



Rebuilding resilient communities: how to facilitate coordination between stakeholders for emergency and prevention as well as risk communication?

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12th INTERNATIONAL SYMPOSIUM ON DISASTER RISK MANAGEMENT:
RECONSTRUCTION TOWARD RESILIENT CITIES

Lima, Peru, Sep. 5-8, 2018



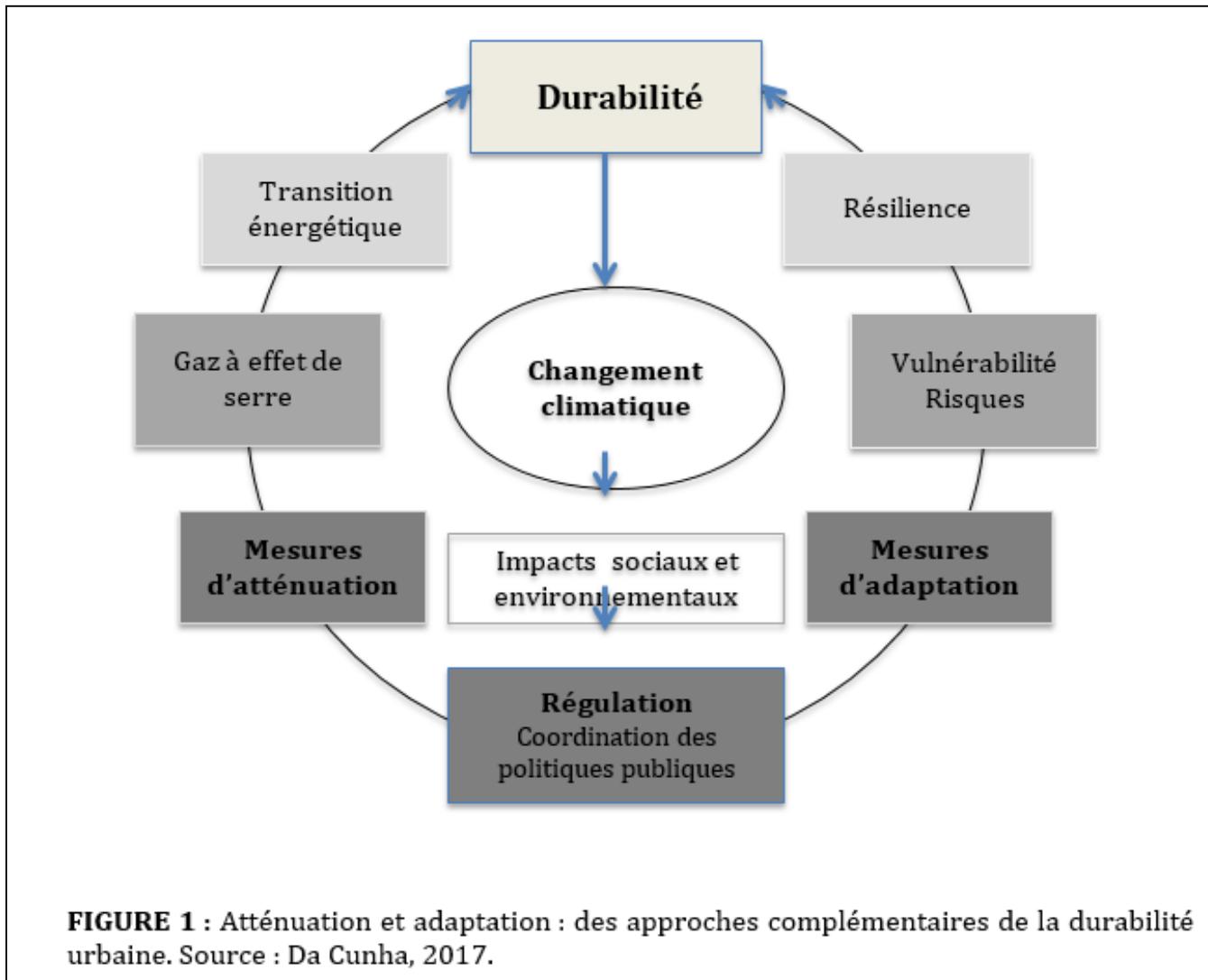
Rebuilding resilient communities: scrutinizing institutional and social articulation

- 1. Introduction
- 2. From vulnerability to resilience
- 3. From knowledge to action
- 4. Leaving with risks: enhancing adaptation and communication
- 5. Conclusion

1. Introduction

- Many changes can alter communities: climate change, non-sustainable land use choices, economic crisis, major disasters, lack of institutional and social coordination.
- Uncertainty challenges disaster risk management experts and policy-makers, notably regarding long-term adaptation planning.
 - What are the main challenges? What can we learn from past events to rebuild resilient communities, to facilitate the articulation between stakeholders ?
 - What type of knowledge is needed so as to increase awareness and adaptation?
 - How the use of a participatory and collaborative approaches to mobilize and empower local and regional stakeholders' knowledge and expertise can enhance the development of adaptation strategies ?
 - How specific communication tools can foster not only stakeholders and citizens awareness on risks in their specific areas but also empower them to work on adaptation and prevention, which is key to resilience building ?

2. From vulnerability to resilience





Hazard × Vulnerability = Risk
(Exposition and Sensibility)



(source: Resilient New Orleans, 2015)

P
PUM



La ville résiliente

Comment la construire ?

Sous la direction de
ISABELLE THOMAS et ANTONIO DA CUNHA

“City resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience ». (*Resilient New Orleans. Strategic Actions to Shape Our Future City*, 2015, p.10)

“Resilience, includes also the meaning of the capacity of recovering from a catastrophe but while adopting a more sustainable configuration.” (Maret and Cadoul, 2008).

“Vulnerability offers us a new possibilities to rethink urban planning ...

Local stakeholders have to act not only in terms of knowledge building but also to take action to foster attenuation ...and adaptation measures to rebuild local resiliency... ” (Da Cunha A., Thomas I., dans 2017, *La ville résiliente: Comment la construire?* Chap. 1 p. 20).

March 2010: Xynthia storm, Atlantic coast, France



@Frank Perry



@Bertrand Guay

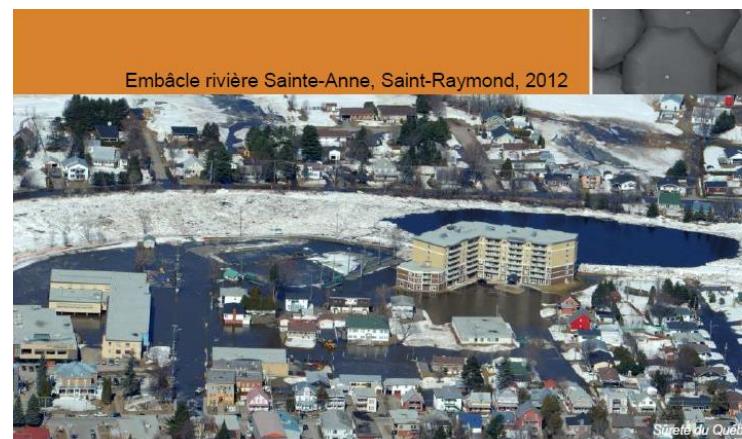
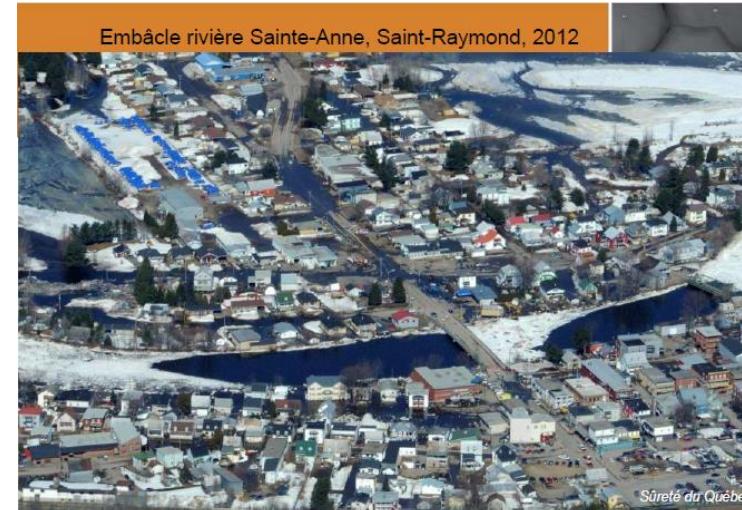


@Frank Perry



@XAVIER LEOTY

April 2014: Floods in St. Raymond, Quebec



Mai 2017: Floods in Québec : impacted communities



Ledevoir.com



La-croix.com



Ledevoir.com



Infosuroit.com

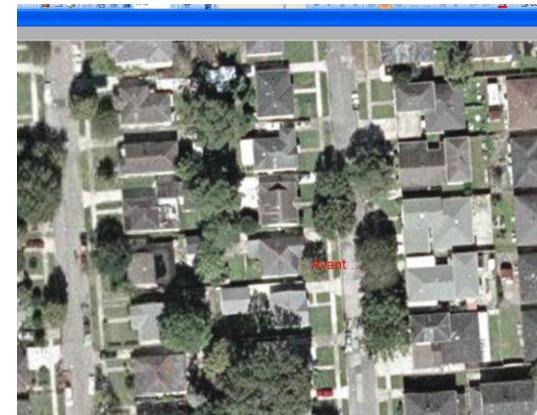
2.1. The case of Lakewood, New Orleans : stakeholders collaboration and resilient rebuilding



August 2005: Hurricane Katrina

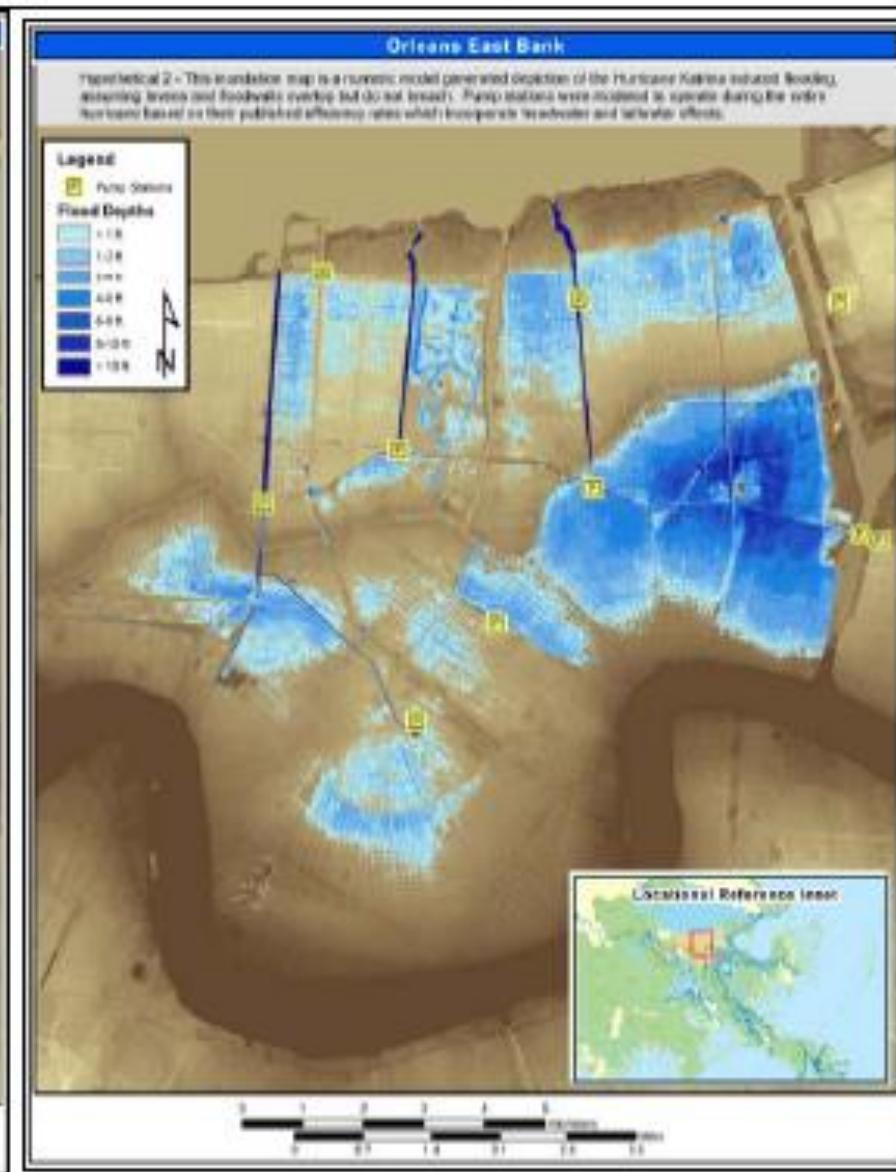
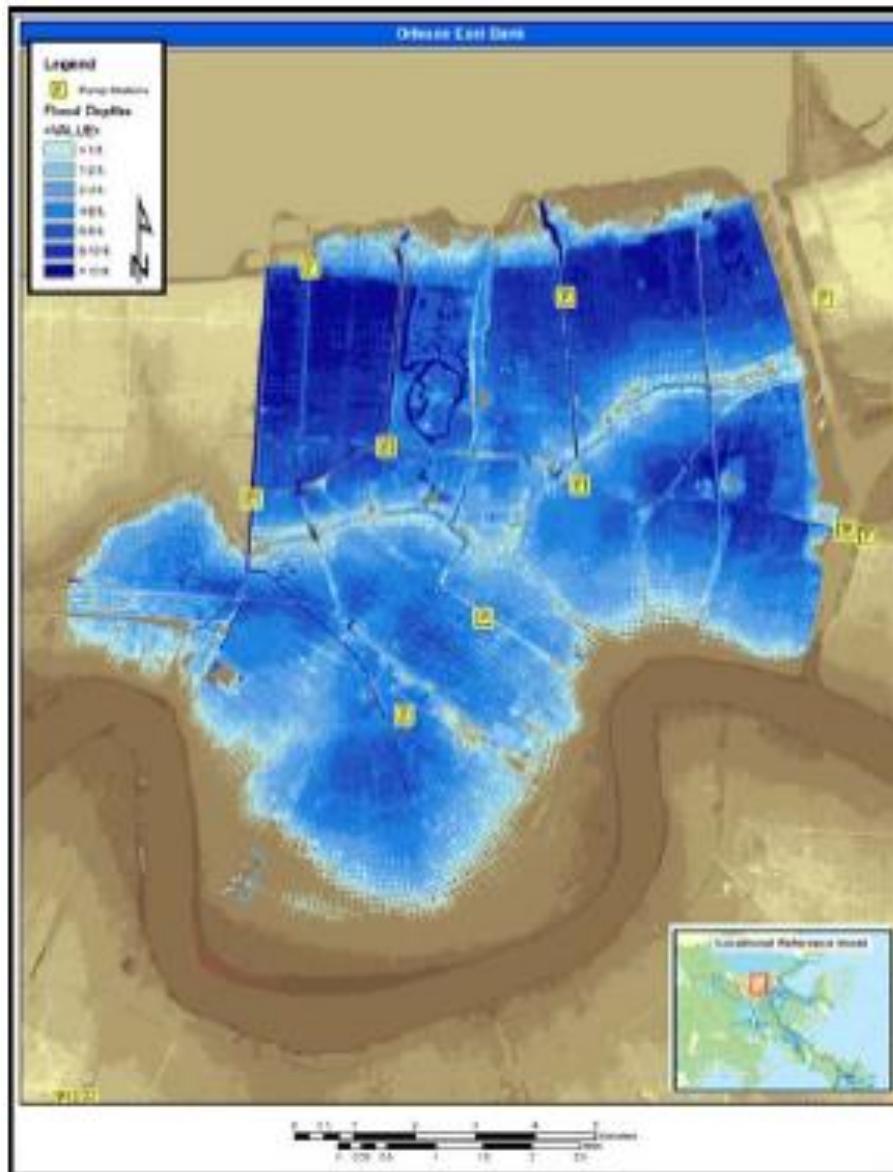


Photos CNN



Photos: Isabelle Thomas

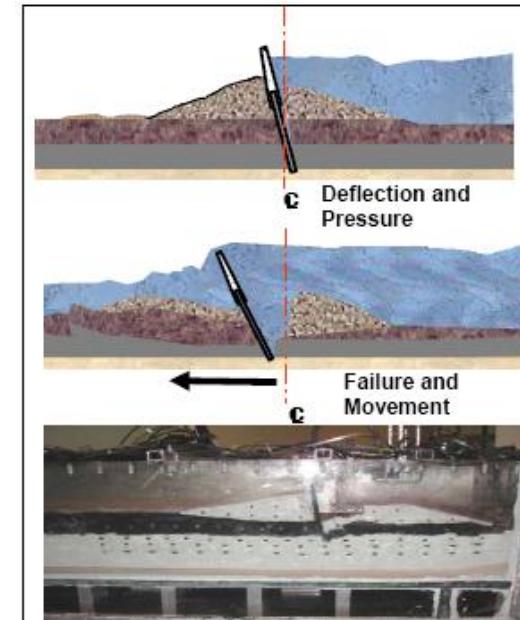




London Avenue Canal and 17th Street



<https://ipet.wes.army.mil/>



17th Street Canal Breach

- Deflection of I-wall by surge/waves
- Full hydrostatic pressure along wall splits levee into two blocks
- Weak clay below peat fails allowing protected half of levee to displace



