



# Including the capacity for coping with surprises in post-disaster recovery Policies. Reflections on the experience of Tangshan, China<sup>1</sup>

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## **Abstract**

Surprises are characteristic features of many disasters that pose major challenges to theorists as well as practitioners. When surprises occur during the recovery stage of disasters, they can complicate efforts to reestablish order, by introducing new variables that demand attention from societies that are already hard-pressed to adjust to a problem-laden environment. The case of Tangshan, China stands as an example of an economic development surprise that permitted decision-makers greater than anticipated latitude to reset and attain post-disaster policy goals. In recent decades, other surprises, like sustainable development, global change, European political restructuring and the War on Terror, have had more complex impacts on disaster recovery policies and programs throughout the world. The current global credit crisis may yet be another disjunctive event in this context. Herein, it is argued that the management of surprises like these will become ever more salient in the 21<sup>st</sup> century during the recovery phase of disasters.

**Keywords:** disaster; recovery; Tangshan; risk; mitigation; natural hazards

## **Introduction**

The topics of disaster and surprise, though different, are conceptually linked. Many disasters are also surprises and many surprises often become disasters. It is therefore reasonable to expect that post-disaster recovery policies would be crafted, not just as responses to previous surprises but also in anticipation of future ones. Unfortunately, empirical evidence suggests that most public policies fall well short of incorporating both of these goals. Stricken communities typically react against their most recent disaster experience with a flurry of relief and reconstruction measures but only a few take anticipatory actions to prevent a repetition of the same experiences. Much has been written about the need for including disaster-mitigation among the elements of post-disaster recovery programs but even that kind of action may not be enough to buffer society against future surprises. It may be insufficient simply to learn from experience – it may also be necessary to prepare for events about which experience is lacking. In the opening years of the

<sup>1</sup> This paper is a revised and updated version of an earlier, longer paper published in a limited circulation conference report (Mitchell 2004).

21<sup>st</sup> century disastrous or potentially disastrous surprises of many kinds are crowding the public arena, among them the terrorist attacks of September 11, 2001, the South Asian tsunami (December 26, 2004), Hurricane Katrina (August 2005) and the global credit crisis (September–October 2008). In light of the complexities that these and other events have brought in their wake we must now begin to take a more expansive view of disaster policy-making. Just as governments are beginning to realize that the achievement of sustainability is a necessary criterion for judging the success of long-term political-economic development we must now begin to incorporate sensitivity to unprecedented contingencies into public decision-making. Nowhere is this more important than in the fashioning of more intelligent post-disaster recovery plans. The paper that follows recounts the experience of one Chinese city that has had the good fortune to profit from a surprise that came unbidden to aid the process of disaster recovery. Others may not be so fortunate but they can nonetheless gain from re-examining conventional conceptions of recovery.

### Conceptions of recovery

In developed countries, post-disaster recovery has been reconceived a number of times during the modern era. Early in the 20th century, recovery ceased to be a loosely organized gamble for survival and became instead a managed activity that could ensure the continuity of stricken communities. Later, what used to be the goal of recovery, namely a return to the *status quo ante*, became instead the attainment of a “new normalcy”. At about the same time, the view of recovery as a series of discrete but overlapping stages was replaced by the notion of recovery as a continuing opportunity-seeking process. (Mileti 1999, 229–30) More recently, the concept of “holistic disaster recovery” has emerged to become the reigning policy orthodoxy, including in New Zealand’s recently adopted recovery strategy.<sup>2</sup> (Monday 2002; Petterson 1999; New Zealand, Ministry of Civil Defence and Emergency Management 2004)

At each point along this evolutionary path the focus of recovery planning has shifted progressively from the compassable goal of retrieving a known world that *was*, toward the much more uncertain task of achieving a projected, predicted or imagined world that is *yet to be*. In other words recovery has been increasingly keyed to a designed future rather than a recovered past. Such an orientation places a very high premium on the ability of planners to incorporate the essentials of a satisfactory future living experience into recovery plans. It also requires that recovery specialists be able to manage unexpected contingencies as well as to strive for particular goals, like those of sustainable development. Let us see why this might be by examining the experience of Tangshan. A modest literature about the earthquake that struck this city in 1976, and its immediate aftermath, is available in English but not much about the larger recovery process has been published

2 New Zealand is embarking on a thoughtful and ambitious strategy for the recovery of communities devastated by various kinds of emergencies and disasters. Within this formulation recovery is viewed as one element in a comprehensive framework for managing disasters that also includes the mutually supportive activities of risk reduction, readiness and response. Recovery is further subdivided into five separate components that address the physical environment, infrastructure, psychosocial dimensions, attributes of community and the economy, respectively.

outside of China.<sup>3</sup> (Arnold 1993; Chen 2005; Grossi, del Re and Wang 2006; Jiaqi et al. 1996; Kang and Tang 1993; Li 1991; Wu, Wu, and Mao 1996; Xie 1994)

