

Report – Preliminary Consultations
Tantramar Community Adaptation Viewer Project

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Tantramar Community Adaptation Viewer Project

1. Introduction and Purpose

This project is an extension to a previous project funded by the Atlantic Climate Change Adaptation Solutions organization, SSHRC, and Mount Allison University (Mount A REB 2011-042 “Is geovisualization an effective tool for public communication of climate threats?” and Mount A REB 2012-071 “New Brunswick Climate Change Communication Needs Assessment: Expanding the Tantramar Map Viewer”). Dr. David Lieske and the Mount Allison Geospatial Modelling Lab (GML) created flood scenarios using GIS software to help members of the public visualize the spatial extent of flood risk. Dr. Lieske and colleagues also brought planners, GIS technicians and planning directors from six¹ planning districts in New Brunswick to discuss the following issues: the climate-change related risks facing their planning district; the challenges they encounter when communicating with the public about climate change; the types of software tools they would like to have to facilitate public communication, and; how web-based maps and other types of geovisualizations (e.g., animations) could help facilitate public communication.

This project builds on this earlier work through the development of new spatial decision support software. This web-based toolkit will combine information about infrastructure vulnerable to coastal flooding with new information about community vulnerability (based on StatsCan census data). The toolkit will support the creation of hypothetical planning zones, allow for the exploration of the costs and benefits of each, and facilitate ranking of their relative priority. It will conclude with the development of a draft action plan for mitigating flood risk in Sackville.

2. Project Research Questions

The research questions are:

1. From the perspective of the experts, what information do they need to have in order to make adaptation recommendations? (Addressed in this report.)
2. From the perspective of the experts, what locations do they consider to be vulnerable within the Sackville area?
3. What makes these locations vulnerable?
4. How should these locations be grouped to form adaptation priority zones (e.g., neighbourhoods, sections of dyke), and incorporated within a community adaptation plan?
5. What can be done in order to make each priority zone less vulnerable?

¹ An invitation was sent to planners, GIS technicians, and planning directors at the twelve planning commissions in New Brunswick. Six commissions were represented at the meeting.

6. As part of an overall action plan, how do experts prioritize the adaptation zones that should be targeted to lower community vulnerability?

3. Methodology

The entire project methodology will involve:

1. Holding preliminary meeting with constituent groups to discuss spatial information requirements (one meeting per group). (Addressed in this report.)
2. Amending the project database and Tantramar Community Adaptation Viewer (as necessary and feasible) to reflect the spatial information requirements identified in step #1. (Addressed in this report.)
3. Having a second meeting with individual constituent groups (one meeting per group) to present draft Tantramar Community Adaptation Viewer, identify core areas of community vulnerability, create priority zones, and propose adaptation plans to lower vulnerability in those priority zones.
4. The project team developing a summary of the constituent-identified adaptation plans, with a preliminary assessment of the barriers to implementation, and a proposed implementation strategy.
5. Hosting a final plenary meeting with all constituent groups) to present preliminary results of project, as well as facilitate revised priority setting by the entire group.
6. Completing a final report summarizing project findings.

This report documents the results of step #1. The particular methodology involved in completing the first step in the project was to consult with seven constituent groups in Sackville: (1) Town Council, (2) dyke managers, (3) infrastructure and emergency response, (4) planners, (5) environmental groups, (6) community service providers (previously referred to as socio-health organizations and government departments), and (7) the public-private sector.

The participants were invited as a result of their specialized knowledge in their field. They were not sought after as official representatives of their employers or asked to provide an organizational 'position' on the issue of flood risk or community vulnerability to flooding. Community service organizational representatives were invited because they have specialized knowledge about the needs of potentially vulnerable constituents; town councillors are elected officials who have the power to enact by-laws and will contribute to understanding what is feasible from a policy perspective, and the public-private sector group consists of commercial interests whose businesses may be in the flood zone and who will be able to comment on the impacts they would face in the event of a flood and offer adaptation strategies of their own. Members of the remaining constituent groups were invited because of their technical knowledge of the flood zone, planning issues, or dyke or infrastructure management.