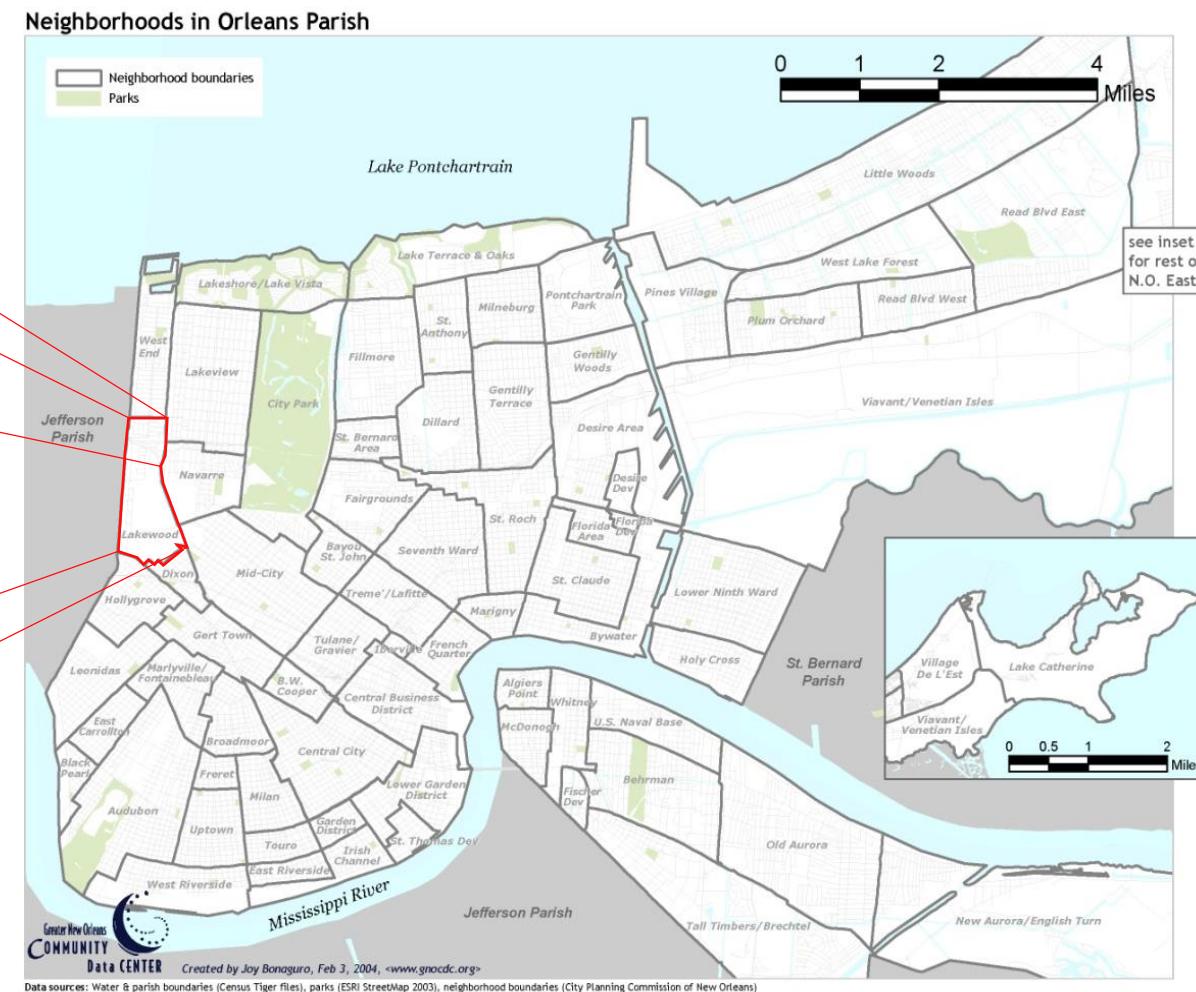
Displacement of wall and part of levee

<https://ipet.wes.army.mil/>

- Bring New Orleans Back Commission
- Lambert Plans (City Council)
- Unified New Orleans Plan
- City Recovery team
- Citywide Master Plan
- Resilient New Orleans



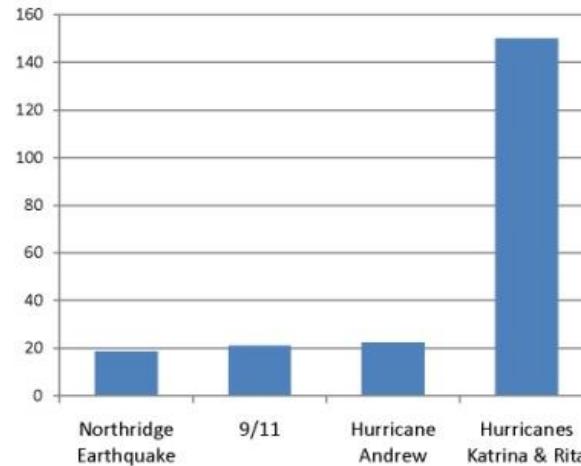
<https://www.nola.gov/resilience/resilient-new-orleans/>



GNOCDC, 2004. Reference Maps : Neighborhood boundaries. [En ligne]. Data sources: Census Tiger files, ESRI StreetMap 2003, City Planning Commission of New Orleans. [03.02.2004] URL : <http://www.gnocdc.org/mapping/docs/Neighborhood.pdf> [Consulté le 05.07.2010]



Damages, Hurricane Katrina and Rita Katrina et Rita (150\$ billions).^[1]



Consequences of long time flooding.



Housing damaged by hurricane Katrina, Rita and Wilma. ^[3]

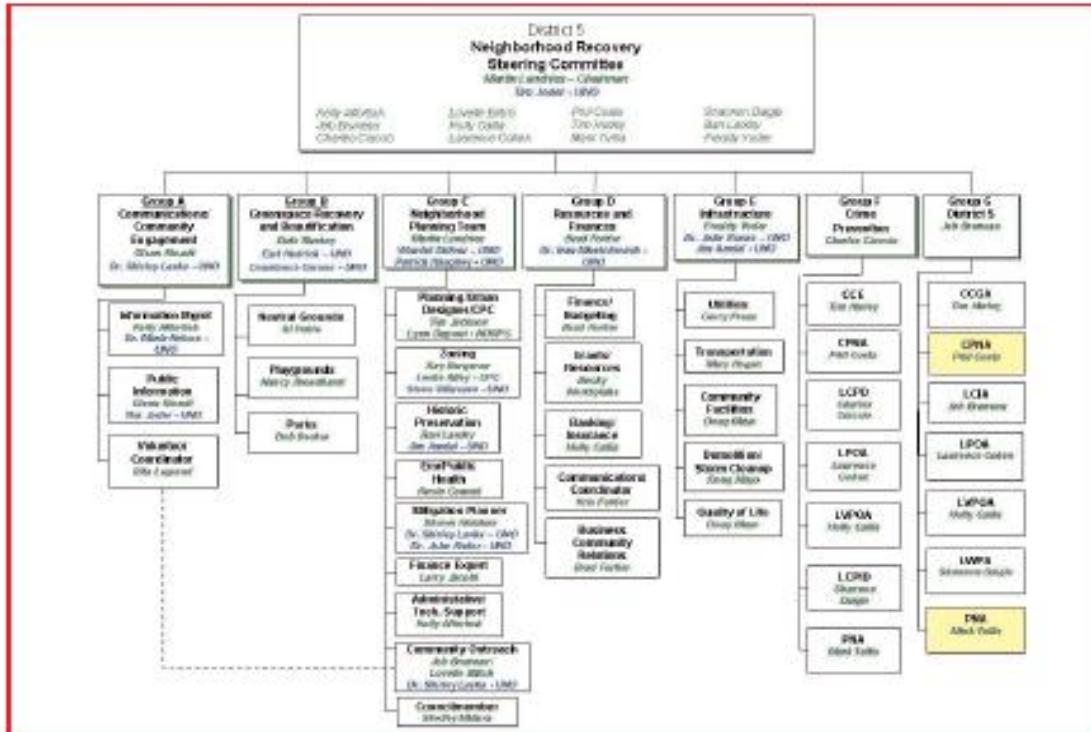
| | Census 2000 Occupied Units | Minor Damage | Major Damage | Severe Damage | Total Damage | Total Major/ Severe Damage | % Occupied Units with Damage | % Occupied Units with Major/ Severe Damage |
|-------------------|----------------------------|--------------|--------------|---------------|----------------|----------------------------|------------------------------|--|
| Orleans Parish | 188,251 | 29,241 | 26,405 | 78,918 | 134,564 | 105,323 | 71.5% | 55.9% |
| Lakeview District | 12,666 | 576 | 1,334 | 7,214 | 9,124 | 8,548 | 72,0% | 67,5% |

[1] GNOCDC, 2008. *Where is the Money?* [En ligne]. [Consulté le 03.07.2010] URL : <http://gnocdc.s3.amazonaws.com/reports/HurricaneFundingGap.pdf>

[2] The Impact of Katrina: Race and Class in Storm-Damaged Neighborhoods, John R. Logan, Professor of Sociology, Brown University, Director, Spatial Structures in the Social Sciences

[3] GNOCD, 2006. *Current housing unit damage estimates hurricanes Katrina, Rita, and Wilma.* [En ligne]. Data from FEMA. Analysis by the U.S. Department of Housing and Urban Development's Office of Policy Development and Research. [Consulté le : 03.07.2010].

URL http://gnocdc.s3.amazonaws.com/reports/Katrina_Rita_Wilma_Damage_2_12_06_revised.pdf



Lambert Planning Process: Neighborhood stakeholders participation.

D. Neighborhood Rebuilding Scenarios

The recovery plan will follow the existing neighborhood urban plan and organization with special emphasis on restoring and enhancing the residential and historic qualities of the City Park and Parkview Neighborhoods and its retail, commercial and civic areas.

A number of basic assumptions support the overall neighborhood rebuilding effort. These underlying assumptions are derived from the commitment of local, state and federal authorities to provide flood protection that makes a levee protected area livable as well as the mitigation protection afforded by stringent building codes and hurricane evacuation system.

These assumptions are:

- 1) a flood protection system will be designed to withstand future catastrophic loss from a 1 in 100 year storm and that this is a commitment by the Federal Government;
- 2) Stringent building codes will be implemented to further limit wind damage;
- 3) That there is an organized, coherent and operable Hurricane Evacuation Program; and
- 4) That the basic urban structure of the city is sound and that rebuilding will respect the basic urban structure of the City;

The rebuilding scenario is based on the assumption that the basic urban structure of District 5 and these neighborhoods is sound and that residents enjoy the urban



pattern and layout of their neighborhood and community, and that site specific improvements and strategies are the key to their reconstruction. To accomplish this goal the following actions need to be carried out:

1) Formulate policies and actions for the clean-up and maintenance of the community so as to create an adequate health environment that allows the orderly repopulation of the neighborhood and that projects an image of cleanliness and order needed to further aid community faith and momentum for the reconstruction process;

2) Identify and implement public sector financed Early Action projects to act as catalysts for neighborhood reconstruction including essential public facilities and programs identified in the Neighborhoods Rebuilding Plan and other planning efforts and documents;

3) Implement key catalytic recovery projects to spur commercial development in the City Park and Parkview Neighborhoods and Planning District 5;

4) Restore and improve neighborhood parks and open space to address not only the damage caused by Hurricane Katrina, but to also turn them into the community assets that these parks were and can become;

5) Reconstruct the utility infrastructure by the City of New Orleans Water and Sewerage Board and private-sector

entities;

6) Continuously monitor recovery programs and projects;

7) Reconstruct the street and sidewalk infrastructure damaged by the flooding and subsequent repairs to the water and sewer lines post Hurricane Katrina;

8) Assist and guide the recovery of the key private land parcels in District 5 and the City Park and Parkview Neighborhoods;

9) Develop / promote elderly housing options within the City Park and Parkview Neighborhoods where appropriate.

Neighborhood Re-population

Several factors indicate that the City Park and Parkview Neighborhoods will repopulate at an increasingly faster rate as time progresses:

- * Community faith and commitment as manifested in the organization of the community to reconstruct post-Hurricane Katrina, through the efforts of the City Park and Parkview Property Owners' Associations, the District 5 Steering Committee, and the continuous commitment of its residents to participate in the recovery efforts;

- * Pre-Hurricane Katrina indicators (2000 U.S. Census) of home ownership,

income distribution, and property values that provide a clear indication of the attractiveness of the community pre-Hurricane Katrina and auger well for its rapid recovery; and

- * Homeowners' economic assistance programs such as the Louisiana's Recovery Authority Road Home Program, FEMA's Increased Cost of Construction (ICC) financial grants program for mitigation that will provide a catalyst for private home reconstruction; and

- * Neighborhood geographical characteristics indicate that both the City Park and Parkview Neighborhoods are points of destination within the City of New Orleans with clearly defined boundaries, linked to the City's traditional urban grid and the major expressway access routes serving the region.

Challenges

While we believe that the City Park and Parkview Neighborhoods are on their way to a full recovery, a major challenge facing the neighborhood is the lack of housing assistance grants from the Louisiana Recovery Authority (LRA). Another major challenge to the total recovery of the City Park and Parkview Neighborhoods is obtaining substantial investment capital from the public sector to address infrastructure needs.

Rebuilding scenarios.



Projects identified with community leaders.

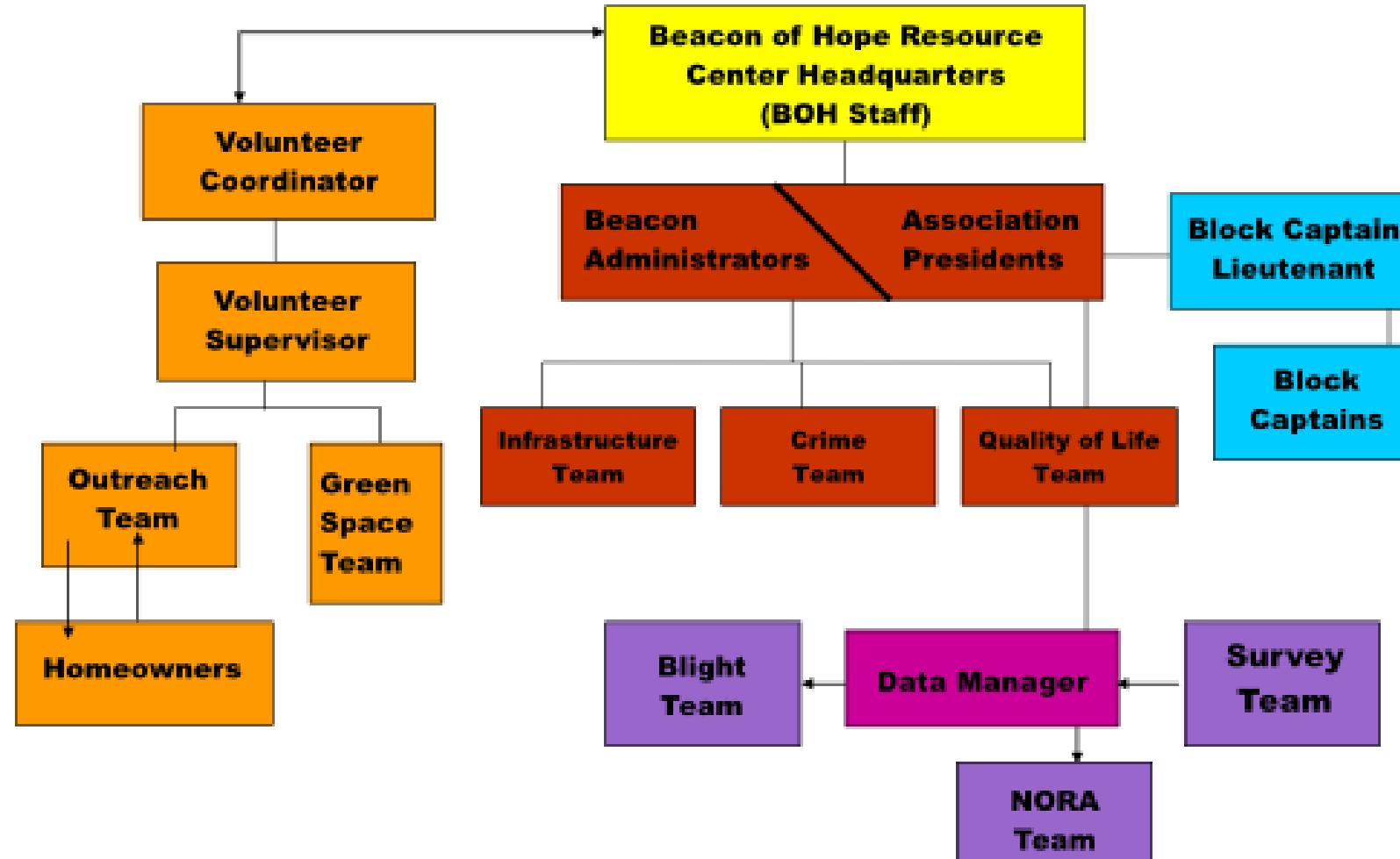
| NEIGHBORHOODS REBUILDING PLAN CITY PARK & PARKVIEW IMPLEMENTATION PRIORITY MATRIX | | | | | | | | | | | | | | | | | |
|---|--|---|-------|--------------------|----------|------|------|------|------|-----|------------------|-----|--------------------|---------------------|----------------------|-----------------------------|--------------------------|
| PROJECTS & PHASE | | POTENTIAL FUNDING SOURCE(S) | | | | | | | | | | | | | | | |
| | | Critical (1) Needed vs Desired (2) FEMA | CDPRA | Other HUD Usage | CITY CIP | GWPB | LHPA | HAND | HOME | EDA | TIF/DOB/BORDEAUX | BID | Special Tax/VA/TIF | Private Foundations | Oreleans Levee Board | Other Government & NGO's | Capital Funding Need-SAP |
| Early Action Plan | | | | | | | | | | | | | | | | | |
| Capital Projects | | | | | | | | | | | | | | | | | |
| Street Lamps Repair/Lamp Replacement | | 1 | * | * | | | | | | | | | | | | \$60,000 | |
| Natural Grounds Restoration | | 1 | * | * | | | * | | | | | | | | | \$110,000 | |
| Bayou St John Open Space Enhancement | | 1 | * | * | | | * | | | | | | | | | \$140,000 | |
| Street Signage | | 1 | * | * | | | | | | | | | | | | \$8,000 | |
| Street/Sidewalk Infrastructure Rehabilitation (Officers, Prichouse, Ogden) | | 1 | * | * | | | | | | | | | | | | \$2,500,000 | |
| Subtotal: Capital Projects | | | | | | | | | | | | | | | | \$2,818,000 | |
| Housing Initiatives and Other Policies | | | | | | | | | | | | | | | | | |
| Support RTA/Ball South System Restoration | | 1 | | | | | | | | | | | | | | | |
| Participate in Block Captain Assessment Survey | | 1 | | | | | | | | | | | | | | | |
| Actively Support Restoration, Enhancement & Operational Sufficiency of John Dibert School | | 1 | | | | | | | | | | | | | | | |
| Mid Term Plan | | | | | | | | | | | | | | | | | |
| Capital Projects | | | | | | | | | | | | | | | | | |
| Perimeter Bike Path on City Park | | 2 | * | * | * | | | | * | * | | | | | | \$500,000 | |
| Subtotal: Capital Projects | | | | | | | | | | | | | | | | \$500,000 | |
| Long Term Plan | | | | | | | | | | | | | | | | | |
| Capital Projects | | | | | | | | | | | | | | | | | |
| Traffic Control Signal at City Park/Dunbar, Signal Warrant Study | | 3 | * | * | * | | | | | | | | | | | \$60,000 | |
| Traffic Calming at City Park Avenue | | 3 | * | * | * | | | | | | | | | | | \$15,000 | |
| Landscape Restoration at Harding Street Park | | 3 | * | * | * | | | | | | | | | | | \$75,000 | |
| Paint and Restore Magnolia Bridge | | 3 | * | * | * | | | | | | | | | | | \$300,000 | |
| Subtotal: Capital Projects | | | | | | | | | | | | | | | | \$450,000 | |
| CAPITAL PROJECTS TOTAL | | | | | | | | | | | | | | | | \$3,768,000 | |

Each plan (46) was incorporated in a 'City-Wide Rebuilding Plan'. Total \$4.4B.



