
After Action Review – Tropical Storm Arthur

Introduction

Post Tropical Storm Arthur had unanticipated and dramatic effects on New Brunswick, and resulted in the most extensive disruption of power transmission and distribution services, wireline and wireless telecommunications services and food distribution services in our history.

The disruptions and associated impacts occurred in a context of increasing interdependence of critical infrastructure and life-line services, and increasing societal dependence on continuous connectivity and just in time supply chains. Increasing dependence and the apparent increasing risk of extreme weather events pose a significant threat to lives and livelihoods. The public and private sector expect governments to do their part to manage risks effectively and to ensure the sustainability of the economy.

Government has requested that officials examine what could possibly be done to prevent or mitigate the risk or reduce the impacts of similar storms in the future. This after-action review has considered the known and potential risks, mitigation and adaptation measures that may be possible, and looked for opportunities to improve emergency management and response for such events.

Event Description

The circumstances surrounding Tropical Storm Arthur may be considered extremely unusual. The impacts on communities, private property, business enterprises and public infrastructure were very significant.

Post-tropical storm Arthur swept through New Brunswick on July 5-6, 2014, bringing high winds and intense rainfall over a sustained period, and knocking out power to approximately 195,000 (approximately 50%) customers during the course of the event. Most of affected customers had power restored within two or three days, however it took two weeks to fully restore service.

Arthur initially caused a number of transmission line outages which required both air and ground patrols to investigate the cause and source of the faults. Access to these locations required the use of off-road and other specialized equipment. The distribution system (lines within communities) was badly damaged by thousands of fallen trees, along with broken poles and other equipment. The severity and complexity of damage meant repairs took many hours and sometimes days to finish. In many cases, the lines were beyond repair and crews were forced to rebuild entire sections of systems.

Direct costs (infrastructure; private property; small business) are assumed to be \$20M, with many more millions in economic loss due to business interruption.

Executive Summary

This review and its recommendations are focused on strategic factors, rather than more tactical matters, typically covered by agency reviews of emergency response or telecommunications and electrical grid restoration operations. Consequently, this report emphasizes important strengths and highlights some opportunities to further improve resilience, build emergency management and response capacity and better prepare the public for emergencies.

Community resilience is a combination of robust social and physical infrastructure, effective emergency management and response capacity, and public preparedness. Leadership is also an important factor. Resilience is the ability of a community under stress to bend, but not break. While most communities and residents impacted by Arthur managed the challenges well and recovered quickly, it was evident that there are areas where community resilience and individual preparedness need to be improved.

Arthur is also a signature event, in what is now clearly a period of increasing risk of similar, extreme weather events with disruptive impacts on critical infrastructure, essential services, lives and livelihoods. Had Arthur occurred in winter, rather than summer, the effects, consequences and management challenges would have been far more dramatic, and more costly. We should then consider more dangerous scenarios in our planning and program design.

Consequently, this review has examined closely the factors and good practices that positioned New Brunswick well for this event, with a view to leveraging what worked well and identifying opportunities to improve our collective preparedness and capabilities for future events.

Observations & Recommendations

Observations and recommendations have been aligned with the following themes: Governance; Coordination and Collaboration; Public Alerting; Public Information; and Essential Services. Observations and recommendations are summarized in Appendix A.

Our overarching recommendation is to broaden the dialog about disaster risk and our collective responsibility as a society to work collaboratively for the safety and security of our residents and the sustainability of our economy.

To that end, it is recommended that the Government of New Brunswick establish a Roundtable on Emergency Management and Resilience; in order to:

- support dialog on risk reduction and community resilience;
- encourage continuous improvement of public sector and private sector emergency programs;
- foster greater collaboration among all organizations with emergency roles; and
- promote public preparedness.

1. Governance

Observations

Arthur proved the value of a whole-of-government approach to emergency management and coordination. New Brunswick has since 2001 had a governance framework for emergency management that includes an ad hoc (as needed) Deputy Ministers' Committee for Security and Emergencies.

As was the case for the 2008 St John River Flood and the 2009 H1N1 Influenza Pandemic, this committee was instrumental during Arthur in supporting government's decisions and coordinating executive action within government and with the private sector.

It was evident that some departments have not kept their emergency plans up to date. During Arthur, emergency officials experienced difficulty reaching some departmental points of contact. In some cases, information deemed essential to the response was not readily available. This suggests a need to strengthen governance and accountability for government's emergency management program, to ensure that documentation and operational readiness for emergencies are maintained, and to foster a culture of continuous improvement.

