade’s urban planning; consequently, plans for the Soviet Danube, laid out in the first postwar years when Yugoslav–Soviet relations were amicable, were discontinued.²⁹ The disruption in plans brought about by the crisis thus “saved” the island on the one hand. But on the other hand, the island’s own floodability helped its preservation, and this turn of events was neither the first nor the last time.

SAVED BY THE FLOOD

The Belgrade City Archives hold Zemun Municipality’s materials for its modern period, covering the nineteenth and twentieth centuries. One of the documents in this collection reveals that the record watermark of the Danube until 1932 was 74.92 m above sea level (7.16 m), measured in 1895, while the second-highest, 7.11 m (74.9 m above sea level), was measured in 1924. In the same collection, we can also see a note stating that most of Zemun lies three meters below this watermark. Another document from this collection records even higher figures in the following decade, recalling the record 7.56 m watermark in 1940.³⁰ In its present shape, the flat and the flood-prone Great War Island lies well below that mark—between 69.5 m and 73.5 m.³¹

In the postwar, socialist Yugoslavia, protection against floods was a serious business overseen by the state. Flood defenses required vigilance, and the infrastructure for flood defenses was discussed annually, with extensive translocal and transnational inspections, coordinated by the Central Government of Waters of the Federal People’s Republic of Yugoslavia (Centralna upravna voda FNRJ).³² The Archives of Serbia hold materials on state-allocated subsidies and credits that supported these works.³³ In 1951, the Yugoslav government adopted a regulation on the water communities that covered both defending and using the country’s waters.³⁴ The island at the confluence of the Danube and Sava rivers could not, of course, be included in any of these plans and

fortifications. It was flooded in all these instances and in many others, including in July 1954, when the severe flooding of the Danube and its tributaries affected about one million people across Central and Eastern Europe.³⁵

While the humans on the riverbanks were busy building flood defenses, regular flooding acted as a system of defense for the island. The island's defensive floodability prevented it from being excavated in the late 1940s, and so the island continued to evolve in its own way, disrupting humans' plans up to the point when they seemed to accept its wilderness as a reality. For example, the General Urban Plan from 1972 stated that it was better to preserve the island in its then-wild state, rather than to alter it as part of a (mis)managed landscaping project.³⁶ At the end of the 1970s, it was discussed once again how the Great War Island, as a unique urban oasis, should become a tourist hot spot. The ideas of turning the island into a park, a sports center, a public swimming pool, or a port were also reiterated. There were also those who thought that, because of its central position and view of Zemun and Belgrade, an Olympic stadium should be built on that very spot.³⁷

Again, none of these plans came to pass; the island's flood-prone quality did not allow for it. Indeed, as Jasmina Šinžar-Sekulić et al. noted, the island floods periodically: "These periods, however, can range in the lowest parts of the island 'from 20 to 365 days per year.'"³⁸ It seems that the only human community with whom the island "cooperated" were those who did not harbor outlandish infrastructural ideas about it; those people who simply lived there, in houses on stilts, weathering all the winds and every flood together with the island, as part of it.

The island was surveyed as a possible water source several times, including in 1939. Post-World War II attempts were noted in 1976 and 1981, with ambiguous results each time. Some of these studies showed a degree of feasibility, indicating that Ranney collectors or other types of wells could be built. The studies also showed, however, that the yield would be negligible regarding the total water consumption in the city and that the construction of wells would be too expensive for the amount of water produced. When flooded, the island can be submerged in up to 4 m of water, which would damage the wells, the studies showed. Also, water drained this way would also drain the sewage-contaminated water either from the Danube or from the arm between the island and the land where city sewage empties. All this is to say that the island has been saved by the floods and its floodability in more ways than one over its history.³⁹

SHARING ITS CITY'S FATE: FLORA, FAUNA, BOMBS

According to Branislav Božović, a hydrogeologist and former adviser on environment protection to the city of Belgrade, since the 1960s the island has grown by 40 ha. The

layering of silt, which has increased the island's size and changed its shape, has resulted in the island gradually growing at times through "the agency of silt," "slow-moving and unbiddable," to borrow Katie Ritson's elegant definition.⁴⁰ At other times this growth was a forceful swell, such as when the Danube and the silt "swallowed" the battleships, at once anchoring the island and increasing its mass within seconds. Božović explained that geodynamically speaking, the Great War Island is still a very active terrain.⁴¹

In 1996, 125 plant species were identified on the island.⁴² In 2020, Jarić et al. listed thirty-four alien plant species, as well as dozens of rare, protected, strictly protected, and endemic ones.⁴³ Besides the marshy flora and wetland vegetation, which include reeds, yellow irises, and rushes, there is a forest that covers about 120 ha of the island with trees like black poplar, common oaks (after afforestation in 2011), European nettle trees, acacias, walnut trees, ash trees, white elms, elderberry trees, hawthorn, and even some rare conifers.⁴⁴ In addition, over thirty invasive plant species have found their home on the island, mostly brought there by the river traffic. One such species is the deciduous cypress genus *Taxodium*, which mainly inhabits North America, thus developing and growing much faster than the homegrown or rather island-grown species such as poplars and almond willows. The island was also the first site in the Belgrade area where a rare orchid, *orchis palustris*, was first spotted as early as 1896, but it has not been seen on the island since. Importantly for this historical account, the orchid was rediscovered in 1955 in the Makiš area, which is another source of Belgrade's underground reservoirs suitable for the production of drinkable water. The island is also the only location in Serbia where bird's nest fungi can be found, which are of notable use for antioxidant extraction. In 2020, besides its remarkable 208 species of birds, fifty-three species of fish were found around the island and in the Galijaš channel and lake.

During the 1999 NATO bombing of Yugoslavia (whose final form included Montenegro and Serbia with Kosovo) massive damage was inflicted on the Yugoslav environment and neighboring countries. According to Phillip Frazer, the editor of *News On Earth* when the bombing occurred, besides tens of thousands of human casualties and tens of billions of dollars of property damage, Yugoslavia's rare native plant and animal species suffered as well.

The Danube was a grave casualty. One of the most obvious catastrophes there was NATO's repeated bombing of the Petrohemija petroleum processing plant and the chemical and fertilizer plant in the Danube town of Pančevo, upstream of Belgrade. As the London *Times* reported and Frazer quoted, "Due to the bombing 1,400 tons of carcinogenic ethylene dichloride and 800 tons of hydrogen chloride leaked into the Danube flowing downstream to Belgrade and further to Romania, Bulgaria and into the Black Sea." According to Robert Hayden, former director of the Center for Russian and East European Studies at the University of Pittsburgh, "the bombings risked the life, health, and safety of Belgrade's civilian population."⁴⁵

The Great War Island suffered from some of its animal inhabitants abandoning it. The white herons left the island, which until then was their largest nesting place in Europe. It was also the most unusual, as they normally do not nest in such bustling urban spaces. However, their elegant flight has unfortunately not been seen around the island or, indeed, anywhere in Belgrade since the bombing.⁴⁶ This devastating and illegal NATO bombing campaign was yet another time when the island and its flora and fauna were shaped by war. Other challenges in the following decades, however, came from within Belgrade.

SELLING OUT THE CONCRETE CITY'S GREEN HEART

In January 2021, the Belgrade Water Supply and Sewage Council issued a tender calling for a new feasibility study on building a water supply system on the Great War Island. This idea was considered again because a group of investors and developers, unknown to the public, wished to build an extensive business and residential complex on the aforementioned Makiš Field, a potential source of quality potable water for Belgrade, located around twelve kilometers away from the city center. The plans included a vast new urban development with a large commercial center and a station for an underground metro network that remains undeveloped in Belgrade. This idea, however, is a risky one: Were the production of potable water, currently produced by purifying water from the Sava River, ever in any kind of jeopardy, then the underground reservoirs of the Makiš Field could become a key resource for Belgrade's backup water supply. And if the Makiš Field were to become a new residential and commercial district, then a replacement backup supply would be needed. Therefore, the idea of replacing the potential water sources on Makiš with those the developers hope to find on the Great War Island started to circulate among the Serbian public.

The hydrogeologist Branislav Božović and a group of his expert colleagues in the field of water resources warned of the great risk attached to such a profit-driven idea of turning the water source into a concrete slab. They warned that the plan is risky because it may leave the population of the capital without water (ironically a place defined by an abundance of it, with its *two* rivers), and added that it also contrasts sharply with the history of Belgrade's urban planning. The archival materials in the Serbian National Archives, such as a report by the Water Management Committee's Belgrade Water Resources Management in 1951, reveal that most of the Greater Makiš area was envisaged as space for a forest or a park, with a small area planned as a classification yard for trains and a link road leading to it.⁴⁷

Public debate and vociferous protests by water management experts ensued in 2021 and 2022. During a debate on the multifaceted and complex issues of water resources in

Belgrade in particular and Serbia in general, which took place on December 2, 2021, Sonja Pavlović, a civil engineer specializing in water resources, noted the public illusion of “water as a given” and emphasized that the journey “from the river to the tap” is a complex and expensive venture that involves technology, infrastructure, and input from multidisciplinary teams of experts. She stressed that potable water itself is a precious resource and that the threat to it in Belgrade is a “developmental and urbanizing hysteria” resulting from the city’s booming population combined with the grave mismanagement of its resources. In the same debate, Branislav Božović accentuated the interchanging use of the terms *water* and *water management* as dangerous and misleading. Božović opined that those of his colleagues in the water management sector who supported the feasibility study viewed water as a commodity, which he flagged as the most dangerous notion.