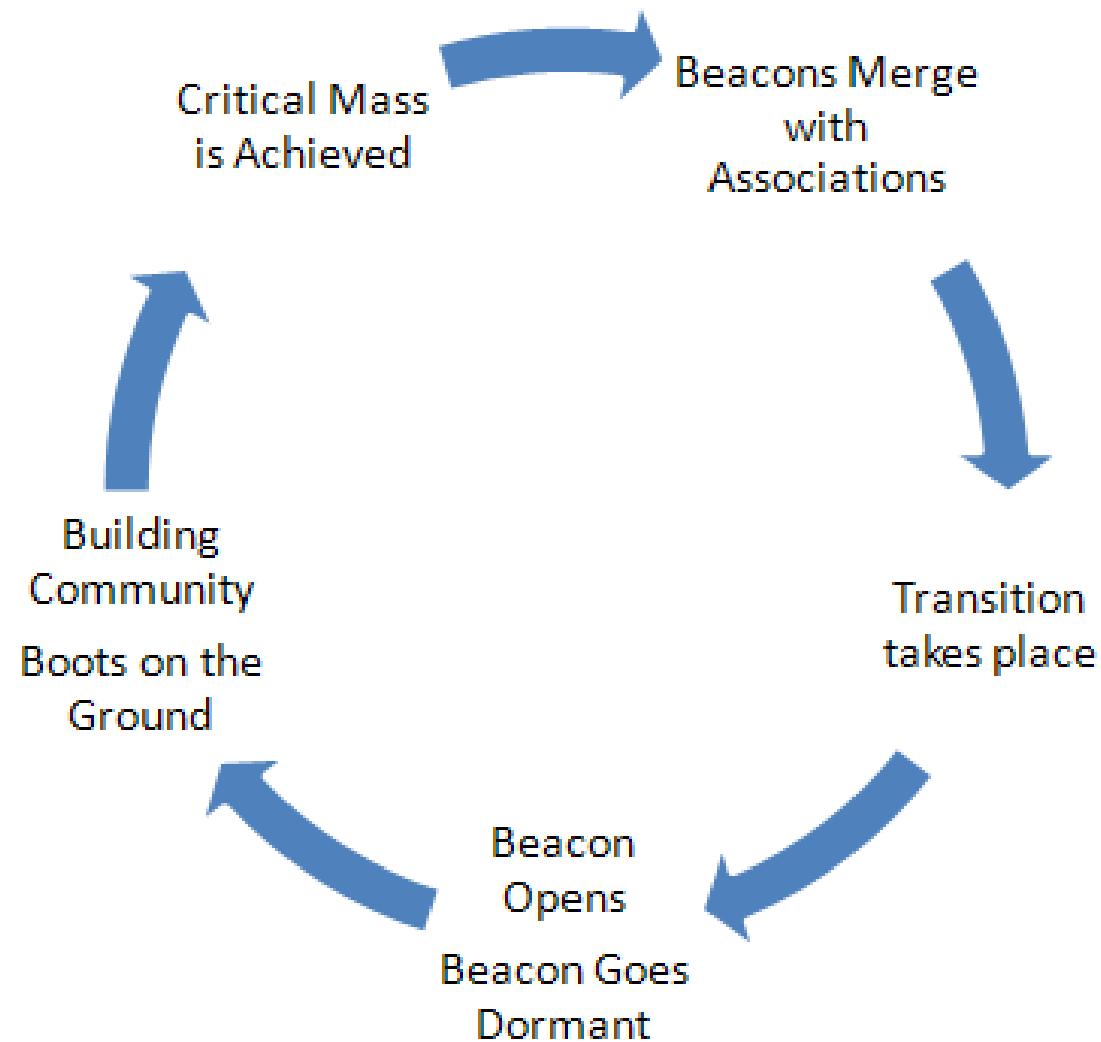
BEACON M.O.D.E.L.

(MAPPING - OUTREACH - DEVELOPMENT - ENGAGEMENT - LEADERSHIP)

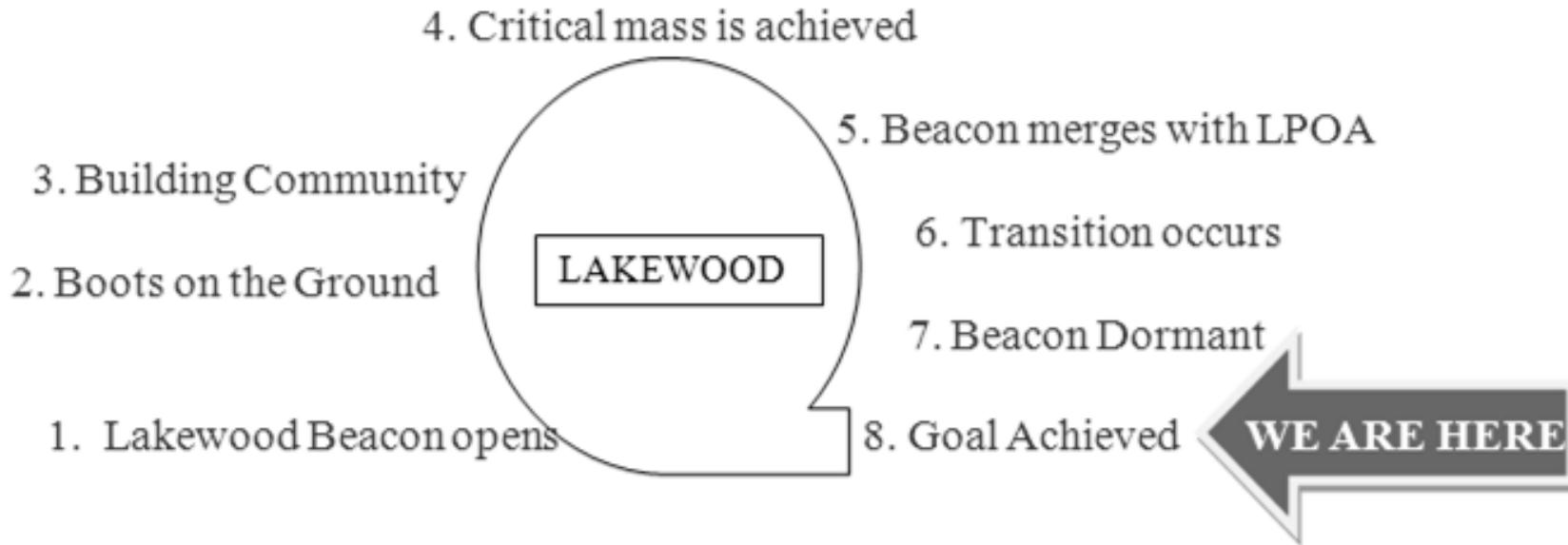




Data from GNOCDC, 2010. *Percent Recovery by Neighborhood in New Orleans, June 2010*. [En ligne]. Source: Valassis Residential and Business Database. [Mise à jour 01.07.2010] [consulté le 05.07.2010]
URL : <http://www.gnocc.org/RecoveryByNeighborhood/index.html>

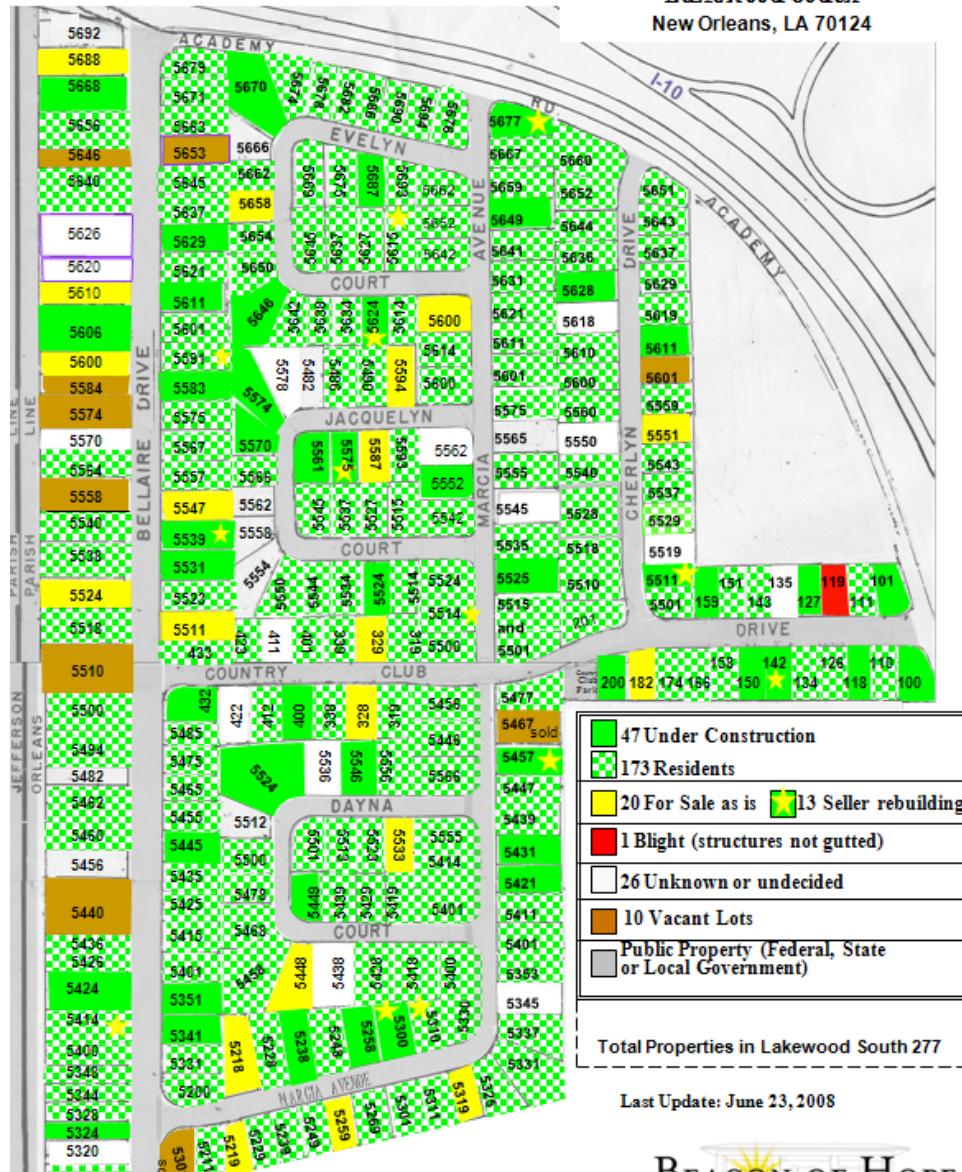


YEAR ONE



Lakewood South

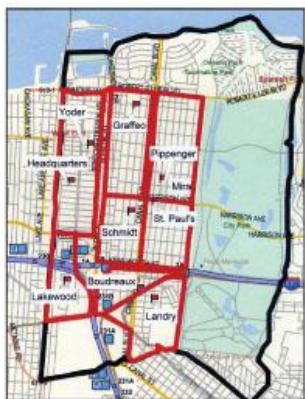
New Orleans, LA 70124





No Place Like Home

*-A self-guided Tour of Lakeview-
and the Lakewood Neighborhoods*



JOIN US!

Sunday April 22, 2007
1:00 p.m. to 5:00 p.m.

Main registration at St. Paul's
(Canal Blvd. at Harrison Ave)

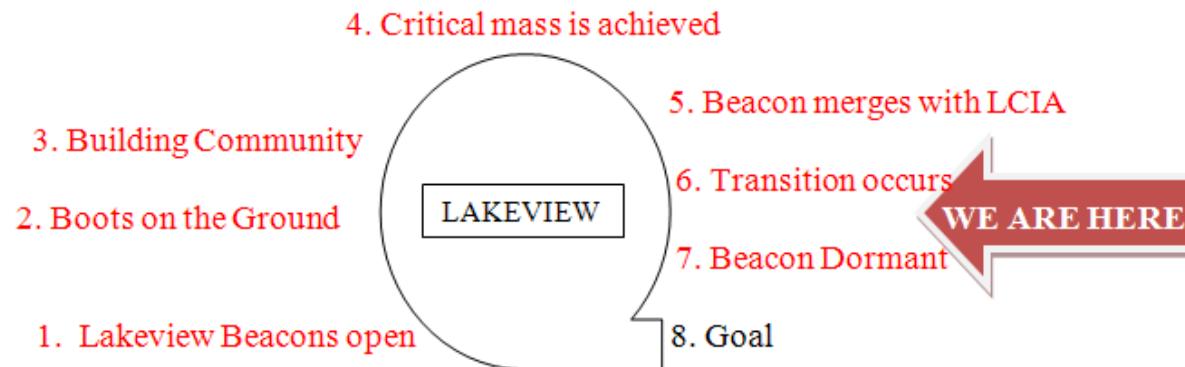
Please join the Beacon of Hope Resource Center
in welcoming returning residents
and potential residents back home.

Food ~ Music ~ Beautiful Homes!

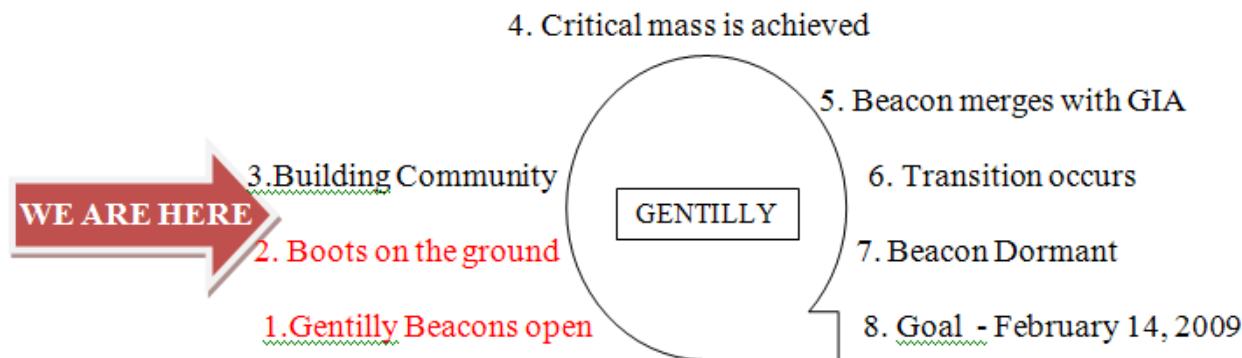
More info at www.lakewoodbeacon.org



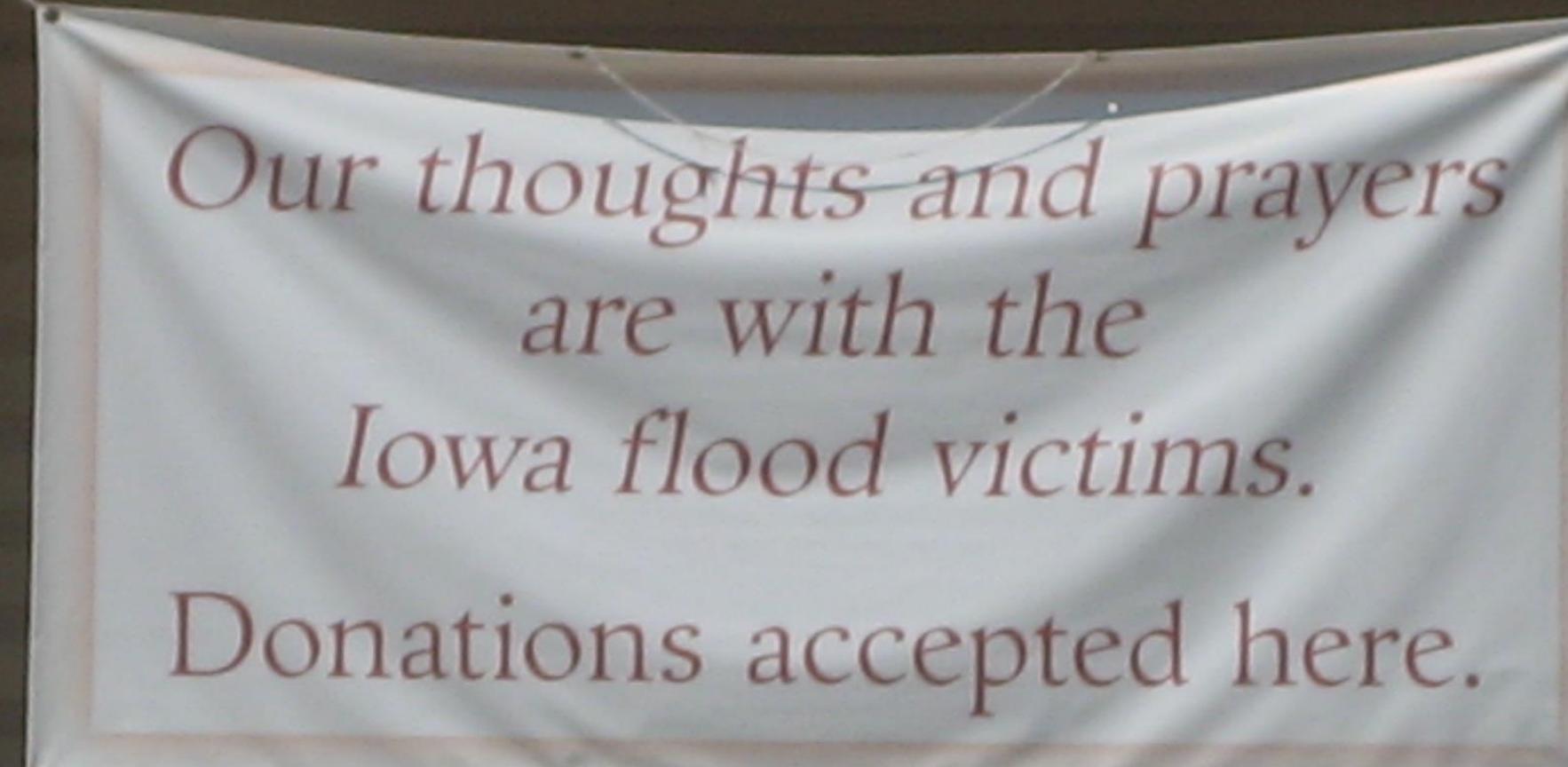
YEAR TWO



YEAR THREE



love



Our thoughts and prayers
are with the
Iowa flood victims.
Donations accepted here.



