

Chapter 3

Predicting the Past? Integrating Vulnerability, Climate and Culture during Historical Famines

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Abstract Research on climate change is essentially a study of the past. However, while predicting future developments rests firmly on the analysis of historical changes, cooperation between climatologists and historians is extremely rare. Instead, the field is mired by disciplinary constraints and the resilient dichotomy of ‘natural’ and ‘cultural’ factors. Integrative approaches are only just beginning to emerge. Fewer still are empirical case studies that test the interaction of climate impacts and human responses in small-scale, high-resolution analyses. This paper tries to provide examples of both, drawing on the field of famine-studies. It presents the vulnerability-approach as an interdisciplinary *boundary object* for climate research, introducing the global famine of 1770–1772 as a case study. In this way, the paper makes the case for a genuinely historical approach in climate research to replace the current mode of simply ‘predicting the past.’

3.1 Archives of Nature, Archives of Man

Integrative climate research is challenging. It not only requires the ‘little interdisciplinarity’ of related disciplines, but also the ‘big interdisciplinarity’ across the two-culture divide of natural and cultural sciences. At present, climatologists (working in an already cross-disciplinary field) regularly confine themselves to the biophysical reconstruction of climates, while the societal impact of the observed phenomena is regularly left for others to research. Even large-scale co-operative enterprises rarely include the social sciences and humanities. Recent schemes such as the *pages2k* project have brought together close to a hundred researchers working on historical climates, but did not include a single historian (PAGES 2k Consortium 2013). As a result, when reflections on societal impacts are voiced at all, they are often added as an afterthought (see Fig. 3.1) and remain curiously detached from the meticulously documented climatological data. More often, however, societal implications are

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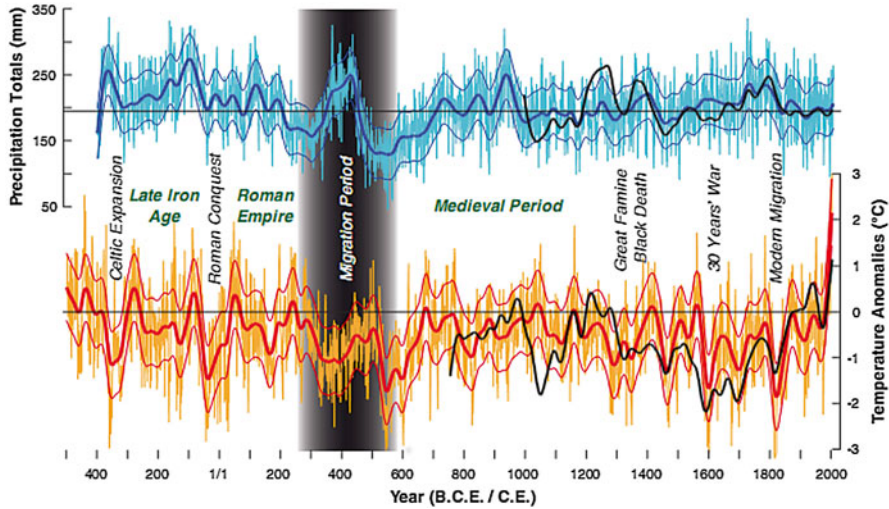


Fig. 3.1 Detailed reconstruction of precipitation (*top*) and temperature (*bottom*) from tree-ring data with a rudimentary overlay of supposed phases of “demographic expansion, economic prosperity, and societal stability” (see p. 581 in Büntgen et al. 2011)

supplemented by non-scientific actors, such as the public relations (PR) departments and journalists, or published in separate formats, such as podcasts or interviews. As a result, they often play on the established narrative of the ‘rise and fall’ of civilisations and remain, at heart, deterministic.¹

Historians have similarly sidestepped the challenge of ‘natural data.’ Even though climatic extremes constituted a formative experience for pre-modern, agrarian societies (Radkau 2008), the most recent major studies on climatic extremes by historians appeared decades ago (Labrousse 1944; Abel 1974). This indifference is partly a reflection on the discipline’s genesis: for a long time, historians studied the natural world alongside human societies. When ‘human history’ finally split from the field of ‘natural history’ during the nineteenth century, this decoupling resulted in the marginalisation of natural factors and a strong aversion to perceived climate

¹ *Pages2k* (past global changes of the last two millennia) is a multinational working group focusing on climate reconstructions. Its papers and official press releases, for example, focus exclusively on reconstructions, refraining from any interpretation of possible societal impacts. Nonetheless, these gaps encourage journalists to take licence and charge these reconstructions with populist narratives. For example, the leading German news site *Spiegel Online*, featured the paper (PAGES 2k Consortium 2013) with the headline “The fall of civilisations explained” and incorporated sweeping assumptions on the fate of “the Romans” or “the Mayans” (Bojanowski 2013). In another typical move, a “science podcast” (*Science Magazine* 2012) as well as an article on climate and the “collapse of ancient Maya civilization” (*Science Daily* 2012) are the result of PR “material provided by the University of Southern California,” to flank a more cautious scientific article on the day of its publication (Kennett et al. 2012). To a certain extent, the same division of labour is present in the separation of working groups I (“the physical science basis”) and II (“impacts, adaptations and vulnerability”) in the reports of the *Intergovernmental Panel Climate Change (IPCC)*.