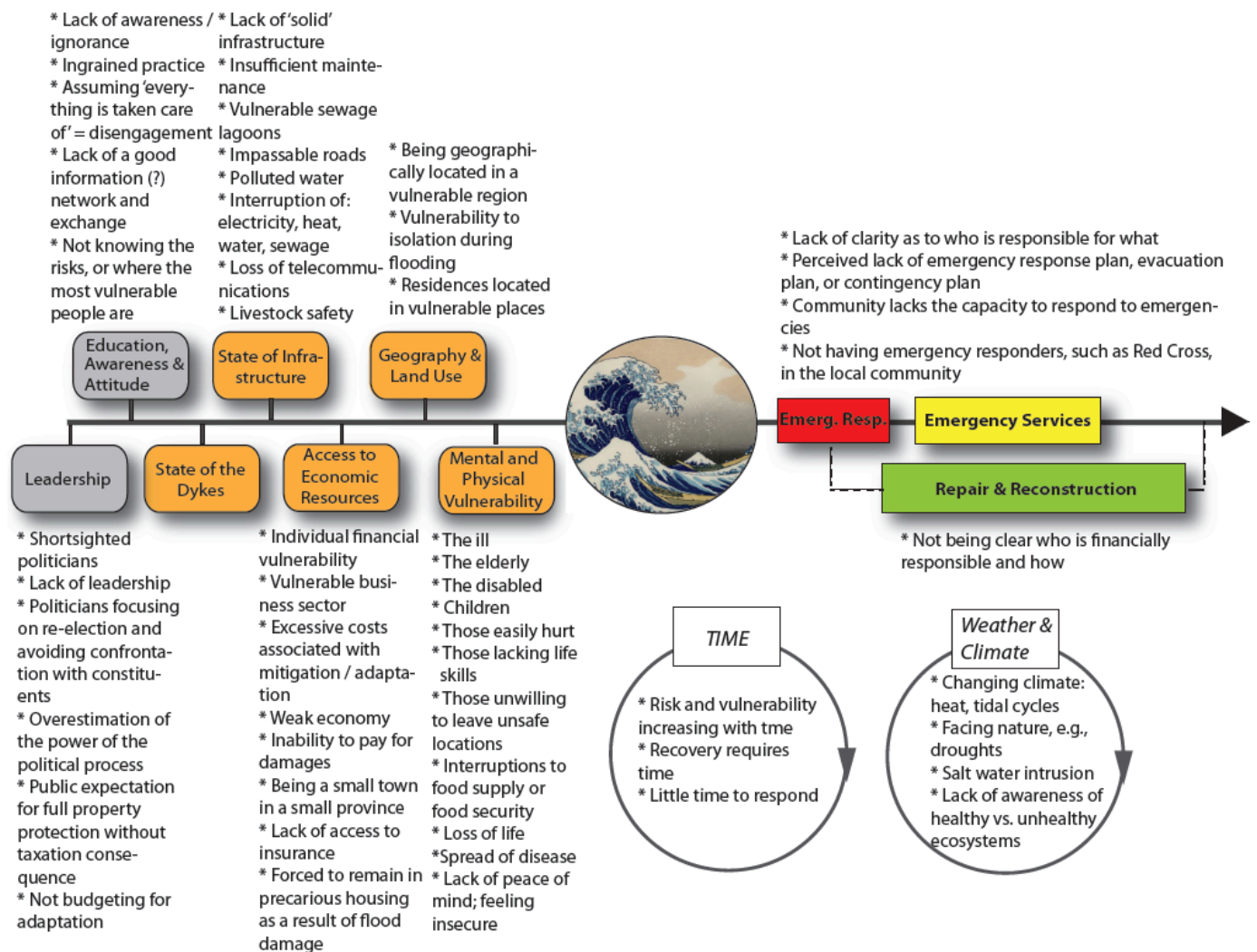
4. Project Results

4.1 The Meaning of Community Vulnerability

Focus group attendees participated in a brainstorming activity and were asked to indicate what the word 'vulnerability' meant to them. The purpose of the exercise was to identify as many aspects of vulnerability as possible. Participants were asked to think about the meaning of vulnerability in a very general way. Notwithstanding this, some participants localized their discussion to flooding in particular.

