

Chapter 7

What Can Japan's Early Modern Capital of Edo Teach Us About Risk Management?

Jordan Sand

Abstract The city of Edo, early modern capital of Japan, was built of wood and burned with extraordinary frequency. This essay considers the logic of fire prevention and response in Edo in contrast to disaster management in the present day, with particular attention to the Fukushima nuclear disaster. The comparison reveals that the emphasis in Edo on strength and continuity of the social order rather than preservation of material property produced a different view of risk and uncertainty.

Keywords Urban fire · Japan · Fukushima nuclear disaster · Edo-Tokyo · Psychology of risk

7.1 Introduction

The city of Edo, precursor of present-day Tokyo, was the capital of the Tokugawa shogunate, a dynastic military regime, from 1600 to 1868. Under the quasi-feudal system set up by the Tokugawa family, the 250-odd provincial lords known as daimyo, who ruled independent domains throughout the country, were required to live half their time in the capital and maintain large permanent estates with bands of retainers there. These military men, called *bushi* or *samurai*, made up roughly half the city's population. Servicing this large ruling elite was the foundation of the city's prosperity.¹ Since the Tokugawa shogunate limited foreign trade to the far western port of Nagasaki and allowed no foreign residence elsewhere in Japan, the growth of international trade and Western imperialism had little direct impact on the city until the arrival of U.S. gunboats in 1853. The country also remained largely free of internal warfare during these two centuries. Despite the bureaucratization of rule over the course of this long peace, the Tokugawa rulers remained military men, whose

¹*Bushi* is the usual term in Japanese for all members of the military caste, who made up roughly six percent of the national population.

J. Sand (✉)
Georgetown University, Washington, D.C, USA
e-mail: sandj@georgetown.edu

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Fig. 7.1 Map of fires in Edo-Tokyo

capital was in theory, if not in practice, a fortress and encampment. The merchant bourgeoisie that came to flourish in Edo was given considerable autonomy but was never involved in the governance of the city as a whole.

Since almost all construction in this densely populated metropolis was of wood and the technology of fire extinguishing was primitive, large fires were routine.

This map (Fig. 7.1) by Yamakawa Kenjirō, Tokyo University's first native professor of physics, shows 91 fires that burned 15 blocks or more over a period of 234 years. The map was published in 1888, the year after the Meiji government completed the first comprehensive fireproofing project in central Tokyo. Yamakawa shows the point of each fire's origin and its point of extinction, in order to illustrate the influence of the prevailing winds each month of the year.²

Once or twice each generation, a fire would cause high casualties. Historian Kuroki Takashi records 16 fires in the period from 1601 to 1859 that caused over 100 deaths, of which eight caused over 1000 deaths. Such high casualty figures are shocking by contemporary standards for fires. But how did life in Edo compare in actuarial terms to life in other cities? Based on the numbers of dead and missing reported by Kuroki for the period between 1755 and 1855 (a period that includes the Ansei earthquake of 1855, but excludes the anomalous and statistically dubious Meireki fire of 1657), and assuming a constant urban population of one million, the average

²Yamakawa Kenjirō, "Tōkyō fuka kasairoku," *Rika kaisui* 3:2, *Tōkyō kishōhen*, 1881.

annual rate of deaths due to conflagration comes to roughly $\frac{32}{100000}$.³ This would place the risk of death from fire in Edo in the same range as the contemporary risk of being murdered in Oakland, California, which ranked number 7 in the list of the top ten US cities for homicide rates in 2012. Since the data for Edo is fragmentary, however, the estimate based on Kuroki's figures may be low. Doubling it would place Edo's fire risk alongside the homicide risk in Flint, Michigan, the "deadliest city" in the United States in 2012.⁴ It would appear, therefore, that Edo was a risky place, but people live in riskier ones, possibly even in major American cities today. On the other hand, one was considerably more likely to die from epidemic disease in Edo than to die in a fire, and in this respect Edo was a safer place than most cities in Europe at the time. Before cholera reached Edo in 1858, deaths due to epidemic disease were higher as a percentage of population in Europe than they were in Japan [6, pp. 188–208]. Overall, life expectancy in 18th-century Edo probably compared favorably with London or Paris.

The real question to consider in thinking about how fire risk was managed, however, is how people perceived the risk. In this regard it is important that only a small percentage of the fires that turned into conflagrations destroying multiple houses in Edo also resulted in deaths. Disaster management scientist Nishida Yukio calculates that roughly 5% of recorded fires in the second half of the Edo period resulted in deaths [18]. This meant that Edo residents frequently witnessed large fires, and were even forced to flee from them, without experiencing a direct threat to their own lives.

The issues raised by Edo's fire problem thus go beyond statistics. This study will draw comparisons to present-day disasters in order to consider what fire management in Edo reveals about the social mechanisms and social psychology of disaster preparation and response. I will refer particularly to the case of the Fukushima nuclear accident, which presents a striking contrast and suggests the extent to which Japanese society was transformed in the twentieth century.

My claim that the people of Edo may have something to teach us is premised on a few anti-orientalist assumptions about early modern Japan. The first is that Edoites were not fundamentally different from ourselves. They valued their lives and took precautions to protect them. They were not fatalists who accepted all misfortunes as inevitable. Nor did they worship their leaders. Edoites belonged to a largely literate urban society. Although the authorities censored print and other media heavily, criticism of government failures can be read between the lines of a vibrant tradition of social satire. Second, Edo was not a static society. Although institutional and cultural change came slowly under Tokugawa feudal rule, Edo saw significant economic and technological development, making it comparable to early modern Europe in many respects. Techniques were developed to battle fire and authorities were aware of other systems of fire hazard reduction. Eventually, following the Meiji Restoration

³Kuroki Takashi, *Edo no kaji* (Tokyo: Dōseisha, 1999), 229–235. The total of Kuroki's figures for the period is 31, 860. This omits several large fires about which the historical record indicates only "numerous deaths".