## Tangshan redux

At 3.42 a.m. on July 28, 1976, Tangshan, China - a mining and industrial city of about 1 million people, located approximately 100 miles east of Beijing in Hebei Province - was almost totally leveled by a 7.8 Richter scale earthquake.<sup>4</sup> Ninety percent (90%) of all residential buildings collapsed and there was considerable damage to old residential buildings in distant Beijing. (Gaubatz 1995) At least 242,000 people were killed and 164,000 severely injured.<sup>5</sup> Direct and indirect losses and costs of repair exceeded \$20 Billion (1976 prices). Now 32 years later the city has not only been repaired, rebuilt and replaced; it has been extensively reinvented, reengineered and repositioned among the high performing economic investment regions of the new China. What was once a secondary city in a poor developing country now bids for inclusion among the world's more advanced urban areas. How might this heady transition be explained?

First, a caveat is in order. The leaders of Tangshan speak of its recovery in glowing terms; similar opinions are widely shared by disaster researchers and hazard management professionals in China and beyond. However, this assessment is heavily indebted to government sources that have not yet been independently verified.<sup>6</sup> Criteria employed by official assessors focus on material and economic considerations but are silent about many other matters. Some evidence also points to an uneven and incomplete process of recovery. Nonetheless, the Tangshan experience is worthy of close examination.

To a significant degree Tangshan has become an advertisement for characteristic Chinese approaches to post-disaster recovery. These have relied on strong centralized government leadership by means of which stricken communities receive priority for public spending, tax forgiveness and the rapid marshalling of national resources for assistance. Explanations of the city's post-earthquake experience typically point to the key roles played by unstinting central government aid and the PLA (Peoples Liberation

3 One notable exception is Chen (2005).

4 Vital statistics for Tangshan can be confusing. The urbanized area of Tangshan (which is the focus of this paper) today covers about 197 square kilometers of territory. The larger Tangshan region includes 3 cities, 6 counties, 4 development zones, 2 farms and 1 administrative area. These are: Zunhua City, Fengnan City, Qian'an City, Fengrun County, Luanxian County, Laoting County, Tanghai County, Qianxi County, Yutian County, Lunan District, Lubei District, Kaiping District, Guye District, New District, Lutai Farm and Hangu Farm. Together they contain more than 7 million people and cover approximately thirteen-and-a-half thousand square kilometers.

5 Unofficial credible sources have placed the death toll even higher, at more than half a million and some suggest as many as 750,000 (Thornton 1982, 385; Hough and Bilham 2006, 248)

6 Given international skepticism about the accuracy of some official Chinese data on past disasters and economic performances (Liu 2002), such verification would be most valuable. A few groups of hazards professionals have visited Tangshan in the years since 1976 but none carried out separate inquiries that sought to test or confirm the validity of official reports. The present study is a preliminary overview assessment. It is based on: reports and informal gray literature not available outside China and mostly in Chinese; a close re-reading of existing publications on Tangshan's recovery; face-to-face meetings with local community leaders, and management professionals; and direct observations of some parts of the city over a two day period.

Army). The diligence of these two organizations, together with the efforts of local leaders and residents, is given credit for restoring Tangshan to its pre-disaster status within a decade.<sup>7</sup> Self-reliance is often invoked as an important corollary factor because the government of China was unwilling to accept international aid in support of Tangshan's recovery.<sup>8</sup> Perhaps because of these features, Tangshan has begun to attract attention from foreign disaster experts. A number of international conferences and study visits have been held in the city.<sup>9</sup> Most of these involve experts in seismology or other branches of the environmental sciences although one or two papers about the urban sustainability of Tangshan have also appeared. Signatures in the guest book maintained by the Earthquake Museum indicate that representatives from several American hazard management organizations – both voluntary and government-sponsored – have come to view the city. Tangshan has also been featured on Chinese Academy of Sciences and United Nations Web sites that showcase best practices of recovery.<sup>10</sup> Within the overall history of Tangshan's recovery several features are particularly noteworthy. These are highlighted in the next several sections.

### Disabled groups

One prominent aspect of Tangshan's experience is the amount of attention that was devoted to long-term medical care and rehabilitation of severely injured earthquake victims (e.g. amputees, paraplegics, quadriplegics, renal casualties).<sup>11</sup> At the time of the quake, it was generally accepted that earthquake victims in China who suffered major physical disabilities might live on for another 15 years at most. The fact that in 2004, 3,917 such victims still resided in 18 different long-term care hospitals after 28 years is evidence of much improved treatment procedures that were developed since the Tangshan quake. These hospitals now perform four main functions: (1) assist with recovery from physical injuries; (2) supply psychological therapies that are designed to permit victims to explain, accept and alleviate disabilities while also promoting self-confidence (Zhang and Zhang 1991); (3) secure gainful employment; and (4) assist victims to marry and form