determinism (Chakrabarty 2009). This tendency has been reinforced by the growing disenchantment with earlier econometric approaches, portraying the relation of environment and society as an interplay of climate and demography, forces beyond the reach of the individual (see p. 975 in Hoyle 2010). Since the ‘cultural turn’ of the historical disciplines in the 1980s and 1990s, the prospect of such a history disconnected from human agency has held little interest.

This deadlock between natural and cultural sciences is particularly noticeable in the research on famines—events that mark an important contact zone of man and nature. Famine research has remained split into two mutually exclusive approaches since the 1980s. The natural sciences have worked exclusively on the external, biophysical impacts, studying the *archives of nature* (precipitation and temperature data reconstructed through the proxies of speleothems, sediments or tree-rings). In turn, the humanities have focused on internal, societal factors such as poverty and entitlement failure, based on the *archives of man* (records of prices, births and deaths, etc.). These approaches do not just use different data sets and ‘archives’; moreover, they also suggest entirely different causalities of famine. The former regards famine as the straightforward result of the decreasing *availability* of food, advocating a strong link to climate anomalies, whereas the latter considers the decline in *access* to food as the root cause of famine, highlighting political famines with no relevant link to climate, particularly in modern times. Indeed, the opposition of interpretations based on either food availability decline (FAD) or food entitlement decline (FED) continues to delineate this research field (Murton 2000).

This rigid dichotomy of ‘natural’ and ‘cultural’ factors not only mirrors the two-cultures-tradition of today’s scientific set-up or the rise of postcolonial theory during the 1980s, with its strong focus on man-made causes. Furthermore, it also reflects the character of famines as ‘slow catastrophes,’ developing over many months and providing ample opportunity for human interference. The resulting plurality and variability of human responses is difficult to process with the modelling techniques commonly used by economists and climatologists, given that their models need stable data sets rather than the malleability and contingency of human reactions. Faced with the opaque interplay of factors during a slow catastrophe, the measuring sciences tend to focus on the more manageable data of the natural archives—a confinement that further reinforces disciplinary boundaries.

However, integrative approaches have begun to emerge in recent years, mainly due to the debate on the impacts of the current climate change. New approaches conceptualise the natural environment and human practices as coupled “human-environment-systems” (Turner et al. 2003), “social-ecological-systems” (Oliver-Smith 2004; Bohle and Glade 2008) or “sociospheres” (Mauelshagen 2010). They replace established narratives of man’s ‘struggle against nature’ with an integrated study of climatic impulses on the one hand, and the ways in which these have been interpreted and exploited on the other. These integrated approaches have been pioneered by disaster studies, whose research into earthquakes or floods focuses on the intersection of nature and culture (Johns 1999; Mauch and Pfister 2009). Studies in this field have argued that while hazards are natural, disasters are not (Bankoff 2004a). As a result, they should be classified as “cultural” as well as “natural catastrophes”

(Walter 2008). Disaster studies have revealed historical patterns of interpretation and coping to be unexpectedly dynamic—particularly during the late-eighteenth century—offering a poignant critique to determinist approaches to climate and hunger. One of the most promising interdisciplinary approaches to have emerged from these pioneering studies on disaster and famine is the concept of *vulnerability*.

3.2 Vulnerability as a *Boundary Object*

Vulnerability studies constitute a multidisciplinary approach that traces the dynamic interaction of multiple factors. At its core, the concept is used to capture the interplay of several stressors or perturbances threatening the stability of a system (Turner et al. 2003). In relation to human-environment interaction, vulnerability is conceptualised encompassing “an *external side* of risks, shocks, and stress to which an individual or household is subject; and an *internal side* which is defencelessness, meaning a lack of means to cope with damaging loss” (Chambers 1989). This interaction has often been visualised in diagrams, focusing on multiple and mutually entangled impacts on the level of society, households and individuals (Fig. 3.2). With its emphasis on the dynamic interaction of heterogeneous factors, such an approach is well suited to transcend the dichotomy of natural and societal factors.

