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Open Space Innovation in Earthquake Affected Cities

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<http://dx.doi.org/10.5772/55465>

1. Introduction

‘One of the best ways to understand a system is to disturb it.’ [1]

1.1. Resilience

There are two types of resilience: engineering resilience, and ecological resilience. [2] Engineering resilience is drawn from environmental sciences where the resistance to disturbance and rate of return to an optimal equilibrium is paramount. It is predicated on understanding the componentry of a system, the universal applicability of resilience principles, and its ‘efficiency, constancy and predictability’ [3] – all attributes at the core of engineers’ briefs for fail-safe design.

Ecological resilience (ex ecological sciences) is about the interrelatedness of a system’s components and forces; how a system can undergo change and still retain function and structure; how it can self-organize; and how it can increase the capacity for learning and adaptation. [4] Evolution exemplifies ecological resilience: it is a force (within a system) that uses random mutations of components (of a system) to lasting advantage. But it is hard to predict how it will work. The characteristics of ecological resilience are immeasurable, different at different scales, dependent on persistence, change and unpredictability, balanced by multiple equilibria, and accepting of experimentation, knowing that it is safe to fail. These characteristics may not always be apparent, but will probably surface when there is a disturbance, when there is a need to adapt. [5] Nature tells us, paradoxically, that it is perhaps a mistake to try too hard to avoid shocks; that stability lets risk accumulate without providing capability or capacity to deal with disaster; and that volatility actually keeps things manageable [6].

In the wake of apocalyptic disturbances, such as hurricanes, floods and earthquakes, the concept of resilience has penetrated recent urbanism theory. But which type of resilience?

Engineering resilience, one would think, should have a stranglehold on urban design. The environment of the city – the makeup of the entire field of the city including its landscape, its infrastructure and its buildings – is the componentry of the urban system that needs to ‘bounce back’ quickly and efficiently to facilitate recovery after a disturbance. It is the focus of engineers, planners and city makers as they piece together recovery.

Yet a city’s contextual interrelationships are often the result of its non-linear processes [7]. The nested but discontinuous scales of the building plot, the street block, the neighbourhood and the region [8] demonstrate that a city’s morphology is structured like an ecological system. Furthermore, systems-based urbanist theories share ecological sciences’ resilience concepts of diversity, modularity, variability and innovation. [9] Hence, we can examine a city’s recovery after disturbance in terms of its ecological resilience, in which the agents of adaptation would be urban designers, institutions / government and, more often, community driven by a changing social, cultural, political, economic and environmental contexts.

After a disturbance in nature, competitive forces are at large, creating tensions between the pre-existing trying to re-establish; the aspirants who want to do better; and competition who invite innovation and change, often through experimentation. Does the same happen in a city? How do the agents of adaptation in a city – the government, the urban designers, the community – know how, where and at what scale they can innovate? What is innovation in urban design?

1.2. Innovation

Innovation, whose etymology comes from the Latin word meaning to change, is bilateral. It entails something ‘new’, and it entails systematic implementation. The ‘new’ may be new needs, but it may also be ‘old’ needs that are met in ‘new’ ways. It can entail ‘new’ products, ‘new’ processes, ‘new’ values, or ‘new’ technologies. It differs from invention which refers more specifically to ideation: innovation is a change to a system.

The relationship between innovation and disturbance is at the core of commerce and economics literature. Joseph Schumpeter described the distinguishing trait of innovation as ‘creative destruction’, [10] in which the ‘new’ wipes out the ‘established’, calling it radical innovation. Henderson and Clark subsequently recognised slower moving, ‘incremental’ innovations where systems’ architecture may be enhanced rather than destroyed [11]. Tushman et al highlighted the important role of the consumer in innovation: a change to a market is a change to the system, even if it is not accompanied by a new technology [12]. Verganti points out that this process, which culminates in society accepting new ‘meanings’ of old technologies, is not necessarily led by consumer feedback, but is more often ‘design- driven’. [13] Research and development, often by and through design, is thus fundamental to innovation.

Innovation is also one of the hallmarks of a resilient ecological system. ‘A resilient system would subsidise experimentation – trying things in different ways – and offer help to those who are willing to change. Enabling innovation is an important way of creating space... Resilience thinking is about embracing change and disturbance rather than denying or constraining it’...When rigid connections and behaviours are broken ‘opportunities open up

and new resources are made available for growth....the warning bell to a resilient thinker is increasing preoccupation with process... a resilient approach would advocate initiating a disturbance or freeing things up to recapture the dynamics of a growth phase.' [14]