Recommendations

- 1.1. It is recommended that this ad hoc deputy ministers' committee be formalized with a mandate to oversee the provincial government's Emergency Management, Business Continuity, and Security programs.
- 1.2. It is recommended that a formal working committee be established to manage the associated initiatives and action plans; it is suggested that the working committee be comprised of the ADMs responsible for each department's emergency program.
- 1.3. Governance, executive level accountability and continuous improvement are essential elements of emergency program design, and are described well in the Canadian Standard, CSA Z1600. It is recommended that this reference standard be adopted formally, in order to ensure effective governance for government's emergency programs, and to serve as an example for others.
- 1.4. It is recommended that relevant information be provided regularly to the committee to enable it to assess readiness, to understand the risks and potential consequences of emergency events, to enable and support decisions and to provide advice to government.

2. Coordination and Collaboration

Observations - Coordination

Essential prerequisites for effective coordination are the communications means, including land line, wireless and desktop connectivity. It was noted that during Arthur hundreds of thousands of people lost connectivity for significant periods of time (days) and local authorities were not immune. Where these services were disrupted, situational awareness was poor and coordination was very challenging. This was particularly true outside of urban areas.

While there were significant disruptions to commercial wireless services in southern New Brunswick, the provincial radio communications system remained fully operative and supported emergency services in the field. Commercial radio sites generally appear to have less robust onsite power supply. It was observed that it would be advantageous for DPS, DTI and NB Power to work more closely with owner-operators of commercial wireless networks, with a view to improving coordination and mutual aid during outages.

One long standing limitation of GNB current mobile radio systems is they are based on old, analog technology. Digital systems are more capable, providing agency and inter-agency talk groups that enable emergency services to share information and work together. Digital systems make more efficient use of spectrum, and more secure and use less power. Signals are clearer. All of these features taken together make for a better informed and more agile response, while contributing to worker safety. Modernizing our radio communications systems is in our view the single most effective way to improve the efficiency and effectiveness of emergency management and response. Modern communications tools enable better situational awareness and understanding, and more timely decisions and interventions.

Emergency management organizations at the local, regional and provincial level provide the means to coordinate across mandates, sectors and levels of government. The New Brunswick Emergency Measures Organization (NBEMO) has the mandate to coordinate provincial emergency operations and to assist municipalities as needed. NBEMO also has the coordination role for unincorporated areas, in partnership with the Department of Local Government.

Arthur presented significant challenges to effective coordination because of widespread disruption of power, land line, wireless and fiber infrastructure. It was 72 hours before the extent of the impacts were fully understood and effective coordination of operations was established. This is not to say there was no response. Emergency services reacted very well and NB Power ramped up their response quickly. The issue was that agency officials at all levels had to fight for information and improvise ways to communicate, and this took considerable time. This does suggest that business continuity planning and supporting systems may be deficient.

Recommendations

- 2.1. It is recommended that DPS, DTI and NB Power work more closely with the owner-operators of commercial mobile radio networks, with a view to improving cooperation and collaboration in emergencies.
- 2.2. It is recommended that DTI continue to work on conversion of its wireless systems from analog to digital technology, with a view to improved emergency coordination, emergency service cooperation and emergency worker safety.
- 2.3. It is recommended mobile radio network design, talk group engineering, and operational policy address the specific needs of local and provincial coordinating agencies (EMOs), communications centres and emergency operations centres.

Observations - Collaboration

Given the scope of Arthur's impacts, it was initially very challenging to gain situational awareness and to influence efforts on the ground. Once the impacts, implications and consequences were understood, there was a strong, coordinated whole of government response that involved emergency services, essential service providers and critical infrastructure owners-operators. In addition, the private sector at large made many valuable contributions, as did non-government organizations and volunteers at community emergency centres.

It is typical in events with wide spread impacts that the public's sense of safety, security and well-being depends on local leadership and community spirit, which were much in evidence. In rural areas, local fire departments were key providing comfort and information. Municipal and provincial elected officials were very active in their own communities and neighbourhoods. Visible leadership demonstrated in the impact phase was advantageous and contributed to public confidence.

Most importantly, the public responded very well to Arthur. People looked after themselves, looked out for their neighbours and worked together to meet immediate needs and begin the process of clean up. In spite of the unprecedented scale of Arthur's impacts, people remained calm and patient and there were relatively few complaints heard.

Collaboration across mandates, sectors and levels of government was generally effective, however it was noted that not all those with roles in the emergency response were aware of NBEMO's whole of government coordination role, or indeed, they had a civic duty to coordinate their operations with government. It took several days to establish effective liaison with some key agencies and this impeded understanding of the situation in the field. It has also been suggested that because of this opportunities to work collaboratively were missed, and that this delayed the restoration of wireless services in some areas.