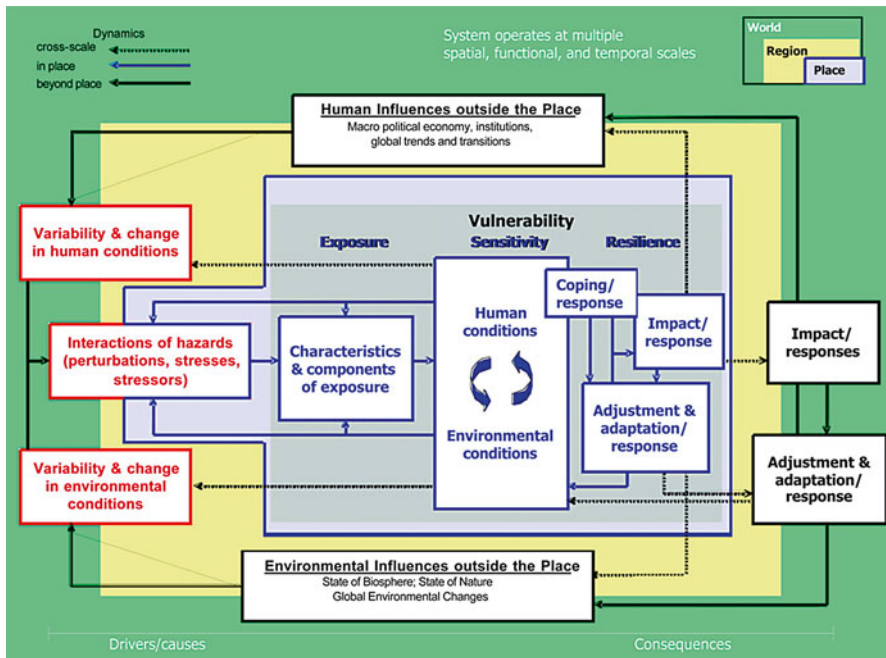


Fig. 3.2 Illustration of a “vulnerability framework” chart (see p. 8076 in Turner et al. 2003, Copyright (2003) National Academy of Sciences, U.S.A.)

However, multifactorial approaches are not a modern invention. Pre-modern societies readily accepted that events such as famines could be simultaneously attributed to human neglect, extreme natural events and divine intervention. While the weighting and relative importance of the three fields—profiteering, real scarcity, punishment by an angry god—were eagerly discussed, all three were conceptualised as being closely interwoven. Only during the nineteenth century did a new, secular understanding of nature become dominant, conceptualising man and nature as fundamentally separate (Walter 2008; Phillips and Fordham 2010). Subsequently, famines were principally attributed to natural factors that originated outside human society. Since then, prevention has largely focused on technical rather than social instruments.

The renaissance of multifactorial approaches is often associated with the rise of postcolonial and development studies during the 1980s. However, the roots of the vulnerability approach reach back even further, resting—surprisingly given its strong focus on civil society—within military research of the 1940s. During this time, large-scale collaborative projects such as the *United States Strategic Bombing Surveys* started to study the impact of new military techniques such as carpet-bombing on the affected population. As the bombing campaigns resulted in not only physical but also psychological devastation, the surveys incorporated social as well as infrastructural data. After the war, the cross-disciplinary collaboration of physicists, geographers, sociologists and psychologists during the *Bombing Surveys* extended to non-military catastrophes. Researchers began to combine external biophysical shocks with internal economic, social or psychological perturbations caused by catastrophic events, in a move that arguably paved the way for civilian research on catastrophes and later interdisciplinary collaboration (see Bankoff 2004a; Dombrowsky 2008).

The programmatic combination of natural and societal factors initially generated little reaction from the academic world. When it was finally picked up by the universities, research on hunger and famines proved pivotal. The continuation of severe famines in Africa and Asia during the 1970s had challenged traditional patterns of interpretation. In the midst of the modern world and all its capacities, it became increasingly difficult to attribute these catastrophes to natural impacts alone. Accordingly, societal factors such as poverty, inequality and exploitation were increasingly put forward. When Amartya Sen published his influential essay on *Poverty and Famines* (1981), asserting that famines frequently developed with little any discernible natural impact, he once again opened the field to multifactorial approaches and a balanced debate on the mix of climatic and societal factors. Robert Chambers later described the entanglement of these two sides with the term “vulnerability” (Chambers 1989), in an integrative concept that was meant to counteract purely climatic or economic approaches. Chambers and his colleagues drew attention to the notion that popular measures, such as simply raising net income and land ownership, could raise other risks: they diminished mobility in times of crisis, reduced the availability of wild substitute foods and destroyed vital networks of patronage and relief. Rather than replacing older approaches that focused on natural impacts with an equally monocausal concentration on socio-economic factors, they advocated the integration of biophysical and societal aspects.

The initial “double-structure of vulnerability” was later expanded to include ecological approaches, integrating the developing field of ecosystems research (Bohle and Watts 1993). This shifted the focus from short-term relief measures to a systemic perspective. As a result, the term ‘vulnerability’ has come to specify not just a temporal condition, but also a research programme. Due to this broadened perspective, it has been applied not only to famine research but also in other areas that study human-environment interactions—most notably climate change research. Indeed, the 2007 *Intergovernmental Panel on Climate Change (IPCC)* report included a working group on vulnerability, using the term to describe “the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change” (IPCC 2007).