So what does urban design innovation look like? Sola de Morales suggests that the Carrer de Ferran, an urban intervention undertaken in the mid 19th century that widened and straightened a cross street in medieval Barcelona, was 'unquestionably the most innovative urban intervention in the old town.... It was innovative not just in form, but also in its ideological and political underpinnings ... [where] the new forms were the driving force of a new era, cultured, egalitarian and progressive, in contrast to the old feudal and aristocratic stratification.' [15] Not as radical as Haussmann's contemporary transformation of Paris, the one kilometre long Carrer de Ferran project (see figure 1) resulted in a modest nine metre street width, and took 40 years to implement. But it established a significance to the role of the city's cross axes which informed later moves such as Gran Via, Carrer Ample and Cerda's Eixample. Carrer de Ferran's innovation was that it set a new agenda for the city's form because the cross streets catalysed exponential growth. But perhaps more importantly Carrer de Ferran suggests that innovation in urban design is not just stylistic or typological, and does not have to be large scale or transformative, but is significant when it rethinks the political, social and civic context with broad catalysing implications. In urban design this is usually a slow process. 'It is very difficult to identify clearly the turning points in the history of the city.' [16]

Urban design has, of course, always heralded the importance of context, milieu and networks. So does the psychology of creative thinking and the management of knowledge creation. In psychology divergent thinking, the foundation of creativity and innovation, is thought to emanate when designers and artists draw together previously unconnected threads in their context to create the 'new'. [17] Management theory also recognises how new knowledge emerges from tacit or intuitive knowledge via externalisation and socialisation. [18] In urban design, more so than in other spatial design disciplines, social, political, historical and environmental contexts provide the basis for design solutions. But the parallels often stop there usually because urban design practice, unlike urban design theory, uses context objectively (like an engineering science) rather than symbiotically (like an ecology). [19] The problem is compounded by conservative governments and property owners who usually resist broad-scale changes to a city: the reality of institutional democracy and Benthamian utilitarianism tends to nullify risk and untie the link between creativity and its application in the public domain. Ann Forsyth [20] suggests the opportunity for urban design innovation may be best achieved through academic research because it is ideally placed to take time to explore data and technique, experiment, and ground ideas to remove risk. The large scale effect of Jane Jacobs' thesis on urban systems, [21] and the research into low impact urban ecology provide evidence of the innovative outcomes of research. But it does not have to be the exclusive domain of academics. If recovery could occur at a pace that will allow everyday research and experimentation to occur, a disturbance may be the ideal opportunity to investigate the potential for innovation, when the system is exposed, when new players are involved in adaptation, when cultural shifts occur in the relationships between people, governments and place, and a new kind of thinking alters the way contexts are interpreted.

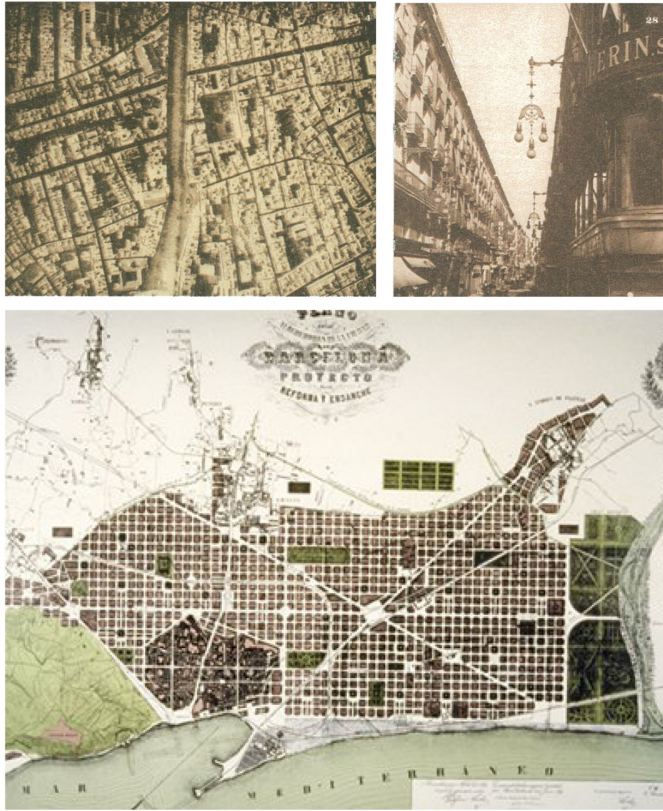


Figure 1. Carrer de Ferran, clockwise from top left: the new street cuts horizontally through the old city; street view; and the street forms the plumb line for the Cerda plan of Barcelona. (source: Sola de Morales, M. Ten Lessons on Barcelona. COAC: Barcelona; 2007.)

1.3. Innovation after disturbance

In the past, post-disaster adaptation has had divergent consequences. It has led to abandonment (Antigua in Guatemala, 1773) and irrevocable structural change (Lisbon, 1755) [22]. But broadscale change is usually the exception. Having experienced numerous tremors in the nineteenth century and becoming adept at recovery, San Francisco rebuilt the city without changing its street pattern after the major 1906 earthquake. After the Great Kanto Earthquake of 1923, despite authorities' unusually ambitious plans [23], the Japanese citizens wanted stability and relief and strongly opposed major changes to the urban structure. The desire to quickly rebuild their lives promoted rapid rebuilding of the city according to traditional protocols [24]. A similar scenario has arisen after the Christchurch earthquakes in 2010 and 2011, where the seemingly 'safe' option of building back what was there before is an accepted objective in recovery management. The community reiterates, just get 'back to normal'. There

are Freudian parallels: loss leads to grieving which ends when the mourner accepts a substitute for what was lost. [25] The collective memory of the citizenry errs towards a replacement for the known, rather than experimenting for the new.