- 7 A welcome arch that spans the main access highway reports both the city's affinity with the PLA and its status as a beacon of recovery.
- 8 It is important to point out that there is another side to the Tangshan disaster story. Not only is it possible that loss of life was very much heavier than officially reported, critics have claimed that the emphasis on self-help was really a pretext for keeping secret or covering up details about poor disaster preparedness and inept initial responses. Some have even suggested that the earthquake sealed the fate of Mao's regime or symbolized the end of its policies.
- 9 For example: First meeting of the Asian Seismological Commission, International Association of Seismology and Physics of the Earth's Interior, Tangshan, China, August 1–3, 1996: <http://www.iaspei.org/annual%20reports/annual98.html>; United Nations Global Programme for the Integration of Public Administration and the Science of Disasters, International Conference, Beijing, China, January 20–28, 1997 <http://www.globalwatch.org/ungp/confer.htm>; Workshop on Urban Development and Disaster Planning in Tianjin, November 13 and 14, 2001 attended by members of Earthquake Engineering Research Institute based in New Zealand: <http://www-megacities.physik.uni-karlsruhe.de/www-mega/downloads/Tianjin2001Report.pdf>
- 10 See <http://www.kepu.com.cn/english/quake/tangshan/> and <http://www.globalwatch.org/ungp/qinglong.htm#whatsnew>
- 11 This section is based on interviews with the Director, staff and patients of the Tangshan Recovery Hospital for Disabled People (May 21, 2004).

new families. Hospital staff and city leaders have sought to integrate the disabled survivors into the life of the recovering city and to take advantage of their experience to inform others about the earthquake and its impacts. For example, patients interact with youthful visitors (i.e. Young Volunteers program) on a routine basis and also write articles for local newspapers and magazines. They are encouraged to spend as much time out of the hospitals as possible, including overnight trips to the homes of local citizens. When they were younger, the disabled survivors formed a traveling basketball team that participated in tournaments as far away as Hong Kong. To some extent it might be said that this subset of survivors are regarded as “heroes” of Tangshan.

### The public policy legacy of survivors

A second noteworthy aspect of recovery in Tangshan is the continuing role of the earthquake experience in public policymaking as expressed through the concerns of its surviving victims. Local officials speak approvingly of a “moral marriage” that exists between the pre- and post-earthquake residents. By this they mean a sense of responsibility for the *collective* welfare that transcends those who suffered from the disaster and those who did not.<sup>12</sup> Though not detectably connected with self-conscious ideas about sustainability, the language and thinking here are strongly reminiscent of the discourse about trans-generational equity that is an important component of sustainable development philosophy.<sup>13</sup> However population dynamics clearly complicate this process because earthquake survivors – who are freighted with memories of the event as well as anxieties about repetitions – are rapidly becoming a decreasing minority of Tangshan’s contemporary population. Although no reliable figures are available to substantiate this conclusion, there is plenty of supporting evidence. For example, a sample of ten middle-aged local government officials in Tangshan included only one who had experienced the earthquake at first hand. When it is realized just how demographically different is today’s population from the pre-earthquake one, the task of rendering equity and justice to the survivors of Tangshan becomes formidably complex.

Not only did the city lose between one quarter and one half of its original residents, it also received a large post-quake influx of migrants, added more numbers through natural increase of the survivors and lost others who died or moved elsewhere in the years since 1976. It seems likely that earthquake survivors probably account for no more than 10-20% of today’s population; while people are living longer, with each passing year that proportion shrinks.

Tangshan raises a variety of thorny questions about the role of victims and survivors in long-term recovery. Some of these are interwoven with considerations of demography, others with differences between the roles of individuals and groups as defined by different cultures, and yet others with the relationship between recovery and sustainable development. For example, in constructing and executing recovery strategies how much weight

12 Matters of individual preference and choice are much less salient in Tangshan. Some Chinese colleagues attribute this to long-standing cultural traditions that favor the ascendancy of group identity and strengthen tendencies toward consensus-seeking in public decision-making. The persistence of these traditions in the face of economic modernization is an open question.

13 The achievement of sustainable development has recently been included in statements of general planning goals.

should be attached to the concerns of victims/survivors versus other stakeholders? Should the weight that is attached to victim/survivor prerogatives change as their numbers decline over time?

## Physical reconstruction and redevelopment

Judged by the condition of its contemporary urban fabric Tangshan might well serve as a model of what can be accomplished by the introduction of appropriate architecture, engineering and physical planning in other disaster-stricken communities.