Since the new millennium, the concept has become the subject of intense debate and modifications, whereby the initially static concept of vulnerability has increasingly given way to a more procedural approach. Moving away from event-focused ‘catastrophism’ to a long-term perspective on the historicity of vulnerability has opened the field to the historical sciences (Bankoff 2004a; Oliver-Smith 2004). More recently, the factor of ‘culture’ has been added into the equation, with the impact of “cultural capital” (P. Bourdieu), the role of cultural memory and practices of neglect (J. Assmann) or the exclusion from hegemonic discourses and practices of communication (A. Gramsci) all having been highlighted as important contributors to patterns of vulnerability (Voss 2008; Swift 2006; Pfister 2011; Bankoff 2004a). As a result, the concept has now gained relevance for the humanities as well as the social and natural sciences.

These extensions and modifications certainly point to the enduring appeal of the concept. The plurality of the included factors (biophysical, social, cultural) and levels (spatial, historical, biological) encourage interdisciplinary exchange. At the same time, they also attract criticism, much of which is common to attempts at ‘big interdisciplinarity’: the measuring sciences complain that the large number of factors now included impede any sensible modelling. From their perspective, greater realism has been achieved at the expense of practicability (see p. 488 in Thywissen 2006). The hermeneutical disciplines, on the other hand, take issue with the tendency towards abstraction and reduction, which marginalises the contingency of individual cases and studies societies “from the outside” (see p. 48 in Voss 2008). Even advocates of the concept agree that its rapid development poses a challenge for researchers to remain up-to-date. Research overviews now distinguish up to five generations of vulnerability studies (Birkmann 2006) and as many as 20 semiotic dimensions and 30 definitions (Füssel 2007; Thywissen 2006). As a result, many researchers use a rather mechanistic, ahistorical concept of vulnerability. Ignoring the concepts’ turn towards processuality and agency, they reduce vulnerability to a simple aggregation of stressors—a tendency particularly prominent in recent works on climate change (see p. 104 in Bohle and Glade 2008; p. 70f. in Ericksen et al. 2010).

Other critics lament that the profound political implications of the concept have been ignored. Labelling a population as ‘vulnerable’ can be used to stigmatise groups and delegitimise governments of the global south. Indeed, the terminology remains tied to western concepts rather than those of the societies commonly

associated with being at risk (Bankoff 2004b). Crucially the term ‘vulnerable’ encourages a perspective that frames the affected population or ecosystems as passive victims. It plays on declensionist narratives of ecological deterioration and promotes the disempowerment of local systems of relief and coping. These criticisms highlight that the concept is still missing a self-reflexive perspective—a desideratum that might be meliorated by the growing involvement of the humanities.

The most common critique, however, is the result of a misunderstanding: the complaint that vulnerability studies do not come equipped with a set methodology. In fact, as their proponents argue, as an interdisciplinary tool they do not attempt to do so. Instead, in the context of interdisciplinary cooperation, ‘vulnerability’ constitutes what Susan Starr has termed a “boundary object.” Such objects are both plastic enough to organise cooperation and sufficiently robust to maintain a common identity across disciplines: “they have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation” (Starr 1989). Scholars of science studies and interdisciplinarity have stressed that it is precisely this pliability that encourages cross-disciplinary ‘borrowing’ without forcing participants to abandon the respective methodological resources of their field (Weingart 2000). As such, vulnerability can be compared to concepts such as ‘sustainability’ or ‘discourse’ in the way that, at its core, it merely encourages a specific perspective: multifactorial rather than monocausal approaches, dynamic interdependencies rather than rigid determinisms, a concept of human-environment relations as entangled rather than conflicted.

The vibrant cross-disciplinary use of the vulnerability approach testifies to the attraction of such an open concept. This is particularly relevant to five areas of human-environment relations: agency, historicity, entanglement, scalability and comparability (Collet 2012):

- The vulnerability approach highlights the agency of the people affected. Their practices are not regarded as simple reactions to external stimuli or mere functions of precipitation and temperature. It integrates the multi-faceted and often improvised actions of specific “economies of survival” (V. Shiva).
- The concept opens climate change research to genuine historical approaches: instead of the popular ‘catastrophism’ that focuses on disasters as mere events, it encourages a long-term perspective. It studies how vulnerability is created over long periods of time and considers the way in which it manifests itself in specific “built environments” (A. Oliver-Smith).
- It enables us to perceive the relation between man and nature as one of entanglement rather than conflict. Instead of rigid schemes of stimulus and response, it studies the mutual interaction and co-development of climatic and anthropogenic impulses that can be appropriated and ‘socialised’ in various ways.
- The concept is scalable, given that it can be applied to various geographical as well as societal levels, covering individuals as well as households and larger groups. As a result, it is able to trace inequalities in vulnerability according to gender, ethnicity and age that often go unnoticed by traditional state-centred approaches. It also reflects that greater resilience on one level can increase

vulnerability on another (i.e. a state profiting at the expense of its farmers through ‘development aggression’). As such, it can contribute to the ongoing debate on micro- and macro-perspectives in climate impact studies and other academic fields.