But building back does not necessarily tap into the latencies in a system that an earthquake exposes. The Government's focus in Christchurch on like-for-like replacement of engineered structures (roads etc.) with some improvements – also known as 'betterment' – is a risk averse strategy, built from the remit of engineering resilience. [26] In an interesting development, Christchurch's Port Hills' communities want to rethink the irretrievably lost recreational amenity – not just the infrastructure of transport and utility services, but also the infrastructure of landscape - which was what attracted people there in the first place (see figure 2). The loss of natural and cultural assets has elevated the government-community conflict over what the map of infrastructural recovery includes and looks like. The government wants to just rebuild the roads and utility services; the community wants something that was not there before: a new pathway along the coast that might cement the new-found social capital, might foster the diversity of lost recreation facilities, and might provide an 'essential' redundancy - an access route for when the only main road is blocked by landfall. It is an innovation with the potential to create a new typology of pathways across the city, with far reaching impact on health, culture and environment. But it is the inherent uncertainty of qualitative outcome, its experimental nature that deters Government. Therein lies the paradox of ecological resilience: it needs to be capable of failure to succeed.

Can we be sure that change is productive? As an experiment, is it not subject to failure? In a more radical case Tangshan in China, after its 1985 earthquake, reformatted their urban structure in accordance with the then-current (but now-outdated) recovery planning mantra that spreads the components of settlement far enough apart to minimise the impact of a disaster. Institutionally it seems sound, but it left no options for the diversity that urbanism theorists [27] champion. Not surprisingly, problems have arisen because the change was too one-dimensional and predictable. It's hard for Tangshan to reverse this: 'the wide streets, low rise buildings and lack of an identifiable centre of a post-earthquake reconstruction have left it somewhat lacking in what some have called "urbane refinements" [28]. Such an approach to dispersed-ness is not really palatable in modern urban theory as humanity faces environmental issues of potential resource depletion, increased catastrophes [29] and inexorable population growth [30]. Can we experiment without creating Tangshan's irreversible problems?

1.4. Clues

Scale may provide a clue. Innovation is obviously less risky when experiments occur on the small scale as opposed to the neighbourhood scale or the regional scale. But we are concerned here with urban design, and as scale gets broader government traditionally has an increasingly influential role as the agent of adaptation unless, of course, there is competition from community. If, at the broadest scale, risk-averse economics dominate, if community is sidelined, if the blanket approach of 'building back' or 'building back better' is politically adequate, and if fast-tracked formulaic change and mono-functional planning are preferred, the systems of



Figure 2. The collapse of Christchurch's Port Hills in the 2010/11, where fallen cliff faces have not only led to loss of property, but have also threatened access and recreation opportunities. There is now tension between community and government on the rebuilding of the road, pathways and other open space facilities (sources top: N. Jones; below: BeckerFraser Photos).

research and experimentation that are embedded in ecological resilience are unable to gain traction. To achieve ecological resilience at larger scales and buy time for design research, perhaps there needs to be a greater involvement by community in public space design, because the community has more time to explore options and understand their implications and meaning, more time to understand what is 'possible in a system'. [31] Not surprisingly ecological resilience theories place emphasis on society: the concepts of social capital and overlapping governance are important threads in social and urban theories of resilience [32].

Context provides another clue, especially the cultural context. Cultural context is invariably woven into the physical context of the city and its landscape. Cognitive forces such as the memory of an earthquake provide a re-reading of physical context and how it might change to satisfy the need for safety. The sweeping destruction may seldom effect structural innovation, but it will shift cultural perceptions of what is important and valued, which could affect the redesign of the spatial language of the urban fabric. So, if communities have a say in public space design, the ensuing change in cultural context will influence adaptation of urban fabric, initiating innovation in the meaning of public space and its role in the recovery process. Public space potentially could mean something 'new' after an earthquake.

This chapter discusses how innovation might, at appropriate points, be a catalyst for recovery, what influences it and what it contributes to the resilience of an urban system. By looking at case studies we are able to match community adaptation with urban morphological change and establish a basis for evaluation of a fine grained resilience. To do this we have looked at the newly constructed open spaces of Kobe after its 1995 earthquake, after it has 'recovered' (normally considered to be a 10 year period). [33] We highlight five urban parks that show how innovation operates at the urban and community scale as a key part of recovery. We review the way people adapt their land holdings, their attitudes to community and their activities in a city after a major disturbance.