Only a few clues about the events of 1976 remain on the landscape. A handful of destroyed buildings have been carefully preserved for posterity. A soaring earthquake commemoration monument is a prominent feature of the downtown skyline and a nearby earthquake museum documents both the event and an official version of the region's recovery experience. The story that is told therein is relentlessly positive. Walls are covered with photographs of exemplary buildings and other facilities that have sprung up since 1976.<sup>14</sup> Tables and graphs portray upward accelerating trends in population, infrastructure improvements, public services, investment, production, earnings and profits. Every significant redevelopment target seems to have been reached well ahead of schedule, whereupon it was re-set at a much higher level, only to be outpaced and surpassed again and again.<sup>15</sup> Nor is there much worry about a recurrence of acute disaster. City leaders are keen to reinforce the notion that earthquakes are no longer a major problem because mitigation has been a priority during the recovery process. A remote sensing-based seismic monitoring network with 26 data points has been established; 44 projects involving other indicators (e.g. water levels, animal behavior) are under way; 78 civilians have been trained to conduct additional observations and report them to emergency management teams; a large area affected by subsidence has been converted into a lake-filled metropolitan park, and anti-seismic design features have been incorporated into the rebuilt environment. From the perspective of today's Vice Mayor, Tangshan's most pressing contemporary environmental problem is not acute geological hazard but a chronic shortage of fresh water.<sup>16</sup> Acquisition of well-provisioned buildings and infrastructure was made possible by systematic recovery planning. Much of the period between 1976 and 1986 was devoted to physical reconstruction. This occurred in five stages. First, a Master Plan was formulated, heavy equipment was purchased and industrial plants were established to produce reconstruction materials. Second, the process of debris clearance and rebuilding was begun in the outskirts of the city and progressively extended inwards towards the downtown center. Third, the reconstruction of underground facilities (i.e. infrastructure)

14 No photography is permitted inside the museum.

15 For example, by 1994 targets for the 1994-96 master plan were exceeded and a new plan was devised to accommodate projected growth between then and 2010. Yet in 2002 the 2010 targets had been surpassed so yet another plan has been formulated for the period through to 2020. See (Liu, 2002) for a different assessment.

16 Tangshan's water scarcity problems are a function of four major factors: (1) diminished rainfall in this part of China; (2) rapid expansion of water demands among the region's burgeoning industries; (3) restrictions on the use of underground aquifers; and (4) priority access to available water for Tianjin – one of four Chinese cities that are administered by the national government and given preferential treatment in the allocation of resources for development.

was given priority over the replacement of buildings. Fourth, selected pilot projects were undertaken to gain knowledge of reconstruction challenges and to work out procedures for achieving appropriate rebuilding standards. Fifth, once general rebuilding began, priority was given to the construction of housing for the city's vast displaced population. Each year approximately 60% of the reconstructed area was devoted to residential buildings. Throughout the entire process buildings were strengthened against future earthquakes using a "three cuts" ranking system which gave priority to: regions of highest risk; institutions of greatest importance to the community; and structures that had the potential for greatest loss of life. (Ye 2002)

## **Economic recovery**

The amount of attention that was paid to economic revival sets Tangshan apart from most recovering cities elsewhere. Here post-earthquake recovery was not simply a bricks-and-mortar restoration project. Much effort was devoted to ensuring the economic well-being of the recovering city. Nor was economic development simply just another goal in a general program of recovery. Instead economic rejuvenation was singled out for special attention. For example, by means of a deliberative decision-support mechanism known as the "analytical hierarchy process method", two of the four criteria used to select and rank recovery projects in Tangshan emphasized national and regional economic development goals. (Ye 2002)

After reconstruction was completed (c. 1986), emphasis shifted to securing a prominent place for Tangshan in the national – and then the global – economic system.

Towards this end the city sought to capitalize on its legacy as the "cradle of China's modern industrialization" by rejuvenating old industrial facilities (steel; railway rolling stock; chemicals, ceramics; cement) and initiating new ones (e.g. Asia's largest industrial salt works; shallow and deep-water port facilities on the nearby Gulf of Bohai 40 miles away.) The results have exceeded all expectations: Tangshan's urban population has grown to around 1.7 million; it is graced with wide modern streets, attractive green spaces, a mixture of two, six and fifteen storey residential and commercial buildings, planned unit developments, and reinvigorated industries; the urban area is criss-crossed by 180 miles of high-speed limited access highways; a new export-oriented economy has grown up; and the rebuilt metropolis ranks well up the list of China's top fifty most vibrant urban economies. (Anon 2002)

One might argue about the degree to which Tangshan's post-earthquake economic vitality is a tribute to skillful recovery planning or simply a fortuitous turn of events connected with economic globalization (see below) but there is no denying the favorable outcome. In either case, Tangshan's attention to issues of economic recovery presents a striking contrast to the experience of Kobe, Japan after the 1995 Kanto earthquake.

There liquefaction put many docks and offloading facilities out of action for more than two years during a period of intense competition among East Asian ports and a major economic recession in Japan. Kobe has never recovered its status as a leading global port and analysts of the city's experience suggest that lack of attention to the economic dimensions of recovery contributed significantly to the port's relative decline. (Hayashi 2003)