⁴Lauren Galik, "America's Ten Deadliest Cities 2012", *policymic* January 11, 2013. policymic.com/articles/22686/america-s-10-deadliest-cities-2012.

of 1868, the government embarked on the road toward the chimerical goal of a zero-hazard environment. For two centuries prior to this, no such goal was pursued. Yet as the city's foremost environmental hazard, fire prompted a range of responses and innovations.

The first and most obvious contrast with the present day is that in addition to being feared and lamented, fires in Edo were also celebrated. A popular saying went that “fires and fights are the flowers of Edo”, suggesting that both were enjoyed as spectacles.⁵ Fires followed certain rhythms, coming most often in the dry winter months, becoming conflagrations when the wind was high (usually out of the northwest), and spreading at a rate that permitted warnings to be relayed ahead of their arrival. This familiarity reduced the trauma of the experience for survivors. We see similar examples in other situations. The Bangkok floods of 2011, for example, were reported in the world press as catastrophic in proportion and causing property damage in the millions, yet there were also reports of Thai residents going about their business apparently cheerfully in streets inundated with over a meter of water. Flooding is a familiar part of life for residents of much of the region around Bangkok. They are more than simply resilient—they have accommodated their lives in practical terms to the hazard. I should emphasize that this does not mean that we should consider the residents of these disaster-prone places as content and therefore needing no remedy. It means rather that familiarity can make people capable of extraordinary adaptations and that the language of trauma may not always be appropriate for interpreting the social effects of a fire or flood.

Every type of disaster traces a distinctive temporal arc. The entire arc of a large conflagration in Edo, from first warning until first steps of recovery, is presented in excellent detail in the narrative scroll painting titled “Views of an Accidental Fire and its Extinguishing in Edo”, painted by artist Umehara Seiga in 1829 and presumably representing the colossal fire of that year, which damaged or destroyed tens of thousands of houses.⁶ The scroll (shown in Figs. 7.2, 7.3 and 7.4⁷) begins with a fire watchtower at a daimyo estate. Further along, commoner townsmen appear, some in a fire lookout on a rooftop, while across the street others pack up belongings, suspending chests of drawers from poles. This portable furniture represents one of the key adaptations Edoites had made to fire. They lived constantly at the ready to flee with their belongings. Nearby are several groups of people who have fled and are taking refuge in a wide area, probably a firebreak. They have formed private enclosures out of furniture, doors and tatami floor mats from their houses. Edoites were accustomed to arranging temporary shelter for themselves in this manner. Men on a rooftop nearby hold enormous hand fans to fan away flying embers. Then comes the fire itself, and firemen jumping the flames on a rooftop. Rather than extinguishing

⁵For discussion of the culture of Edo fire brigades, see [8].

⁶*Edo shikka shōbō no kei*; Tachibana Museum, Yanagawa. Reproduced in *Ō-Edo happyakuya chō* (Edo-Tōkyō hakubutsukan, 2003), 80-83.

⁷This figure and the two following figures are used with the permission of the Tachibana Museum, Japan, where the originals of the scrolls are exposed. These three figures are not covered by our Creative Commons Attribution licence.



Fig. 7.2 Residents gather their belongings while firemen run by



Fig. 7.3 Refugees set up temporary households with their doors and belongings in a clearing

the flames, the firemen strip off the roof to allow the energy of the fire to exhaust itself and to limit its lateral spread (many firemen were in fact also roofers). Then we see the conflagration itself, followed by a burned-out neighborhood where the fire has already passed. The only buildings still standing are clay-walled storehouses, sealed and labeled. Some are being doused. Firemen clean up, while gleaners can be seen sifting through the ashes searching for nails and other pieces of metal to be recycled. Already a fence is being erected around one site, revealing how rapidly shopowners began recovery so as to lose as little custom as possible. The point at which the fire stopped can also be seen: a partially burned house festooned with the placards of the fire companies. The companies would be compensated based on this evidence of their participation in firefighting. Elsewhere, shogunal officials inspect the damage. Householders whose houses survived reinstall tatami floor mats. People go about greeting one another, bowing, conveying thanks and condolences. Finally, the painter celebrates the firemen's bravery by showing them performing acrobatics on a ladder—a performance still seen in Tokyo today at New Year. The acrobatic display reminds us that in Edo firefighting, technique and daring took precedence over mechanical technology. Finally, two samurai are seen greeting each other in the entrance of an unharmed estate, suggesting a return to peace with solemnly performed acts of social exchange. Their grooms wait outside, regaling each other with fire stories.

Sadly, a sequence of vignettes like this, tracing a coherent trajectory from disaster occurrence to resolution and recovery, is impossible to imagine for the Fukushima nuclear disaster. Not only is the return to normal conditions in Fukushima projected for a distant future, the response of authorities has been dogged by doubts and scandal and the affected population lives in a state of profound uncertainty. It is ironic, in a sense, that strictly in terms of loss of life, the 1829 fire caused greater casualties



Fig. 7.4 After the fire has passed, people reinstall floor mats and doors, and pay condolence visits to neighbors. In the foreground, the charred roof beams of a house that was stripped by firefighters

than Fukushima is expected to do by present estimates. But even this is uncertain: we won't know for years how many lives will be shortened by the radiation. Although present projections of casualties are low, the question will probably always remain ambiguous. What is certain is that the Fukushima accident, unlike a fire in Edo, is open-ended. It has precipitated wide-ranging confusion and a state of uncertainty that may last for generations.