The results of the discussions are presented in the following graphic. The left side lists the main elements of vulnerability identified by the focus group attendees that could be addressed as a way to mitigate the impact of a flood event before one occurs. These are grouped by main theme. The right side of the graphic presents gaps that could contribute to vulnerability during or after a flood event.

Summary Results of the Meaning of Vulnerability



One participant defined vulnerability as involving a lack of capacity or opportunity to respond or adapt; in other words, vulnerability is powerlessness. In the absence of a large external threat, the participant indicated that s/he felt personally empowered to adapt and control his/her own behaviour. Others indicated that vulnerability is created out of a lack of political will to lower vulnerability, not because there is a lack of technology to help with adaptation.

Others associations with vulnerability included:

In terms of who or what is vulnerable

1. People are vulnerable
2. Having a weakness
3. People who are isolated
4. The elderly
5. Children
6. People who are ill
7. People with disabilities
8. People who need assistance
9. Being unwilling to leave an unsafe location
10. People who are unaware
11. People who are easily hurt
12. People who lack the skills to care for themselves/others

In terms of one's physical, mental or emotional safety

13. Being unsafe/lacking security
14. Instability
15. Being unprotected or exposed
16. Being unprepared
17. Being vulnerable in terms of physical or mental health
18. Lacking a or having an interruption of the food supply or food security
19. Being homeless or lacking a place to go
20. Not having the equipment to move people (such as ceiling lifts to lift those who are confined to a bed)
21. Having an increased risk of disease/poor hygiene
22. An increase in human loss
23. Loss of security
24. Loss of life
25. Being overwhelmed
26. Lacking peace of mind
27. Spread of disease

In terms of attitude and perception of risk

28. Having an attitude that a person is immune to a problem (like flooding) or that such a problem will not affect someone (e.g., a feeling of invincibility)
29. Living in denial about the state of affairs
30. Ignorance
31. Ingrained practice
32. Being inactive (not taking action)
33. Being resistant to change
34. Being unengaged
35. Assuming a problem is 'being taken care of'
36. Being out of control
37. Having anxiety

In terms of financial well being

38. Being financially or economically vulnerable
39. Having the business or retail sector be in danger
40. A lack of economic wellbeing or safety
41. The excessive cost of mitigation/adaptation measures
42. An inability to pay for repairing damages
43. A weak economy
44. Business decisions that have economic costs

In terms of property

45. Physical damage
46. Not being covered by insurance
47. Having precarious housing as a result of flood damage
48. Not being able to afford to repair damage
49. Continuing to develop (build) in areas that are particularly vulnerable to flooding

In terms of the physical location or surroundings

50. Being geographically located in a vulnerable area
51. Being isolated
52. Being influenced by the features of the landscape
53. Residential areas (as opposed to agricultural areas) because that is where people live
54. Being a small town in a small province
55. Being one of many places experiencing a flood at the same time
56. Being cut off from the rest of town or from other communities

In terms of infrastructure and interruption of services

57. A lack of solid infrastructure
58. Insufficient maintenance of infrastructure
59. Damaged infrastructure
60. Lacking electricity, heat, water, plumbing, and sewage

61. Having vulnerable sewage lagoons
62. Having polluted water
63. Having impassable roads, e.g., cut off because of a flood, not wide enough for a service vehicle, etc.

In terms of the temporal reality

64. Having risk and vulnerability increase as time goes on
65. The extensive time it takes to recover or rebound from an event
66. Lacking sufficient time to respond

In terms of environmental effects

67. Facing seasonal issues, such as heat, tidal cycles, spring/fall peaks
68. Facing nature, e.g., global warming droughts, etc.
69. Salt water intrusion
70. Not understanding that healthy ecosystems are less vulnerable to impacts than unhealthy ones
71. Being susceptible to global warming and environmental change

In terms of mobility

72. Being inconvenienced
73. Being physically isolated or cut off
74. Lacking a way out
75. A broken transportation corridor, e.g., roads, rail, shipping, etc.
76. Risk of transportation accidents
77. Nova Scotia becoming cut off
78. Changing demographics, e.g., if people start leaving, if people stop moving here, and how that affects the community's composition, allocation or availability of resources, etc.