The Jaroslav Černi Institute for the Development of Water Resources—the leading water resources institute of the former Yugoslav region—helped to prepare a feasibility study and a project for the construction of an alternative groundwater source on the Great War Island. On October 1, 2020, it was announced that the institute, 92 percent of which was owned by the state, and whose annual profits have steadily been over ten million euros per annum, should be privatized and sold to the controversial Millennium Group for the staggeringly low sum of 2.5 million euros. At a press conference on November 1, 2021, numerous activists and experts from the fields of hydrogeology, ecology, and environmental sciences appealed to the public to mobilize against the institute’s privatization, out of fear that private ownership would dictate the “favorability” of studies such as the one commissioned to determine the feasibility of potable water extraction from the Great War Island.

On this occasion, Božović reminded the auditorium that such studies had been conducted, the most recent one being in the 1970s, and they indicated that the Ranney well collectors might not be able to turn the island into a potable water supply site, not least because of the water’s silty quality, which would make maintaining the collectors a lengthy, expensive, and at times futile affair.

Using the island as an alternative potable water source did not garner support among some of Božović’s colleagues either. For example, the hydrogeologist Milojko Lazić, a retired professor at the Faculty of Mining and Geology in Belgrade, believes that while this revival of the old idea of building a water source on the Great War Island could be a backup solution in extreme situations, it is not an inherently good one, particularly if pushed by profit-driven interests related to the Makiš Field. He said:

It is good that we have a backup at our fingertips, because we cannot save Makiš from the rush in the race for profit. . . . Although it is a protected area, nothing will be disturbed by the construction of springs and wells. However, we can’t exclude the

possibility that the appetites of decision makers will one day grow, so that the island's area will also be under attack from construction and urbanization.⁴⁸

Professor Zoran Stevanović, however, emphasized that the island is not a good candidate for Ranney collectors because of its makeup: The silt causes problems for the drainage pipes that Ranney collectors use. Moreover, as Stevanović noted, the Great War Island is the only oasis of such biodiversity in all of the fourteen cities on the river Danube from its source to its delta.

Other activists involved in protecting the island in its current form, meanwhile, fear that the island may one day become a spot for yet another commercial or residential complex. Petar Lalović, the late, well-liked Serbian screenwriter, director, and environmental documentary filmmaker, whose internationally recognized works include *The Last Oasis* (*Poslednja Oaza*), *The Perishing World* (*Svet koji nestaje*), and *The Belgrade Oasis* (*Beogradska oaza*, a film about the Great War Island), said, "My wish is for it to remain untouched. Belgrade would lose a great deal by selling the Great War Island or by giving it to someone to build hotels and a nightclub there, and there are many who wish for something like this, so I hear."⁴⁹

Moreover, legislatively speaking, any construction on the island would be against the 2005 bill, in which the island was proclaimed a Landscape of Outstanding Features and therefore legally protected from such developments. In 2015 the decision to protect the island was underlined by a directive protecting bird habitats. Both decisions were made by Belgrade's city council. Amid these opposing voices, clashing interests, and threats, the island itself has resisted in the way it always has: by being silty, muddy, and flooded for a good portion of the year. Large portions of it were submerged in the Danube's waters in 2019, 2021, and 2022, with a couple of cases of wild boars who live on the island swimming over to the Old Town side of Belgrade, therefore bringing a part of the island into the city.

CONCLUSION

This chapter has outlined the (environmental) history of Belgrade's Great War Island, known as the "green heart of Belgrade," as an entity experienced both as terra incognita and as a terrain soaked in history. The explorations and meanderings through the tangled, silty past of the (a)historical Great War Island all seem to lead to one core notion—that human plans for the island's infrastructural development have lingered over it, specter-like, for centuries, and these plans have been repeatedly disrupted by the shifting, floodable, amphibious unity of the island and the river Danube.

The Great War Island is in many ways—perhaps in all ways—inextricable from the city of Belgrade and from the Danube River at its confluence with the Sava River. The island has been a key factor shaping the city's history. It has witnessed and experienced many things from allotments and stilt houses to plans for air trams, bridges, and Ranney collectors. The people who have cared for or harnessed the island have been diverse: from those who sought to claim the city of Belgrade as their dominion, to urban planners and developers over the ages, to those who turned to the island seeking refuge, solace, sustenance, knowledge, or recreation. All the while, it continues to change in size and shape: from being a small sandbank in the fifteenth century, to the island with a military garrison on the sixteenth-century Ottoman siege maps, then growing through the later centuries and becoming the “urban oasis” of today.

The stories of the Great War Island reveal the prodigious properties of urban (fluvial) islands as remarkable absorbers of material, temporal, and identity-related changes, embodied in their biophysical features. They are key shapers of the cities they are part of. True to the city's character, “ever suspended in the winds”—destroyed and decaying on the one hand and restoring and thriving on the other—the Great War Island has been many things to Belgrade. It was the spot where the city's conquerors of centuries past have laid their hopes (and camps); it was a site from where they have strived to enter the city; and, in the present moment, it is a site for those who harbor infrastructural ambitions and plans of turning a profit from taming and harnessing the island's silty materiality. The entanglement of wars, waters, winds, and shapeshifting sediments have all formed a collaborative relationship with the island's mighty partner, the Danube, and so the island has consistently thwarted, and continues to thwart, the plans of its prospective developers.

No Ranney collectors or luxury developments have been built on the island to date. In 2023, however, another outlandish idea was presented to the public, this time by Serbia's president, to remove the Old Sava Bridge (Stari Savski Most) that currently connects New Belgrade with the old city from its place and to mount its entire gargantuan steel construction between Zemun Quay and the Great War Island, to the vociferous protest of the city planners.⁵⁰ An attempt at deconstruction of the bridge in late 2024 provoked a public protest that spanned several months with Belgrade citizens guarding the bridge by standing on it in masses. The protest was still ongoing as of February 2025. It would perhaps be interesting to see how, if at all, the amphibious, shapeshifting island's terrain would tolerate much of it. An image of a steel bridge, a Ranney well, or a glitzy nightclub being swallowed up by mud and the swelling Danube comes to mind, sharing the fate of the two Nazi ships in the 1940s, fixing the island perhaps even more firmly to the confluence, and to the heart of its city.

NOTES

1. Jenia Mukherjee, Raktima Ghosh, and Pritwinath Ghosh, "Quilting the 'Brown Hole' in 'Environmental History: Muddy Materialities of Bengal,'" in *Entire of Itself? Towards an Environmental History of Islands*, ed. Milica Prokić and Pavla Šimková (White Horse Press, 2024), 128; Franz Krause, "Towards an Amphibious Anthropology of Delta Life," *Human Ecology* 45, no. 3 (2017): 403–8, 403.
2. Tanya Richardson, "The Terrestrialization of Amphibious Life in a Danube Delta 'Town on Water,'" *Suomen Antropologi: Journal of the Finnish Anthropological Society* 43, no. 2 (2019): 3–29, 6.
3. Vladimir Malinić, "Урбани екотуризам као концепт оптималног развоја ПИО 'Велико ратно острво,'" [Urban ecotourism as the concept of optimal development of the landscape of outstanding features "Veliko ratno ostrvo"], *Zbornik Geografskog fakulteta, Univerzitet u Beogradu* 64, no. 1 (2016): 480–516, 489.
4. Mirjana, "Na skriveno te vodim mesto- Veliko ratno ostrvo," *Medias*, May 20, 2016, <https://www.medias.rs/na-skriveno-te-vodim-mesto-veliko-ratno-ostrvo>.
5. Here I refer to the discourse on "wild capitalism" (valdcapitalizmus) that, according to the anthropologist Krista Harper, Hungarian environmentalists of the 1980s articulated through "a particularly trenchant ecological critique of the neoliberal orthodoxy that dominated the transformation to a market economy throughout [Eastern Europe]." Krista Harper, *Wild Capitalism: Environmental Activism and Postsocialist Political Ecology in Hungary* (University of Massachusetts, 2006). See also: Krista Harper, "'Wild Capitalism' and 'Ecocolonialism': A Tale of Two Rivers," *American Anthropologist* 107, no. 2 (2005): 221–33.
6. Adam Grydehøj et al., "Returning from the Horizon: Introducing Urban Island Studies," *Urban Island Studies* 1, no. 1 (2015): 1–19, 1.
7. See: Pavla Šimková, *Urban Archipelago: An Environmental History of the Boston Harbor Islands* (University of Massachusetts Press, 2021).
8. John Schofield and Jennifer J. George, "Why Study Islands?," in *Island Studies*, ed. Robert Irving, John Schofield, and Chris Webster (Lundy Field Society, 1997), 5–13, 11.
9. See, for example, Jenia Mukherjee and Kuntala Lahiri-Dutt, "South Asian Chars as Destabilizers," in *Living on the Edge: Char Dwellers in Bangladesh*, ed. Mohammad Zaman and Mustafa Alam (Springer Geography, 2021), 25–40, 25.
10. See for example Stefan Dorondel, Stelu Șerban, and Daniel Cain, "The Play of Islands," *Environment and History* 25, no. 4 (2019): 521–47.
11. Mukherjee and Lahiri-Dutt, "South Asian Chars," 25.
12. Branka Vasiljević, "Danas počinje sezona na Lidu," *Politika*, July 1, 2015, <https://www.politika.rs/sr/clanak/331948/danas-pocinje-sezona-na-lidu>.
13. Branka Vasiljević, "Veliko ratno ostrvo—raj za ptice iz Sibira," *Politika*, July 14, 2018,