7.2 Six Principles Drawn from Edo's Fire Management

The remainder of this chapter will propose six principles derived from the study of fire and its management in Edo for considering risk and disaster in the modern world. We should not look at history with rose-colored glasses. The Tokugawa shogunate was an autocratic regime that imposed a hereditary status hierarchy to preserve the privilege of a few against the many. The regime's treatment of criminals and suspected criminals was draconian. Most Edoites lived in poverty with little chance of improving their lot. Tokugawa society was not one in which many of us today would wish to live. My intent here, therefore, is not to propose a return to Tokugawa-period practices. Nor do I intend to champion Japanese culture's supposedly inherent virtues in times of adversity, as was common in the mass media after March 11, 2011. The aim is rather to use the case of Edo's fires as a means to reexamine values and assumptions in today's disaster and risk management discourse.

7.2.1 *Build Light, Travel Light*

At the most basic level, this principle is an obvious one. The more we invest in technology, buildings and material goods, the more we have to lose. Lighter structures provide less fuel for a fire, and less rubble to kill, injure or trap occupants in a collapse. Lightweight, portable belongings can be carried to safety, easing the return to normal life after a disaster. Terrible dangers accompany this portability too, however, since refugees encumbered by baggage may become a hazard to themselves and others. In Edo's first and worst conflagration, the Meireki Fire of 1657, thousand of lives were lost because residents attempted to rescue their belongings in large four-wheeled

carts, which caused traffic jams and provided further fuel for the flames. The shogunate subsequently forbade the use of four-wheeled carts [11, p. 115–116]. As we see in Umesawa Seiga's painting, household belongings thereafter were carried on the back, suspended from poles or, occasionally, placed on maneuverable two-wheeled carts.

Edo's buildings too were designed to be dismantled and partly portable. There were three classifications of building types in Edo: clay-walled storehouses, plastered wood structures with tiled roofs, and tenements built entirely of wood, with wood shingled roofs. In a large fire, the storehouses were sealed, plastered wood structures were stripped to their structural skeletons, and wooden tenements were treated as expendable and torn down in the path of the fire to diminish the available flammable material and the risk of flying embers. Residents carted off doors and tatami floor mats. Since these pieces were modular, they could be immediately installed when houses were reconstructed. The same modularity made it possible to dismantle, transport and reassemble the buildings themselves in non-emergency conditions.

The ultimate implications of the "build light, travel light" ethos are ecological. A city is the most massive object constructed by human effort. Hypothetically, it is possible to imagine the total weight of all the steel, stone, brick and mortar, infrastructure and material goods accumulated in a city. Learning from the ecologist's term "biomass", we could call this totality "technomass". What would a comparison of the technomass of different cities, or of cities in different eras reveal? Or of the biomass/technomass ratio in different cities? This kind of hypothetical calculation also has bearing on issues of environmental sustainability. A calculation of technomass would tell us something about how much energy input was required to erect the city, or to reconstruct it after a disaster. For its population size, the city of Edo was at the light end of the technomass spectrum.

A nuclear power plant would stand at the heaviest end of the spectrum. Although the hazards of a nuclear plant lie partly in the intrinsic character of nuclear fuel and partly in the rigidity of the system for controlling its fission, which allows small margins for error, the Fukushima disaster demonstrated that the problems of nuclear power are compounded by the sheer mass of the technology, which must be heavy to be preserved in place for an indefinitely long time, protected from seismic and other environmental disruptions. Seismicity poses a special problem for Japan, one of the most seismically active inhabited areas on the planet. The trade-off between fire resistance and earthquake resistance was first seriously confronted in Japan following the Nobi Earthquake of 1891, in which brick structures that had been built as demonstrations of the modern state's technological progress collapsed, causing heightened casualties.⁸ The government had initiated a heavy-technomass approach to urbanism two decades earlier with reconstruction in brick of buildings on the main street of Tokyo's Ginza commercial district following destruction of the area by a fire. The response after 1891 was not to return to lighter construction, however. Permanent structures were viewed as essential to capitalist modernity. Eventually, reinforced concrete would emerge as the solution, together with heavier and heavier

⁸On the engineering debates sparked by the Nobi Earthquake, see [2].

infrastructure. In broad terms, the Fukushima nuclear plant, constructed in 1970, can be seen along a single trajectory from the brick-built, gas-lit Ginza of 1872.

7.2.2 Strong Social Infrastructure Counterbalances Vulnerable Physical Infrastructure

Here too, the basic principle is an obvious one: mutual aid helps victims overcome the effects of a disaster. By “social infrastructure” I mean the network of relationships and social institutions that support urban life and provide assistance in times of need. In a city like Edo, where the physical infrastructure of the city was fragile and easily destroyed, residents were likely to need the assistance of neighbors at some point in their lives. The fire hazard encouraged mutual aid and mutual aid made the fire hazard more manageable.