In terms of community services

79. Struggling to continue service, e.g., the nursing home or hospital
80. Having competing priorities
81. Having an increased risk of accident, liability, financial, etc.
82. A lack of progress is addressing an issue

In terms of human interaction

83. Facing pressures due to population increases
84. Being afraid/scared
85. Having too many 'unknowns'
86. Different populations being affected in different ways (e.g., the differential effect on seniors, people with low versus high incomes, etc.)
87. Communities and/or neighbourhoods being isolated
88. Having different interpretations, understandings or beliefs about reality

In terms of communication and information

- 89. Having a lack of communication an issue or having too much communication
- 90. Having an issue not be highly visible
- 91. Having an uninformed public
- 92. Not being individually informed
- 93. Having incomplete or a lack of information
- 94. Having information be not easily or readily available
- 95. Lacking or losing telecommunications
- 96. Lacking a good network
- 97. Not knowing where the most vulnerable people in the community are
- 98. Not knowing the risks
- 99. Not having current information, including contact information when seeking advice, updates, etc.

In terms of animals

- 100. A lack of livestock safety

In terms of responsibility

- 101. Not being clear on who is financially responsible
- 102. Not knowing who is in charge of what when

In terms of politics and government

- 103. Shortsighted politicians
- 104. A lack of leadership
- 105. Having politicians focus on the next reelection and not angering their constituents
- 106. Having a public who believes government(s) are responsible to take care of everything
- 107. Overestimating the power of government
- 108. Feeling one's property should be protected at all costs with no additional taxes
- 109. Not having an emergency response plan, evacuation plan, and/or contingency plan
- 110. Being susceptible to political pressure
- 111. Having government policy that does not prioritize an important issue
- 112. Not being proactive
- 113. Not having a budget for adaptation
- 114. Decisions being made elsewhere that have local effects

In terms of emergency response

- 115. Not having the capacity to respond to emergencies
- 116. Not having emergency responders, such as the Red Cross, in the local community

4.2 The Meaning of Community Vulnerability in Relation to Coastal Flooding in Sackville

Participants were then asked to indicate which definitions of vulnerability applied when they specifically thought about coastal flooding in Sackville. Their responses are listed below in order of popularity:

1. Not being prepared, lacking adaptation or poor planning (including a lack of emergency or contingency plans, emergency management, regulations and/or enforcement) (30 responses)
2. Damage (injury, loss of property, loss of life, financial) (18 responses)
3. Infrastructure that is lacking, weak or exposed (17 responses)
4. A lack of public safety and/or being unprotected or open to harm (life and property) and needing assistance (15 responses)
5. Denial (12 responses)
6. Economic factors (e.g., high costs of mitigation and/or adaptation, a lack of resources, or how resources are allocated) (10 responses)
7. Being isolated (geographically or otherwise) (9 responses)
8. A lack of information, knowledge, awareness, and/or education (poor communication) (9 responses)
9. Blocked transportation routes and inability of emergency vehicles to access areas (9 responses)
10. Governmental politics that focus on the short term or election results and inhibit planning (lack of political will) (6 responses)
11. A lack of understanding about the roles of healthy ecosystems (6 responses)
12. Public/corporate reluctance to change or relocate or differing corporate priorities (5 responses)
13. A lack of control, be it because of the force of nature or because of a lack of social power (5 responses)
14. Geographic location (where one lives makes one/family/friends vulnerable to different disasters) (5 responses)
15. A lack of skills to make decisions or get things done Inaction (3 responses)
16. Having decisions made by external agencies Inaction (3 responses)
17. Homelessness (3 responses)
18. A lack of food security (3 responses)
19. Disturbed buffer zones (rivers, wetlands) and/or a polluted environment (like water) and ensuing health risks (3 responses)
20. Increased risk, e.g., to accidents, liability, exposure, increased risk over time Inaction (3 responses)
21. Inaction (3 responses)
22. Inability to predict or anticipate the future (2 responses)
23. How actions are prioritized based on social values (2 responses)
24. Poor health (2 responses)
25. Danger of the unknown (2 responses)
26. A lack of education (2 responses)
27. Identified areas (2 responses)
28. Impacts, human element (anxiety) (1 response)