Limits of innovative projects:

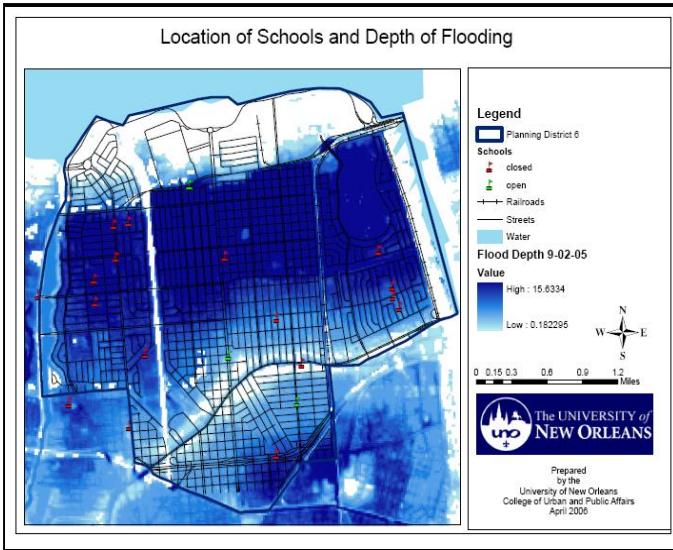


Photos: Isabelle_Thomas



@Isabelle_Thomas

Lack of planning coordination

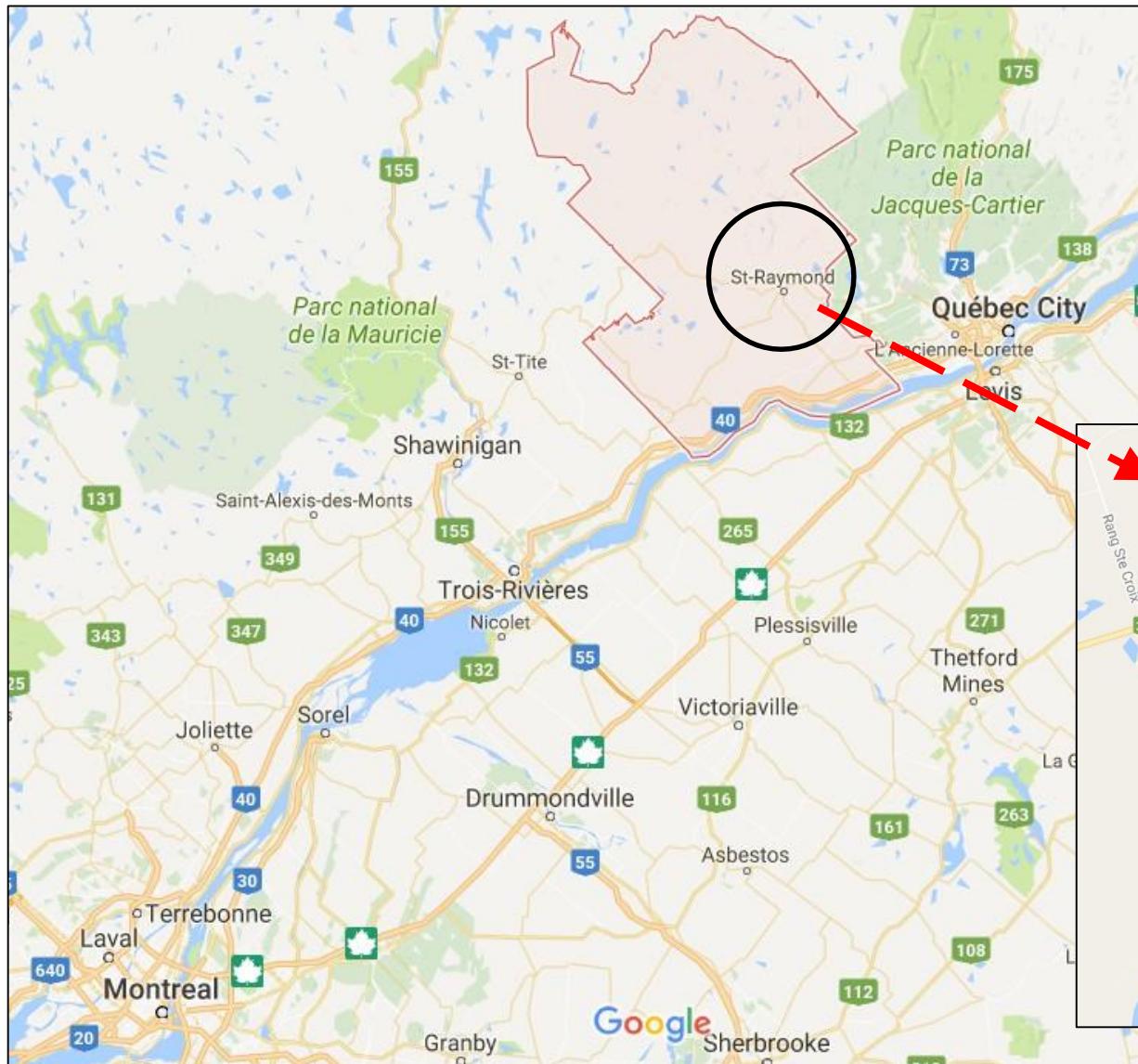


Photos: Isabelle_Thomas

2.2. The case St Raymond, Quebec : coping capacity and knowledge building



RMC of Portneuf



Saint-Raymond
rue verte
DE LA NATURE



Municipality of Saint-Raymond



Source: www.lapresse.ca



Source: www.lapresse.ca



Source: www.lapresse.ca

Characterizing sensitivity

Social sensitivity:

- Socio-economic characteristics that exacerbate people's vulnerability to disaster risk

Territorial sensitivity:

- Critical infrastructures or services that are susceptible to disaster risk, and can potentially extend vulnerability across an affected territory.

Adaptive capacity:

- Capacity to mobilize dynamic resources that allow an individual or group of individuals to better their condition in regards to disaster risk, whether in the short- or long-term.

EVALUATING SOCIAL SENSITIVITY



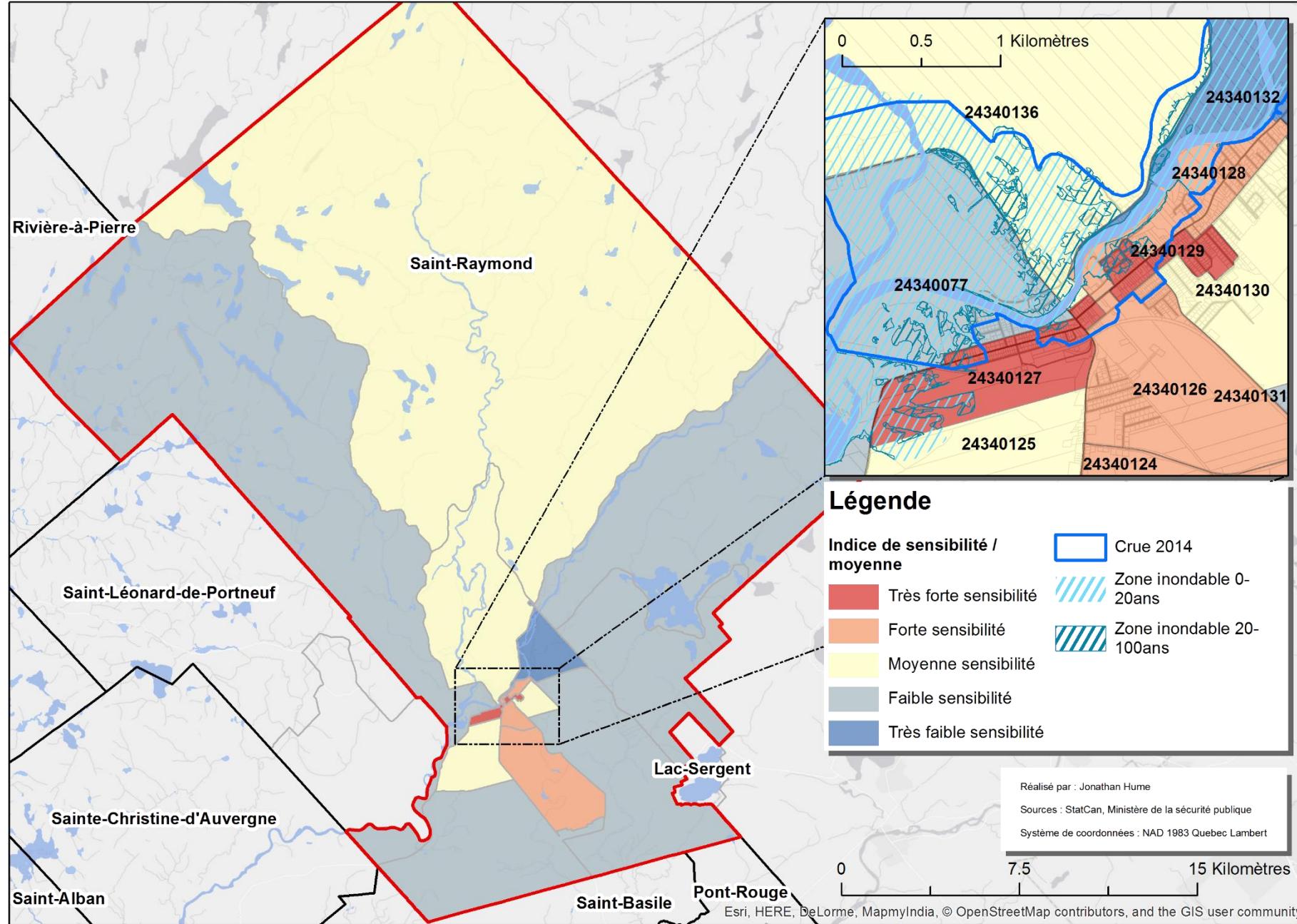
Results

| Component | Name | Indicators |
|-----------|---------------------------------|---|
| 1 | Pauvreté, elderlies, and rental | Pourcentage of renters |
| | | Pourcentage of buildings with 2 or storeys |
| | | Poercentage of people living alone |
| | | Pourcentage of the population spending more than 30% of their income on rental or housing costs |
| | | Pourcentage of the population 65 years old and more |
| | | Median household income |
| 2 | Education and assets | Average house value |
| | | Pourcentage of the population 25 years old and more without a diploma |
| 3 | Economic dependency | Unemployment rate |
| | | Inactivity rate |
| 4 | Density and youth | Pourcentage of families with 2 or more children |
| | | Total population |
| | | Pourcentage of the population 14 years old and under |

Portrait de la sensibilité sociétale par analyse en composante principale (ISSACP)

Ville de Saint-Raymond, 2006

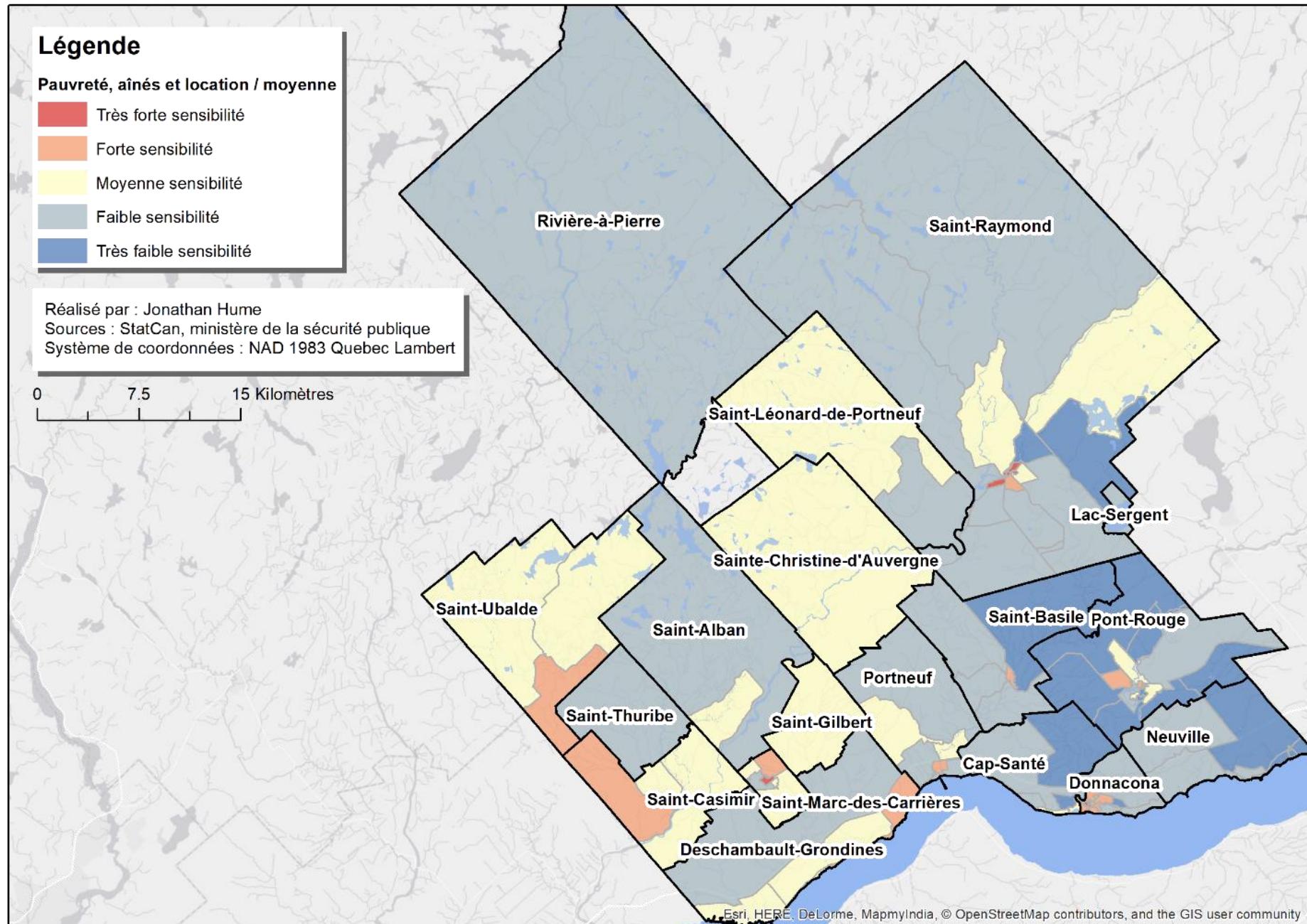
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Source: Thomas et al. (2016b)

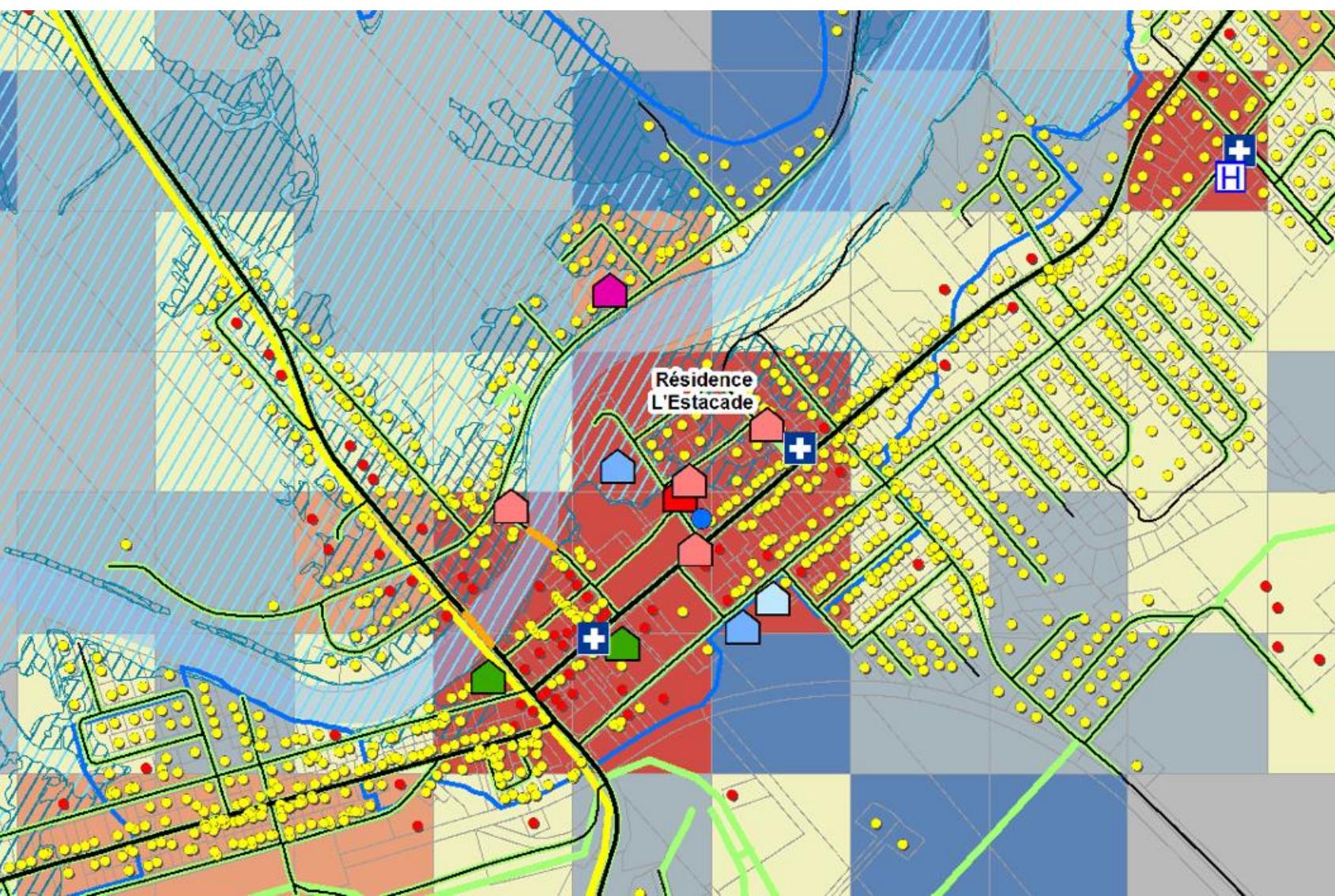
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Portrait de la composante 1 : Pauvreté, ainés et location MRC de Portneuf, 2006



EVALUATING TERRITORIAL SENSITIVITY





Légende

- Résidences (1,120)
- Commerces et entreprises (113)
- Hôtel de ville (1)
- Hôpital (1)
- Services de la santé (3)
- Soutien psychologique (1)
- Pharmacies (2)
- Résidences pour personnes âgées (5)
- Caserne de pompier (1)
- CPE et garderies (1)
- Écoles primaires (3)
- Écoles secondaires (0)
- Ponts (3)
- Aqueducs et égouts
- Crue 2014
- Zone inondable 20 à 100 ans
- Zone inondable 0 à 20 ans
- Réseau supérieur
- Réseau local
- Gazoduc

Sensibilité territoriale / moyenne

- Très forte sensibilité
- Forte sensibilité
- Moyenne sensibilité
- Faible sensibilité
- Très faible sensibilité

Source: Thomas et al. (2016b)

EVALUATING ADAPTIVE CAPACITY



What is adaptive capacity?

