

BRINGING RISK ASSESSMENT INTO URBAN PLANNING

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Abstract

The rapidly increasing costs of natural disaster response and the prospects of even larger natural disasters have gained government interest in the last half decade. The terrorism that destroyed the World Trade Centre on September 11, 2001 exacerbated government concern to move beyond response and recovery to mitigation. Planners will now need to address mitigation in many aspects of their work. This requires the planner to study a broad base of possible hazards and quantify the associated risks. In turn, this requires a new approach to looking at information resources and systems, and the planning and plan review process.

Introduction:

Urban communities experience a range of disasters that are due to natural or man made causes. The range and magnitude of such events have been increasing rapidly in the last decade (Newkirk, 2001). For example since 1996, Canada experienced three of its most devastating natural disasters: the 1996 Saguenay flood, the 1997 Red River flood, and the 1998 Ice Storms. Just these 3 events alone resulted in an estimated \$7.8 billion direct cost to governments, private and voluntary sectors (OCIPEP, 2002). This sum does not include any estimates for environmental impact or any indirect costs. The unprecedented act of terrorism on the World Trade Center on September 11, 2001, in which a number of Canadians died, demonstrated a degree of vulnerability to manmade disasters that transcended anything previously considered likely. This has added great urgency to the desire of the Canadian government to move forward with a National Disaster Mitigation Strategy. No doubt this initiative and the consultations being held with the provinces will lead to a requirement for urban areas to conduct risk assessment studies and to file plans to show how the urban area would respond to disasters and mitigate against them. Certainly it is worthwhile to identify the potential risks from natural disasters. However there are a number of other areas where urban risk assessment should be considered. Since planners are directly involved in development approvals, plans that define hazard lands, plans that provide community health, safety, and educational resources, it is important for them to become involved in risk and vulnerability analysis on a much broader bases than just those associated with disasters. We consider some of these here with the intention of beginning an agenda for bringing risk assessment into urban planning.

Context:

It can be argued that risk and vulnerability are naturally occurring components of everyday life. Risk is defined: "risk: *n.* chance or possibility of loss or bad consequence." And "vulnerable: *a.* that may be wounded or harmed, exposed to damage" (Oxford, 1994) Thus risk and vulnerability assessment is simply aimed at understanding possible negative outcomes. Of course it is desirable to take steps to reduce the possibilities and magnitudes of risk or vulnerability. But it may often be

impossible to reduce all or even a significant part of every risk. Whether risk reduction is partial or complete, it is called mitigation. "Mitigation - sustained actions to reduce or eliminate the long-term impacts and risks associated with natural and human-induced disasters." (OCIPEP, 2002) This means that urban areas need to develop a well documented understanding of the range of hazards that could face the community so that risk assessment can proceed. The definitions do not restrict the consideration to disasters. There are a number of examples of significant hazards that can be found in urban areas. For example, contaminated lands, run down or dilapidated areas, industrial areas, major transportation corridors, flood prone lands, and poor air quality may be just some of the hazards in a community. The public is aware of some of these hazards. There are increased views that urban areas are really not working well since there is often continual traffic grid lock, air quality so poor that small children and the elderly must stay indoors a number of times in the summer, and people are prohibited from swimming in the lakes due to pollution. This indicates that the public has an operational sense of hazards. Planners are being called upon to develop ways of reducing the risks associated with these and other hazards. This requires extensive analysis.

OCIPEP (2002) recognizes that Hazard Identification and Risk Assessment should be broad based. "To be effective, any measures to reduce the impact of probable disasters should be taken based on sound risk assessment and hazard identification. Conducting risk assessments can be complex, but they are an essential undertaking. Comprehensive approaches in this area involve historical research, data gathering and scientific estimations about hazard frequency, magnitude, damage potential, and vulnerability of potentially affected peoples and communities."

It is not sufficient to conduct risk assessments simply as background studies. Communities and political decision-makers must be made aware of risk levels and the possibilities of mitigating them. Ontario has achieved good success in some aspects of risk reduction in the area of flood hazards partially because the discussion of flood hazards and the formal mapping of flood plane lands has long been in the public domain. OCIPEP (2002) observes "A comparative study of Ontario and Michigan following a severe rainfall event in 1986 concluded that damage in Ontario, from the same storm, was less severe than in Michigan due to Ontario's policies that limited development in floodplains." Planners need to build community risk and vulnerability analysis into fundamental planning instruments. An obvious place to begin is with Official Plans.