29. Commons (1 response)
30. Demographic characteristics that make people more vulnerable (1 response)
31. Vulnerability of businesses (1 response)
32. A lack of definition about what risk is or what being at risk means (1 response)

4.3 Factors that Contribute to Community Vulnerability

When probed further, participants identified numerous factors that they thought have the potential to make communities more vulnerable. They are presented as follows:

Leadership

- Lack of leadership
- Inadequate compensation for the mayor
- Inability for the mayor to make decisions without the approval of Town Council (a lack of empowerment to make decisions)
- Unwillingness to pursue or understand solutions
- Personal agendas and 'egos' that inhibit problem solving or acceptance of the problem
- Poor management
- Poor decision-making
- Reactive, not proactive leaders
- Leaders that are not empowered
- Multijurisdictional levels of responsibility
- Governments that do not act in a timely fashion

Action Planning

- A lack of an action plan
- A lack of an evacuation plan
- A lack of support system
- Plans that are not up to date
- Aging precautionary measures
- A failure to take safety measures
- Inaction
- Not having a plan to reduce the vulnerability of physical assets
- Being unaware of the emergency measures plan
- Not having enough time to plan (e.g., an emergency comes before the community is prepared)
- No adaptation

Emergency Response

- People being slow to respond
- A lack of a warning system
- A lack of trained personnel
- A lack of external assistance

Resources

- No financial support
- Reduced revenue streams or a total lack of funding and other types of resources to address the problems/concerns
- Failure to allot a budget for an emergency response plan
- Not knowing who to go to for information/assistance in a time of crisis
- A lack of local, sustainable resources, such as food and energy
- Competing priorities regarding factors, such as budgets, infrastructure conditions, zoning, etc.

Community Cohesion

- Disengaged
- Un-/under-educated citizens
- Not working together as a group
- When people do not feel connected or experience a sense of isolation
- When people do not support one another
- A community that does not feel empowers
- A reactive rather than a proactive community
- A lack of concern in the community
- Divisions within the community
- A lack of neighbourliness
- Community conflict

Requirements of Life

- Having insufficient food and water

Location/Geography

- Extent of exposure to flooding, be it from coastal or inland flooding or precipitation events
- Proximity to low lying areas and other risk factors
- Rising tides
- Climate change
- Storm surges
- People having different levels of risk depending on where they reside
- Where people live
- Weather factors of an area

Water Management

- An inability to let the water out
- An inability to keep the water out

Population

- An aging population
- Children and youth
- Mobility issues
- Being in a lower income bracket
- Poverty
- Having a transient population (e.g., students and others who do not live in town permanently)
- Expanding populations

Communications and Information Management

- Lack of communication
- Lack of information
- A lack of awareness
- Not understanding the risks or dangers the community faces
- A lack of knowledge about how to prepare and be ready
- A lack of knowledge of the structures and geographic locations of the sites that have the most vulnerability
- Not knowing what is happening and not happening
- No community engagement

Attitude

- Being in denial
- Having a lack of will
- An insistence on maintaining the status quo
- Waiting for someone else to solve the problem
- Not having a culture of risk taking

Community Assets

- Not knowing what physical assets are vulnerable and which need to be protected
- Conflicting views of the importance (or lack thereof) of community neighbourhoods

Housing and Infrastructure

- Cheaply built houses
- Older houses
- Not updating or repairing damaged infrastructure, including dykes
- A failure to undertake preventative maintenance
- A concern about the potential of ensuing declines in property values
- Dyke breakdowns
- Aging precautionary measures

Transportation

- Disrupted or dangerous rail traffic
- Transport trucks on the highway transporting dangerous goods
- Having the flight path being over Sackville

Regulations and By-Laws (Planning)