2. Kobe's earthquake

2.1. Kobe's urban morphology pre 1995

In 1868, when the Meiji restoration opened Japan to international trade, Kobe was one of the key ports that facilitated Japan's transformation from commercialisation to industrialization [34]. The geomorphological transect of Rokko Mountains, lowlands and deepwater harbour all within close proximity had served a string of rice farming, fishing and merchant communities administered by the centralised nationalistic state of Japan's hierarchical shogunate. By the 1920s two of the most powerful steel fabricators in the world had appropriated most of the port for its plant. Institutional planning for urbanisation focused on industrial and transport infrastructure. But urban governance of built form and urban parks was poor. [35] As the non-rural population grew with factory employment, the rice paddy was adapted as the template of urban residential structure: the paddy fields were reclaimed for low-rise housing, often sold to multiple owners, with plots set out in a dense, finely-grained matrix accessed by a squared network of alleys; the raised edges of the paddy field formed a gridded city road network in

100 metre squares; in plan, the squares (cho) rotate with the topography to form terraces, once part of the paddy field system's hydrology, now the definition of neighbourhoods (see figure 3). Open space was located on the periphery or in conjunction with temples, and as such there was a lack of spatial diversity in the size of parks. There was no doubt a strong reverence for nature in the large urban parks, but many of the smaller urban parks 'increasingly in the hands of municipal bureaucrats, became hard-surfaced and functionalist, with cookie-cutter layouts and standardized equipment, and remained so for much of the twentieth century.' [36] They were rarely part of the housing pattern. Streets provided the main setting for community life and activity.

During WWII American bombs laid waste much of the city, but Japan modernised in a programmatically functional way: building highways and transport and industrial infrastructure. Private land units were unaffected, except when the land readjustment instruments juggled free holdings to make way for wider arterial roads or transport routes [37]. Modernisation was not deferential to the value of open space within the city: city planners focused on efficiencies of transport while few controls were exercised over private development. As a result, Kobe faced the 3rd millennium as a dense and vibrant city rich in street culture with a strong sense of identity afforded by its neighbourhood densities. Unlike the disappearing cities of Fordist modernism [38], Kobe's wartime disasters had primed the city for diversification when its industrial plant became uncompetitive in a bullish Asian economy. The earthquake of 1995 was a further catalyst for change.

2.2. Kobe post 1995

The earthquake caused significant damage to the infrastructure of transport, the port areas, and to the traditional housing areas. The government's response was typical engineering resilience - infrastructure was replaced as quickly as possible, upgraded with improvements to meet modern standards [39]. 'The object of recovery is to aid victims to get back to normal life...measures are conducted as swiftly and smoothly as possible' [40]. In some places Modernist practices such as streets widening, high rise buildings, and local parks of one hectare were introduced – a universal approach to urban planning without input from local culture. It appears that the government pursued recovery as a means of renewing fabric, without addressing change in community culture. Shin Nagata was a model. The streets and built form were all transformed to create a safe and accessible urban setting, where density was relocated vertically. But the change was not really innovation: more a reversion to globally established standards.

Modernisation did not coalesce altogether with Japanese culture. A grass roots planning movement called Machizukuri (community-building) emerged out of citizen participation and community organisation in the 1980s and a reaction to globalised modernism [41]. After Kobe's earthquake, community action galvanized because of the slow and somewhat inhumane response of the national government to the earthquake victims [42]. Machizukuri and government contested the urban landscape. Land readjustment, park design and street layouts all became areas of tension, where the community sought to address the lessons of the earthquake and experiment in the way they might shape their public spaces. Although some commentators