- It encourages and facilitates comparative studies. Through its analytic framework, it can organise comparisons between historical and modern as well as western and non-western societies. Its embrace of non-standard factors such as imperfect markets, informal strategies of risk or specific cultural modes of perception reveals linkages that have been overlooked or underestimated to date.

Compared to previous approaches, the vulnerability concept supplements biophysical impact with ecological, societal and cultural factors. This turn shifts the focus from measurement and quantification towards weighting and qualification. As a result, the concept breaks with determinist approaches and highlights the dynamic entanglement of multiple impacts—entanglements that create space for the agency of the people affected.

Its multifactorial approach goes beyond what disciplinary methods can achieve; for example, through discourse analysis, climate modelling, “cliometrics” or economic mapping. In terms of research on climate change, vulnerability provides a framework that is able to capture the complexity of human-environment interactions rather than reducing them to manageable yet disconnected particularities. It reminds researchers that extreme climate events cannot be adequately described by drawing on the logic of a particular discipline, but rather constitute fundamental societal experiences that require the crossing of academic boundaries.

3.3 The Global Famine of 1770–1772

Research on the impact of historical climates is often geared towards ancient civilisations. Here, climate data is considered a suitable supplement for completing the patchy human record. However, the scarcity of historical records is usually inadequate to reconstruct human-environment relations in meaningful detail. To fill in such gaps, research often draws on established narratives—particularly in works of popular science, such as Jared Diamond’s bestseller *Collapse* (2005). Crucially, these rather sweeping assumptions concerning the rise and fall of civilisations, on mass-starvation and ‘climate migration’ often serve as *silent referents* in contemporary debates on climate change.²

Early modern crises have attracted less attention. Paradoxically, this deficit is at least partly due to the better quality of the data available: because the human record

²Dipesh Chakrabarty (1992) used the term “silent referents” to describe narratives that continue to shape our knowledge even when they have slipped from an individual’s power of disposal over time. While he refers to colonial discourse, similar historical narratives of decline and ascent shape our understanding of ‘climate’ and its societal impacts. On the (fragile) historical grounding of modern imaginaries dealing with ‘climate refugees’ see, for example, Lübken (2012).

is more detailed, it does not yield as easily to the formulation of clear-cut theses.³ The rich archival sources also require the unusual cooperation of climatologists with historians. However, once these prerequisites are met, the events provide a rich source for an integrative approach to climate impact studies. Historically, they mark a halfway-point: unlike studies on ancient societies, they can draw on rich human as well as natural records, rendering small-scale, high-resolution case studies operable. Nonetheless, this wider source base is not bought at the expense of including later industrial societies, where modern technologies have arguably constrained the impact of climate. Crucially, the precise documentation of human responses allows climatologists to use this period as a test case for the presumed impact that the shifts observed in the natural archives might have had on historical societies.

The case discussed here provides a good example: the global famine of the 1770s occurred during one of the most severe spikes of the ‘Little Ice Age’ (1350–1850). It can also count as one of the best-documented disasters in the pre-instrumental period, thanks to the proliferation of sources during the high Enlightenment. Unlike the extremes of 1816 (‘the year without summer’) or 1740 (‘the black spring’), its disastrous effects lasted for several years, causing disruption and stress on all levels of society. Due to its global reach, it also offers the rare chance to compare western and non-western ways of coping.⁴

The unfolding of the biophysical event—a multi-annual weather extreme framed by long-term climatic deterioration—is fairly well understood. Reconstructions are able to draw upon a large array of data. To date, tree-rings offer the highest resolution on temperature and precipitation in the natural archives. The (sub-) annual measurements they provide can then be supplemented with more long-term data gained from tracing stable isotopes in speleothems and sediments. More precise proxy data is available from an array of phenological sources (cherry blossom, vine, wheat and rye harvest dates) and qualitative data such as ship-logs, tax-dates, early instrumental measurements and—particularly for India—revenue (diwani) accounts. These show significant correlations and, in aggregated form, can be used to create indices of local climate. In some cases, they even allow the drawing of monthly atmospheric pressure charts (Brázdil et al. 2001).

The climate reconstructions illustrate that while India and Central America faced severe drought, Europe experienced a persistent “cold/wet” complex (Ouweneel 1996; Arnold 1999; Johnson 2005; Le Roy Ladurie 2006). All of central Europe was subject to exceptionally cold winters, with snow cover at low altitudes until June. More damaging still was the persistent heavy rainfall, which prevented airborne insemination and timely sowing, encouraged the proliferation of fungi and stunted growth on virtually all sources of food, while simultaneously shutting down transportation, with most major rivers unnavigable due to flooding for long periods. In India, the general drought was aggravated by the repeated failure of the

³However, the supposed impact of climate on the *French Revolution* has remained a popular topic (Fagan 2002; Le Roy Ladurie 2006).