## Dissenting murmurs

Clearly, much has gone right with the recovery of Tangshan. However, the process of recovery and its present outcome are not without their critics. As recounted by Ye (2003) and Ye and Okada (2002), too much effort was devoted to the construction of temporary shelters that were not popular with residents and ultimately had to be torn down to make way for permanent homes. Housing allocation systems did not take account of the varying composition of survivors' households. Ambitious redevelopment plans called for major land use changes that resulted in wholesale population relocations and widespread public discontent because long distances often separated residents from their preferred schools, hospitals and friends. External analysts also criticized the absence of a distinguishable city center and Tangshan's lack of other urbane refinements. (Kogel 2003) Partly in response to these criticisms and in anticipation of a major expansion over the next few years, urban planning advice has recently been sought from other countries.<sup>17</sup> An informal canvas of best architecture and design practices that may be suitable for emulation in new neighborhoods of Tangshan has also begun. (Kogel 2003) Finally, the absence of publicly available alternatives to the governmental interpretation of Tangshan's recovery stands in contrast to practices elsewhere, notably unofficial portrayals of disaster and recovery sponsored by private non-profit organizations, friends and relatives of disaster victims, and researchers who hold "revisionist" views. (Maruyama 1996; Steinberg 2002) In places like Minamata, Japan such alternative viewpoints have had a leavening influence on public discourse and have prompted plans for recovery that contrast with the official ones.

## The relevance of Tangshan for improving recovery policies

How does Tangshan's apparently successful experience with post-disaster recovery inform the evolving contemporary debate about reforming disaster policy in Europe, North America and elsewhere? More specifically, does it augur well for the new conception of holistic disaster recovery that is coming into effect in some places? At first glance a strong affirmative answer seems justified. Components of recovery that were paid attention to in Tangshan are much the same as those in holistic recovery programs adopted elsewhere (e.g. New Zealand). In Tangshan, reconstruction of the physical environment was an early priority that initially focused on buildings, infrastructure and other landscape features (e.g. vegetation, parks, vehicular circulation systems) but now shows signs of addressing issues of livability in the form of community needs for a more dynamic and focused downtown as well as more fully serviced residential neighborhoods. The psychosocial concerns of earthquake victims have surely received priority in Tangshan although the extent to which newcomers since 1976 (i.e. the great majority of contemporary residents) might harbor earthquake-related fears does not seem to have been queried. The "moral marriage" between pre- and post- earthquake populations also appears to have the

17 On the other hand it is clear that aspects of the new Tangshan have met with approval from planning and development experts. The city received recognition from UN-Habitat and was placed on its Honor Roll of outstanding communities.



effect of keeping seismic risks in the public eye and perhaps of increasing support for hazard mitigation. Certainly, improvements of risk reduction, disaster readiness and emergency response are all manifest in Tangshan whether in the form of earthquake monitoring networks, anti-seismic building controls or a well-designed emergency management system. Finally the salience of economic recovery planning in Tangshan – and its apparent success – speak forcefully in support of including economic considerations among those that should receive high priority in the formulation of recovery plans.

Although “environment” and “community” are perhaps differently defined and interpreted in China than in many western societies both also received attention from planners of Tangshan’s recovery. To a far greater degree than most parts of the earth, the landscape of northeast China is a human construction (Elvin 2004), so the creation of formal open spaces, parks, green belts and other artifacts of humanity, loomed large on the environmental recovery agenda. Likewise, the notion of community may carry special connotations in China (see footnote 11 above). Even so, the community actions that were taken in Tangshan would be widely recognized outside China as displaying a concern for human collective wellbeing. This is reflected in a wide range of actions: the degree to which household connections to public utilities are used as an index of recovery; the care taken to design livable neighborhoods and the pride when they received international awards for good planning; the efforts expended to integrate disabled survivors into the larger society; and the “moral marriage” that guides long-term redevelopment plans and keeps mitigation goals on the agenda.

### **Tangshan’s surprise**

However, a number of factors that were not anticipated or taken into consideration by the recovery planners also contributed to Tangshan’s successful recovery. Chief among these is the socio-economic revolution that swept across China beginning with Deng Xiaoping’s administration in the 1980s and picking up additional steam after 1992. During this period a variant of market capitalism replaced state socialism and the PRC entered the global economy. (Lardy 1998) Economic growth rates began to accelerate and the nature of industrial enterprise altered dramatically. More recently these trends have continued at a furious pace.<sup>18</sup> Now, instead of being state enterprises, a majority of the 56 steel companies in the Tangshan area are privately funded. Both the nature of these changes and their timing were fortuitous. The earthquake occurred four years after President Nixon’s door-opening visit to China and about 6 weeks prior to the death of Chairman Mao Zedong. Tangshan’s recovery was able to benefit from both the strengths of the *ancien regime* and the new one. Under the tenets of centralized state socialism the restoration of the city’s industrial production was a high priority that attracted large amounts of central government resources during the period of physical reconstruction. (Chen et al. 1988) When capitalist-style market economics began to take hold in the 1980s, the city’s location and labor advantages as a base for new export-oriented mining and manufactur-

18 Figures published by the national government of China indicated annual increases of Gross Domestic Product in excess of 7% since 1997 and rates not much less during the early 1990s. Though many observers are skeptical of the magnitude of these claims (Liu, 2002), few would quarrel with the fact that there has been a marked acceleration in growth.

ing became obvious. Exploitation of these advantages added further heft to the economic boom as evidenced by the performance statistics showcased in the Earthquake Museum. The boom, in turn, helped speed the physical reconstruction of Tangshan as well as the provision of long-term medical and social aid to victims. But the boom was unanticipated by recovery planners who initially set rather modest economic targets for the city and subsequently raced to readjust their sights. In this case the context of recovery was redefined by a surprise that ensured a successful outcome. Without China's larger socio-economic transformation it is questionable that the second (post-physical reconstruction) phase of Tangshan's recovery would have proceeded either as fast or as successfully as it did or perhaps whether it would have occurred at all. As we shall see next, this is not the first time that hazard management and recovery plans have been jarred by similar surprises.