There is a tendency to idealize strong social infrastructure today because it is in short supply in first-world settings. In Japan, communalism was often coerced. The people of Edo were required to police themselves and field their own fire brigades. The wealthy property owners who had the most to lose from lawlessness and property damage paid directly for these services, which were provided by their tenants and employees, and established town residents provided alms to the poor until houses were rebuilt. Although this charity was in theory voluntary, the need to maintain neighbors’ respect (and keep their custom) made it effectively obligatory [9, p. 230]. The modern government exploited these traditions, particularly in the era of fascism and total war. While American bombers showered incendiaries on downtown Tokyo, citizens were urged to stay and run bucket relays, which were almost completely ineffective. They participated in this futile effort as members of neighborhood associations, whose strength was a legacy of local organizations dating back to the Edo period [5, pp. 155–160].

Strong social infrastructure in Edo was thus the product of both environmental pressures and political pressure from above. The Tokugawa shogunate treated fires in the commoners’ districts predominantly as a problem of social control, and addressed them through moral exhortation and threat of punishment. Each block (*chō*) was required to have a guardhouse with a watchtower, and guards, accompanied by a local concierge, were expected to make nightly rounds. Commoners were subject to punishment for accidentally starting a fire that spread to adjacent buildings. To encourage mutual surveillance, punishment was also meted out to the landlord, concierge, a neighborhood official responsible for the fire watch, and members of the five-household group that made up the smallest unit of urban administration [11, pp. 130–131]. The communal responsibility for fire control enforced the maintenance of a strong social infrastructure.

The kind of mutual dependence among neighbors that characterized urban Japanese life before the modern era is probably impossible to recover in first-world cities of the present day, even if we were to desire it. Signs of mutual aid and sto-

icism in Japan after the March 11th, 2011 disaster were widely reported and praised. The absence of looting was taken as evidence of social cohesion. Certainly some of the hallmarks of traditional social infrastructure and resilience are intact in Japan. Yet in modern Japan as in other advanced nations, citizenship has been channeled through state-dominated institutions, making the majority of citizens passive—if largely law-abiding—participants in society. In this context, it is difficult to imagine the type of disaster response seen in Edo occurring today. Events in the affected areas in northeast Japan since the 2011 disaster are instructive in this connection. A few tightly knit villages outside the radiation zone revealed the strength of traditional community by rebuilding together, but more commonly, large construction interests tied to the ruling Liberal Democratic Party have taken over the process, often without regard to the future needs of the region. Meanwhile, thousands of Fukushima refugees remain stranded in a bureaucratic limbo, living in government-built temporary housing, waiting for compensation, unable to rebuild their lives.

7.2.3 *Disaster Clarifies Society's Hierarchy of Values*

Edo's frequent conflagrations appear from a modern perspective not only a risk to life and limb, but a massive and wasteful destruction of property. One might imagine the economic impact to have been devastating. Yet Edo flourished as a commercial city, and following the Meiji Restoration, transformed with extraordinary rapidity into the capital of an industrial country. The Tokugawa bourgeoisie had managed to build an advanced commercial society without depending on accumulation of fixed capital in the city. The shogun's government generally tolerated but did nothing to encourage this commercial development or to protect private investment. The hierarchy of things protected or saved in the case of fire gives testimony to these values. The shogunate placed priority on protection of the shogun's palace, expecting daimyo and townsmen to fend for themselves. As for the commoners, clearly the priority was placed on life and limb rather than the protection of property, particularly of buildings. This might seem obvious and universal, yet the logic of private property in many societies today has distorted this value, producing disaster responses that would have puzzled an Edoite. In Malibu, California, for example, firefighters in municipal and state brigades are dispatched at great public expense and individual risk to quench naturally occurring brush fires that threaten the mansions of wealthy citizens who have chosen to build in a hazardous environment. It would appear that the state of California values private wealth—or the unconditional promise of aid to all private property holders, no matter how wealthy—to such an extent that it will place public servants' lives in danger to save rich people's houses.⁹

The Vehicle of Fire Precautions, a Japanese advice manual published in 1766, instructed readers facing an approaching fire to attend to their affairs in the following order: household members, contents of the family shrine or Buddhist altar, cash and

⁹On the politics of firefighting and property in Southern California, see [3].

goods, then storehouses and cellars. The text advised first that the family should put on fine clothes before fleeing, since it was advantageous not to appear destitute when calling on strangers for aid. Planning for the period of uncertainty during and following the disaster itself thus took precedence over preservation of any material property. The next priority was placed on saving religious objects associated with ancestors, which embodied the family's spiritual continuity even if all other property were lost. Following portable wealth, buildings came last, in the form of storehouses and cellars for preserving portable goods and cash. No mention was made of attempting to preserve the house itself [12].

It is not impossible to imagine a readjustment of the contemporary hierarchy of disaster response priorities in the direction of the Edo approach, in which the government offers no guarantee for the security of private property. Faced with the possible loss of everything, people today might also make similar choices to those made by Edoites. The victims of the 2011 tsunami in northeast Japan had undoubtedly invested more in their homes than the average Edoite. Solid and secure new housing thus plays an important role in reconstruction planning. Yet at a psychological level, one of the most striking things to emerge in the massive recovery effort has been the importance of family photographs. Tens of thousands of photographs were collected from the debris left by the tsunami, and both private organizations and government bodies contributed to cleaning them, exhibiting them, and seeking to locate their owners.¹⁰ A personal photograph or family album generally belongs outside the category of insured property, indicating that its meaning as property has not been translated into monetary terms (in this sense, the insurance industry, which depends on a commodification of things that are often uncommodified, also distorts value). Yet like the religious articles of family worship for the Edo resident, the family photograph may have a symbolic value that exceeds the price put on other material things.