⁴The crises of the 1770s are at the focus of an interdisciplinary research group on eighteenth century famines, uniting palaeoclimatologists, anthropologists and historians at Heidelberg University: <http://www.hce.uni-heidelberg.de/jrg/facingfamine.html>.

monsoon, causing serious damage to the dominant rice cultivation. However, the causes of these anomalies are less certain. cursory research has hinted at solar activity or volcanic eruptions (Vasold 2008), while others have suggested fluctuations of the El Niño-Southern Oscillation (ENSO), particularly as it has been demonstrated to explain the wet Europe/dry India constellation (Davis 2002). Nonetheless, at the current level of research, causal explanations must remain speculative.

In comparison, the societal responses to the 1770s famine have attracted substantially less scholarship, even though the severity of the climatic anomaly resulted in a large body of sources. They comprise serial data on births, deaths, prices and revenues, alongside criminal records, both for European bandits and Indian dacoits (robbers) as well as supplications, letters directed by the peasants of both continents to their superiors in search of relief and tax breaks. The crisis inspired large numbers of egodocuments such as diaries and memoirs, as well as sermons, economic records and numerous songs. Additionally, the famine in Europe sparked a learned debate that resulted in several hundred volumes of so-called “Teuerungsliteratur” (dearth literature) (Soden 1828). In central Europe, special ‘poor papers’ circulated that were sold for the benefit of famine victims and offered a unique mix of political comment, theological advice and meteorological observations. There is also a rich tradition of material culture that comprises memorials, commemorative coins, grave inscriptions and a broad pictorial record.

The archives of man confirm that Europe and northern India certainly experienced dramatic mortality crises. Bohemia and parts of Saxony are thought to have lost 10 % of their population, with a loss of up to ten million (30 %) in Bengal (Post 1990; Arnold 1999). At least in Europe, excess mortality was closely associated with the outbreak of major epidemics. How these large-scale effects were linked to climate, pre-crisis vulnerability or post-crisis interventions (or a lack thereof) needs further clarification (Pfister and Brázdil 2006). On an abstract political level, the crisis in India has frequently been associated with the *East India Company’s* takeover of direct government in Bengal in 1772 (Ghosh 1944; Chaudhury 1995). In Europe, the governments in France, Sweden and Denmark collapsed. While grain shortages, price hikes of bread, widespread riots and migration undoubtedly had an impact, their relevance—as a catalyst, an inhibitor or a convenient pretext—is equally difficult to assess on such an abstract level. Small-scale case studies give a much better idea of the way in which external impulses can be adapted, used and ‘socialised.’

For example, research on a local level suggests a reinterpretation of many precautionary measures. Two of the most common strategies of historical societies—banning grain exports and building granaries—are usually regarded as a straightforward (if ineffective) reaction to the overwhelming impact of weather extremes. In the few cases where these strategies have been studied in more detail, they were blamed as counter-productive impediments to interregional grain exchange and a fatal discouragement of trade (Collet 2013b). Close-up analyses of the practices of early-modern ‘hazard policy’ paint a rather different picture, illustrating that borders and granaries became foci for a broad spectrum of religious, economic and social practices, conflicts and appropriations.

For example, the closure of borders to secure grain for local consumption constituted a highly symbolic move. As in all pre-modern crises, this policy covered all of Europe (and much of Bengal) during the 1770s, in a close-meshed net of fortified boundaries that quickly reached down to the level of individual villages and communities. However, studies from the Ore Mountains in Saxony and Lake Constance near the Alps or, indeed, the riverine landscapes of Bengal show that these blockades were almost impossible to police (Collet 2013b; Chowdhury-Zilly 1982). Smuggling and trespassing, often under the pretext of pilgrimages and migration, remained common. Additionally, the closures were flanked by propaganda denouncing foreigners and vagrants suspected of trafficking grain out of the country. Particular attention has been paid to the scapegoating of grain traders in Europe that took the form of vicious anti-Semitic propaganda in the Empire. The authorities minted coins denouncing these ‘Corn-Jews’ alongside images of hoarders hanged from trees or rotting in hell (Gailus 2001). As a result, these ineffective and politically-charged corn bans have been interpreted as “moral economy from above,” whereby governments faced with extreme weather managed to appropriate popular resentments, fostering “an attitude of submissive abidance” (Medick 1985). However, the vivid local debates suggest a different perspective. Large groups used the bans as an argument to secure relief and participation in times of crisis. Given that the bans terminated all commercial grain trade, the responsibility for provisions shifted immediately and entirely towards the authorities. In this way, it fell exactly on those people who had drawn the largest profits from grain through taxes and land-ownership in prosperous years. Fencing off the country to the outside created a community on the inside that transcended the usual hierarchies and privileges—a fact vividly illustrated by successful denunciations against noblemen and clerics. The public provisioning that the bans had made obligatory did indeed happen, often with disastrous financial consequences for the authorities (Collet 2013b). The border closures allowed the ‘inmates’ to activate entitlements and rights to relief that would otherwise have remained out of reach. As the eminent German economist Reimarus sneered, “food handouts are no longer regarded as gifts but rather as a statutory obligation of the government” (see p. 131 in Reimarus 1791; *own translation*).