### **Other surprises and their effects on recovery policies**

In the sense that it used here the term “surprise” refers to an event or a process that re-set the terms of debate, policy-making and/or management with respect to natural hazards but was not on the radar of hazards professionals before it occurred. What follows is a mix of surprises that became evident as policy issues at different times during the past two decades. In addition to the Chinese economic revolution these include: global climate change; sustainable development; the political reorganization of Europe; and the War on Terror.

These are by no means the only broad-based surprises that helped to shape hazards policy since 1980; the Chernobyl and Bhopal technological disasters, the collapse of the Soviet Union, global pandemics (e.g. HIV-AIDS), emergent social movements (e.g. human rights, feminism) and the IT (information technology) revolution are among many others. Some analysts might link most of these together under the general heading of “globalization” factors but that term tends to mystify as much as to illuminate, especially by failing to recognize contrasts among the different transitions and transformations. I will argue that each surprise has tended to upset existing practices of hazard management in different ways. None were – and probably could not have been – predicted.

### **Sustainable Development: Reinforcement of broad, flexible, soft, slow-acting, transparent alternatives**

When it emerged into the public arena during the late 1980s the philosophy of sustainable development contrasted sharply with prevailing notions of economic and environmental policy. No longer would it be necessary to assume that economic growth and environmental protection are inherently opposed. Programs in support of both might be managed jointly to meet present goals without foreclosing on alternatives available to future generations. Sustainability was adopted as a principle by the United Nations and defined as a program of action in two global conferences – the World Conference on Environment and Development (Rio de Janeiro, 1992) and the World Summit on Sustainable Development (Johannesburg, 2002). Hazards researchers paid considerable attention to these new policy principles. For example, in the later 1990s they sought to develop a new strategic conception labeled “sustainable hazards mitigation”. In this formulation hazard mitigation programs are intended to achieve the goals of sustainable development. (Mileti 1999)

The reigning policy orthodoxy of disaster recovery planning – holistic disaster recovery – is an outgrowth of sustainable hazards mitigation. It is intended to “incorporate various aspects of a sustainable society... into all the decisions (that must be taken) during the recovery period.” (Natural Hazards Research and Applications Information Center 2001<sup>19</sup>). In this case the goals of sustainability include: creation of more livable communities, preservation of open space or wildlife habitat, enhancement of economic vitality, promotion of social equity, increasing public participation in decision-making and making provisions for future generations. Recovery measures that do not contribute to these goals are not encouraged. Clearly, sustainability philosophy has already had a significant impact on the formulation of hazard management programs – one that is shifting their locus away from short-term palliative measures like disaster relief payments and from structural engineering works that lack sufficient flexibility to adapt to changing relations between society and nature. In contrast, incentives and restrictions that affect land use and development, as well as behavioral adjustments like insurance, are favored. Presumably, in due course, holistic disaster recovery programs will also be affected. At this point it is too early to conduct post-assessments of such programs but there are some straws in the wind.

In seeking to bring recovery planning into line with sustainability principles, hazards managers have undoubtedly improved the likelihood of avoiding repetitions of past disasters. But they have not made the context of recovery planning much more predictable. This is so for two reasons. First, an unexamined and unresolved contradiction still remains at the center of holistic recovery and sustainable hazards mitigation generally, namely, how can immediately pressing issues of safety and security be reconciled with commitments to trans-generational ecological and economic sustainability? At least in the short run, a safe society is not necessarily sustainable and vice versa. Second, the degree to which “holistic” disaster recovery is truly all-inclusive is open to question. Much that is essential to the creation of a satisfactory living environment is missing from this conception.

### **Global Climate Change: Risks become riskier**

Policies for coping with floods, storms, droughts and other weather extremes are clearly being affected by the emerging scientific consensus that anthropogenic forcing of atmospheric carbon dioxide has been accelerating in recent decades. (Intergovernmental Panel on Climate Change 2002; McGuire, Mason and Kilburn 2002) Because of the likely connection between carbon accumulation, atmospheric heating, sea level rise and the availability of extra energy to fuel storms and other extreme weather processes, recovery strategists now must factor into their plans the prospect of progressively narrowing safety margins brought about by worsening physical risks. Perhaps the most dramatic example of what this might mean for recovery policies is provided by Tuvalu.