While there may be a number of root causes, the most significant one appears to be that some agencies and organizations simply did not see themselves as part of a government-led, collective effort. Much of response and recovery is naturally self-directed and uncontrolled. It is evident however, that there is a clear need to reach out and broaden the dialog about emergencies, and how governments, emergency services, private organizations and individuals can each contribute and help achieve unity of effort.

Recommendation

- 2.4. Our overarching recommendation is to broaden the dialog about disaster risk and our collective responsibility as a society to work collaboratively for the safety and security of our residents and the sustainability of our economy. To that end, it is recommended that the Government of New Brunswick establish a Roundtable on Emergency Management and Resilience; in order to:
- support dialog on risk reduction and community resilience;
 - encourage continuous improvement of public sector and private sector emergency programs;
 - foster greater collaboration and unity of effort among all organizations with emergency roles; and
 - promote public preparedness.
- 2.5. It is also recommended that Arthur serve as a case study example of an effective community response to an emergency, with emphasis on the value of people and organizations working together. Arthur stories may be useful in educating the public about the need to understand and be prepared for disruptions of essential services, such as communications, electricity, fuel, food and water.

3. Public Alerting

Observations

During Arthur, people turned to radio for news and advice, but local stations were either inoperative or not carrying local content. NB Power made effective use of their web service and social media to issue safety advice and report on progress of restoration operations. Provincial and municipal officials were relegated to distributing flyers through community emergency centres.

Radio is considered the most reliable broadcast medium to address local emergency public information requirements in emergencies. After hours and on weekends however, most radio stations are typically unattended and content is either pre-programmed or remotely controlled. This was certainly the case during Arthur. Efforts to reach station managers were largely unsuccessful. Since Arthur, CBC has committed to taking a more active role when there is an emergency after hours and on weekends.

The CRTC has recently mandated all over-the-air broadcasters to enable dissemination of emergency alert messages, no later than 31 March 2014. This is intended to enable emergency officials to broadcast emergency alerts and messages over local radio and television stations. This will be a significant enhancement to current capabilities which are currently limited to channels operated by Pelmorex (The Weather Network; Meteo Media).

Recommendations

- 3.1. It is recommended that NBEMO work collaboratively with broadcasters to enable public alerts to go direct to broadcast when stations are unattended or when lives are at immediate risk.
- 3.2. It is recommended that NBEMO and ECO renew their relationships with major broadcasters to ensure that they can be engaged to assist officials to inform and advise the public in emergency situations.

4. Public Information

Observations

New Brunswick enjoys a well-deserved reputation for excellence in emergency public information. During Arthur, communications operations were generally effective, but were largely dependent on the efforts of a handful of departmental communications officers. The availability of communications professionals in crises and emergencies has been a long standing challenge for government. The advent of digital media, as well as public expectations regarding social media, presents significant new challenges for all governments.

Recent changes to how the provincial government's communications resources are managed provide opportunity to revisit how best to mobilize and organize communications resources in crises and emergencies. Accordingly, it would be prudent for ECO and NBEMO to conduct a review of the applicable emergency plans and procedures.

Recommendations

- 4.1. It is recommended that ECO and NBEMO review and update the provincial Emergency Public Information Plan to reflect the roles, organization and capabilities of government's new communications structure.
- 4.2. It is recommended that ECO develop supporting operational policy to ensure a consistent approach to addressing communications requirements for crises and emergencies. This should include such things as emergency on-call lists, activation procedures, initial and scalable staffing arrangements, whole-of-government coordination and guidance on orientation, training and exercising.
- 4.3. It is recommended that ECO and NBEMO use the next off-site nuclear exercise as a functional test of the updated Emergency Public Information Plan (Emergency Communications Plan).

5. Essential Services

Observations

New Brunswick emergency management and security officials have worked closely with critical infrastructure owners and operators since 1999. In the post 2001 environment, this work was formalized into a Provincial Critical Infrastructure Program, one which was developed in partnership with the Government of Canada and the State of Maine. The program design, methods and tools were shared nationally as a model for other provinces to use. In short, New Brunswick's program is fully mature and processes for interagency information sharing and collaboration are well established and effective. The program is comprehensive as it includes both government agencies providing essential services, and private sector service providers. Emphasis is placed on the following sectors: Food & Food Distribution; Energy; Government; Informatics & Telecommunications; and Transportation.

During Arthur, DPS's Security Directorate worked directly with approximately 30 critical infrastructure partners to assess impacts, share information, inform decisions and provide advice to government. Numerous interviewees highlighted government's coordination with essential service providers as something that worked exceedingly well and to positive effect.