These practices can be read as “empowering interactions” (A. Holenstein). They counteracted the social vulnerabilities of a highly stratified society, not primarily through physical, but rather through communicative practices. During extreme climate events, new constellations and alliances became possible. Subjects and Sovereigns used the crisis to establish relations of mutuality, irrespective of their diverging interests, marking each other as authoritative partners. In doing so, they managed to expand their rights at the cost of intermediary levels of government, as well as the privileges of nobility and the church (Collet 2013b).

Public granaries constituted another field where the physical practices of facing famine can only be understood when their material and their communicative aspects are integrated. A quick glance at their genesis already hints at some zones of conflict. Most public grain depots did not originate from the need to provide relief, but rather to store tax grain and provisions for the military. Furthermore, they also illustrate

the momentous separation of producers and consumers. As such, granaries mark not only an infrastructure to guard against extreme climate events, but also an intensely contested interface of military, fiscal, economic and humanitarian interests. On a local level, these fault lines quickly become visible. In early modern Prussia, a veritable “granary state” (Collet 2010), the public magazines owed their existence to the ‘military revolution’ rather than relief. However, during harvest failures, King Frederick II used them as a stage to portray himself as a benevolent sovereign—a strategy he had pursued since his accession to the throne during the ‘black spring’ of 1740 (see p. 239 in Collet 2010). At the same time, eminent German cameralists drew on the granaries to develop and propagate their theories of economic circulation, arguing for the state depots to be used for price balancing (Justi 1771; see pp. 376–381 in Sonnenfels 1777).

In 1770, however, Prussia’s granaries stood half-empty. The military administrators had seen few merits in tending the magazines during peacetime. Local landowners, unwilling to lose control of their stocks, supported this cavalier approach. Therefore, when the subjects took to writing desperate supplications, they directed them not to the local authorities involved in the grain trade, but rather directly to the king. Initially, Frederick II dismissed them, stepping up his anti-Semitic smear campaign against ‘Corn-Jews’ instead. However, when the persistent rains ruined a second harvest in 1771 and reduced his subjects to eating bark and grasses, Frederick was forced to act. His ‘solution’ involved moving his troops under a pretext into neighbouring war-torn Poland to requisition large quantities of grain abroad—a campaign that eventually paved the way for Prussian land gains during the First Partition of Poland in the following year (Collet 2013a). Frederick’s move exported the famine eastwards, allowing the King to uphold the well-publicised fiction of granaries as sources of food security.

Therefore, granaries performed various societal roles and cannot be interpreted as a simple response to climatic fluctuations. The sovereign used them for power politics, as well as portraying himself as a good shepherd. For the ‘economists,’ the granaries constituted an important sparring pit that initiated new concepts of an integrated, cyclical economy and prepared the way for new food regimes in the nineteenth century based on free-trade rather than charity (Priddat 2008). The experience also grafted the loose assortment of self-fashioned experts into a coherent group and helped to establish the new scientific field of Nationalökonomie or classical economics. For the common people, the granaries provided an argument to activate new participatory rights. Not just in Prussia, they served as a pretext to circumvent intermediary levels and open up a direct channel of communication to the sovereign. As in the previous case of the border closures, these ‘empowering interactions’ served to legitimate both parties at the cost of local authorities. In this way, the humble petitioners did not just secure food; rather, they inadvertently modernised the institutional set-up of the early modern state. Again, the vulnerabilities that common people experienced at the hands of external impacts and a highly stratified society were not kept at bay through the physical means of technology alone, but through social norms activated by communicative practices.

Strikingly, comparable strategies can be observed in the Indian arena. Export bans and grain stocks, both local and regional, played a comparable role in securing participatory rights (Chowdhury-Zilly 1982; Curley 1977). While earlier research attributed the Bengal famine of the 1770s exclusively to the *East India Company* (*EIC*) and colonial rule, more recent studies have re-evaluated role of the native interests, focusing instead on ecological disempowerment (Damodaran 2007). This revision also suggests a new perspective on the effects of the famine: the plight of the ‘zamindars,’ the local gentry in charge of the intermediary levels of administration, jurisdiction and tax collection, could be equally attributed to the *EIC* government as to the agency of local peasants (see pp. 22–41 in Sen 1988; pp. 43–49 in Chowdhury-Zilly 1982). Ultimately, the famine might have served as a pretext to replace local rulers with the *EIC* as a supposedly weaker outside force—a strategy that hints at an alternative interpretation of early colonialism. In comparison, these new coalitions at the expense of the middle-ranks are reminiscent of the situation in Europe. Moreover, they suggest that ‘colonial’ food regimes also existed in the Old World. In another transcontinental exchange, the Bengal famine proved instrumental in Europe as well. A London show trial against the *EIC* governors involved provided starving Londoners with the opportunity to voice their plight and secure a reform of the Poor Laws while the British parliament used it to pass the Regulation Act of 1773 that initiated the transfer of the Indian possessions to the English government (Dirks 2006).