This small state is now considering abandoning existing policies for coping with extreme storms and floods in favor of permanent evacuation of the entire population to secure locations elsewhere. For Tuvalu, as for the Maldives, Kiribati and a number of other archipelagic coral atoll states in tropical latitudes, there is, as yet, no foolproof method for

19 See [http://www.colorado.edu/hazards/holistic\\_recovery/](http://www.colorado.edu/hazards/holistic_recovery/)

restraining rising sea levels that may bubble up from below their permeable foundations. It is extremely doubtful that the founders of Tuvalu or any of the similar states that emerged after World War II considered the possibility that the countries they created might be so short-lived. Here, in the space of a few years, post-disaster recovery has gone from being a policy that held out the promise of resuming familiar life ways and livelihood patterns after a period of adjustment, to an open-ended experiment with fundamental and permanent change.

Few places may experience such a sharp discontinuity in the meaning of recovery as Tuvalu but many must now reconsider recovery strategies because of projected climate changes. Even such a well-established city as New York is beginning to come to grips with what global climate change may mean for the future investment, development and hazard mitigation strategies that are a central element of any post-disaster recovery plan.

Now that global climate models are being downscaled to regional and metropolitan levels they are beginning to produce the kind of information that can redefine community level hazard mitigation and disaster recovery plans. The result will likely be a permanent shift in the riskiness of some places and a consequent resorting among the range of alternative adjustment measures.

### **Political restructuring in Europe: Catalyst of electronic information-based decision support systems**

The political reorganization of Europe began with the Treaty of Rome in the 1950s but the implications of this process for natural hazards and disaster recovery policy have only come to the fore in the past decade mostly as a consequence of the European Community's expansion from fifteen to twenty-seven states. Europe has been engaged in a project of integration that is changing both the mix of problems that are salient to governments at every level throughout Europe and the institutional means by which they might be addressed. As the European Union has expanded to the east and south it is incorporating countries whose long-term susceptibilities to floods, earthquakes, wildfires, droughts and other natural extremes are much larger than those of the original EU states. (European Environment Agency 1996; European Commission 2001) This change is encouraging the organization to reposition disasters on its policy agenda and to rethink existing procedures for managing such events (Mitchell 2003a).

New European-wide hazard management and disaster recovery strategies are being rushed to completion in an experiment that combines sub-global governance with the application of science, during a time when professional expertise is in flux and lay societies are in turmoil. The evolving outcome is a set of policies and programs in which electronic information (EI) technologies are assuming a pivotal role. The institutional expressions of these technologies include: information clearing houses, Internet sites, GIS and remote sensing systems, networked and digitized atlases, online conferencing, e-mail discussion groups, peer-to-peer messaging and real-time emergency management systems. (Anderson 2001) As innovations that did not already exist in most European countries, these policy instruments lack the problems of "harmonization" among different sets of national measures that bedevil the evolution of pan-European public policy. Although it is too early to be sure, it seems likely that one result will be to raise the salience of certain hazards (information-sensitive or -dependent) management devices and practices, most likely: risk and vulnerability mapping services; monitoring prediction, warning and evacuation systems; and education and training schemes for expert professionals. Like

other aspects of hazard management, disaster recovery policies will undoubtedly begin to reflect these changes.

## **The War on Terror: Narrowing the range of choice**

The terrorist attacks of September 11, 2001 marked a very sharp watershed in thinking about hazard and recovery issues of all kinds; though undoubtedly profound, their implications for this field are still not clear. In the USA they produced a marked narrowing of the range of policy and management alternatives. (Mitchell, 2003b) Crisis response, especially the role of threat detection and emergency management organizations (i.e. first responders) has risen to the top of the agenda, closely supported by new information technologies, specialized safety and communications equipment and other hardware innovations. There has been a turning away from thinking about vulnerability as a variable state that societies help to construct to the simpler notion of vulnerability as an intrinsic state of populations that are threatened by external risks. Mitigation,<sup>20</sup> which had been the new headline policy innovative of the Federal Emergency Management Agency, is now very much a secondary concern of policy managers in the Department of Homeland Security. Though lip service is paid to an “all hazards” policy that addresses natural, technological, biological and social threats, the preponderance of effort is directed towards issues of terrorism and state security.

In the midst of this transformation, recovery is being increasingly viewed through the lens of Manhattan’s experience with the World Trade Center site. This is a highly idiosyncratic case whose policy issues are far from being resolved. Among others they include: government responsibilities for economic and other losses that were previously covered by private insurance; the proper balance to be struck between remembrance and new beginnings, or between expiation and profit; or between business recovery and social recovery; the role of security technologies in the reconstructed city; contested visions of Manhattan’s future etc.

Many observers had hoped that the dire experience of hurricane Katrina (August 2005) would blunt or reverse the disaster policy trends that were set in motion after 9/11 (Mitchell, 2006). While there have been some important changes, including passage of the Post-Katrina Emergency Management Reform Act (2006) and adoption of a new National Response Framework (March 22, 2008), most changes are confined to improving emergency response. Although the first of these acts has established a recovery system and seeks to encourage reconstruction to disaster-resistant standards, issues of disaster recovery and mitigation still remain peripheral to the main thrust of federal policy.