7.2.4 Give People Some Control Over Their Fates and They Will Tolerate Risk

As suggested above, the contrast between Edo fire victims and victims of the Fukushima nuclear disaster appears stark. Known casualties for Edo's largest fires reached into the thousands. At present, no one is known to have died due to radiation from the Fukushima nuclear disaster. Despite this disparity, the Fukushima disaster's impact on residents of the region and beyond appears more traumatic than the impact of most fires on Edoites. Caution is due in the comparison of emotional effects, since the information about Fukushima victims that is provided to us by contemporary media is quantitatively and qualitatively different from what comes down to us in the historical record of Edo's disasters. Certainly Edoites grieved, and descriptions

¹⁰David Slater, "Incurring Debt; Picturing Death: Japanese Family Albums Washed Away in Tsunami Waters," Forthcoming.

survive that witness with horror the deaths of helpless citizens. Yet the social psychology of the overall disaster response in the two cases contrasts sharply, revealing the very different nature of the two types of disaster. I believe the essence of the psychological contrast lies in knowability and the sense of control.

Despite the high casualties that occasionally attended a conflagration in Edo, a fire was a knowable disaster. It was spectacularly visible. Experience and close attention to wind direction permitted one to judge a course of action (and to dress one's children in fine clothes in case flight should prove necessary). Edoites in a fire were like highway drivers today, who know the danger of driving but seldom fear for their lives because control of their own mobility affords them the illusion that they are safe. Since the fire brigades worked primarily by demolishing or dismantling houses rather than extinguishing the fire with water, and since the majority of houses were rented, most citizens packed up what could be carried and left rather than waiting for rescue. Once they had found themselves a place they believed safe, they could join the throngs watching the fire, which was a popular sport. This pastime was of course nothing peculiar to Edo: the sublime power of nature manifested in a fire seems to have an innate attraction. Repeated edicts from the city magistrate's office reveal the frustration of the authorities with gaping crowds who got in the way of firefighters' work [11]. American Edward Morse, who lived in Tokyo in the 1870s, reported finding on the way home from an evening's fire-viewing at one o'clock in the morning that a number of shops had opened their doors to pick up spectator traffic [17].

On a day-to-day basis, Edoites were aware of a list of precautions to take against the fire hazard, including avoiding the use of candles on the second floor of houses (where they were more likely to be left unattended and forgotten), maintaining water in cisterns and buckets at all times, dispatching men on regular fire watches during winter nights, and sealing up shutters on windy days. When a fire was burning elsewhere in town, residents were enjoined to climb on the roofs of their houses to extinguish or fan away flying embers. These injunctions were enforced by the shogunate, transmitted down to authorities at the district and block level, and repeated in manuals like the *Vehicle of Fire Prevention*. A fire usually began as a private accident, in someone's home, making it a personal responsibility. The great majority were extinguished on the spot. Even when it became a conflagration, the origin could be known and was reported. Writing in his diary on the 15th of the first month of 1846 about a fire that had begun two hours away from where he lived, Kanda district headman Saitō Gesshin recorded the address and the name of the head of household at the house where the fire had started.¹¹ Thus, despite the reality that uncontrolled fire overwhelmed human capacities and swept through large swathes of the city periodically, Edoites were able to understand a fire as a preventable calamity and one over which the individual might exercise some control. Even after it had engulfed blocks, with just a little luck one could be sure at least of one's own bodily safety.

The Fukushima disaster presents the opposite pole in terms of knowability and control. Its effects are invisible, its nature and scope incomprehensible, and its victims

¹¹Quoted in [13].

completely powerless against it. This is a dilemma of contemporary society as a whole. As Ulrich Beck writes, “non-knowledge rules in the world risk society” [1]. In place of an immediate, visceral knowability, we have unknowability produced by science itself and batteries of scientists speculating on what cannot be known. Although some specialists in Japan have argued that the risk posed to individuals by radiation from Fukushima was in fact minute, the incident has bred an extreme sense of vulnerability, together with distrust and resentment. The seemingly simple fact of what can be apprehended visually expresses the disparity in social psychology. In the first days after the tsunami, the Fukushima nuclear accident unfolded on television as if in slow motion. Cameras stayed fixed on the plant although most of the time nothing appeared to be happening. Hydrogen explosions occurred on the second, fourth, and fifth days. These provided the only visual evidence that a disaster was occurring. As a result, they were televised repeatedly. As time passed and reports of the radiation leaks became more serious, no new imagery evoked the disaster in spectacular form. Instead, intimate images underscored individual helplessness in the face of an invisible threat: people carrying geiger counters (even school children—although there was little they could do if the radiation levels rose), medics in protective suits conducting radiation tests on residents who were wearing no special gear, closed roads to settlements that looked untouched but to which residents were forbidden to return.

The difference between early modern Edo and present-day Fukushima with regard to knowability and the sense of personal control in the face of disaster correlates with divergent understandings of how much risk is tolerable. Edoites lived with a threat to their lives that was constantly present, but it was familiar, visible, and knowable. They developed a range of individual and collective measures for prevention and response. These habituated practices helped give the threat a finite form and shape. A nuclear accident offers little of this. It is not even clear where the limits of the affected region and population lie. The desire to give the threat a containable form is not diminished by these frustrating conditions, however. Some people as far away as the Pacific coast of the United States took iodine pills in the hope of protecting themselves from the risk of thyroid cancer resulting from Fukushima radiation. From a scientific perspective, the probability that this was necessary or useful must have been infinitesimally small, yet those who did it could at least feel that they were responding actively. Like carrying a geiger counter, it represented taking some control of the condition of risk.