- <https://www.politika.rs/sr/clanak/407321/veliko-ratno-ostrvo-raj-za-ptice-iz-sibira>.
14. Brigitte Le Normand, *Designing Tito's Capital: Urban Planning, Modernism, and Socialism in Belgrade* (University of Pittsburgh Press, 2014), 63.
 15. Branka Vasiljević, "Ade i ostrva kroz istoriju," *Politika*, September 7, 2020, <https://www.politika.rs/sr/clanak/461905/Ade-i-ostrva-kroz-istoriju>.
 16. See: Goran Vesić, "Odluka iz 1948. godine: 'Izbagerisati Veliko Ratno ostrvo'" [A decision from 1948: 'The Great War Island to be excavated'], *Kaldrma*, June 3, 2021, <https://kaldrma.rs/odluka-iz-1948-godine-izbagerisati-veliko-ratno-ostrvo>.
 17. Le Normand, *Designing Tito's Capital*, 63.
 18. "Sirotinjsko ostrvo: Na vodoplavnom ratnom ostrvu kod Zemuna žive ljudi u kućama na balvanima" [The island of the poor: On the floodable War Island near Zemun people live in houses on stilts], *Politika*, May 1, 1938.
 19. Branka Vasiljević, "Изградња рени бунара или очување природног богатства" [Construction of Ranney collectors or preservation of the natural wealth], *Politika*, January 17, 2021.
 20. Le Normand, *Designing Tito's Capital*, 30.
 21. Le Normand, *Designing Tito's Capital*, 44.
 22. Le Normand, *Designing Tito's Capital*, 25.
 23. Le Normand, *Designing Tito's Capital*, 63.
 24. Vesić, "Odluka iz 1948. godine."
 25. Le Normand, *Designing Tito's Capital*, 70.
 26. Miloš R. Petrović, "A Study for the Restructuring of the Center of New Belgrade and the Sava Amphitheatre," *Ekistics* 52, no. 312 (1985): 217–31, 227.
 27. Vesić, "Odluka iz 1948. godine."
 28. Graham Swift, *Waterland* (Picador, 1983), 8–9.
 29. Državni Arhiv Srbije. Zbirka G-92 Fascikla 1, godina 1946–1947- materijal iz 1946, 1947, 1948–1951, 1952–1956, Glavna uprava voda Narodne Republike Srbije. [State Archives of Serbia, Collection G-92 Folder 1, years 1946–1947, materials from 1946, 1947, 1948–1951, 1952–1956, Central Management of Water Resources of the People's Republic of Serbia].
 30. A report from 1929 states that the police were mobilized to remedy the situation and evacuate people, as the water threatened residents' homes in Zemun. To remedy the situation in 1932, the Embankment of the Danube Bank for Flood Protection project took off by building embankments along the Danube in Belgrade and Zemun. Other embankments had been built at least fifty years earlier, with some traces of partial embankments being built in premodern times. The Danube threatened to flood in 1932 as well, but thanks to this project, it did not happen. See: Belgrade City Archives, The Zemun Municipality Archive Collection: Danube River-Quay 1929–44, Book 278 [Arhiv grada Beograda. Opština Zemun-Zemunski kej 1929–44, Knjiga 278].

31. Snežana Jarić et al., "Alohtone biljne vrste u vegetaciji Velikog ratnog ostrva" [Alien Species of the Great War Island Flora] *Acta herbologica* 29, no. 2 (2020): 111–28, 113.
32. Državni Arhiv Srbije. Zbirka G-92 Fascikla 1, godina 1946–1947- materijal iz 1946, 1947, 1948–1951, 1952–1956, Glavna uprava voda Narodne Republike Srbije. [State Archives of Serbia, Collection G-92 Folder 1, years 1946–1947, materials from 1946, 1947, 1948–1951, 1952–1956, Central Management of Water Resources of the People's Republic of Serbia].
33. Ibid.
34. Državni Arhiv Srbije, Zbirka G-94, 1951–1952 State Archives of Serbia, Collection G-94, 1951–1952.
35. Julia F. Irwin, "Raging Rivers and Propaganda Weevils: Transnational Disaster Relief, Cold War Politics, and the 1954 Danube and Elbe Floods," *Diplomatic History* 40, no. 5 (2016): 893–921, 893.
36. Vesić, "Odluka iz 1948. godine."
37. Ibid.
38. Jasmina Šinžar-Sekulić, Aleksandra Komarnicki, and Vladimir Stevanović, "Changes of Habitat Types Through Several Decades in the Danube Region in Serbia—The Case of Veliko Ratno Ostrvo Island Near Belgrade," *Proceedings of the 36th International Conference of IAD* (2006): 322–35, 322.
39. Vasiljević, "Изградња рени бунара или очување природног богатства" [Construction of Ranney collectors or preservation of the natural wealth].
40. Katie Ritson, "Silt," *Environmental Humanities* 11, no. 2, 2019, 461–64, 461.
41. Interview with Branislav Božović and Ivona Lalović, *NI*, February 3, 2021, <https://rs.n1.info.com/vesti/gosti-n1-napadaju-se-zasticene-celine-beograda-grad-se-siri-bez-osecaja/>.
42. Slobodan Jovanović et al., "Flora of Belgrade Surroundings (Serbia) 150 Years after Pančić's Monograph—A Comparative Overview," *Botanica Serbica* 38, no. 2 (2014): 201–7, 204.
43. Jarić et al., "Alohtone biljne vrste u vegetaciji Velikog ratnog ostrva," 113.
44. "Besplatni izleti na Veliko ratno ostrvo" [Free fieldtrips to the Great War Island], *Politika*, April 7, 2008, 23.
45. Phillip Frazer, "What NATO's Bombs Did to the Environment," *Earth Island Journal* 14, no. 4 (1999–2000): 40–41.
46. Branka Vasiljević, "Значај станишта за животињски опстанак" [Importance of habitats for animal survival], *Politika*, May 5, 2021, 16.
47. Državni Arhiv Srbije Zbirka: Zbirka Glavna Uprava Voda G-94 Fascikla 2 1951- Ulaganja [State Archives of Serbia: Collection Central Management of Water Resources G-94 Folder 2 1951- Investments].
48. Ivana Nikoletić, "Beograd ostaje bez alternative za pijaću vodu," *Danas*, January 14, 2021, <https://www.danas.rs/vesti/drustvo/beograd-ostaje-bez-alternative-za-pijacu-vodu/>.
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DISTURBANCE ON THE UPPER DANUBE

A Long-Term Socio-Ecological Perspective on Floods

GERTRUD HAIDVOGL, SEVERIN
HOHENSINNER, AND MARTIN SCHMID

INTRODUCTION

Floods are an essential element of river systems, defining, among other things, the spatial extent of riverine landscapes.¹ During mean flow, riverine ecosystems are composed of aquatic and terrestrial habitats, but during inundation, the terrestrial zones of floodplains become aquatic, too. Floods are commonly caused by fluctuating discharges, which show seasonal and longer-term patterns. In snow- and glacier-fed rivers, such as the Upper Danube, a seasonal discharge peak occurs usually in late spring and early summer when snow and glaciers melt. On the Upper Danube, summer floods also occur due to longer rain events in the catchment upstream. Before dikes or dams existed, ice-jam floods were a typical river feature. They intensified river dynamics in particular during the Little Ice Age and they occurred when an ice cover developed on the river during winter. For example, in February 1876, the entire Danube from Tulln (thirty-five kilometers upstream from Vienna) to downstream of Budapest was blocked by an ice jam over a length of 380 kilometers.² Ice cover and jams obstructed the flow and, consequently, could back up the water several meters high, like human-made dams. Extensive inundations upstream of the blockage were typical phenomena. When melting ice covers fell apart, the backed-up water abruptly pushed large ice blocks downstream. Such

floods were even more severe than those upstream of the jams due to the high velocity and erosive power of the flood waves.

Despite being perceived as a threat by humans from the earliest times of riverside settlement, floods were vital for the evolution of river channels, floodplain morphology, and habitat conditions for riverine biota.³ The hydrological variability of alpine rivers such as the Danube triggered strong fluvial dynamics. Hence, the riverine landscape, composed of aquatic zones and terrestrial floodplains in alluvial river reaches, changed its appearance during every mid-sized and higher flood event.