It was evident that daily coordination with agencies such as Bell-Aliant, Irving Group of Companies, New Brunswick Power, Rogers, The Retail Council of Canada, and others resulted in improved situational awareness, more effective use of available resources and decisions about utility restoration priorities in affected areas. In fact, restoration priorities plans were continuously adjusted to reflect information and needs brought to light through this process. Information derived from this process was also shared appropriately with municipal officials.

During Arthur many municipalities and rural communities established community emergency centres to serve the public's need for information and comfort and to serve as distribution points for water and ice. A number of community emergency centres provided access to government and volunteer services. Municipal centres were open to people from outlying areas, as well as local residents. Services varied from community to community, but included such things as showers, water and ice, land line and mobile communications. Moreover, these centres provided a nucleus for local efforts, and contributed tremendously to the public's overall well-being, and their employment may be viewed as a very good practice.

Some concerns were expressed about the resilience of supply chains for food. Little food is sitting on shelves and in warehouses, perhaps a five-day supply. We import 90% of our food, much of it through long supply chains that depend on transportation infrastructure, fuel and local facilities. To their credit major grocery chains and smaller suppliers gave away much of their inventory when they lost power, but some areas had essentially no food supply for several days. It was observed that it would be advantageous for the Food & Food Distribution companies to work more closely with the provincial Critical Infrastructure Program.

As observed above, emergency plans and procedures are often not kept up to date. Deficiencies are often observed on exercises and through after action reviews, and typically include weaknesses in documentation, training and exercising. During Arthur it was noticed that there was a lot of variation in readiness and practice across intervening public and private sector organizations. This suggests that emergency programs are not being held to an adequate standard.

Requirements for emergency programs are only loosely defined in provincial regulation 84-7 (for public sector entities only), but there is also available a Canadian reference standard, CSA Z1600, Emergency Management Business Continuity Programs. This standard has been in place for more than five years and is a useful reference around which there is a growing community of practice. Similarly, CSA Z246, Security Programs may inform provincial security policy and program design.

It is evident that New Brunswick has an effective critical infrastructure program. That said, the program depends entirely on the good offices of the Security Directorate and its largely informal arrangements and relationships with a small number of owner-operators. It has been suggested that government set clearer expectations and formalize arrangements to assure the continuity of *vital critical infrastructure* and *essential life-line services* in emergencies. Given ongoing and planned resource development, further development of our energy sector and increasing risk of extreme weather events, it would be prudent to establish look at options to provide greater assurance regarding critical infrastructure and essential services. Australia has taken such an approach and applied it successfully at a state (provincial) level.

Recommendations

- 5.1. It is recommended that municipal and regional emergency plans designate appropriate facilities to serve as community emergency centres. Plans should also detail the arrangements for back-up power supply and back up communications. Government financial assistance for this would be advantageous.
- 5.2. It is recommended the Critical Infrastructure Program engage the Food & Food Distribution Sector on the issue of supply chain resilience, with a view to closer cooperation in emergencies.

- 5.3. It is recommended that DPS revisit requirements for business continuity planning within government and with owner-operators of critical infrastructure and essential services. The following program guidance is applicable:
- New Brunswick Regulation 84-7, Emergency Planning for the Continuity of Government.
 - CSA Standard Z1600, Emergency Management and Business Continuity Programs.
 - CSA Standard Z246, Security Programs.
- 5.4. It is recommended that consideration be given to requiring owner-operators of *vital critical infrastructure* and *essential life-line services* to work collaboratively with government on their emergency programs.

6. Conclusions

Looking back twenty years an event such as Arthur would have been much less disruptive to commerce and to the public, but today society has become very dependent on continuous connectivity. Lives and livelihoods depend on cloud based information and applications. We don't carry cash. We run our lives on smart phones. Contemporary society is impacted to a much greater degree when connectivity is lost, as is our economy, and as is public confidence.

Arthur is also a signature event, in what is now clearly a period of increasing risk of similar, extreme weather events with disruptive impacts on critical infrastructure, essential services, lives and livelihoods. Had Arthur occurred in winter, rather than summer, the effects, consequences and management challenges would have been far more dramatic, and more costly. We should then consider more dangerous scenarios than Arthur in our emergency planning and program design.

This review has examined closely the factors and good practices that positioned New Brunswick well for this event, with a view to leveraging what worked well and identifying opportunities to improve our collective preparedness and capabilities for future events. To that end, our recommendations are intended to illustrate opportunities to foster greater community resilience, while strengthening our collective capacity to manage emergency events.

The assistance and advice of the many contributors to this report are very much appreciated.

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