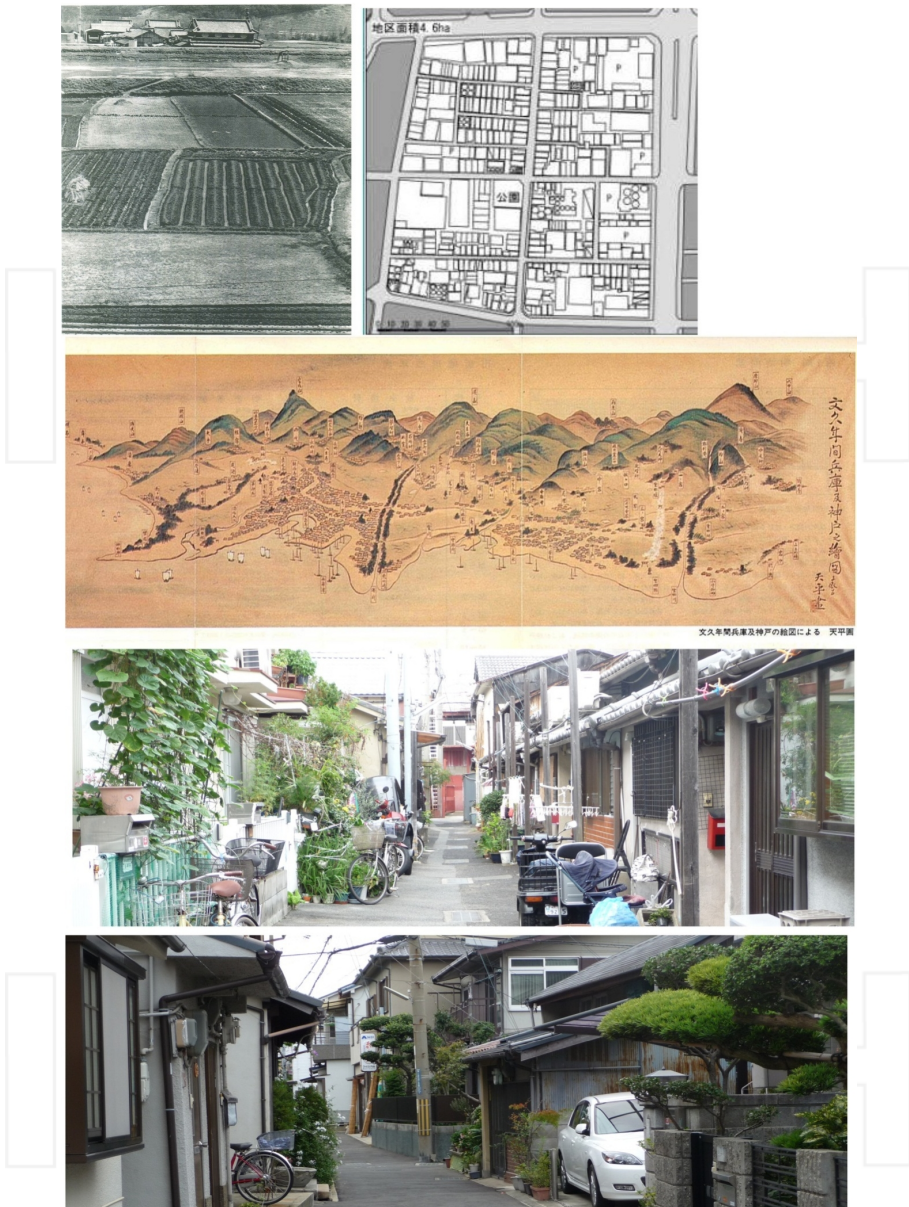


Figure 3. From top left: Rice paddies formed the basis of Kobe's street and block grid (Source: Ishihama et al. Nikon No Bi Vol 14 Kansai. Kokusai Joho Sha. (1968)); typical cho layout and street grid (Source: Miyasada Akira , cited in Yasui, E. Community vulnerability and Capacity in Post-Disaster Recovery: the cases of Mano and Mikura Neighbourhoods in the wake of the 1995 Kobe Earthquake. Unpublished PhD thesis. UBC. (2007)); aerial view of Kobe in 1861 (Source: Kobayashi, I. Kobe: 100 years of urban history. Unpublished paper. 2003.); typical street scenes in traditional housing (M. Bryant).

have dismissed Machizukuri as being characterised by 'long-drawn-out procedures' that 'generally operate only at very closely limited spatial reference levels' [43], some of the outcomes that have emanated in the aftermath show an innovation in the way open space has been researched and re-imagined by community will.

3. Five parks

There are five parks that seem to demonstrate various aspects of innovation in post-earthquake Kobe. All of the parks were slow to emerge, being built as part of the 'development restoration period', the final phase of recovery identified by Haas [44] and which Mileti [45] identified as a social process as well as a physical process. Each shows an approach to innovation that demonstrates an ecological resilience, where experimentation in form was driven not by institutional compliance, but by the changing community values that sought to integrate the disparate but important threads of Modernisation, social heritage, grass-roots politics and the memory of the disaster. The latter influence is pervasive: the earthquake became part of the consciousness of the community, a trigger for formal change. Not surprisingly, four out of five are bottom-up community-designed parks. The other is a government design commission which tests the social norms embodied in the formal idea of an urban park.

3.1. Rokko Kaze No Sate Koen

Traditional typologies of urban open spaces are either a place of respite, or a place of civic activity. The former are often dressed like an Arcadian idyll, the latter a fusion of simplicity and activity. Suburban parks often sit somewhere between these two, mixing both, without inventing the new. But can there be another typology?

Rokko Kaze No Sate Koen (see figure 4) is the ultimate community park, built in Rokko Michi, a dense urban area. The park was established after land readjustment established a one hectare space and government agreed to community involvement in the design. The land readjustment took six months; but the design of the park took seven years, mainly because there was so much interaction, discussion and research amongst the political atmosphere of an empowered community. The idea for the park embodied respite. Trees, vegetation and open space were paramount. The park also incorporated places for civic activity. A community centre was prominently positioned to frame an edge of the park; a baseball pitch was defined; and an outdoor gathering space and activity areas addressed needs of children and adults.

But what is interesting and innovative was that each of these somewhat traditional ideas was interpreted in a way that could only have come out of the experience of living through an earthquake. Play areas were dominated by water bodies, that had pumps and wells that anticipate the next disaster. Seats were designed to be adapted for cooking pits, or toilets. Tree species were selected for edible fruit. The park's form provided for recreation and civic activity: the design was a deliberate gesture that embodied intensity of activity throughout and a diversity of spaces in an otherwise everyday setting. But it also addressed the social need for the community to be self-sufficient for the next disturbance.