The magnitude and frequency of floods have not been stable across past centuries and millennia. Over the last two decades, studies have reconstructed their historical frequency and extent.⁴ Until the nineteenth century, written sources mainly informed about floods when they caused fatalities or damaged buildings.⁵ This changed when gauging stations began to record river discharge regularly. Data collected by the natural sciences—from the analysis of soil cores, for example—can contribute to reconstructing the historical frequency and magnitude of floods for specific rivers and areas, phenomena that Brazdil et al. have termed “paleo floods,” while “historical floods” refer to those events recorded in historical written sources.⁶ In a comprehensive effort, Blöschl et al. studied large parts of Europe (Central Europe, Western Europe, Scandinavia, and parts of Southern Europe) and found nine flood-rich periods between 1500 and 2016.⁷ The latest period between 1990 and 2016 is especially pronounced in Central and Western Europe, and stands out for several reasons. It is connected to warmer temperatures than the preceding period before 1990 and shows a higher frequency of summer floods. Further, it is the second largest in spatial extent after the approximately 1750–1800 period, which affected mainly Western, Central, and Southern Europe, and the third largest in spatiotemporal extent. The authors emphasize that 2016 marks the end of the dataset but most likely not the end of the period. On the contrary, the frequency and magnitude of severe floods are expected to increase.⁸

Humans have settled along rivers for millennia. Since the Neolithic transition, people have benefited from their energy, biomass, and water supply, as well as from waste and wastewater discharge.⁹ Hence, humans were affected by floods and inundations and developed practices to cope with them. Along the Upper Danube, so-called passive measures—that is, without substantial hydraulic structures—were implemented for centuries to mitigate the negative effects of flooding: to prevent injuries and fatalities as well as damage to buildings and goods. Only in the nineteenth century, with the shift to fossil fuels, did hydraulic structures become the prime instrument of flood protection. When the infrastructure was not built at the initiative of the central governments, local people insistently asked for them as Luminita Gatejel shows for the townspeople of Giurgiu in the 1840s (see Gatejel’s chapter in this volume). The main target was now to avoid inundation by separating the river from its floodplains, replacing the practice

of living with floods and mitigating adverse societal effects. As ecosystems, rivers were already modified by preindustrial human intervention, but technical flood protection, together with other engineering works, transformed riverine landscapes substantially and often created entirely new systems. It is worth emphasizing the role of such technical structures to expand the well-established notions of rivers as socio-ecological and, recently, as socio-ecohydrological systems¹⁰ toward rivers as socio-ecological-technical systems (SETS), in which infrastructure plays a crucial role. In this chapter, we comply with the definition of infrastructure presented by Dorondel and Gatejel in the introduction to this volume. That is, infrastructure involves socioeconomic components besides technology and material flows. Such a perspective can help to overcome technical conceptualizations that ignore ecological as well as social effects and to avoid overlooking the critical role of technical systems.¹¹ Further, we build on the notion of SETS as introduced by Markolf et al., who perceive infrastructure as complex and interconnected social, ecological and technological systems (SETS).¹² In contrast to Markolf et al., our notion of SETS relates to the connectedness and interdependency of social, ecological and technological systems in general, as they have evolved in the last two centuries, leading to lock-in effects and path dependency as undesirable consequences of technical infrastructure.¹³ Other research has shown that infrastructure can increase vulnerability as in the case presented by Stefan Dorondel (in the present volume), who shows that the levees not only impeded the flood of villages along the Lower Danube but actually increased the power of the flow, causing the catastrophic floods in 2006 in Romania.¹⁴ The widely used concept of socio-hydrology also relates to vulnerability.¹⁵

"Disturbance" is a well-suited conceptual tool with which to analyze the links between rivers, human societies, and infrastructure. As a concept, disturbance originated in ecology, where it refers to a temporary change in an ecosystem resulting in the modification of its structure and function.¹⁶ Sudden disturbances such as floods or fires ("pulses") were distinguished from events of longer duration ("presses").¹⁷ Already in the 1980s, ecologists debated what comprised the cause of a disturbance. Some argued that the trigger could only be a natural process occurring on different spatial and temporal scales.¹⁸ For example, Resh et al. defined rapid increase in river discharge and the resulting change in sediment transport as one potential driver.¹⁹ Droughts might be another kind of disturbance acting on a longer time scale. More recently, other scientists have perceived human intervention into ecosystems as the main drivers of disturbance.²⁰

Lately, the disturbance theory and its role in river ecology have been revisited.²¹ As river discharge is considered a major driver of disturbance, scientists emphasize the renewed importance of the concept in ecology and ecosystem management given the increasingly visible effects of climate change, among them more frequent and intensive floods.²² Accordingly, definitions have been developed further. Still, the debate about

what drives disturbance prevails. Investigating fire as a disturbance, Mary Cadenasso et al. state that drivers can be both man-made and caused by nature.²³ In contrast, a recent article suggests distinguishing disturbance driver from disturbance impact to disentangle the ecological and societal spheres: “A disturbance driver is a ‘force, either biotic or abiotic, that generates a deviation from the local, prevailing background conditions,’ and a disturbance impact ‘represents the social-ecological consequences of a driver relative to a scale-dependent baseline state.’”²⁴

Useful interdisciplinary concepts integrate socio-ecological-technical systems and disturbance theory. Nancy Grimm et al. emphasize that the classic tenet of the late twentieth century, which considers urbanization as a disturbance, should be counteracted.²⁵ They claim that an advanced socio-ecological perspective might deliver better concepts, especially when looking at urban systems and urbanization. Using SETS as an enhanced perspective, they have suggested systematically distinguishing between mechanisms, impacts, and responses to address this nexus against the background of disturbance. This somewhat resembles the DPSIR concept (Driving forces, Pressure, State, Impact, Response),²⁶ but with a clear focus on disturbance and technical systems.

Technological systems are not just a subset of social systems. Rather, they have their specific influence and agency. Embedding infrastructure into a SETS approach helps to reveal how a fallacious trust in the robustness of infrastructure is challenged by extreme events exacerbated by the climate crisis and unpredictability. Furthermore, the concept can link infrastructure capacities to changes in demography, societal preferences, and unpredictable human behavior, and it can show the complexity and interconnectedness within different infrastructure systems (e.g., power supply lines and pumps for water pipelines). The impact of extreme events—including floods—as disturbance for societies also depends on zoning policy; sound policies account for correct flood risk mapping, soil sealing, and urban development. A historical perspective on the co-evolution of SETS can demonstrate lock-in effects concerning past decisions and actions with respect to infrastructure and path dependency. As building and maintaining any kind of infrastructure usually requires considerable financial resources, transformation to a new and maybe better system often has seemed, and still seems, too costly.²⁷

Using the notion of SETS, we will present the case of the Austrian Danube and one of its tributaries, and demonstrate how dealing with flood risk and floods as disturbance has triggered a shift from preindustrial socio-ecological systems (SES) to socio-ecological-technical systems (SETS). We have chosen three river sections to highlight how various prerequisites created SETS with similarities and differences, though all evolved in similar periods—that is, in the last 200 years—characterized by increasing fossil fuel use and the belief in technical solutions to combat environmental

risk. Among other things, we will describe in which way floods as disturbance to humans and perceived risks and vulnerabilities determined societal decisions on flood protection, and we will take into account the agency of hydraulic infrastructure, which can even exacerbate floods, requiring further technical improvement.²⁸

THE AUSTRIAN DANUBE: A HIGHLY DYNAMIC RIVER SECTION

The Upper Danube stretches from its source in the Black Forest, Germany, up to the breakthrough section known as “Theben/Devín Gate” where the Danube dissects the Little Carpathians. Upper Danube floods are fed primarily by snowmelt in the Alps in late spring and summer and by atmospheric precipitation. Comparatively abrupt discharge changes are characteristic in contrast to the lower section of the Danube. Extreme flood events are well studied for the Viennese section. Here, the annual mean flow currently amounts to 1,980 m³/s. During the highest known flood, which is said to have occurred in 1501, approximately 14,000 m³/s passed the city.²⁹ During the last 500 years or so, the frequency of floods peaked in certain periods, usually linked to colder and wetter climate conditions.³⁰

The approximately 350-kilometer Austrian Danube, part of the Upper Danube, is delimited from the German river section by the confluence of the Inn. This right tributary more than doubles the discharge of the Danube from around 700 m³/s to 1,880 m³/s and generates a strong alpine influence. Until the construction of run-of-river power plants in the second half of the twentieth century, the Danube transported huge quantities of sediment from the Alps downstream: Each year, around 500,000 m³ of gravel and coarse sand were discharged by the tributaries into the Danube as bedload, and a further 5.5 to 7 million tons of fine particles as suspended solids.³¹ Most of the bedload was deposited downstream from Bratislava; as a result, only between 10,000 and 50,000 m³ of this material arrived in Budapest per year. On the other hand, the share of fine sediments (suspended solids) increased to about 11 million tons.

The hydrological regime, substantial bedload transport, and a comparatively high slope of around 0.43 per mille made the Austrian Danube a highly dynamic river system with two different channel types before channelization. In the broad alluvial basin sections, the Danube featured anabranching channel patterns. Here, the riverscape consisted of numerous larger and smaller river arms dotted by many islands. Some of these arms were several kilometers long and exhibited the same terrain elevation as the adjacent floodplain terrain. Typically, one or two dominant river arms could be used for navigation. Such arms exhibited extensive gravel bars, while smaller side arms could develop a great variety of channel patterns such as straight, sinuous,

or even meandering.³² The five alluvial Austrian Danube sections are interrupted by four narrow gorge sections cutting through the Bohemian Massif. Before river regulation, the Danube gorges typically featured sidebars, some midchannel bars, and in wider sections also small backwaters. Numerous mid-sized and smaller rivers discharge into the Austrian Danube. Due to the alpine and prealpine location of their catchments, tributaries from the south in particular show hydromorphological characteristics similar to those of the Danube. One of these tributaries, the Traisen, is presented below in a case study.