- A lack of rules for the construction of buildings or for business expansion
- Permitting development in areas that have higher or increasing risk
- Inadequate regulations and/or enforcement

4.4 Factors that Contribute to Community Resilience

Participants also identified numerous factors that they thought have the potential to make communities less vulnerable. Many participants noted that the factors that make communities less vulnerable are in fact the opposite of what made communities more vulnerable. Many participants felt that the solutions rest in structural changes, such as new planning and government by-laws, management realignments, and so forth. Additional or complimentary feedback is presented below:

Leadership

- Political will
- Strong leadership that make adaptation a priority
- Leaders that are prepared to lead and drive forward in the face of opposition
- A leadership that takes responsibility
- Inspirational leadership
- Create a community government that works with all sectors
- Seek government support and awareness at the provincial and federal level

Action Planning

- Identifying risks, including different risk levels
- Assess risk factors
- Have well thought out action plans (e.g., flood plans, contingency plans, emergency plans, evacuation plans, etc.)
- Create strategies that reduce and address risk
- Plan better
- Continue to make better maps
- Focus on long term well-being
- Engage in long term planning
- Map the assets and vulnerabilities and create a visual representation of where the strong areas are, where weak spots are, and how the weak areas can be made stronger
- Map the assets
- Invest in science/data
- Engage in inter-provincial planning because of a shared region

- Take timely and proactive actions
- Be realistic
- Knowing of and taking advantage of the resources at hand
- Being open to create ideas and solutions
- Being open to compromise and being able to let go of some things in favour of others
- Pre and post event planning
- Actively working on adaptation
- Planning for mayhem, such as panic, chaos, and looting

Emergency Response

- Ensure emergency measures staff (and others) are well trained and ready to respond
- Engage the public in policing the dykes
- Ensure people know who to call in case of emergency
- Conduct emergency drills and simulations
- Have clear emergency measures procedures
- Availability of machinery for repair and emergency response

Resources

- Identify revenue streams
- Ensure that part of the annual budget is devoted to proactive flood prevention measures; have financial stability
- Have a contingency fund set aside for flood emergencies
- Develop expertise (or engage those that do)
- Plan for eventual retirement of experienced personnel
- Take advantage of the knowledge base at Mount Allison University
- Take advantage of technology, e.g., LiDAR mapping, GIS, web-based information

Community Cohesion

- Encourage the community to take ownership of the problem/issue
- Bring stakeholders together
- Foster community mindedness
- Foster community cooperation and working together towards common goals and objectives
- Being willing to help each other
- Building consensus

Requirements of Life

- Ensure that the community is sustainable (e.g., access to local food, local power generation, and the use of local services to adapt)
- Ensure there are community-based services

Location/Geography

- Knowledge about local risks and the effects of climate change/flooding
- Distance from the water

Water Management

- Create buffer zones
- Identify wooded areas
- Identify marsh areas
- Create resiliency of natural areas and respecting their role in decreasing the impacts from flooding
- Understanding the importance of healthy ecosystems in protecting communities and people

Population

- Understand where the people at risk are located
- Engage in community-based work
- Tapping into the natural adaptation power of human beings and demonstrating that adaptation is possible

Communications and Information Management

- Communicate
- Educate the public/community about the risks
- Create strong community awareness
- Engage the community
- Ensure mitigation/prevention activities are visible or promoted so the community sees/understands what is going on
- Gain more access to accurate information
- Have an open and welcoming discussion about risk, vulnerability, and action
- Demonstrate that it can be done
- Learn from others
- Engage in inter-agency communication
- Ensure people have access to information and support
- Understanding the cost of doing nothing

Attitude

- Help people realize that there is a problem; create a broad understanding of the risks
- Take a positive approach to solving issues that make the community vulnerable
- Empower people to make changes
- Create a collective belief that change is possible and that 'we can make it'
- Be forward thinking

Community Assets

- Identify at-risk physical assets and protect them

Housing and Infrastructure

- Have a good understanding of where the infrastructure is located and its state
- Maintain the infrastructure
- Repair the infrastructure
- Increase the level of dyke protection