Is it a short lived over reaction to a crisis? Maybe, but, because it also tells the story of what these people experienced, why this place is significant, and how it serves as a physical memorial of the crisis that passed, it embodies the grieving process of the community. The park's innovation is not in the stylistic physical detail, but in how it has intensified the recreational and social programmes of a community in a small park. It is another way of thinking what a suburban park's role might be in Japan. The park needs to embody memories as well as Arcadian and civic interventions to make a place resilient. In doing so it liberates the neighbourhood of institutional overtones and allows adaptation to take place.



Figure 4. Rokko Kaze No Sate Koen: clockwise from top right: Aerial image of Rokko michi before the earthquake (Source: Geospatial Information Authority of Japan), showing location of future park; photo of plan of park; children playing beside water pump; children playing beside seat which has potential to act as toilet; vegetable gardens and community centre. (Photos by P. Allan)

3.2. Matsumoto

Suburban parks want to be all things to all people: to do this they need to be a size that can reflect the needs of its catchment of population and fulfil recreational / civic roles. What if they don't? What if they are just there to provide open space, and what if they are just there as a symbol of the neighbourhood and its legibility. The pocket parks in Matsumoto (see figure 5) assume this role, and they do it not by concentrating the essence of the neighbourhood in one place, but by creating 10 more or less identical parks in 10 more or less identical chome, in a necklace that threads its way across the neighbourhood.



Figure 5. Photo of maps of Matsumoto showing parks before and after in each of the chomes; image of one of the pocket parks (Photos by P.Allan).

Formally there is not much that distinguishes these parks. They each form an off-centre centerpiece to a modest chome – the 100m square Japanese street block. Each is within 50 metres of all the houses in its chome, and no more than 100metres from each other. Each park is tiny: 20m x 20m, and each has a gravel area, a few playground equipment pieces, a water pump and a clock. Placing each in the heart of the neighbourhood is relatively orthodox piece of urban planning, but they don't have the diversity to accommodate the broad range of needs of the community. Instead they just repeat themselves. Inefficient? Redundant? Yes, but these are some of the hallmarks of a resilient system.

The urban experiment is their size and proximity to each other. Institutional land readjustment urged this neighbourhood to adopt a large 1 hectare park, but the community pursued an idea that each chome wanted spatial structure to match the scale of their chome. So ten parks were created. The simple modularity of the system shows the importance of the neighbourhood of chome as an urban unit fundamental to Kobe's settlement. There are, of course, antecedents to this idea, not the least of which is embodied in Spanish colonization and their laws of the Indies, which some commentators say emanate from earthquakes and the need for accessible open space. [46] The integration of this idea in a modernist planning framework is extraordinary, because efficiencies are sacrificed to achieve a greater sense of legibility and ownership. The size of community is an important aspect often disregarded in urban planning which is preoccupied with a critical mass that creates efficiencies. Matsumoto represents another innovative approach to open space because it experiments with the size of parks rather than their formal or programmatic content.

And the clocks serve as a reminder of the bonds of the small community in times of disaster.

3.3. Minato No Mori

Can a downtown urban park be a community park? If there is no one living around a park, how does it become part of the everyday lives of people who know each other? How does it come part of their identity, their collective memory? And if it is surrounded by multistory intersecting motorways, doesn't it look like urban planning gone wrong? More often the prescription for the siting of urban parks entails natural beauty, lots of residents nearby, and a civic ambience.

Minato No Mori is an urban park that breaks the rules. It is a large urban parkland space, divorced from the harbour, badly connected to the city's business district and framed by motorways. Yet it is here, on disused railyards, that community driven by a newly found momentum of social capital (not government driven by mitigation of impact) resolved to create an oasis in the city's transport infrastructure, and in so doing challenged the monofunctional infrastructural systems that dominate urban planning.

The three hectare park (see figure 6) has a reasonably traditional structure: a large flexible centre dominated by a grass space, and an intense edge either programmed for community gardens and play, or planted with forest. In one area is a traditional physical memorial to the earthquake. In another are the defacto memorials: the community spaces that provide lifelines to the next event: a place for gathering and camping, an elevated area for viewing problems, water tanks and place for food security. It is framed not by well-proportioned buildings, as urban formula would suggest, but by spaghetti of an overhead road system.

The approach exemplifies diversity and its role in resilience in a number of ways. Firstly it shows that parkland can diversify monofunctional pieces of infrastructure, so as to say space under freeways is not wasted. It also shows the unorthodoxy that freeways are not necessarily alien scaled objects in an urban landscape, but rather a piece of topography that can be addressed and integrated. And finally it shows at the detailed scale the importance of diversity