- **Definition :**
 - The capacity of individuals or groups of individuals to mobilize dynamic resources that enable them to transform their actual state into a newer better one to better cope with disaster risk
 - Short and long term
 - Planned or reactive (spontaneous)
- **Why adaptive capacity?**
 - Reduces vulnerability
 - Increases resilience
 - Can manage uncertainties by increasing threshold tolerance to disaster risk

Portrait de l'indice de la capacité d'adaptation (IAdapt) MRC de Portneuf, 2006

N



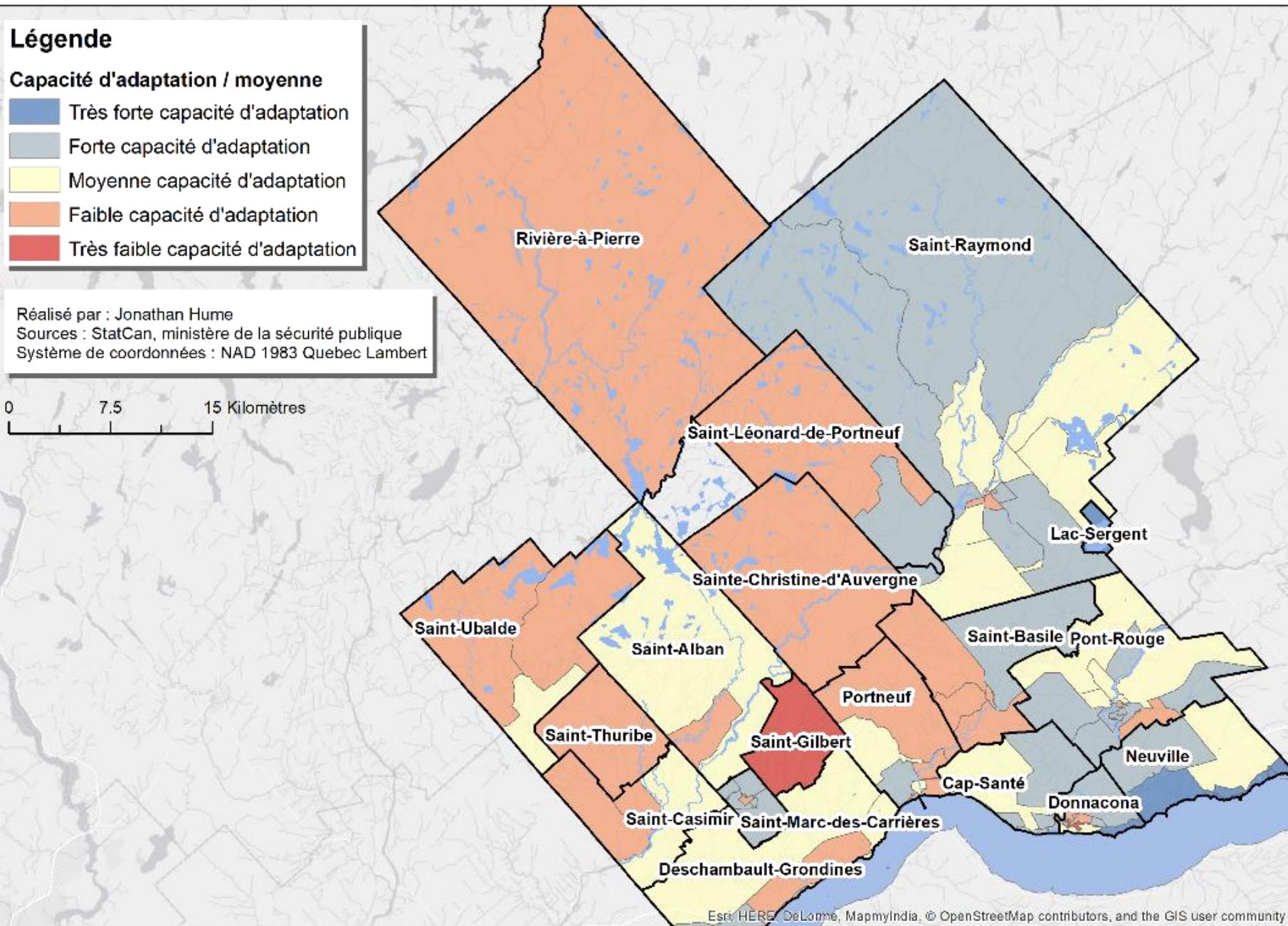
Légende

Capacité d'adaptation / moyenne

- Très forte capacité d'adaptation
- Forte capacité d'adaptation
- Moyenne capacité d'adaptation
- Faible capacité d'adaptation
- Très faible capacité d'adaptation

Réalisé par : Jonathan Hume
Sources : StatCan, ministère de la sécurité publique
Système de coordonnées : NAD 1983 Quebec Lambert

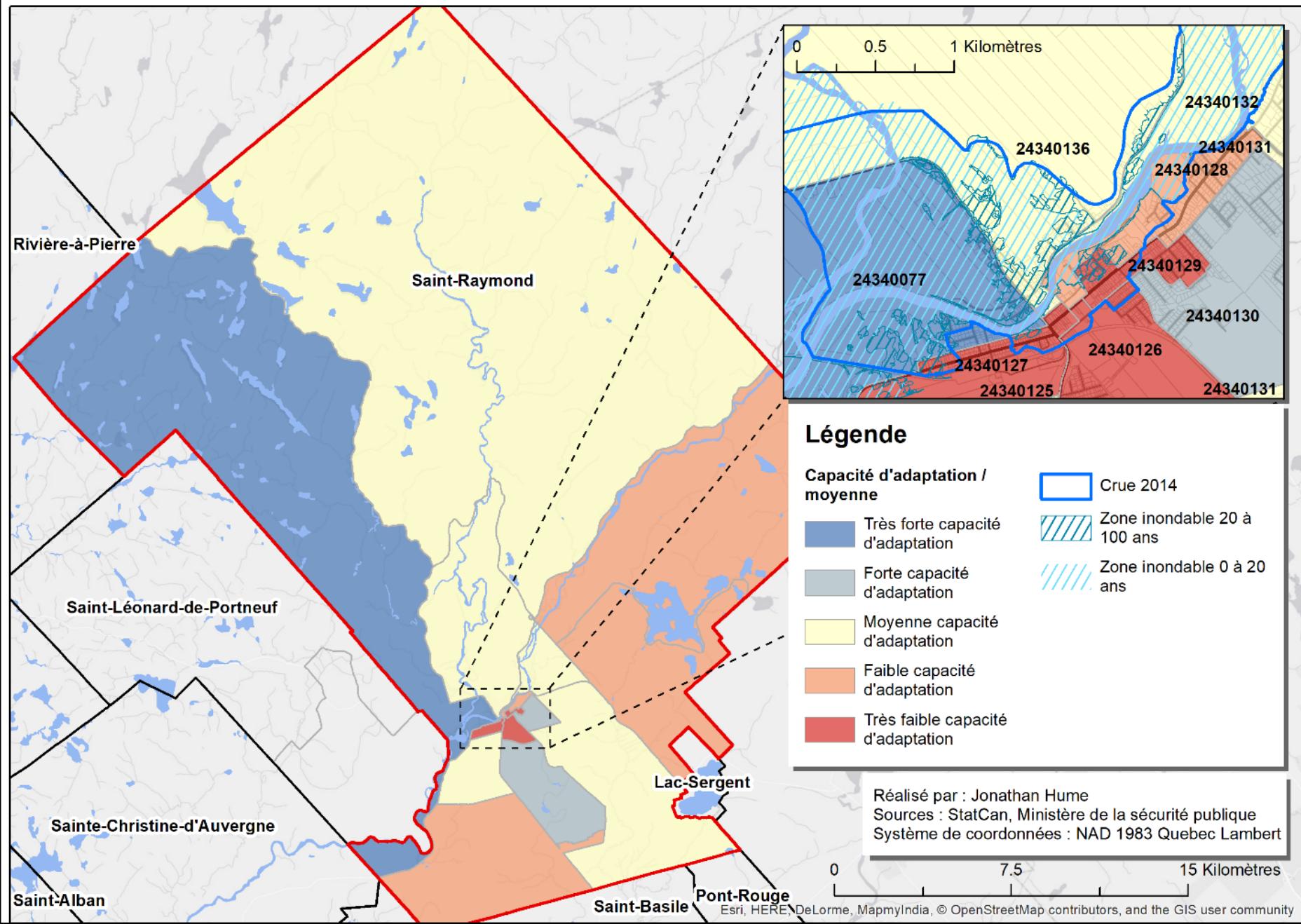
0 7.5 15 Kilomètres



Source: Thomas et al. (2016b)

Portrait de l'indice de capacité d'adaptation (IAdapt) Ville de Saint-Raymond, 2006

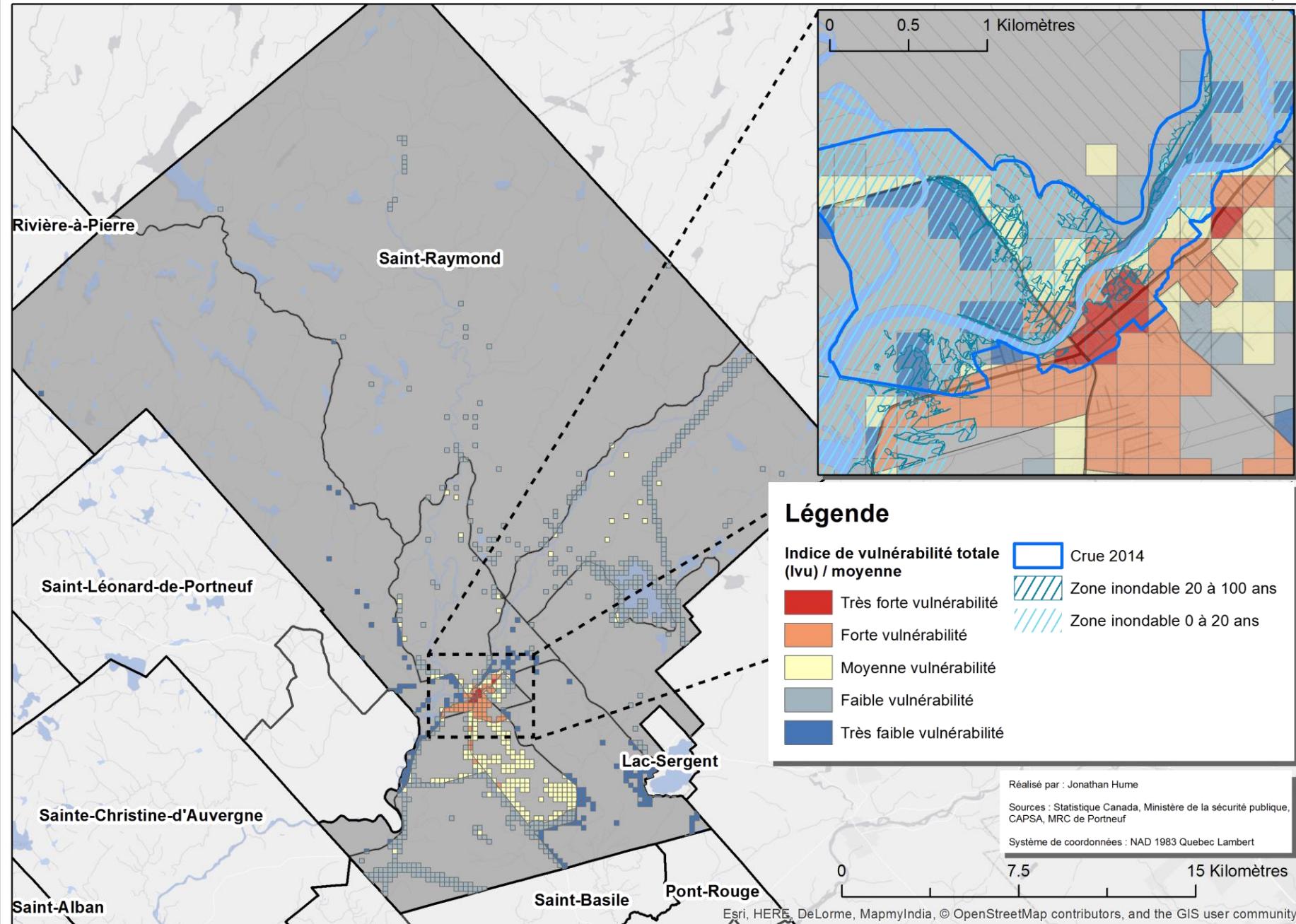
N



Source: Thomas et al. (2016b)

Portrait de l'indice de vulnérabilité totale (IVu) avec un maillage de 200 m par 200 m Ville de Saint-Raymond, 2016

N



Source: Thomas et al. (2016b)

ACCESSIBILITY ASSESSMENT TOOL



Evaluating accessibility in normal times

Légende

- Caserne de pompier
- Caserne de pompier St-Raymond
- Pharmacie
- École primaire

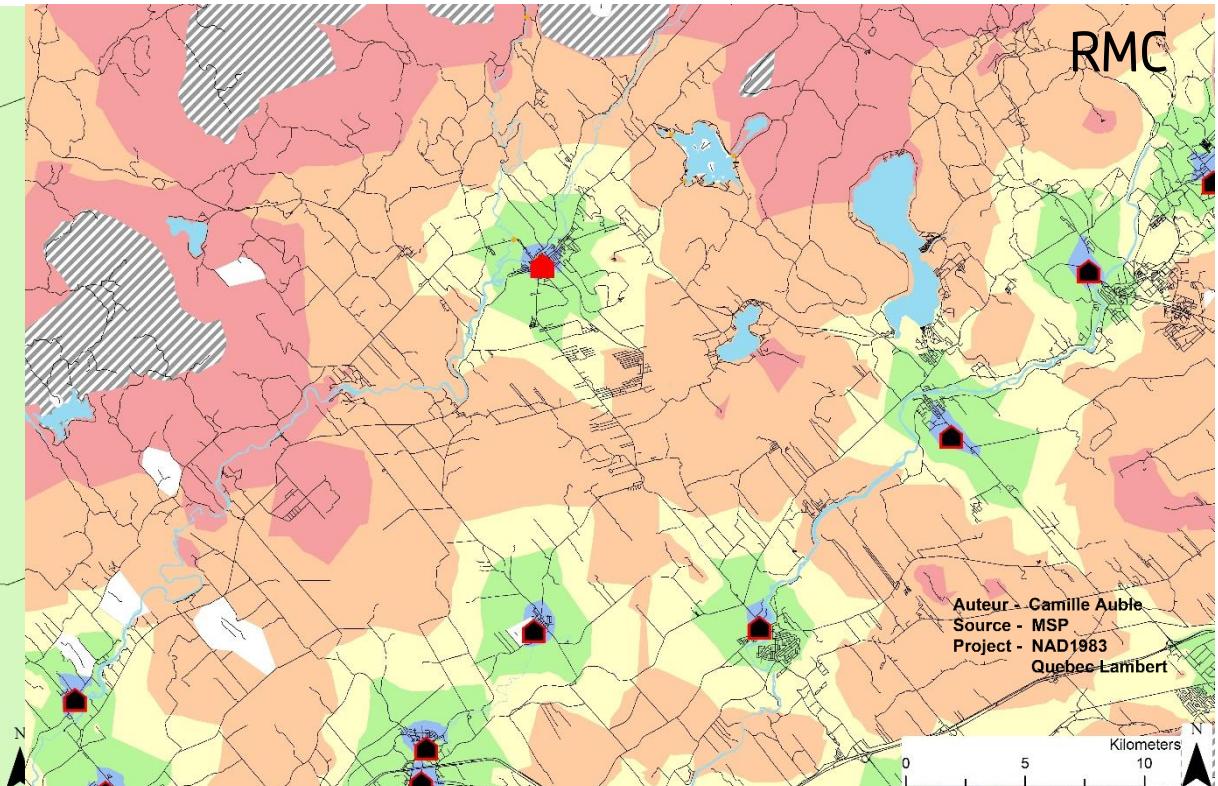
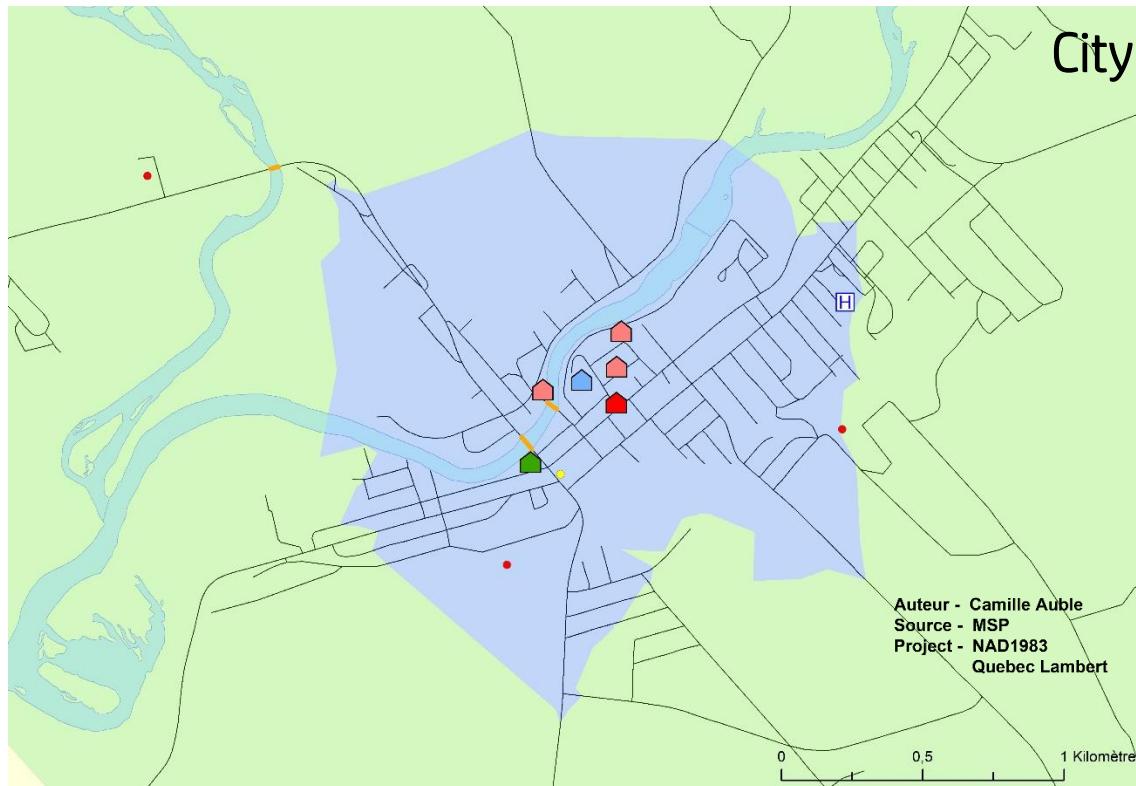
- Rési. pers. âgées
- Entreprise
- Hôtel, motel
- Hôpital