## **The influence of surprise on recovery strategy: A summary of findings**

Each of the preceding five surprises has tended – and is tending – to push public policies for hazards and disaster recovery in particular directions. (Fig. 1) The transformation of China’s economy accelerated Tangshan’s recovery and may have made possible a

20 Measures that are designed to address underlying long-term causes of hazard rather than just their immediate visible symptoms.

level of recovery that would not otherwise have been attained. The emergence of global climate change as a policy issue boosted the salience of planning for an increasingly risky future. The political restructuring of Europe is reinforcing policy measures that place a premium on risk education and real-time electronic information based decision support systems. The advent of sustainable development philosophy has underscored the importance of long-range planning for recovery within the context of new designs for living as well as changed human values and behaviors. The War on Terror has brought emergency planning back to center stage and fed concerns about both the vulnerability of businesses and infrastructure systems to disruption and the capacity of society to resume operations.

The global economic credit crisis of September-October 2008 is the latest surprise that has emerged that has the potential to destabilize disaster recovery programs and other aspects of the disaster policy-making. It is too soon to tell exactly what the ramifications will be though they seem likely to be profound. For example, multilateral aid organizations like the World Bank and the United Nations Development Programme have come to regard the process of economic globalization as an engine for increasing wealth and reducing hazards in less developed countries. Inasmuch as parts of this engine are now in serious trouble, the linkage between wealth production and hazard reduction as a favored strategy for improving vulnerability in the face of potential disasters is apt to be rendered more problematic than heretofore.

Figure 1: SOME SURPRISES AND THEIR EFFECTS

TYPE	LOCUS	DATES	EFFECTS ON HAZARD POLICY
Economic Transformation	China	Post 1972, especially after 1980	Accelerates recovery
Sustainable Development	Global	Post 1987, especially after Rio Declaration and Agenda 21 (1992)	Increases salience of land use change and behavior change
Global Climate Change	Global	Post 1988, especially after Kyoto Protocol (1992)	Increases salience of physical risks
Political Re-structuring	Europe	Post 1951, especially after publication of <i>Agenda 2000</i> (1997)	Increases preferences for electronic decision-support systems
War on Terror	Sub-global to Global	Post 9/11/2001	Narrows range of choice and increases salience of emergency management

Taken together these surprises suggest an important principle for the design of disaster recovery policies and programs. Recovery cannot be thought of simply as a managed process that moves society towards a desired state; recovery is also likely to be affected by disjunctive changes most of which will be unconnected with factors that generate hazards and disasters. In a great many cases these changes will be unprecedented and pivotal for the success of the recovery strategy. Hence, it will be necessary for recovery planners and managers to hone their capacities for managing surprising contingencies as well as their skills for achieving sustainability goals. To paraphrase the American novelist F. Scott Fitzgerald, this is the test of a first rate intelligence – namely, "...to hold two op-

posed ideas in mind at the same time and still retain the ability to function”. This bifurcated task of seeking sustainability while managing the kinds of contingencies that cause us to rethink our assumptions about hazards and responses is the first reconceptualization of recovery that was referred to at the outset.

## Conclusions

Tangshan provides a useful test bed for examining the strengths and weaknesses of disaster recovery planning, including the state-of-the-art strategy of holistic disaster recovery that is now being incorporated into public policy in some countries. Tangshan’s experience underlines the fact that communities now routinely survive and recover from disasters – even the very worst of such events. Hence the emphasis of recovery planning is shifting away from recreating damaged places to creating communities that are “better” (in the sense of being more sustainable) than the ones that preceded them. This goal involves researchers, managers and public policy makers in the difficult art of anticipating the future and the circumstances that will govern public policies for years and decades to come.

In Tangshan’s case, assessments of what would be necessary to create a safe and desirable community focused mainly on physical and economic recovery, long-term care of survivors, the mitigation of earthquake risks and certain aspirations for improved environmental quality. However, it would be rash to assume that what happened in Tangshan was purely the result of a well-conceived recovery strategy. The surprise that is the PRC’s economic miracle was the equivalent of the invisible elephant in the room. When the recovery plans were formulated there was no thought that Tangshan would be able to achieve the kind of economic renaissance it has subsequently experienced. In the same way, few recovery experts expected that the climate change debate, or the political reorganization of Europe or the War on Terror would have such diverse and dramatic effects on planning for recovery from future disasters. But, like the emergence of discourse on sustainable development, they and other surprises have variously jarred the trajectories of change that were in progress. We now design recovery policies differently because of them. Clearly, the post-disaster era is freighted with surprise. Hence, a policy that is keyed to the targets of sustainability, as that term is currently understood, will undoubtedly have to be changed – not once but probably several times and often in different directions - before the recovery process ends. Therefore it will be essential not to forget that the management of crises and contingencies will continue to be a high priority task, all the more so because many of these events will be unprecedented and not susceptible to information-based management policies that rely heavily on historic experience.

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