Until the late nineteenth century, no large settlements existed directly in the Danube floodplains, though there were exceptions, as the case of Vienna shows. But smaller settled areas existed for various reasons, even in zones prone to frequent—often annual or biennial—flooding. For example, mills, fishing, shipping, and other such kinds of commerce were linked to rivers, and trade routes crossed them, attracting people to live close to their banks. Agricultural land was preferably located outside of floodplains as farmers who worked alluvial areas faced flood damage to crops and the washing away of cultivated land. On larger rivers such as the Danube, however, they also appreciated the fertilizing effect of the organic matter that was washed in and deposited along its banks and in the floodplains.³³

The major human interventions that transformed the Austrian Danube into an industrialized river typical for the Anthropocene relate to navigation and hydropower production. To improve the navigability of the Austrian section, a first administrative organization was founded in the early 1770s (Kaiserliche Navigationsdirektion). Its main focus was creating and maintaining a towpath along the riverbanks and mitigating the most dangerous obstacles to navigation.³⁴ Starting in the late 1820s, and particularly between 1849 and the end of the nineteenth century, the Austrian Danube was systematically channelized for navigation. A Danube Regulation Commission was set up in 1850 and was reestablished in 1864–67 as a responsible organization. A main river arm was created with a standardized width of 280 to 350 meters and stabilized banks. However, navigation became hampered during low-flow periods because of the insufficient flotation depth for vessels operating on the Austrian Danube in the second half of the nineteenth century. Hence, a low-flow bed was created by building numerous groins on one side of the river to concentrate the flow on the other side, thereby increasing the water depth. It should be emphasized that until the second half of the twentieth century flood protection along the Danube was realized, except in large cities like Vienna. In the late 1930s and early 1940s, Nazi Germany, along with “annexed” Austria, became particularly interested in the Danube as a waterway in connection with the exploitation of natural resources from southeastern Europe and the issue of flood protection arose, particularly in the new river ports and terminals.³⁵

In 1955, the first part-Austrian hydropower plant began operation on the German-Austrian border. In the following four decades, nine further hydropower plants followed, transforming the Austrian river section more or less completely into a chain of impoundments.³⁶ Today, only two larger sections remain without the direct influence of hydropower dams: a gorge section in the Wachau area and the section between the Viennese Freudenau hydropower plant and the border to Slovakia, which is better known as the Donau-Auen National Park (Danube floodplain national park).

With the construction of the hydropower plants, flood protection—before mainly a concern of Vienna as a metropolis—was improved also for the riparian villages and smaller towns. This was basically due to the need for dikes for backwater retention along the impoundments, where the water level was much higher compared to before. Moreover, in sections not affected by the impoundments, flood protection dikes were erected, too. While in the twentieth century these were stable dikes, the last two decades have seen the use of mobile flood protection walls put in place when an extreme flood is expected.³⁷

The transformation of the Austrian Danube into a navigation channel and hydropower producer left less room for other kinds of human use. Professional fishing more or less completely ceased, on the one hand, because Danube fish are no longer much appreciated as a food, and on the other, because fish populations declined severely due to habitat change induced chiefly by the dikes and dams. At the same time, the Austrian Danube is the main recipient of (treated) wastewater from the cities along the Danube and the surface water is used in particular for commercial purposes. In the twentieth century, recreation along the Danube gained importance, especially along the newly built gravel banks in restored sites.³⁸

The loss of habitat for aquatic biota was only one ecological impact of riverine infrastructure. Because the hydroelectric dams built on the Danube were not equipped with fish migration facilities, fish species depending on spatial shifts, for example for spawning, were threatened. Only in recent years have fish migration aids and, to a degree, long by-pass channels improved the situation. Similar large-scale compensation for negative ecological effects is still sought for the interrupted sediment transport. The latter has led to severe channel incisions downstream of the youngest and easternmost Austrian hydropower plant, Freudenau, threatening navigation as well as conservation in the Danube floodplains national park.³⁹ In addition, the dikes fixed the main arm of the Danube, disconnecting it from the floodplains. Thus, the fluvial dynamics and the characteristic frequent changes of aquatic and terrestrial zones due to erosion and sedimentation in the wake of floods were lost. Floodplain waters started to disappear, and the floodplain forests are now dominated by hardwood trees.⁴⁰

CASE STUDIES FROM THE AUSTRIAN DANUBE MACHLAND: DEALING WITH FLOODS IN A RURAL SECTION OF THE AUSTRIAN DANUBE

The basin section of the Austrian Danube situated on the border of the provinces of Upper and Lower Austria is called Machland. Before the implementation of hydraulic structures from the mid-1820s onward, the riverine landscape was characterized by high fluvial dynamics driven by frequent floods, ice jams, and marked sediment fluxes. Aquatic and terrestrial zones were spatially and temporally “fluid”: Land was eroded in one place and the sediment deposited elsewhere, creating new islands and terrestrial zones (figure 10.1). For example, between 1775 and 1821, 76 percent of the present ten-year flooding area was affected by such dynamics.⁴¹ Outside this particularly dynamic core area along the two main arms of the Danube, the land was more stable from late medieval times; nevertheless, it was frequently flooded. The flood-prone area on the left bank extended far into the settlements, which repeatedly had to struggle with inundation. On the right bank, a tertiary hill area forms a ridge, which largely protected the settlements to the south. At the beginning of the nineteenth century, the land within our study site—the current ten-year flooding zone—was used by the residents of the eight riparian villages in various ways. Along the banks of the Danube where the arms served as shipping routes, trees were felled to build towpaths for vessels that were pulled upstream by horses. In other areas, the floodplain forests were felled for agriculture. A thorough study of land use showed that before systematic river channelization, land use was adapted to the fluvial characteristics and the changing water levels above and below ground. Above all, the proportion of various types of land use varied within and outside the study site. Only 5 percent of arable land was situated within the study site. Also, the area of orchards and settled areas was small. GIS analysis intersecting land use in 1827 with site age, inundation depth, and the depth of the groundwater table showed that arable land, orchards, and houses were never established within the highly dynamic zone but only within the frequently flooded zone. Here, they were located at the highest spots where there was no risk that the land would be eroded, the areas were the last to be flooded, and the groundwater table was lower than elsewhere in the surroundings. In contrast, meadows and pastures were to a large extent situated within the very dynamic core area where land was regularly washed away.⁴² Such agricultural land use types required less effort with regard to cultivation. If they were eroded, the loss was smaller than in the case of arable land for which seed had to be obtained and stored and that had to be fertilized. In the nineteenth century, floods were certainly predominantly perceived as a threat and an event with negative consequences. However, farmers also

saw benefits, because every flood washed in nutrients that promoted plant growth (nitrogen, as well as phosphorus, potassium, calcium, and magnesium). This was repeatedly mentioned in contemporary writings on agriculture, for example in an account from 1846.⁴³ By definition, the remaining floodplain forests were located in dynamic or frequently inundated areas. They partly served as pastures for livestock and were also the focus of forestry and hunting.

Until the 1820s, the Machland basin of the Austrian Danube can be considered a socio-ecological system. In 1826, the transition to a socio-ecological-technical site began with the construction of the first hydraulic structures. Two main drivers can be held responsible. First, fluvial dynamics increased the risk of erosion to a village and several homesteads. Second, shipping was increasingly hampered due to the frequent adaptation of the navigation path to create the best route.⁴⁴ Thus, a training wall was built to prevent water from flowing into the southern main arm. Because this intensified the flow, the width of the northern main arm increased and agricultural land on the left bank was threatened by erosion. The riverbanks had to be stabilized. In 1832, a cutoff channel was dug to straighten the main arm. Sediment that passed this section or was eroded at this point was deposited directly below the artificial cutoff, making the Danube even more uncontrollable for shipping than ever before. Finally, a new navigation channel was built across the whole Machland section, which was largely completed in 1859. By 1875, a still existing side arm was closed. The channelization of the Danube stopped the dynamics of the river. Water and land were now spatially fixed, which also made the previously complex administration of land and its ownership easier. The frequency of flooding, however, changed only slightly.

In the second half of the twentieth century, another kind of major infrastructure was built. In 1958, a hydroelectric dam was put into operation at Ybbs-Persenbeug, approximately twenty-five kilometers downstream of Machland and completing constructions that started under Nazi rule in 1938.⁴⁵ Backwater dikes were built along the impoundment, further improving the level of flood protection. The remaining oxbows were disconnected from the river as their water level was now much lower than that of the impounded Danube. Pumping stations were built that not only removed the water of the oxbows but also drained the floodplains and regulated site conditions for agricultural use. In 1968, the hydropower dam at Wallsee-Mitterkirchen was built in a new artificial main channel at the western end of the investigated Danube section. The former Danube remains in the form of a huge, stagnant oxbow. As a result of the river channelization and channel dredging during the construction of the Wallsee-Mitterkirchen plant, the river incised around 2.7 meters, while the level of the floodplain area rose due to sediment deposited there during flooding. The mean depth of the groundwater table is now three meters compared to around 1.5 meters in the 1820s, resulting in drier site conditions in the floodplains⁴⁶—a trend likely to be exacerbated by anthropogenic

climate change with higher irrigation demand. As a consequence of hydraulic infrastructure, the types of habitat typical for the Austrian Danube before channelization changed fundamentally. While originally 94 percent of the water bodies consisted of flowing water, stagnant waters dominate today.⁴⁷ Habitat change is mirrored in significant biodiversity change.⁴⁸

In the 1970s, the Machland was indeed less often flooded than in the nineteenth century, yet every few years residents demanded improvements to the flood protection measures. The construction of dikes along the Danube's main channel turned out not to be feasible. Thus, resettlement was chosen as the prime strategy in the Austrian Machland section. It started in the 1970s and was completed only in 2018 (figure 10.2). The resettled population built new houses on the edge of the floodplain and their former properties were demolished. The gardens and orchards around the original buildings were left to decay, while crop production was intensified. Changes in agricultural policy were reflected in the landscape. In 1975, Austria introduced compensation for crop destruction caused by flooding. Hence, farmers started to cultivate more sensitive crops such as corn and sugar beet; they leveled the terrain and filled in the depressions so that the areas could be worked with modern machinery. Today, the Machland floodplains are characterized over large areas by arable farming, extending to the banks of the Danube.