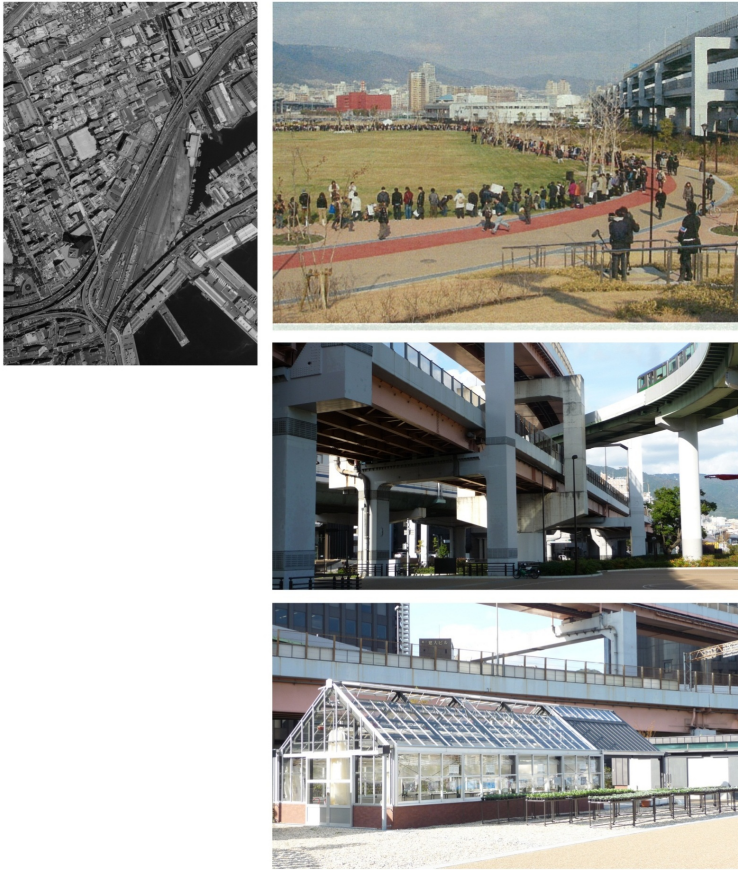


Figure 6. Minato No Mori framed by motorways, built on former railway land by the community. Aerial photo: Geo-spatial Information Authority of Japan. Top photo: Amakawa Yoshimi, Bottom photos: M.Bryant.

in park planning: spatial diversity in elements that drive different programs and also temporal diversity that recognises that the park can fulfil functions at different times.

But the need for diversity is not just what this place is about. It also shows a willingness to experiment in the city grid, to free up rigid ideas of monofunctional connections and allow for growth in new ways. In this way the park is more than a formal expression of diversity in urban design it is also an expansion of the potential for community to colonise the infrastructure of the city.

3.4. Komagabayashi cho 1 chome

Some places weather the impacts of earthquakes and continue to operate as before. But sometimes the impact of a disturbance warrants investigation to reveal the latencies that have



Figure 7. Aerial photo of cho pre earthquake; pavement signage and photo of pocket park established after earthquake destruction left vacant space. Aerial photo: Geospatial Information Authority of Japan. Photos P. Allan

not been exposed before. Some of the traditional residential areas of Shin-nagata were left intact by the earthquake, and after some repair to building stock the area more or less continued to operate as it had. No need to intervene? Perhaps not. But one of the legacies that the earthquake left was an understanding of why open space was important. It was something to be treasured. But there was no room for park in a traditional neighbourhood with multiple ownerships. The only open space in many of these traditional places was disused plots not much bigger than 400metres square, which generally felt 'unhealthy... unattractive... unsafe... insecure... inactive'. [47] The community in cho 1 chome rehabilitated their alleyways with signs for safety and developed a pocket park in one of the disused lots to amplify the qualities of living in a traditional neighbourhood place, and feeling safe (see figure 7).

The park was rehabilitated as simple community space, prepared for the next disaster. It had a water pump, a seat, some flat space and tree planting for shelter and shade. Compared to previous examples this is less overwhelming as a piece of innovation. But the minimal nature

of the transformation is the park's point of difference. The community-based designers left the traditional Japanese settlement pattern relatively untouched. The subtle interventions created beauty and the potential for recovery: a place that integrated community meeting areas and a pathway system that gave directions within a community to find safety. It shows that resilience is not so much embodied in changing form, but in changing community attitudes.

This project questions the hierarchical thinking of traditional post-earthquake recovery. It suggests that, even if an earthquake causes little physical destruction, and even if communities have limited resources, there may still be a significant psychological impact that encourages communities to change the physical fabric of their neighbourhoods in innovative ways and retain the unique alleyways and densities of their traditional settlement patterns.

3.5. Waterfront park

The final case study is not a community project. It is an institutional project, designed by one of Japan's great architects, Tadao Ando. The park shows qualities that are unusual for a waterfront: its formal expression is a series of garden-scaled rooms mostly screening the harbour view; its spatial language controls and frames the vast scenery rather than confronting it; and its programme is contemplation, achieved at a human scale, not at the scale of industrial waterfronts. The outcome is a sense of safety. In so doing Ando reinterprets Japanese culture in a globalized modern context.

Waterfront parks have been following a formula for the last 50 years when heavy industry has been forced out, containerization shipping has made ports more efficient and cities have sought to diversify. Kobe was undergoing this transformation prior to the earthquake, and the Waterfront Park was intended to be part of the gentrification of industrial space by drawing on the industrial or archaeological heritage. But an earthquake has a way of wiping out the heritage: needing to start anew, the *tableau rasa*. So how can a park cling to its context when the context has been erased?