The societal responses to the 1770s anomaly seem to mirror the complicated teleconnections and linkages that characterise the climate system. In close-up, ‘societies’ display a multitude of interconnected groups and interests eager to capitalise on external, biophysical events, with varying degrees of success. As a result, they should certainly be studied with similar precision. Only then does it become possible to map the interactions, co-developments and discrepancies of climates and cultures.

3.4 Pluralities of Responses

The switch from long-term, general reconstructions to small-scale case studies reveals the actual plurality of human responses to climatic impacts and biophysical phenomena. The diverse reactions reflect the manifold social, climatic and cultural causes of ‘vulnerability.’ During the famine of the 1770s, sovereigns used extreme climate events to disempower intermediary agencies. Self-appointed experts exploited famines to establish themselves and their respective fields of expertise. Common people took advantage of the crises to assume new rights of participation through practices of communication and exclusion. Their actions provide a potent reminder of the longevity of what Karl Polanyi termed as “embedded economies” (Polanyi 1944). The resulting de-legitimisation of intermediary actors can be

interpreted as an unintended form of ‘state-building by catastrophe’—an effect discernible in both Europe as well as (colonial) India. Indeed, similarly variegated strategies are observable for other groups. European physicians used the epidemics that accompanied the persistent rains and the famine of the 1770s to discredit and suspend competitors such as midwives, ‘quacks’ and ‘medicasters.’⁵ Their vigorous debates established the public doctor as a profession—even though the miasma theory they propagated proved just as ineffective as the older humorism had been.⁶ Even theologians settled old disputes on church hierarchies and the literal exegesis of biblical texts on the back of the volatile contemporary debate on “whether all people that died during the famine had been abominable sinners” (Sillig 1772).⁷

The scope of human responses is particularly prominent during the late eighteenth century. The broad range of actions in this period mirrors the many interpretations available at this historical watershed of human-nature relations. Religious, economic and physical explanations of the anomaly coexisted, in a plurality that is obvious even in a source genre that is quite small, such as commemorative medals (see Fig. 3.3). The 1770s mark an exceptional *trading zone* where religious and secular environments met, moral and utilitarian concepts of nature competed and imaginaries of the human-nature relationship as symbiotic or as fundamentally separate coincided. In this ‘laboratorium,’ secular approaches and exact measurements coexisted with a remarkable resurgence of religious practices such as pilgrimages and prayer days. This overlap of interpretations created the space for human agency and enabled people to make use of climate impacts for their own ends.

Looking back to the eighteenth century not only provides a test case for climate reconstructions and the dynamics of human-environment interaction; moreover, it also takes us back to a time before the current nature-culture divide was established—a separation that still determines the disciplinary setup of modern science. The pluralities of the perceptions, responses and appropriations observable in this case provide a strong reminder that the prevalent rigid models of ‘climate versus culture’ are often highly selective. Integrative concepts, such as the vulnerability approach presented here, promise a more adequate and operable way to study climate history, offering an empirical alternative to the current determinist mode of simply predicting from ‘the past.’

⁵For an account of these conflicts, see, for example, Arand (1773), particularly pp. 143–153, and on the displacement of non-academic physicians during the hygric anomaly, pp. 163–176. A colleague of his used the famine in Bengal to discuss the relation of climate and health for similar ends (see pp. 110–144 in Hecker 1839).

⁶Early modern European medicine rested on the concept of bodily fluids. Extreme climates such as hotness, coldness or humidity could throw them off balance and result in disease. Even though proponents of the competing miasma theory regarded contagion as a more important factor, the communicating agents (bacteria and viruses) were not discovered until much later, resulting in futile and often counter-productive treatments.

⁷For an overview of the heated discussion that prompted a flood of publications, particularly in hard-hit Saxony, where the church was under particular stress, see Wagner (1773).

Fig. 3.3 Three medals commemorating the famine of 1770–1772, focusing on religious, natural and societal causes (divine wrath, extreme rain, ursury by ‘Corn-Jews’) respectively. From *top* to *bottom*: Anon., Saxony 1772; J. L. Oexlein, Nuremberg 1772 (author’s photographs of coins in author’s possession); J. C. Reich, Fürth 1772 (see Ben-Arieh 2014)



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