One common point between Edo fires and the Fukushima nuclear accident is the affixing of blame. In both cases, people sought to identify a person or group of people to be held responsible. This is evident in the shogunate’s threats of punishment against both individuals and the neighborhood leaders and watchmen who allowed an accidental fire to start. A more extreme manifestation appears in the hunt for arsonists. During a violent crackdown on arson in 1722 and 1723, Shogun Yoshimune had 101 accused arsonists burned at the stake. Nearly half of this number were outcastes or drifters. Another 226 outcastes were banished to remote islands for the crime of arson [14]. This form of arbitrary justice kept the status hierarchy in place while at the same time making fire a containable event to be dealt with by punishment, rather

than a chronic dilemma of urban management. Among the common people, the head of a household where an accidental fire had occurred accepted responsibility for the damage or threat by going around to all neighbors with gifts and apologies. In fact, a fire produced extended rounds of gift-giving, as relationships of trust were shored up by acknowledgments of local responsibility and condolences to those affected. All of these practices sought to reestablish the social infrastructure on a secure footing. In attenuated form, they survive in Japanese communities today.

The Japanese public gave the leadership of the Tokyo Electric Company (Tepco) and the government of Prime Minister Kan Naoto a large portion of the blame for the Fukushima accident and for its mishandling. I will not here attempt to assess whether this was justified or unfair scapegoating. However, I think we can see it in general terms as part of the understanding of a disaster—any disaster—in a modern democratic society. It may be juxtaposed with Yoshimune's execution of accused arsonists, which stands as its autocratic counterpart. Tokugawa autocracy revealed its effectuality through arbitrary displays of the shogun's control over life and death, in this instance, by using execution by fire to punish accused arsonists, with a symmetry that matched the punishment to the alleged crime. In modern democratic society, we expect leadership to be manifested in demonstration of transparency in institutional decisions and personal acceptance of the burden for institutional failures. Both responses create legibility out of confusion by isolating individuals and emphasizing their malfeasance above other factors.

All acts of fixing individual or group responsibility can thus be seen as products of the impulse to make the disaster knowable and to regain control. Generally speaking, they have a conservative political effect, righting the ship of state and returning society to business as usual. By the same token, they hinder the ability to view the causes of the disaster systemically and to recognize the spectrum of social contradictions in which a broader perspective would compel us to situate it. The Tokugawa shogunate never took it upon itself to prevent conflagration and protect the welfare of all citizens, including the outcastes and others who suffered arbitrary justice, since such ideals conflicted with its model of a hierarchical society. Only a minority of those criticizing the Kan government and Tepco after 2011 asked whether part of the cause for the disaster might lie in the lifestyle they themselves had come to take for granted, which depended on power delivered from Fukushima.

7.2.5 Personal Risk Differs from Systemic Uncertainty

Whether or not the fire hazard in Edo presented an acceptable risk is a question that submits theoretically to ordinary judgment, since the risk can be calculated numerically, at least in approximate terms. Edo citizens would not have known these statistics themselves, but both folk transmission and published books would have taught them the litany of past disasters, and many would have seen casualties in fires during their own lifetime. Awareness of this kind of personal risk does not necessarily determine one's outlook on life as a whole, however. I suspect that more residents

of an economically depressed American city with a high homicide rate today have a bleak view of the future than did residents of Edo, at least in times of relative prosperity, as the 1810–1820s were reported to be, for example. Edo enjoyed social and political stability from the middle of the seventeenth century until the middle of the nineteenth century. Two hundred years of comparative security, when combined with the experience of frequent fires and subsequent reconstruction, allowed Edoites to hold the expectation after each fire that life would soon return to normal. For men in the building trades, a large fire signaled boom times, since there would be lots of work in the reconstruction and wages would rise. Since frequent demand made these men a large part of the work force, the increase in their wages had a spillover effect on other businesses too.

All of this sustained a view of periodic destruction and reconstruction as a cycle with positive effects as well as negative ones. The general understanding was that eruptions of natural violence released pent-up force and kept both nature and human society healthy by renewing them. Confucian philosophers as well as ordinary people believed that the economy followed the same principle. Just as the vital force known as *ki* (Chinese *qi*) flowed continuously in nature, money should be kept moving in the economy too, not allowed to stagnate and foster greed [15]. For this reason, many people viewed capital accumulation distrustfully. Nature, they believed, censured it.

One manifestation of this thinking can be seen in the outpouring of satirical woodblock prints during the two months after the massive Ansei earthquake, which destroyed much of the city and cost between four thousand and seven thousand lives in 1855. Based on a folk belief that earthquakes were caused by a giant catfish, the prints depicted catfish in a variety of guises: wreaking havoc, being subdued by gods or common people, even dressed as firemen saving people from the wreckage. Many of the prints lampooned the wealthy, whose shops and storehouses had collapsed, and depicted the celebratory mood among the carpenters and roofers who stood to profit. A few made oblique reference to the troubles of the Tokugawa regime, which was faced with a crisis precipitated by the recent arrival of U.S. gunboats demanding an opening of Japan's ports. The prints were soon banned [16, 20].