- Réseau Routier
- Ponts
- Passage inaccessible
- Rivière

Isochrones (minutes)

- 0 à 1
- 1 à 3
- 3 à 6
- 6 à 10
- 10 à 15
- 15 et +

TRAVEL TIMES FROM FIRE DEPARTMENT IN NORMAL SITUATION



Evaluating accessibility in disaster situation

Légende

- Caserne de pompier
- Caserne de pompier St-Raymond
- Pharmacie
- École primaire

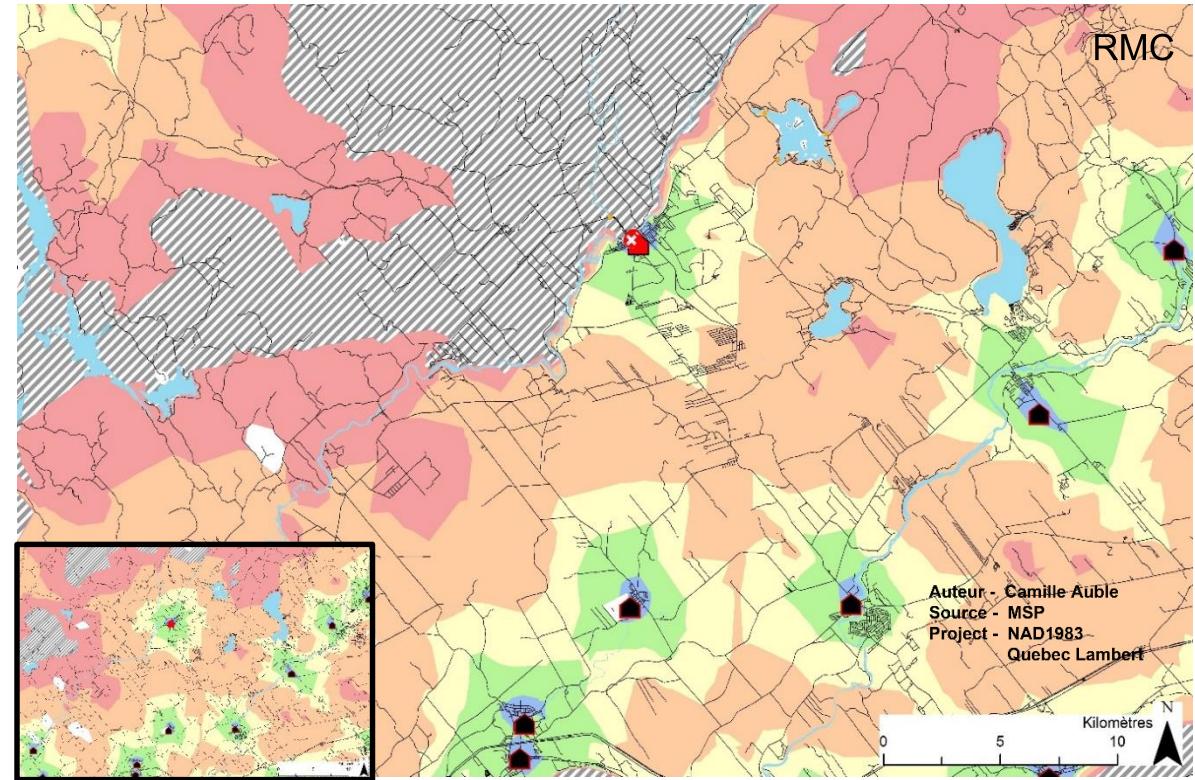
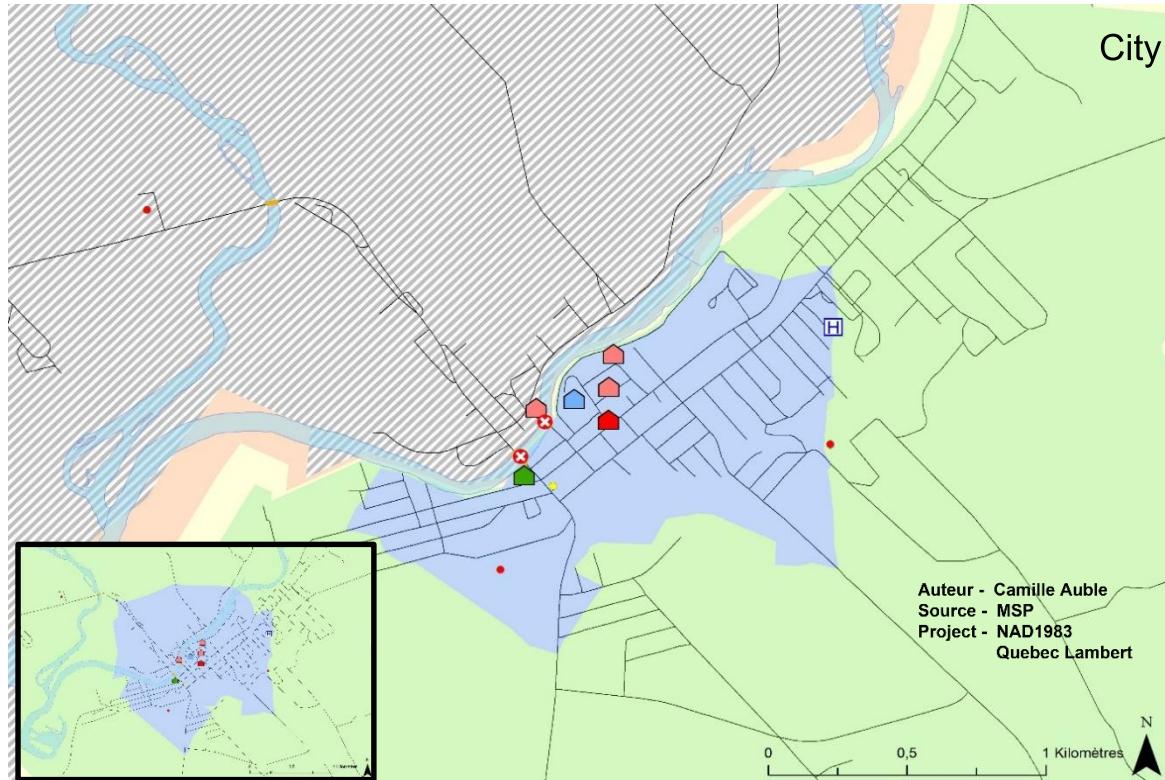
- Rési. pers. âgées
- Entreprise
- Hôtel, motel
- Hôpital

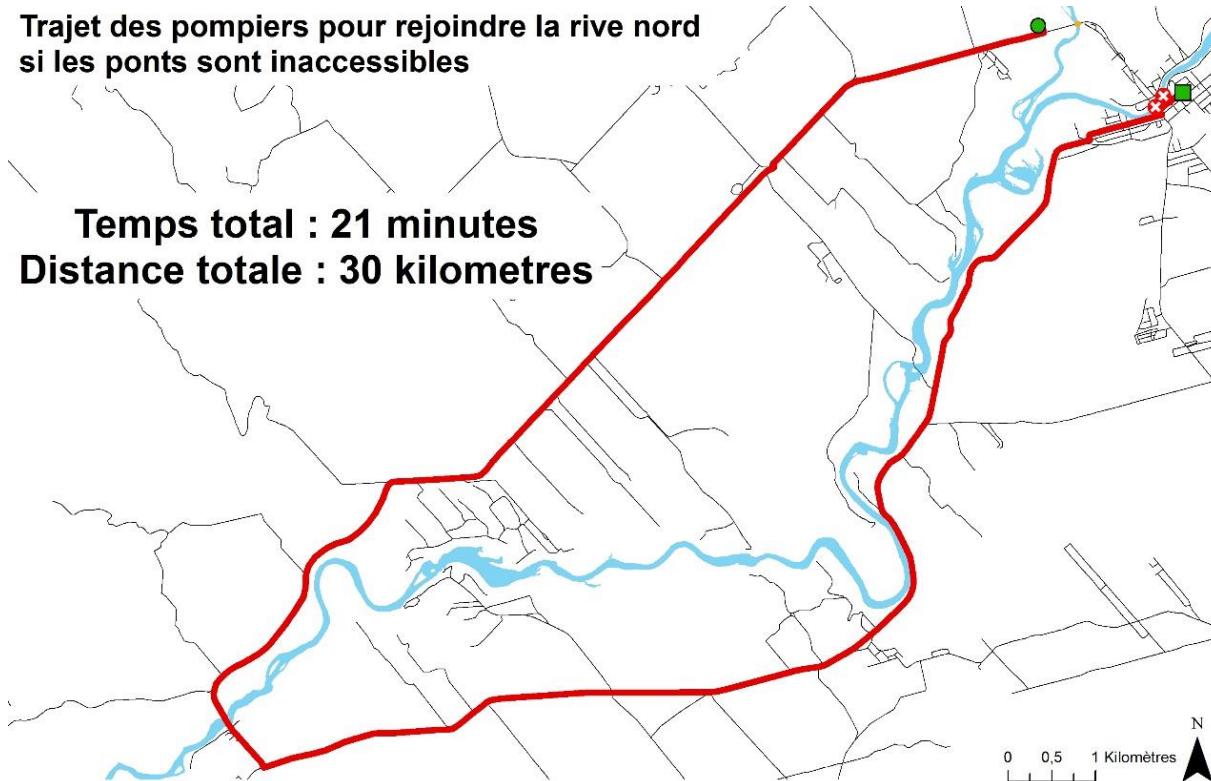
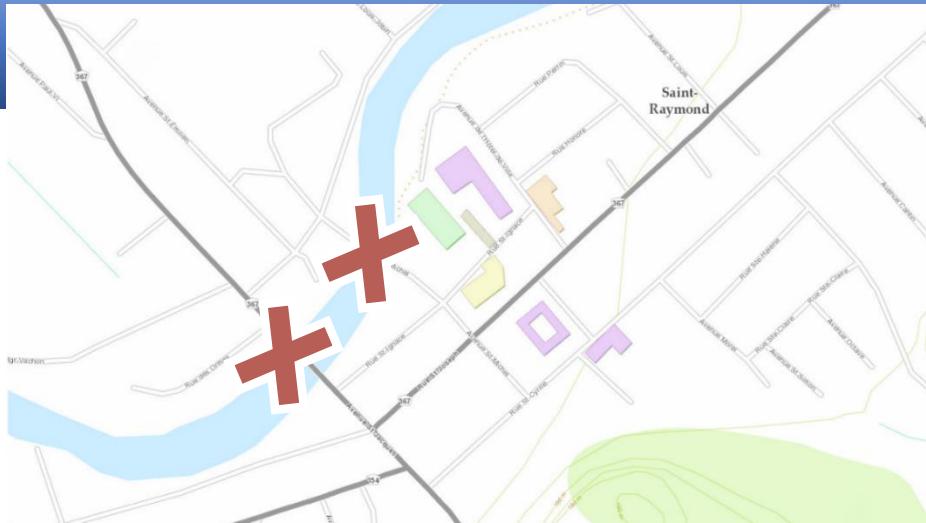
- Réseau Routier
- Ponts
- ✖ Passage inaccessible
- Rivière

Isochrones (minutes)

- 0 à 1
- 1 à 3
- 3 à 6
- 6 à 10
- 10 à 15
- 15 et +

TRAVEL TIMES FROM FIRE DEPARTMENT WHEN BRIDGES ARE INACCESSIBLE



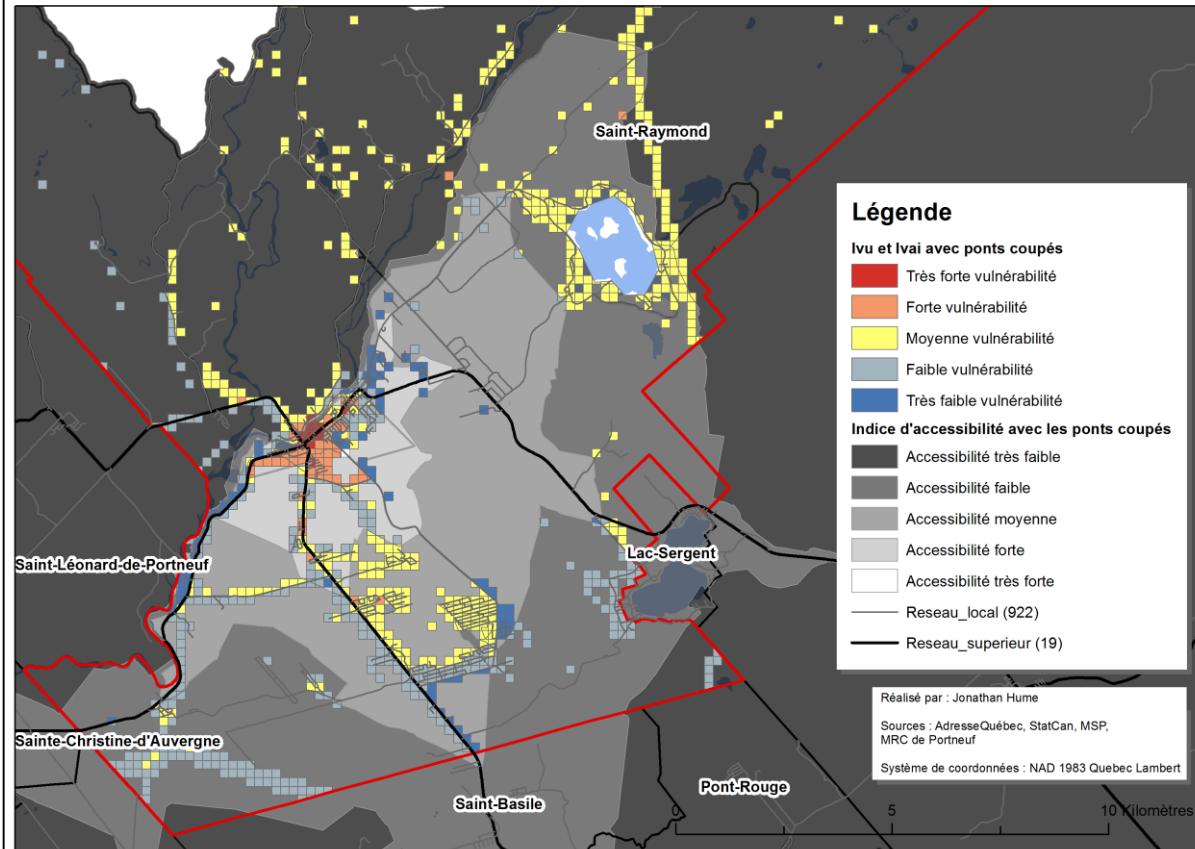


- Scenario where the bridges are cut-off (St-Jacques et St-Michel)
- Bridges are located in the flood zone
- Most infrastructures and services located on the south bank

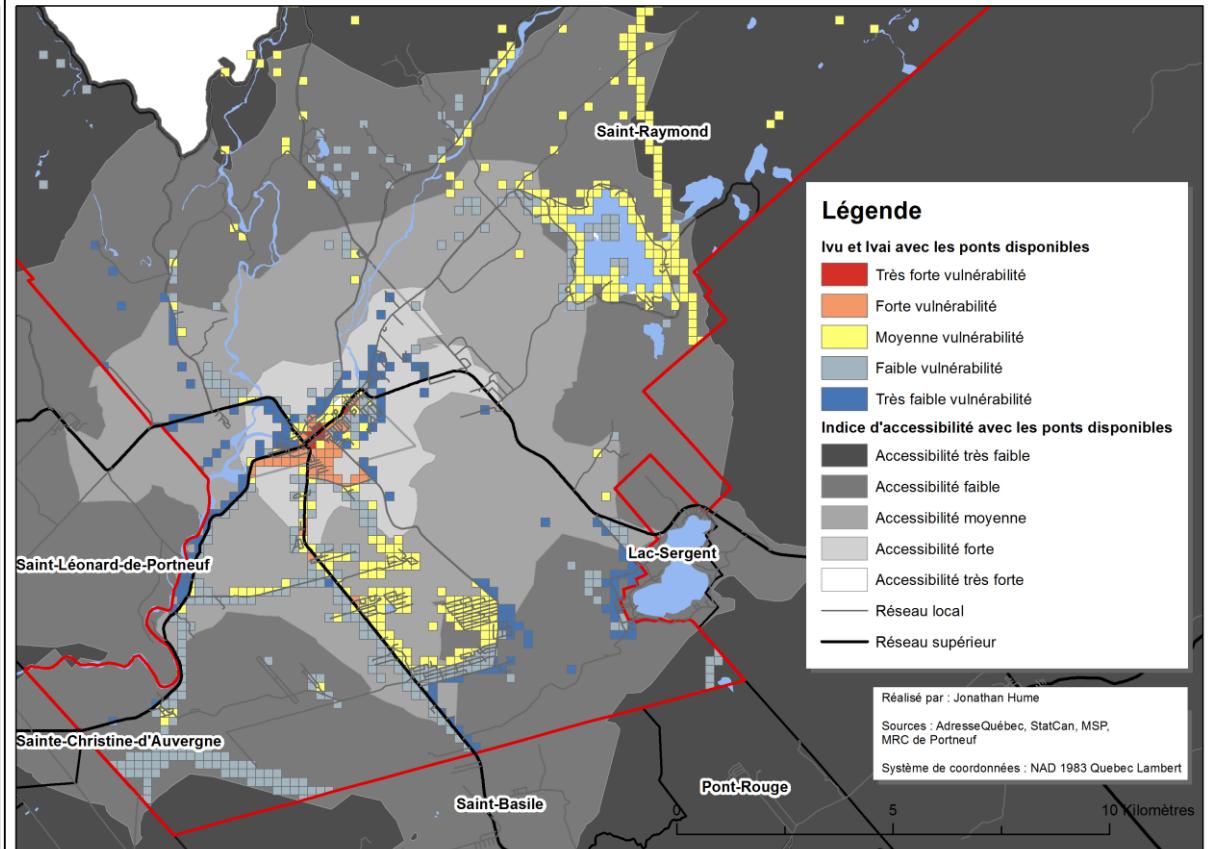
TOWARDS A COMPREHENSIVE VULNERABILITY ASSESSMENT TOOL



Indice de vulnérabilité (Ivu) et Indice de vulnérabilité d'accessibilité aux infrastructures (Ivai)
avec les ponts coupés dans un maillage de 200 m par 200 m, Ville de Saint-Raymond, 2016



Indice de vulnérabilité (Ivu) et Indice de vulnérabilité d'accessibilité aux infrastructures (Ivai)
avec les ponts disponibles dans un maillage de 200 m par 200 m, Ville de Saint-Raymond, 2016