Regulations and By-Laws (Planning)

- Legislation to lead the development and utilization of new tools
- Develop good planning policies and by-laws
- Discontinue development or expansions into the flood zone
- Effective land use planning
- Zoning for future infrastructure
- Plan ahead, both municipally and on a household to household basis (e.g., emergency preparedness kit)
- A common planning exercise that brings stakeholders together

4.5 Personal Concerns

Participants were asked about what vulnerabilities they were particularly concerned about. Responses included:

Leadership

- The need for strong leadership
- Appropriate leadership
- Leadership being capable of action

Action Planning

- Organizing food, clothing and shelter for the displaced

Emergency Response

- How will people in the flood zone be safe, stay safe or get to safety
- What kind of damage, illness, injury, and death will occur before the flood water recedes
- Will the hospital/emergency services still be available for injured or elderly people
- Will the phone lines be down?
- How will widespread panic be handled
- Professional and personal emergency preparedness

Resources

- What are the costs
- The budget for dyke maintenance is too small

Community Cohesion

Requirements of Life

- Clean water for everyone
- Will the community have power/heat if we have excessive flooding
- How will we get food

Location/Geography

- All the residential, business and town infrastructure in very low areas

Water Management

- How long will the flooding last
- How quickly will a flood happen
- How to ensure that the flood water retreats quickly
- Can we model the worst case scenario with a concentration on the timing of the event, e.g., quick and heavy or gradual

Population

- Will I get to my family or will I be able to make sure they are okay
- Lower income populations
- People who are dependent and/or who have low problem solving skills
- The extent of citizen preparedness

Communications and Information Management

- Being unaware of the emergency measures plan
- Understanding the risks and the problem
- Awareness and public knowledge

Attitude

Community Assets

- The (national) historic sites located within the flood zone

Housing and Infrastructure

- Should investments in the infrastructure be repeated if damage occurs
- Homes that are older or that are cheaply built

Transportation

- Being cut off from other communities and Nova Scotia and for significant periods of time

Regulations and By-Laws (Planning)

- Town planning
- Building zones

Pets

- How will I keep my pets safe

4.6 Additional Factors or Questions

Additionally, several factors or questions arose that participants suggested should be contemplated when planning adaptation or mitigation strategies.

1. How does one empower a community to think differently about an issue such as flooding?
2. There are elements of climate change that one does not have to believe but whose consequences should not be dismissed.
3. Focus on the facts that are indisputable and avoid getting into the nuances of the climate change debate.
4. The larger issues are perhaps more frightening because they are beyond any one person's personal control.
5. Adaptation often comes down to a question of economics and the amount of money one is willing to pay to adapt, prepare, or mitigate.
6. Flood issues and mitigation are community-wide or global issues so reliance on individual responses will likely not be effective or sufficient.
7. A meaningful public discourse about what should and should not happen while staying on topic will be key to engagement.
8. The pros and cons of adaptation measures will have to be assessed and a reasonable compromise will have to be reached.
9. Community-wide planning is required.
10. Legislative support will be required regardless of the types of adaptation measures that are adopted.
11. It is also important to create institutional memory that will outlive the government of the day.
12. If one adopts an adaptation solution that requires a constant infusion of cash, one will ultimately create a new vulnerability because now one faces a vulnerability of requiring ongoing cash flow that will never be guaranteed.
13. Adaptation planning should consider larger global issues, such as global financial instability, food insecurity, etc.
14. Adaptation does not mean that something has to be torn down or abandoned. However, the community does need a long term plan and decisions and actions that ensue should be part of this long term vision.

5. Next Steps

The results of this phase of the project are foundational and will be considered during the next phase of the project, which involves developing a new decision support software toolkit. The new software will combine information about infrastructure vulnerable to coastal flooding with the information about community vulnerability as revealed by the preliminary consultations and as presented above. The new software will be highly interactive and will support the creation of hypothetical planning zones, allow for the exploration of the costs and benefits of each, and facilitate ranking of their relative priority. Once a prototype of the software is developed, it will be presented to the same stakeholder groups for critique.