It appears improbable enough that a disaster of almost unprecedented scale could inspire comedy. No less surprising is the fact that many of the prints referred to the present with a phrase that meant “this blessed age,” or “this blessed reign” (*arigataki goyo*). The words probably mixed equal parts irony and genuine hope. Although Edo commoners were kept out of national politics, they knew that the political elite were in an unprecedented position of danger because of the American incursion. The earthquake disaster threatened to destabilize conditions further. Yet disasters had visited the city repeatedly in the past, and each time, the same cycle of destruction and renewal had been repeated. As in the past, the shogunate had town leaders draw up records of alms contributions, obligating rich and poor alike to give toward the welfare of all in rough proportion to their wealth. Rebuilding presaged one or two years of high wages. Formulaic reference to a “blessed reign” may also have reflected the hope that political stability would return along with prosperity [10, p. 235].

Modern nation-states claim to assure the safety and welfare of all citizens (which is not to say that any state truly guarantees the safety of citizens or distributes risk

equitably). Yet when a disaster—whether it be war, natural catastrophe, or industrial accident—throws into question the long-term viability of the system itself, revealing that the life we presently enjoy is probably unsustainable, we confront a kind of uncertainty that differs fundamentally from that engendered by a familiar hazard. This is true even when calculations can be made that indicate individual endangerment to be low in the short term. Thus awareness of uncertainty may have no correlation with quantifiable individual levels of risk.

7.2.6 Safety Decisions Are Political Decisions

This principle is discussed at length by Mary Douglas and Aaron Wildavsky in *Risk and Culture*. Stated as I have done here, it is something of a truism. Different people will be affected by a disaster differently, and society's resources to cope with hazards are finite, meaning political choices must inevitably be made. "Is it fair?" may be as important a question as "Is it safe?" But as Douglas and Wildavsky emphasize, we need to recognize not only that choices have to be made, but that particular political models underlie our objectives and priorities in coping with safety issues. The case of Edo becomes heuristically useful in this context because its founding political assumptions contrasted so sharply with the dominant assumptions today [4].

Although the particulars of economic and social policy fluctuated over the long period of Tokugawa rule and some members of the merchant bourgeoisie became rich far beyond their station, the shogunate remained consistent in maintaining the formal structure of status hierarchy. Land held by samurai, commoners, and religious institutions was segregated. The samurai estates that occupied seventy percent of the area of the city were considered to be granted temporarily by the regime, and not to be traded. In commoner districts, hereditary town elders bore responsibility for all in their districts, maintaining curfews and acting as local proxies for town magistrates. Landlords and their concierges had authority over their tenants approaching that of a parent under modern law. As mentioned earlier, collective punishment was occasionally used to remind all parties that responsibility accompanied authority.

This hierarchical ideal, rather than the goal of either universal welfare or prosperity, ran through the government handling of fire prevention and response. The historical exception proves the rule. In the 1730s, the unusually activist shogun Yoshimune (the same Yoshimune who had burned arsonists at the stake) sought to make the capital city more resistant to fire. He offered cash loans to samurai and relief from tax and corvée to commoners in order to tile their roofs and plaster their walls. Leaders of commoner districts petitioned the shogunate, complaining of prohibitive cost. Some textual evidence suggests that substantial fireproofing was achieved, but large conflagrations remained common in the following century, and when the modern regime conducted building surveys in the 1880s, roughly two thirds of the buildings in the city were still roofed in wood shingles, which Yoshimune's campaign had been

intended to eliminate.¹² The fireproofing program of the 1730's was part of a larger campaign for fiscal retrenchment aimed at returning an overextended ruling elite to solvency. In keeping with the shogunate's conception of economic management as fundamentally a matter of moral discipline, the same edicts that offered loans for fireproofing enjoined samurai to build smaller houses. The policy's aim was thus to stabilize economic and social conditions rather than to build a more secure environment for economic growth. When town elders protested, the regime did not attempt to enforce policy against their wishes. Such accommodation provided a sign of benevolent rule more consistent with Tokugawa political values than slum clearance for the sake of fireproofing would have been.

As a result, the same policy that kept Edo in constant danger also preserved class diversity in the commoners' districts. Obligated to look after their poor tenants and holding little prospect of improving their investment by building more expensive buildings, landlords preserved the status quo and generally sought their profits in commerce rather than rents. This arrangement appeared economically wasteful to political leaders under the new capitalist regime after 1868. In the 1870s and 1880s, when fireproofing policies were enforced in central Tokyo, the poor were forced out. Tokyo Mayor Matsuda Michiyuki regarded the expulsion frankly as desirable, writing in a letter to the Prime Minister in 1880 that "if those lacking the finances to respond to this system should leave the central districts of their own accord and settle in some other, less appealing district, I would think it only a natural outcome that there would be a turnover of rich and poor and the city would return to peace".¹³

The political objectives we would like to believe lie at the foundation of disaster policies today are democratic ones. Yet the priority on private property and capitalist growth, which in Japan began transforming policy abruptly after the collapse of the Tokugawa regime and then accompanied policies to demonstrate Japan's modernity to the Western powers, created inequities in some cases more severe than under the overtly hierarchical and autocratic Tokugawa regime. The longer history of the Fukushima region and of nuclear power in Japan makes this evident. As sociologist Kainuma Hiroshi has documented in detail, the municipality in Fukushima where the reactors were built in 1970 accepted the power company's proposal, which came with a generous package of economic incentives, in the hopes of salvaging a local economy that had depended on coal mines and had been devastated by the country's shift to imported oil. The region had suffered poverty for generations. In retrospect, we can see that Fukushima residents entered into a Faustian bargain. Yet just like the poor who were pushed out of central Tokyo to make way for fireproof structures, which would in turn show the imperial powers that Japan was building a prosperous modern nation, the residents of Fukushima were not simply embracing nuclear power "of their own accord". The region had been marginalized and exploited throughout Japan's modernization. In what Kainuma rightly describes as a "colonial policy", the politically powerless and vulnerable citizens of Fukushima were then targeted

¹²For statistics on roof materials, see [19].