VIENNA: FLOODS AS DRIVERS OF FLOODPLAIN DEGRADATION/ URBANIZATION

The Viennese Danube formerly showed an anabranching channel pattern similar to the section in the Machland basin. However, the eastern area, today part of the Donau-Auen National Park, exhibited less intensive fluvial dynamics. This is evident, among other things, in the high median age of the terrestrial sites, which reached approximately 200 years compared to thirty years in the highly dynamic Machland.⁴⁹

The Danube, and in particular the southernmost river arm, was Vienna's main transport route, allowing the city to be supplied with food and various goods, especially wood, which was transported along the river network from upstream forests from the sixteenth century onward.⁵⁰ From the fourteenth century, the Danube's southern arm had tended to shift toward the northeast and thus away from the city, so that the construction of local hydraulic infrastructure dates back to the late Middle Ages. The purpose of the groins and training walls was to maintain a navigable river arm alongside the historical center. In addition, the bottom of this channel was regularly dredged to

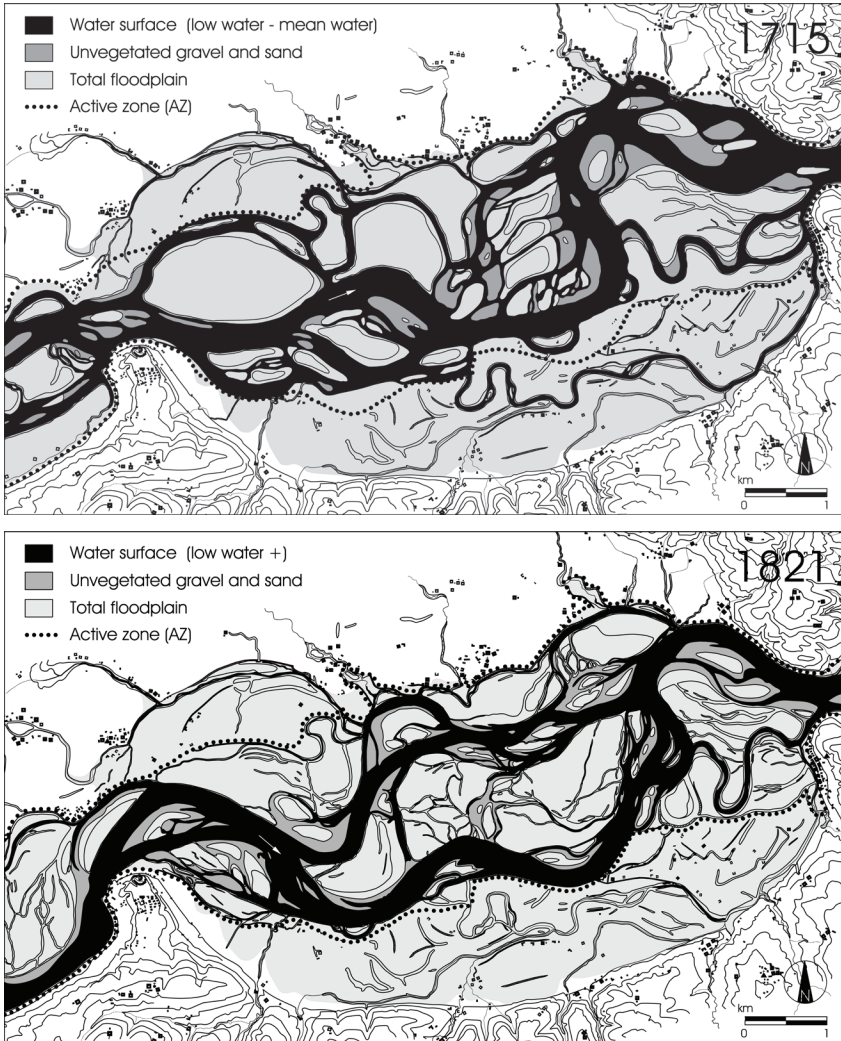


Figure 10.1 The Danube riverine landscape in the Machland, approx. 1715 and 1821. (© Severin Hohensinner; Hohensinner et al., 2014)

remove deposited sediment. Until the nineteenth century, a multitude of local bank protection structures, training walls, and groins were built, as well as local flood protection dikes from the eighteenth century onward. Apart from ensuring navigation to the city center, the aim of these measures was to stabilize the river sections in the urban area, thereby protecting villages and buildings situated at the margins of the floodplains from inundation.⁵¹ Before the nineteenth century, only a few settlements had existed in the floodplains. One example was the village of Unterer Werd. It was founded



Figure 10.2 The small village of Hütting located on the left bank of the Danube in the Machland section was partly eroded by floods several times. During the resettlement program of the late twentieth to early twenty-first centuries, the buildings were demolished, as shown in the encircled image. (© Gemeinde Mitterkirchen, doris.at, OÖN)

around 1300 on the only larger stable island to the northeast of the historical city center. This island was situated along the main road toward the north, which crossed the many Danube arms. Here, many buildings were dedicated to water-related professions or administration (shipping, shipyards, fishing, etc.).⁵² As in Machland, important buildings such as monasteries were erected on elevated terrain. Also, along the main Danube arm of the eighteenth century, a small village was founded around ship mills.⁵³

In the late eighteenth century, local flood protection dikes and the fixation of the riverbanks emerged as a component of preindustrial practices of dealing with floods (figure 10.3). The main measures were “passive” ones. They involved monitoring the discharge upstream and, in particular, potential breaches of the ice cover, which developed regularly in winter and frequently resulted in ice-jam floods in spring. In the following phase—when flooding was imminent—designated persons were charged with providing material for elevated walkways and operating boats at suitable spots to ensure access to and from the flooded areas. Drinking water, flour, and firewood were stored and elderly and sick people were moved to the higher floors of buildings. After a flood, official directives required the thorough drying of buildings to avoid long-term damage to them and disease.⁵⁴ While such preindustrial practices of flood

risk mitigation were suitable for annual and medium events, extreme events sometimes overburdened the preventive measures. Heavy precipitation and rapid snowmelt often only co-contributed to a catastrophic event. The failure of the precautionary measures was another factor, as the ice-jam flood of 1830 in Vienna showed (figure 10.4).⁵⁵

The built-up area in the Viennese Danube floodplains increased gradually due to urban population growth. Hence, a change in flood protection practices aimed at avoiding inundation at all became a matter of discussion—and technologically feasible due to improved engineering knowledge and fossil-fuel-driven machinery. From the beginning of the nineteenth century, several projects were developed. For decades, however, none of these was realized, although the extreme floods of 1830 and 1862 intensified the debate. Along the Austrian Danube in general, shipping was a major driver for channelization in the Viennese section. In the second half of the nineteenth century, fossil-fuel-driven machinery became available as an important prerequisite for the systematic channelization of navigable rivers. By that time, a stable riverbed with a standardized width had become essential for the steamship traffic introduced in 1830.⁵⁶ Another driver, which made Vienna a unique case along the Austrian Danube, was the need to protect existing urban areas along the Danube arm close to the city center and to create new areas for residential buildings, industry, and trade in the quickly growing imperial capital.

Between 1870 and 1875, one of the channelization projects was finally realized. It comprised a newly dug, straight riverbed, the construction of flood protection dikes, and a 475-meter-wide inundation area to hold medium floods on the left riverbank. The expansion of Vienna into the alluvial zone in the twentieth century was impressive.

In the first half of the twentieth century, the local shipping infrastructure was enhanced on the Viennese Danube. A new port was built to the south of the city, where ships could be moored for the winter when the navigation season was stopped. Huge projects were realized during Nazi rule between 1938 and 1945 when the exploitation of oil and grain from southeastern Europe ranked high on the political agenda. Oil and grain terminals were built. Major roads and railways followed to connect the terminals to the terrestrial transport network.⁵⁷ In addition, subterranean water infrastructure was constructed in the (former) Danube floodplains, including drinking water wells and pipelines, sewage canals, and a sewage treatment plant.

Doubts about the efficiency of Viennese Danube channelization and the flood protection measures had been raised at the end of the nineteenth century and continued in the following decades. During extreme floods, some areas along the main Danube channel were still inundated. After long and controversial debates, in 1969 the decision was finally taken to implement the second Viennese Danube channelization project, which was realized between 1972 and 1988. On the inundation area along the left riverbank, a new flood-bypass channel flowing parallel to the Danube