Risk Considerations in Official Plans:

The Official Plan is an overall strategic document that lays out the context within which urban development, services, and activities will take place. Site plans and zoning bylaws must conform to the provisions of the Official Plan. This is also the place where the urban area's priorities can be clearly laid out. Thus, it is recommended that sections be added in each theme area of Official plans (e.g., housing, environment, industrial development, transportation, etc.) that sets out the known state of risks and vulnerabilities in those areas. The section would conclude with statements of objectives to mitigate (reduce) selected risks in specified ways. This process will require background studies and the development of risk assessment databases (Newkirk, 1993). A very important aspect of associating urban risk and vulnerability assessment reports in official plans is the fact that such plans are usually reviewed on a rolling 5-year basis. This would mean that the risk and vulnerability assessment and mitigation strategies would be reassessed on a regular cycle. Some risks are very theme specific. These should be subject to separate detailed reports. Examples discussed briefly here include Hazard Lands, Water Supply, and Industrial Development.

Risk Considerations in Identification of Hazard Lands

Hazard lands include those areas where there may be exposure to risk from natural or man-made activities. Natural hazard lands clearly include flood plane identification. The associated flood risk

mitigation strategies would also be stated. This provides an opportunity for planners to directly address the cumulative impacts of land development on the watershed as proposed by Newkirk (2000, 2001) or could also include plans for physical alterations to floodways, dams and reservoirs, etc. Similar broad-based studies of the implications of other natural hazards and associated development would also be included. For some regions this would include areas prone to earthquake, subsidence, landslides, etc. The evaluation of risks from abandoned industrial land might be included here until suitably decontaminated.

Risk Considerations in Water Supply

A safe and reliable municipal water supply is critical to community health, safety, and for economic development. A detailed discussion of a planning related approach to this area can be found in Newkirk (2002) It is proposed that a broad based risk analysis is required that expands beyond just an engineering approach to water systems. This includes consideration of source of supply protection, protection of bulk transmission rights of way, risk reduction in water treatment and distribution.

Risk Considerations in Industrial Development

Many planning departments are also directly involved with business and industrial development. Most planning statements regarding business and industrial development focus on strategies for expanding such developments and addressing the various servicing needs. Analysis of associated risks and the appropriate mitigation approaches need to be added to these industrial development strategies.

Summary:

The increasing interest in mitigating risks and vulnerability will require planners to become directly engaged in risk and vulnerability studies. These should factor into the development of regional planning databases (Newkirk, 1993). A broader based assessment of risks associated with storm water impacts of development (Newkirk, 1996, 1997, 1999b, 2000, 2001) should be brought into urban development planning. This will go some way toward helping planners to be more strategic in emergency mitigation and preparedness (Newkirk, 1999a), and will be essential if they are going to be able to assist their community participate in a National Disaster Mitigation Strategy (OCIEP, 2002)

References:

- Newkirk, Ross T., 1993. "Extending Geographic Information System for Risk Analysis and Management", *Journal of Contingencies and Crisis Management*. Vol. 1, No. 4. Pp. 203-206.
- Newkirk, Ross T., 1996. "Modeling Storm Water Risks of Alternative Planned Developments by Combining GIS and Hydrology", *The International Emergency Management and Engineering Conference*. Sophia Antipolis, FR.: Ecole De Mines de Paris. Pp. 153-164.
- Newkirk, Ross T., 1997. "Design Stage Modeling Requirements for Reducing Storm Water Quantity and Quality Risks of Urban Development", *The International Emergency Management Conference*. Copenhagen: Riso National Laboratory. Pp. 175-183.
- Newkirk, R. T., 1999a. "Emergency Mitigation and Preparedness: A Challenge for Municipal Planners." *The International Emergency Management Conference*. Delft, Netherlands: Delft University of Technology. Pp. 515-528.

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Newkirk, R. T., 1999b. "Reducing Downstream Storm Water Impacts Using Design Stage Modeling In Urban Development," *Environments*. Vol. 28, No. 1, pp. 65-74.

Newkirk, R. T., 2000. "Reducing Flood Disasters: The Need for Effective Local Planning," *The International Emergency Management Conference*. Washington: The George Washington University. Pp. 469-484.

Newkirk, R. T., 2001. "Avoiding Flood Disasters: Two Important Considerations for Planners," *The International Emergency Management Conference*. Vol. 8, Oslo, 2001: The University of Waterloo, Waterloo, Canada, in press.

Newkirk, R. T., 2001. "The Increasing Cost of Disasters in Developed Countries: A Challenge to Local Planning and Government." *Journal of Contingencies and Crisis Management*. Vol. 9, No. 3. Pp. 159-170.

Newkirk, R.T., 2002. "Risk Analysis in Planning: Communities and Water Emergencies," *The International Emergency Management Conference*. Vol. 9, Waterloo, 2002: The University of Waterloo, Waterloo, Canada, in press.

OCIPEP: Office of Critical Infrastructure Protection and Emergency Preparedness. 2002. Towards a National Disaster Mitigation Strategy: Discussion Paper. Government of Canada. P. 14.

Oxford Dictionary of Current English, 1994, R. E. Allen, ed., Oxford: Oxford University Press.

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