¹³Matsuda Michiyuki, "Shōshitsu no ato kaoku seigen no gi ni tsuki ukagai," February 16, 1880, reprinted in *Tōkyō shishikō shigai hen 64* (Tōkyō shiyakusho, 1973), 609.

by state and industry to be sacrificed for the advancement of national industrial development [7].

7.3 Conclusion

Despite the gulf that separates the Japan of today from early nineteenth-century Edo, there are some broad commonalities in their responses to risk that suggest what may be human universals. First, both nineteenth-century Edoites and post-Fukushima Japanese act more on the basis of their perceptions of risk and their sense of control over their fates in a hazardous situation than on the basis of the statistical probability of coming to harm. For Edoites, large conflagrations posed a serious threat, but since most of the time they followed predictable patterns and well-trained residents had strategies of escape, they were treated as a spectator sport more often than a cause for panic. Since the meltdown at the Fukushima Daiichi nuclear plant in 2011, residents of a large region around the plant—and even some people overseas—have lived with the daily anxiety that nuclear radiation may be making them sick and shortening their lives. It doesn't matter that scientists' data suggest that this risk is lower than other risks for them; the fact that it is pervasive, invisible, unknowable, and seems to render them powerless prioritizes it psychologically above other risks.

Second, strong bonds among neighbors promote disaster preparedness as well as helping people cope with the effects of a disaster. Edoites practiced a vigilance against the risk of fire that would be impossible in most societies today. It was possible in Edo because of the high level of mutual obligation among commoner residents. Particularly in the countryside, Japanese communities still have a reputation for strong social solidarity. Yet as local, prefectural and national governments have offered different plans for the future of northeast Japan since 2011, deep divisions have emerged within towns in the affected regions over how to rebuild and what precautions to take against future disaster (and particularly what to do about nuclear power plants), showing that the mediation of state institutions and of party politics that characterizes modern democratic society has inevitably attenuated local bonds.

Third, in both the Tokugawa period and in the present day, Japanese have sought to place blame on particular actors after disasters, thereby giving the problem a human face and allowing existing political structures to appear capable of managing it. Rounding up and executing suspected arsonists and punishing householders who failed to extinguish a fire in their block offered a tangible form of control over the fire hazard without fundamentally altering its effects. Much the same may be true of pressure that led to the resignation of Prime Minister Kan Naoto following the 2011 disaster and to some extent even of the litigation against the Tokyo Electric company for its handling of the nuclear plant failure. Although a powerful political movement against nuclear power has emerged in Japan since 2011 (and indeed, former Prime Minister Kan himself is part of it), focus on assigning blame to particular individuals deflects attention away from asking what to do about the hazard-prone and unsus-

tainable society that most Japanese, like their counterparts in other economically advanced countries, have come to take for granted.

On the other hand, there are profound differences between Edo and present-day Japan, and recognizing the political nature of these differences points us to lessons that might be learned—and perhaps applied, at least piecemeal—from the case of flammable Edo. These differences stem ultimately from the basic political difference that unlike the modern state, the Tokugawa state was not seeking to facilitate capital accumulation. First, the Edo approach to building and habitation made what I have called the “technomass” of the city extremely light, which engendered greater flexibility and resilience. Because buildings could be put up in days and partially or wholly dismantled in minutes, and because furnishings were portable, the damage of a large fire in most cases had little long-term effect on the welfare of the population. Edoites accepted the day-to-day risk of having the roof swept from over their heads for long-term security from the specter of death or ruin in a greater disaster. Compared to the post-Fukushima present, one could also say that they were unknowingly also trading the possibility of greater prosperity for security from the unending anxiety created by a technical infrastructure whose threats are boundless, albeit ordinarily improbable.

Second, and also related to the scale and character of the urban infrastructure, the example of Edo shows that given the tools to build and manage their living environment, people can be quite resourceful at managing risk collectively, just as they are at maintaining the social bonds of community. Of course, community exercises in managing risk, such as fire drills, continue today in Japan and elsewhere. What differs is that Edo commoners understood that the entire responsibility to cope with the fire hazard fell to themselves and, at the same time, they possessed the means to cope. There was no superordinate body responsible for controlling fires, but within the limits of living in a fire-prone wooden city, the common people knew how to manage without outside assistance. Engaging people in a limited way in responding to the risks in their environment may be helpful, but the kind of collective coping that was the norm in Edo requires that the environment threatened is one fully controlled by its occupants.

Finally, the contrast between Edo and the present day brings into sharp relief the extent to which modern safety regimes are tied to the value modern societies have placed in private property and capitalist growth. We need not harbor romantic nostalgia for feudalism to recognize that the Tokugawa approach to fire risk had certain social merits as its incidental effects. Since social order was given priority over the preservation of buildings and material goods, there was no slum clearance—indeed, probably no large concentrated slums—and the city avoided economic class segregation. Nor did the protection of private property become a public trust with the potential to distort priorities in coping with hazards. In city building and in disaster management, policy makers and planners today might take hints from both of these features of a society that managed risk very differently than we do, but on its own terms managed it well.

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