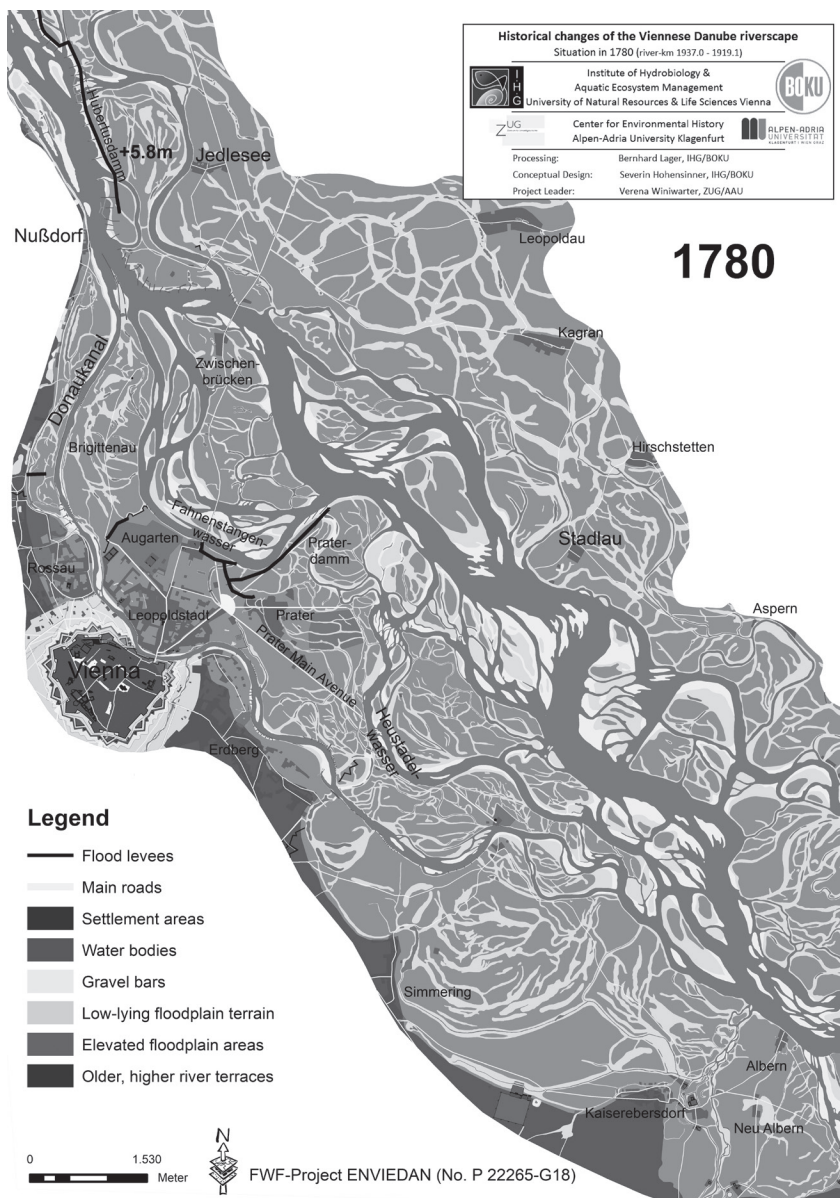


Figure 10.3 The Viennese Danube landscape in 1780. At this time, local flood protection dikes (marked as black lines) existed besides numerous other hydraulic structures at the inlet of the main navigation channel (Donaukanal) near the village of Nußdorf. The settlements of Leopoldstadt (until 1670 named Unterer Werd) and Zwischenbrücken were situated in the middle of the Danube floodplains. (© Hohensinner & Schmid, 2016)



Figure 10.4 The ice-jam flood of 1830 claimed seventy-four lives. (Eduard Gurk, *Das Wiener Hochwasser 1830: Leopoldstadt, Jägerzeile, am 2. März*, Original Albertina Wien, photography © Mefusbren69, public domain)

was excavated. The material was used to create an elevated island between the two channels. Together with the flood-bypass, this island is nowadays a recreation hot spot for the Viennese.

In the 1990s, the youngest Austrian Danube hydropower dam (the Freudenau plant) was constructed, transforming the larger part of the Viennese Danube into an impoundment. This also gave rise to further improvements in the flood protection measures. Above- and below-ground infrastructure (water pipelines, sewage canals, etc.) that exists in the present Viennese Danube and its (former) floodplains is remarkable, and there is more or less no place in the riverine landscape that remains untouched. Only a few green or forested areas still stand due to specific historical circumstances. The ecological change of the urban Danube landscape has been tremendous. As in the Machland section, the fluvial dynamics were completely stopped and terrestrialization threatens the few preserved floodplain waters and remaining green spaces, among them the Viennese part of the Donau-Auen National Park, which is still an urban biodiversity hot spot.⁵⁸ The terrestrial and aquatic habitat types that were typical for the unchanneled river disappeared and biodiversity changed accordingly.⁵⁹

TRAISEN: FLOOD PROTECTION ON AN ALPINE DANUBE TRIBUTARY

The interplay of urban growth and flood protection infrastructure in the twentieth century on the Traisen, a mid-sized tributary of the Austrian Danube, has been investigated in relation to the town of St. Pölten, the capital of the province of Lower Austria.⁶⁰ Before systematic channelization, the lower Traisen section was an anabranching river system with partly vegetated islands. The big difference between mean flow (approx. 13.5 m³/s) and a 100-year flood (approx. 725 m³/s), together with the high gradient of 3.5 to 4.0 per mille, caused high fluvial dynamics. According to reports and maps from the nineteenth century, the riverbed moved by around 100 to 200 meters between 1881 and 1886.⁶¹ Erosion was a major threat to the riparian settlements on this river section. This process was recognized even before systematic channelization took place. River engineers of the late nineteenth century assumed that the high velocity resulting from the high gradient not only eroded the riverbanks (side-erosion) but also the river bottom, leading to local channel incision. Preindustrial human intervention in the hydromorphology of the river included two weirs a few kilometers upstream of St. Pölten. Here, two mill canals diverted water, which flowed parallel to the river on both banks, a potentially conflict-laden arrangement often found on preindustrial tributaries of the upper Danube. Already in the 1810s and 1820s, local bank protection dikes were built to stabilize the main river arm, especially close to bridges. Floods in 1821, 1829, and 1839 destroyed these hydraulic measures. In 1872, a decision was taken in favor of systematic river channelization and projects were developed in 1879, 1882, and 1886, but not implemented.⁶²

In the twentieth century, land use change, temporal and spatial patterns of urban development in the alluvial zone, and the construction of flood protection infrastructure in various periods mutually influenced each other. As in Vienna, though on a significantly smaller spatial scale, industrialization and urbanization were major driving factors. From the 1850s, the population of St. Pölten started to grow as the city was connected to the newly built western railway line and factories were established and expanded. Urban development plans directed the construction of new built-up areas north and south of the historical center. Here, the new urban zones were at a certain distance from the river.

The first systematic flood protection project on the Lower Traisen was realized between 1904 and 1913. The dikes were designed to withstand a ten-year flood. Preindustrial methods of (passive) flood mitigation were still practiced in the first decades of the twentieth century, as an inundation area along the river was kept free of buildings. Thorough examinations of the erosion processes in the Lower Traisen had already been

conducted for the channelization project in 1886 and were redone in 1904. Water engineers concluded that the gradient of the river was too high, and against the background of the large discharges during floods, it was no surprise that the river bottom featured local incision. To counteract this process, they proposed the construction of ground-sills to reduce the gradient to around 2 per mille (figure 10.5). Along the entire—approximately thirty-five-kilometer stretch—of the Lower Traisen, a total of sixty such structures were built between 1904 and 1913.⁶³ In the 1920s, the dikes were heightened and the flood protection level was improved to withstand an approximately thirty-year flood. Still, two spatial development plans, issued by the city in 1923 and 1936, proposed inundation zones along both riverbanks.

A large flood in 1959 triggered efforts to increase the flood protection level to withstand a 100-year event. Hydraulic engineers completed planning by 1963, and construction started soon after. However, progress was rather slow. In the river section at St. Pölten, the project was realized as late as between 1982 and 1996. As a 100-year flood protection level seemed suited to reduce flooding and keep flood damage risk to a minimum, the idea was abandoned to keep a strip along the riverbanks free from buildings. Despite the delayed construction of the new flood protection dikes, in St. Pölten building spread into the floodplains from the 1960s onward. The first buildings were temporarily inhabited summerhouses, but soon municipal buildings and commercial zones followed. By 1981, almost 60 percent of the 100-year flood area had been developed. This value did not change considerably in the following two decades (figure 10.6). However, building practices, as well as the sizes and types of buildings and consequently economic values in the floodplains did. Surprisingly, the biggest increase in the value of real estate in the Traisen floodplains occurred when the flood protection levels had not yet been improved—a process that could be characterized as a “levee effect without appropriate levees.” Residents and businesses benefited from the fact that no extreme flood occurred. The damage potential—since 1996 in the event of a dike bursting—was about EUR 15 million in 1960, doubling to around EUR 32 million in 2000.⁶⁴

As in the case of the two Danube sections in Vienna and Machland, the hydraulic infrastructure built on the Traisen in the twentieth century had an enormous ecological impact. Not only were the fluvial dynamics blocked and the riverbed fixed, but floodplain waters also disappeared and the aquatic and terrestrial habitat conditions were heavily modified. Due to water abstraction for hydropower use along the two mill creeks, the riverbed falls dry for more than half of the year. The many ground-sills interrupt the river continuum, and along with the residual flow they have transformed the river into pools of stagnant water.



Figure 10.5 The riverbed of the Traisen after the completion of channelization in 1913. The groundsills are visible in the upper section of the picture as well as the large sediment bars, which are above water level due to the residual flow. (© Traisen Wasserverband)

FLOODS AS DISTURBANCE AND DRIVERS IN THE SHIFT FROM SES TO SETS

The three areas we have described underwent the shift from socio-ecological systems (SES) to socio-ecological-technical systems (SETS) predominantly in the late nineteenth and the twentieth centuries in the wake of fossil-fuel-driven industrialization, urbanization, and finally globalization. Certainly, hydraulic infrastructure had existed earlier. This is evident in the case of Vienna, where local navigational infrastructure dates back to the late Middle Ages. Such constructions were, however, relatively unstable and were frequently destroyed by floods. They piled up on the riverbed and surprised water engineers in 1870: When the first Viennese Danube channelization project got underway, around 163,000 m³ of dilapidated hydraulic structures had to be removed. In addition, thousands of timber piles from across the centuries and 18,400 running meters of various wooden beams were found.⁶⁵ Despite their sometimes short lifetimes, it is evident that all these structures influenced the river. In the Vienna case, the relicts of the former groins and training walls hidden in the channel bottom caused the repeated deposition of gravel, creating dangerous shallows for shipping at low and medium flows. Preindustrial hydraulic measures to some extent also shaped the Traisen, where the two weirs built to abstract water to the two mill creeks for hydropower use were constructed in the early modern period.