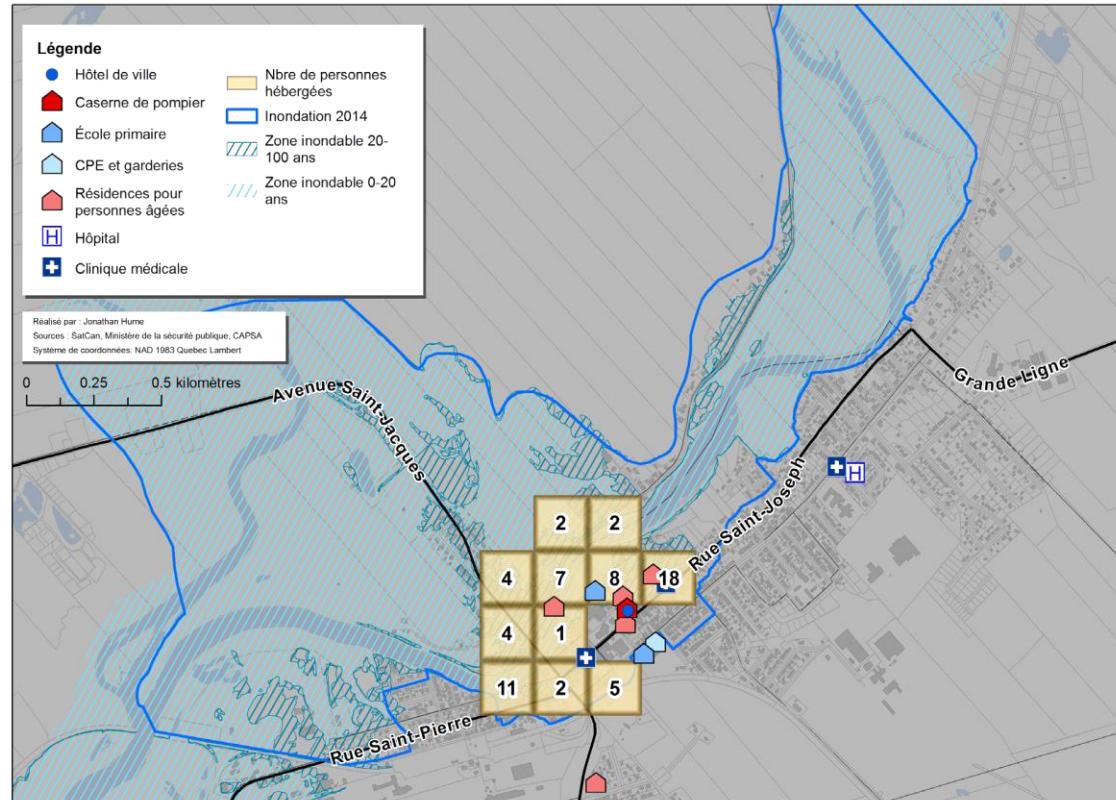




SURVEYS : CAPSA, COMITÉ DE RIVIÈRE, UNIVERSITÉ DE MONTRÉAL

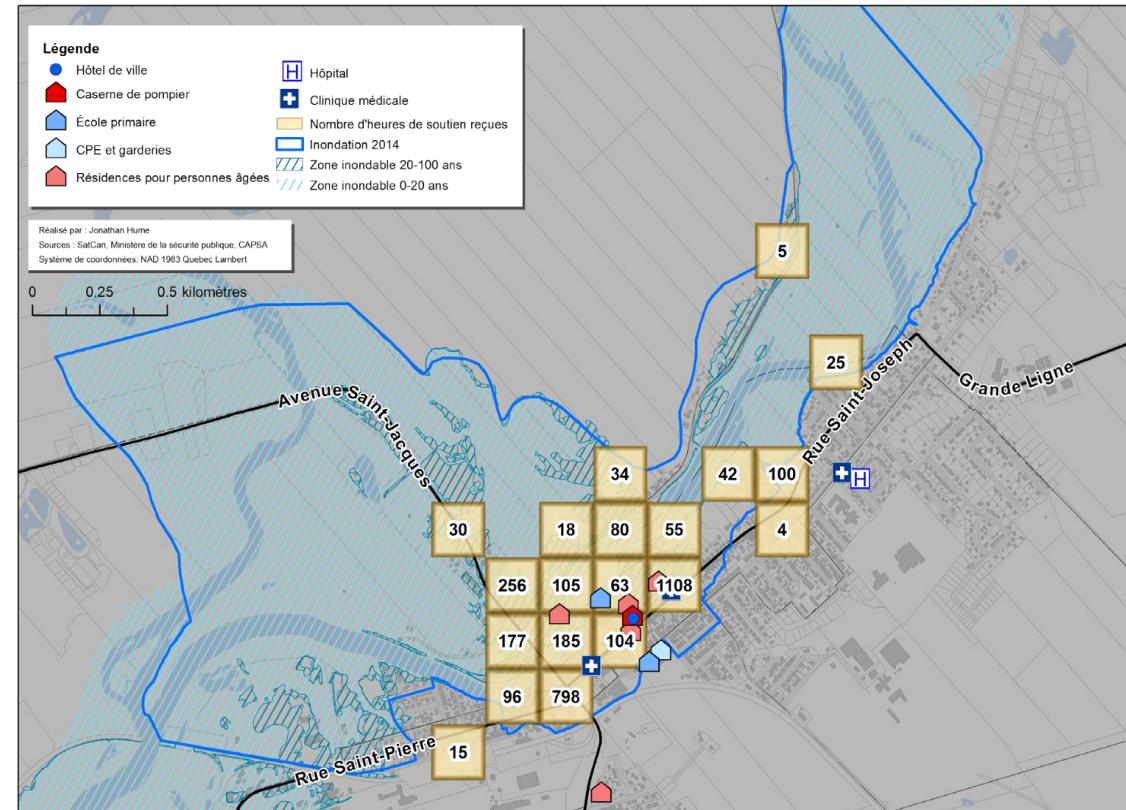
CAPSA and Comité Rivière survey data

Nombre de personnes hébergées par des membres de leur famille lors de la crue de 2014
Municipalité de Saint-Raymond



Source: Thomas et al. (2016b)

Nombre d'heures de soutien reçues données par la communauté lors de la crue de 2014
Municipalité de Saint-Raymond

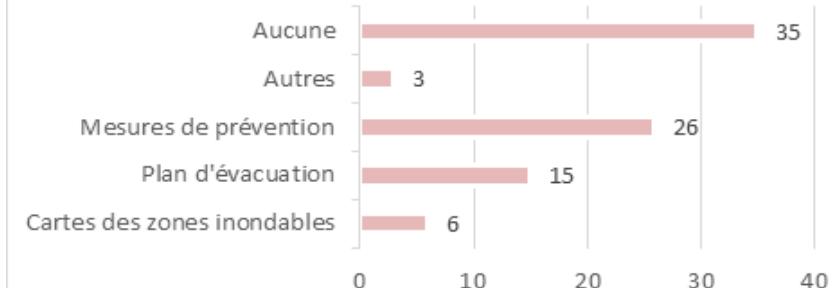


Source: Thomas et al. (2016b)

UdeM research team survey data

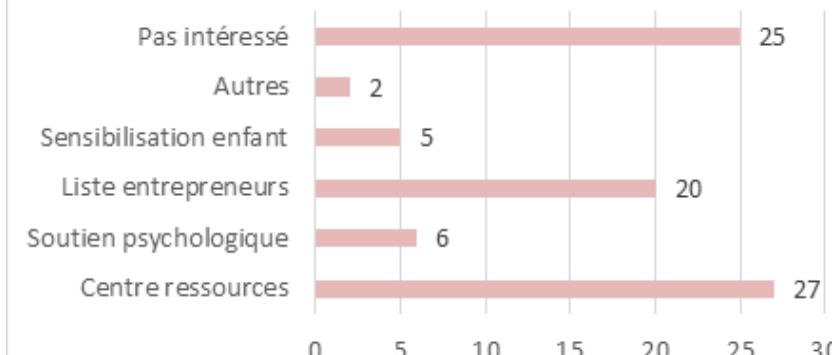
- 85 Saint-Raymond residents surveyed
- Focuses of reconstruction methods and post-disaster adaptation and knowledge acquisition
- Georeferenced data, which allows for mapping
- Sheds some light on adaptive capacity
 - Return to normal Vs “Build back better”
 - Types of disaster aid needed Vs given
 - Learning and capacity building
 - Awareness
- Added-value to quantitative data produced from the bottom-up

Q15 - A quelle information sur les inondations souhaiteriez-vous avoir accès afin d'améliorer la sécurité de votre maison ?



Source: Thomas et al. (2016b)

Q19 - De quoi avez-vous besoin à la suite d'une inondation ?



Source: Thomas et al. (2016b)

- Partnership project with the ministère de la Sécurité publique (MSP) in Quebec and with the Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (CEREMA) in France.
- Tool capable of assessing multi-risk vulnerability and adaptable to local and regional governments.
- Tool that creates awareness for government officials and citizens
- Implementation within Quebec, but also across Canada

Collaborators:

OBV

City

MSP

University of Laval

University of Montreal

CEREM



Direction territoriale Méditerranée



UNIVERSITÉ
Laval

Université
de Montréal



Photos: @ COPARI

Ce projet a été financé par une mesure du ministère de la Sécurité publique relevant du Plan d'action 2013-2020 sur les changements climatiques, financé par le Fonds vert du ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques.

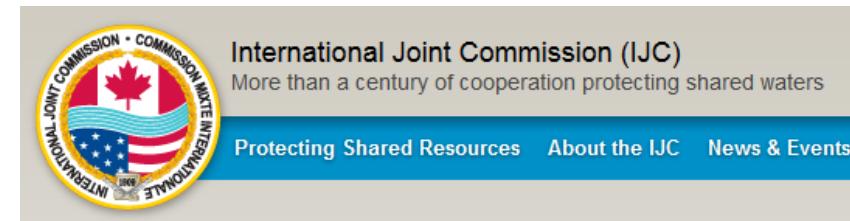
Ce projet a été réalisé avec la participation et la coordination de M. Pascal Marceau, du ministère de la Sécurité publique, et coordonnateur du Groupe de travail Inondation du Comité sur la prévention des sinistres naturels.

3. From knowledge to action :



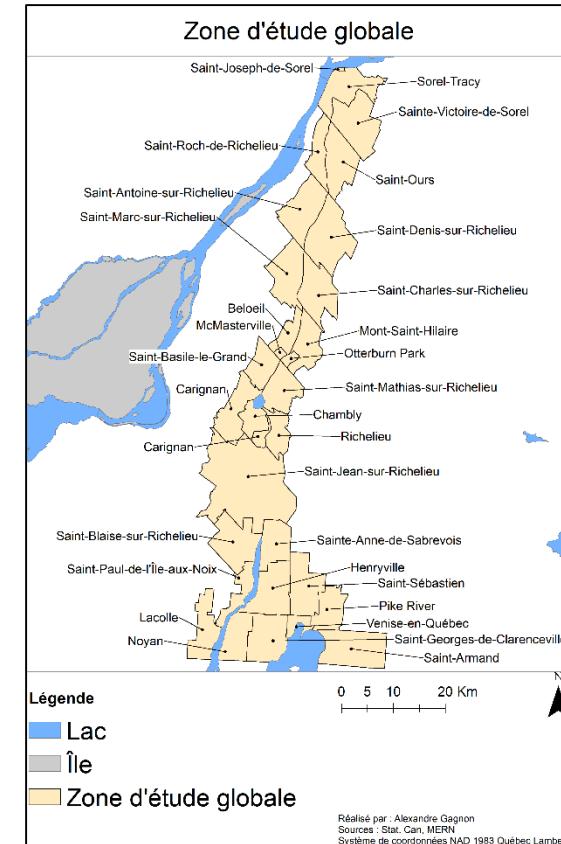
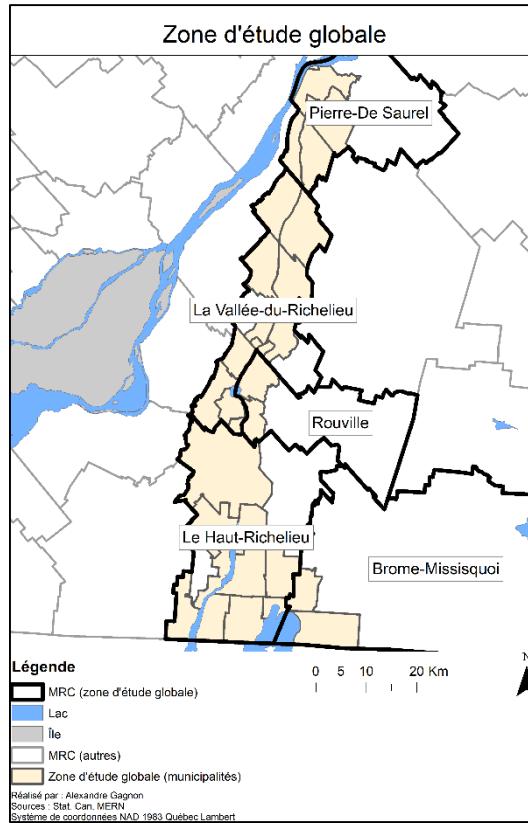
Photo: Noé Bunzli

3.1 International collaboration and knowledge sharing: Joint International Commission, Canada, United states

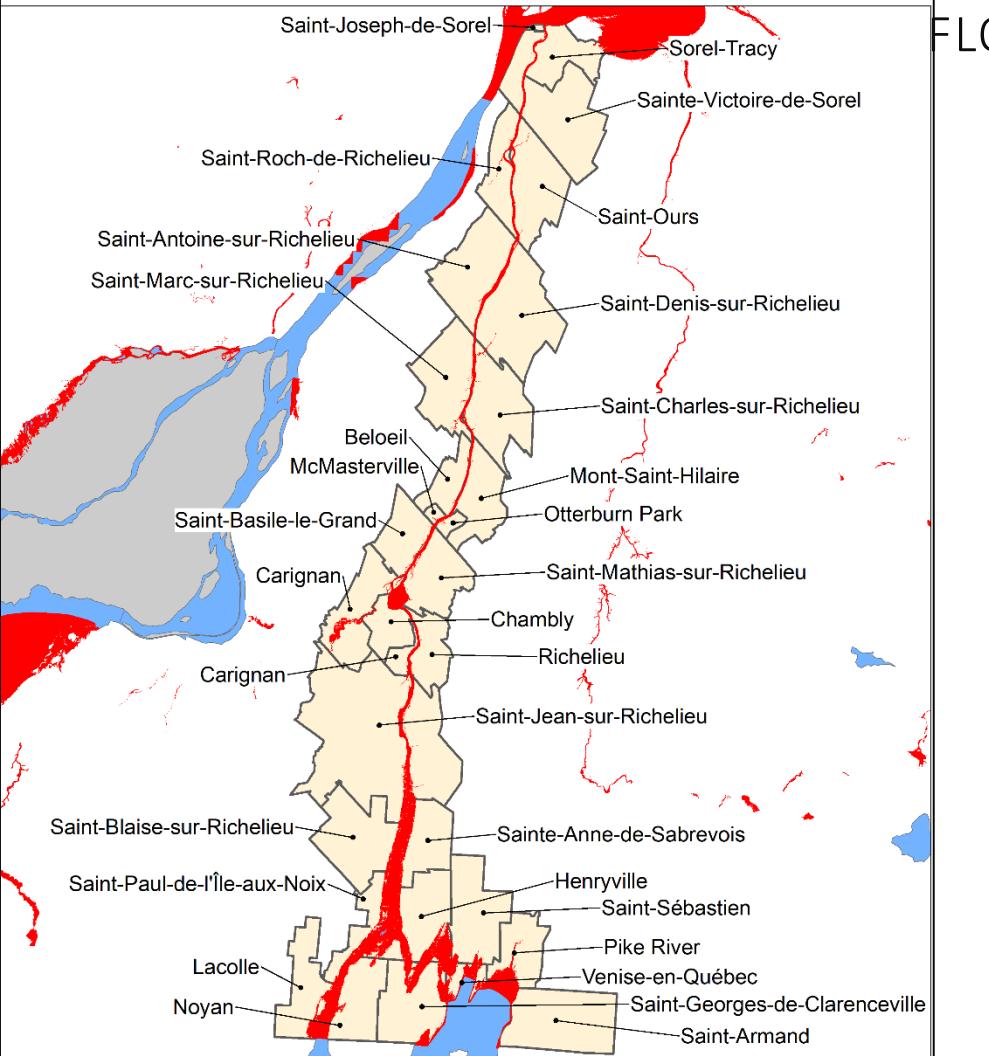


RESEARCH AREA:

3 STATES: VERMONT, STATE OF NEW YORK, PROVINCE OF QUEBEC



Zones inondables (faible courant et grand courant) - BDZI
Zone d'étude globale



Légende

■ Zones inondables (faible et grand courant) (BDZI)

■ Lac

■ Île

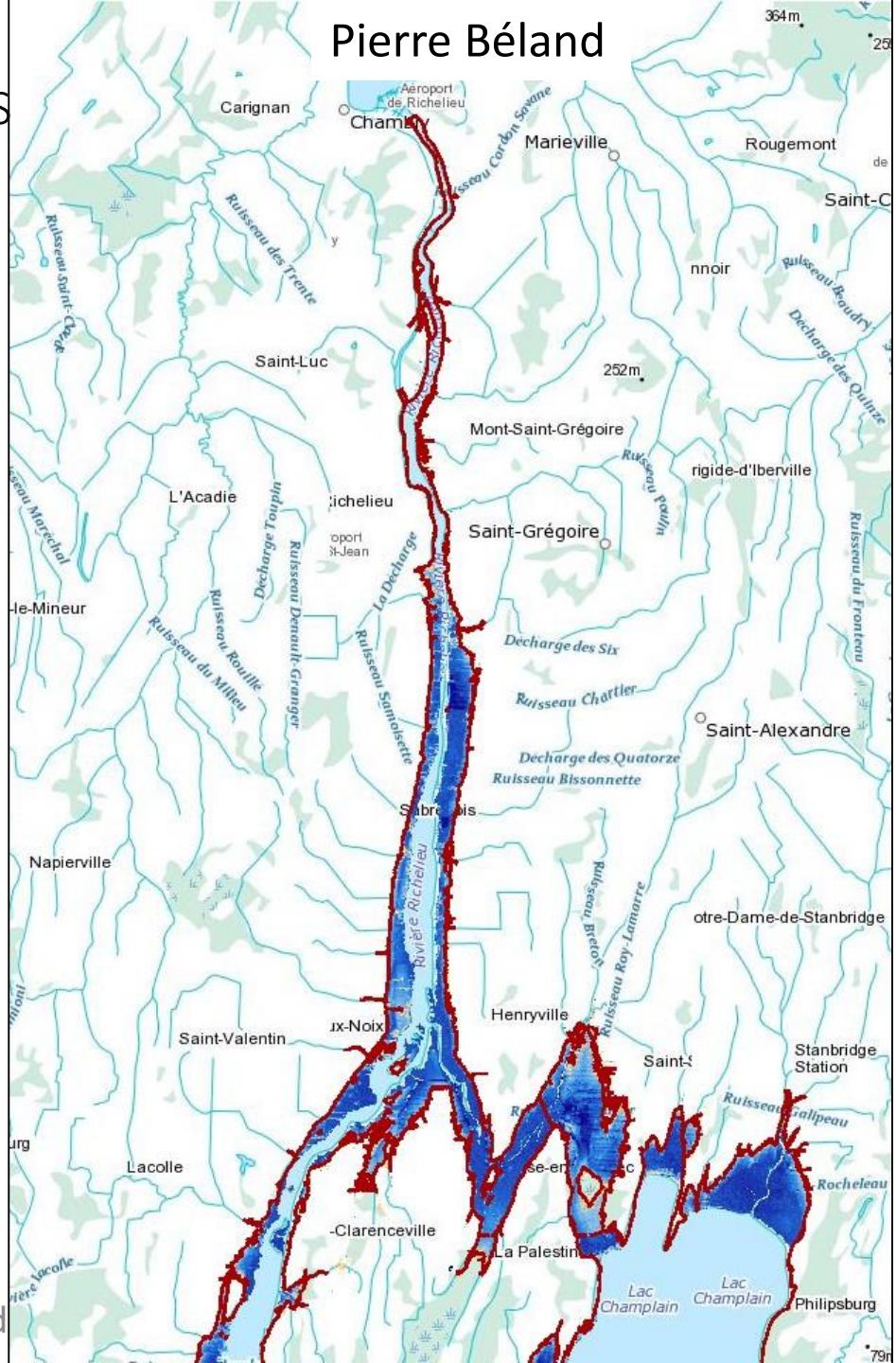
■ Zone d'étude globale (municipalités)