Tadao Ando's Waterfront Park at HAT (see figure 8) is exemplar of rethinking spaces in parks using the historical context of Japan's garden culture [48]. It subdivides space for community ownership rather than as a grand gesture where one can see all. It does this formally by creating a series of park spaces – empty gardens separated by walls. The interconnected walls create a maze of connections, but also allow spaces for people to contemplate – not dissimilar to traditional Japanese gardens which embody Taoism. It abandons the idea that a park needs to be open with surveillance. The spaces in the park provide areas where people can gather but be apart. The tension between the need for gathering and privacy is summarized perfectly. In many ways this park is a memorial to that attitude and to the spirit of Kobe. In this way the park is an innovation not only in form but in reinventing the Japanese psyche in a modern setting.

4. Discussion

There are some important considerations from this collection of projects.



Figure 8. Ando's contemplative Waterfront Park, with 'community rooms'. Photos: P. Allan; aerial view from Jodidio, P. Ando: Complete Works. Hong Kong: Taschen. 2007

Firstly, a caveat: it may be too early and too subjective to say whether the experiments were an innovative-defining success that could add knowledge to the generic ideas of open space design. The projects are each intertwined with a specific community, a specific place and a specific spatial morphology, and so the innovations will take time before they germinate elsewhere, if at all.

Secondly there is clearly an innovation in process of park procurement that has occurred as a result of the earthquake. This process stemmed from the competitive and catalytic tension between the agents of adaptation; between the institutional planning agencies and the small scale designers of the Machizukuri. The competition was not just over control of the outcome, but over the process. While both government and community had a role in rebuilding urban fabric, the design of each park was hard fought by the community, and the outcome appears to be highly treasured. Furthermore, each park then took a long time to come to fruition, because they each took time to be researched, debated and explored at the micro scale of the community after the earthquake. Each of these projects became (perhaps unintentionally) experiments in the social processes of form making, where the social processes were more important and more innovative than the formal outcomes. This long and risky and unpredict-

able procurement process, precipitated by competition, was itself an innovation, a new way of producing public space.

Thirdly, and leading on from the above, the innovative processes led by the communities has generated an innovation in cultural contexts through spatial change. Importantly, the formal solutions are not necessarily novel: each seemed to take the typical model of the modern park – a non-Japanese urban model of the small park, the neighbourhood park and the urban park. What is interesting is that each park explored cognitive transformations in the idea of public space and what it offered as a place of safety, and as a place of memory. They each had a new social and political meaning. The most material form of these transformations, which have become apparent in the spatial language, is in the divergent ideas of intensity, repetition, diversity and redundancy. It appears that these principles are important qualities in urban design because they demonstrate a re-reading of the physical context and a shift in culture and thereby demonstrate capacity for ecological resilience.

5. Conclusion

This study lays down an important challenge for urban designers and government agencies working in recovery after disasters. Undoubtedly there will always be a need to patiently work in the interest of citizens in building back what existed prior to any disaster, to replace what was lost and to provide a stronger urban fabric, one with better engineering resilience. But pre-empting or excluding community involvement in the recovery process can actually make communities more vulnerable [49]. And avoiding risk at all costs will not strengthen communities against all possible disasters. Although ecological resilience attributes, like innovation, are unlikely to dominate recovery of urban fabric, they need to be addressed in some way, just as much as engineering resilience does.

Designers therefore need to play a strategic role, negotiating between community and government, while also leading research and experimentation. In this process designers can help find the best way to achieve outcomes for the community with design interventions that are tactical and yet responsive, and assist government with cost effectiveness and timeliness. Part of this approach will entail an understanding of a community's cultural context and how that may be influenced by spatial design. Spatial design by itself may have little meaning. But small scale experiments in public space can be developed in some sort of partnership with active communities to develop an acute understanding of how spatial design can positively affect cultural context and cognitive memory.

The ecological resilience approach is a good model for public space design because, even though it may entail a lot of design research, it suggests that interventions can be targeted and relatively minimal, generated from the 'bottom-up', with whatever is at hand. This kind of design is about adjusting, encouraging innovation and redundancies, making 'space', exploring new ways and relationships between community and place.

The Kobe examples provide a basis to build up a body of knowledge on how the process of adaptation after disturbances may galvanise innovation and reinforce ecological resilience.

The success of the outcomes may not be clear for some time: they may not be stylistically creative, and perhaps need even more research, but they may, instead of entrenching the status quo of the 'efficient', provide a basis for a new way of thinking about space that addresses the persistence of communities.

Acknowledgements

Knowledge of the development of the community parks in Kobe was developed from the personal conversations with Koboyashi Ikuo and Amakawa Yoshimi from Kobe's Community / Communication / Co-operative Space. The conversations were generously translated by Liz Maly. In the field in Kobe, Yasmin Bhattacharya greatly assisted with translation. Melanda Slemint provided valuable interpretations of Christchurch's Port Hills recovery.

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