Figure 10.6 The town of St. Pölten in 1870 (top) and 2000 (bottom) with the Traisen River in the right half of the image. The spread of settlements into the floodplains was particularly strong from the 1960s onward. (© Bernhard Fraiss and Gertrud Haidvogel, 2004)

Comparing the three case studies presented above, we see commonalities and differences in developments. In the following, we will describe them as the nexus of floods as a disturbance, as well as the main driver of the shift from SES toward SETS. The role of floods as a disturbance has been sketched in a diagram (see figure 10.7).

First, our historical reconstructions of fluvial landscapes have proven that in highly dynamic rivers such as the Austrian Danube and its alpine tributaries like the Traisen, three zones must be differentiated to evaluate the social disturbance effects of floods adequately. On the Austrian Danube, the river's main branch served as a shipping corridor. The frequent spatial displacement of shallows and pools and, at times, the complete relocation of the navigable river arm rendered navigation difficult. Also, ship mills had to be removed from the water when a flood was expected, and when the main river arm shifted, the mills had to be set up in new spots.⁶⁶ The smaller Traisen river showed similar features. However, here the main preindustrial use was hydropower and different kinds of infrastructure were put in place to mitigate the effects of the fluvial dynamics on energy production. To keep the discharge as stable as possible and to prevent damage from both low flow and floods, the two weirs and mill creeks were built. Next to the larger river arm(s), a second zone can be distinguished where fluvial dynamics were high. Erosion and sedimentation, and subsequently a spatial and temporal shift between aquatic and terrestrial areas, were typical. Finally, at some distance to the river, a third zone existed. Here, the terrestrial areas were stable but became frequently inundated during medium floods and extreme events.

Flood protection without large-scale infrastructure meant that riparian residents adopted the principle of "living with flooding." Recurrent shifts of the river channel, land erosion, and inundation could not be avoided; their damage was just mitigated. Adapting land use to these conditions was one possibility. For example, riparian landowners preferably cultivated crop fields outside of the floodplains, and where land on the floodplains had to be worked, they chose stable areas and higher elevations. Buildings and settlements were erected according to similar principles. In the case of a flood event, elaborate procedures to save goods and lives were common, as described for Vienna.⁶⁷ In Machland, elderly people reported similar practices.⁶⁸ Preindustrial hydraulic infrastructure served navigation and sometimes flood protection purposes unintentionally. For example, the channelization measures of the 1830s–50s undertaken in Machland contributed to flood protection despite the fact that the project explicitly targeted navigation. With the creation of a more stable navigation channel the formerly dynamic floodplain zone was fixed, changing the potential for land use.

Major development toward SETS happened in the late nineteenth century, when fossil-fuel-driven machinery started to enable the systematic channelization of large rivers such as the Danube. Steam vessels started to operate on the Austrian Danube in 1830. To provide optimal and fast traffic, steamers require channelized rivers with

standardized river width, depth, and radius of curvature as Constantin Ardeleanu also details in his chapter on the Lower Danube (in this volume). The hydraulic structures of the late nineteenth and early twentieth centuries comprised riverbank protection and later groins to improve navigation (Machland, Vienna), as well as flood protection dikes (Vienna, Traisen/St. Pölten). In the first half of the twentieth century, the technical infrastructure on the Viennese Danube was enhanced with the construction of river ports. In the second half of the century, hydropower plants were built on the Machland and Vienna sections. Flood protection was improved in all three study sites, albeit in different ways. In Vienna, a second Danube channelization project was completed, involving a new river channel and an island that became a highly valued urban recreation area. In St. Pölten, the Traisen flood protection dikes were heightened. In Machland, flood protection was at first improved by the construction of backwater protection dikes along the Ybbs-Persenbeug impoundment, and from the 1970s onward, buildings on the floodplain and in adjacent areas threatened by 30- to 100-year floods were abandoned and rebuilt behind newly constructed flood prevention dikes far from the waterway. Hence, in Machland settlement did not extend into the Danube floodplains. However, the shift of houses into the floodplains was characteristic for the Viennese Danube floodplains and those of the Traisen in St. Pölten. Here, the urbanized area gradually spread toward the river, resulting in an enormous increase in damage potential in the case of a dike breach or a flood, which might overburden the existing flood protection measures. Calculations for the Traisen section in St. Pölten doubled those figures between 1960 and 2000. The projected costs of damage did not take traffic and below-ground infrastructure into account, such as water pipelines and sewers, which were built in all three sites in the former floodplains.⁶⁹ The case of floodplain colonization in St. Pölten is notable and follows the concept of the socio-hydrology of floods, which explores the interplay of floods, technology, politics, economic interests, and risk awareness of local populations. In this perspective, floods cause damage and increase the risk perception of people living along rivers. The construction and adaptation of dikes follow. People subsequently move closer to the river—also because risk awareness decreases—and the value of real estate increases. Floods that overburden the existing flood protection infrastructures would restart this cycle.⁷⁰

Interestingly, floods rarely triggered immediate flood protection measures, except for the Traisen flood in 1959. In all other cases, they reintensified long-lasting discussions and negotiations, as was the case in Vienna and Machland. Even after the ice-jam flood of 1830, no project was realized. This only happened after the flood in 1862 when the need for channelization was much more urgent due to steamship traffic and population growth. Floods are disturbances that directly trigger public and expert debates about risks and responsibility, but material consequences in the form of technical

arrangements and significant improvements are often projected and realized only in a mid- to long-term perspective, reaching over decades.

Hydraulic and other infrastructure as well as new land uses modified the ecological conditions in all three study areas, in particular in Vienna and St. Pölten. The aquatic areas (including sediment bars and islands) decreased by 54 percent between 1812 and 1991 in the Machland floodplain and by 49 percent between 1663 and 2010 in Vienna.⁷¹ A similar reduction in aquatic areas is evident for the Traisen in St. Pölten, where 55 percent of the water bodies vanished between 1825 and 2000, even though the figures for 2000 include a 6.6-hectare artificial lake.⁷² In addition, both aquatic and terrestrial habitat types changed. Side arms and gravel bars/islands almost or completely disappeared; site conditions in the floodplains favored the development of hardwood forests, with some areas like the Vienna Lobau becoming threatened by complete terrestrialization.⁷³ Consequently, animal and plant diversity changed.

The construction of hydraulic infrastructure involves side effects and new risks, among them the need for continued maintenance. In fluvial landscapes, the transformation from SES to SETS is reflected in changing modes of energy dissipation during runoff events. Formerly, the river's kinetic energy was dissipated by the lateral dislocation of water and sediments (erosion and deposition) in the floodplains. Following the spatial concentration and separation of aquatic and terrestrial human uses (shipping, land reclamation, etc.) through the narrowing of channels and dike construction, the infrastructure must absorb the excess energy. This also poses the risk of dike breaches, which is particularly problematic at the time of a predicted increase in flood frequency and intensity. Modern infrastructure can be adapted to the hydrological variability of the "disturbance flood" only to a limited extent. When socially attributed variability is exceeded under industrial conditions (SETS), the "disturbance flood" becomes a potential catastrophe. Among other things, this is rooted in the fact that in the process of industrialization, the variability of flood disturbances was underestimated while the robustness of technologies to contain them was overestimated.

Furthermore, restoration measures are needed to combat the loss of biodiversity. The transformation of the entire Danube into a navigation highway and its integration into a European aquatic transport network has reinforced this problem, as it links formerly unconnected river basins leading to the distribution of new, often invasive species, with negative effects not only on biodiversity but also for human health, forestry, and agriculture. Whereas in the Machland ecological conditions could potentially be improved as large unpopulated floodplain areas still exist, in Vienna, as well as in small towns such as St. Pölten, it is difficult due to the more or less full integration of the floodplains into the urban area. Here, the shift to SETS has resulted in path dependencies where new risks, their mitigation or elimination, and new unintended side effects have become the norm.

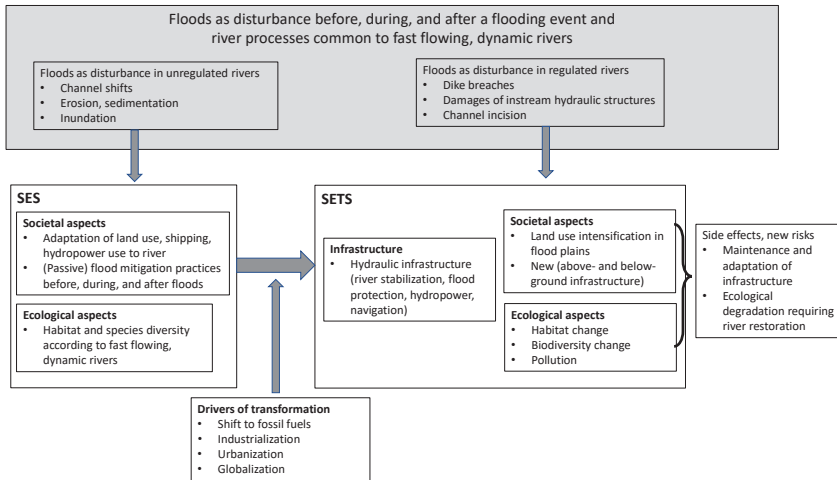


Figure 10.7 Diagram of the transformation of river landscapes from SES to SETS and the role of floods as a disturbance. (© The authors)

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