0 5 10 20 Km



FLOODING AREAS

Pierre Béland



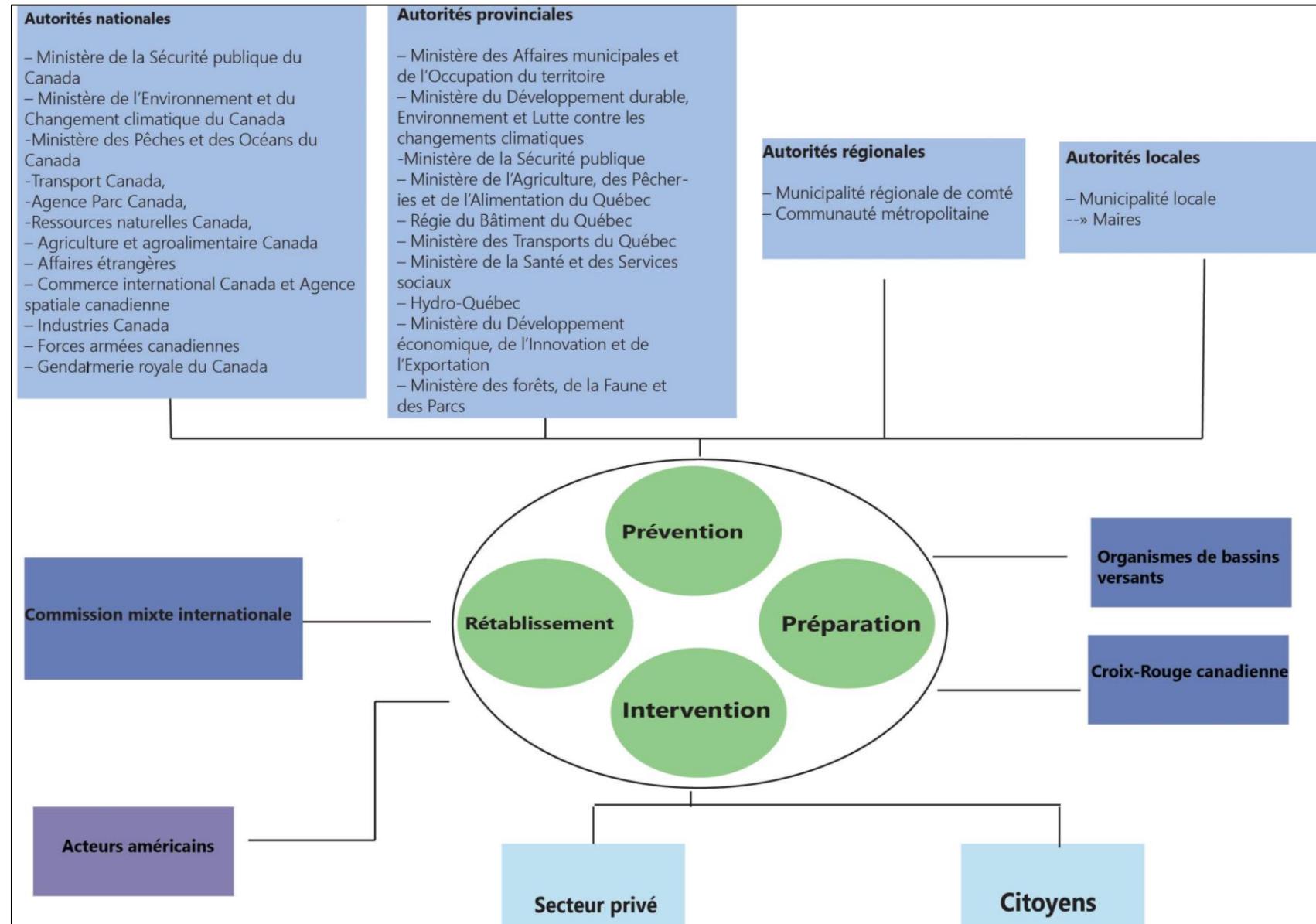
Équipe de recherche Ude

Réalisé par : Alexandre Gagnon

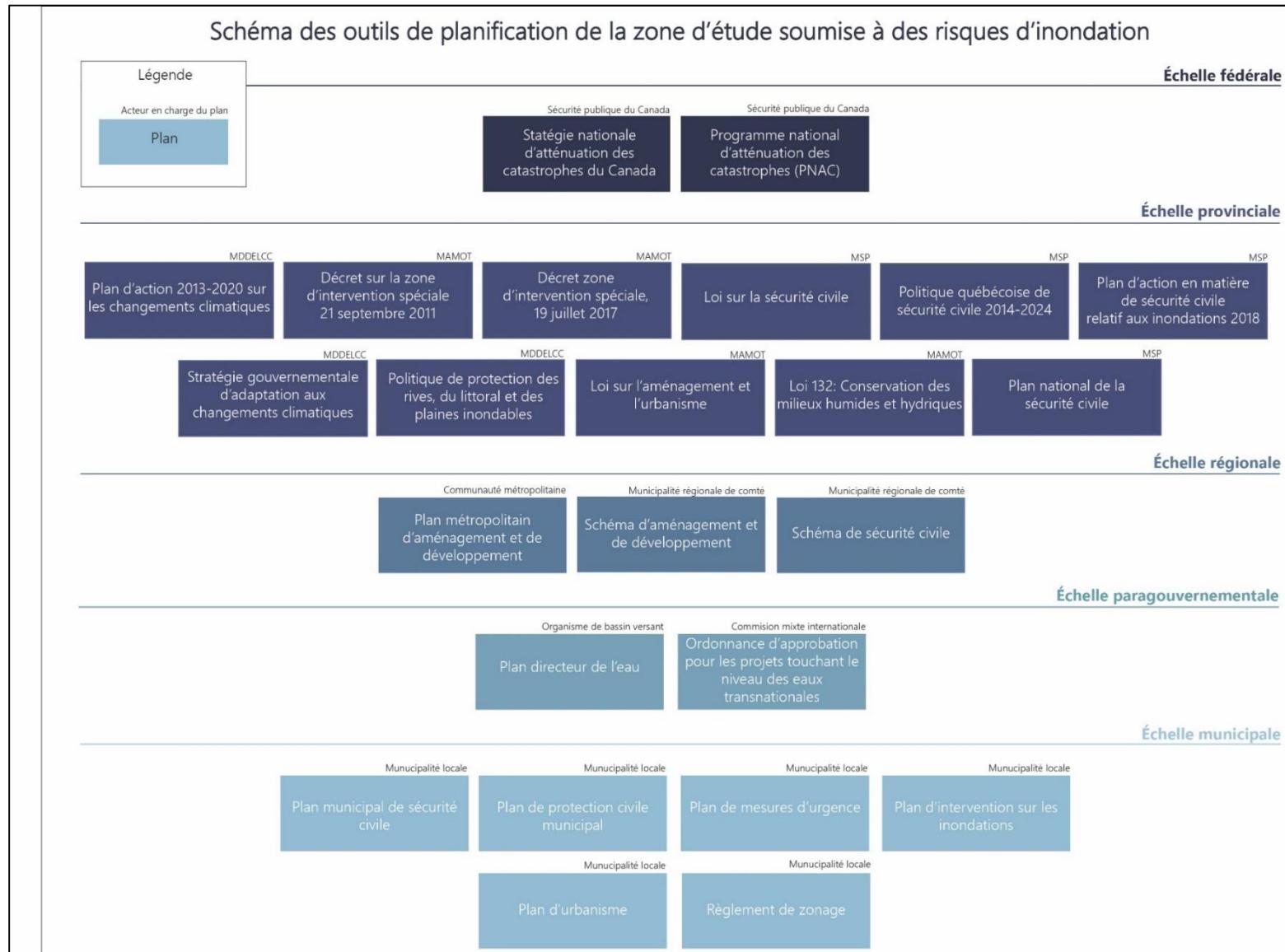
Sources : Stat. Can, MERN, MSP

Système de coordonnées NAD 1983 Québec Lambert

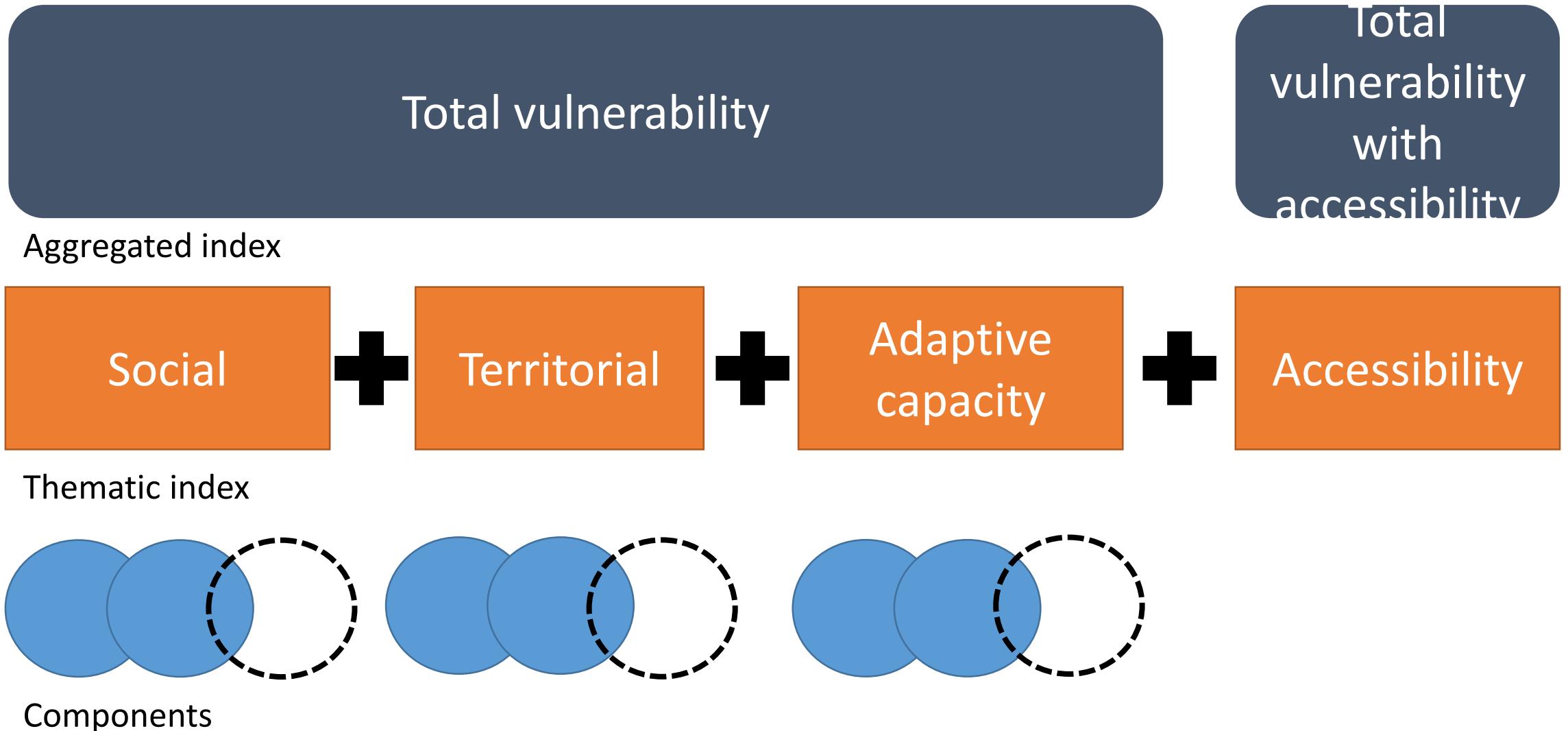
GOVERNANCE



Planification tools

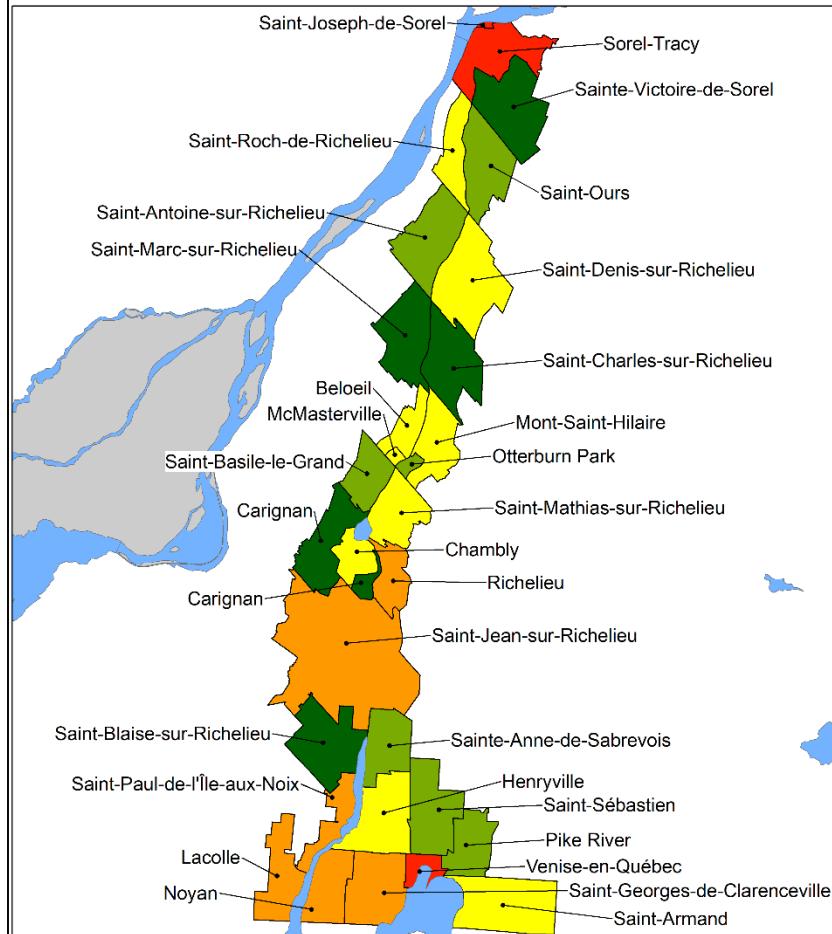


MODEL



SOCIAL SENSIBILITY (COMPONENTS)

Sensibilité sociale - Composante Populations fragiles
Zone d'étude globale

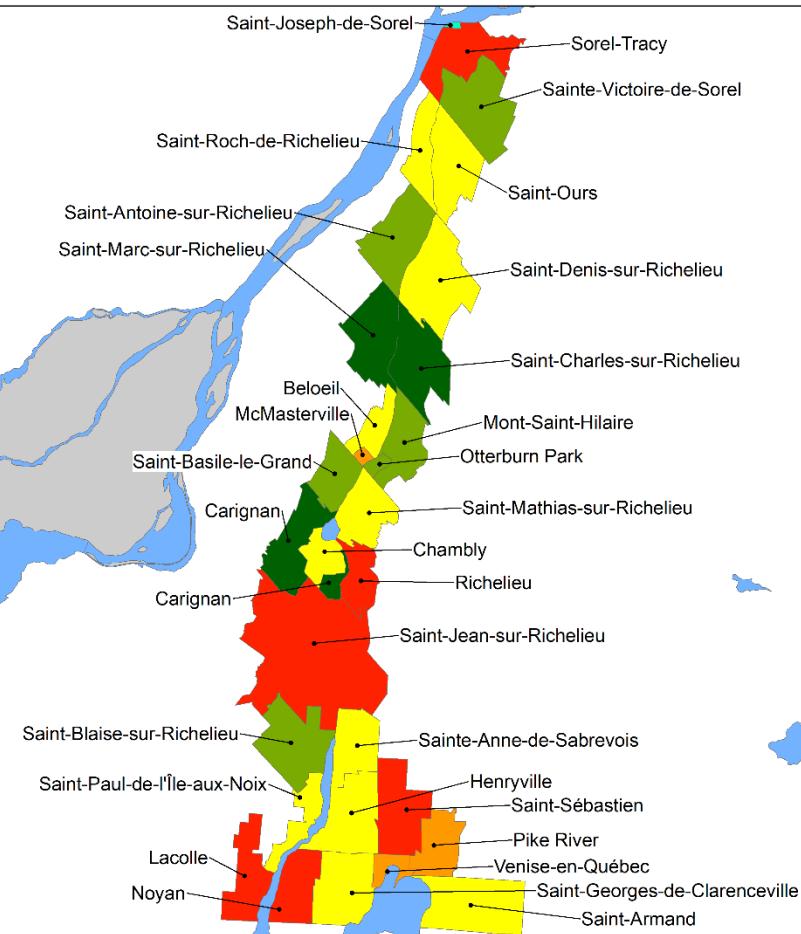


Légende

- [Blue square] Lac
- [Grey square] Île
- Sensibilité relative à la zone globale d'étude**
- Très faible sensibilité (Dark Green)
- Faible sensibilité (Medium Green)
- Moyenne sensibilité (Yellow)
- Forte sensibilité (Orange)
- Très forte sensibilité (Red)

0 5 10 20 Km

Sensibilité sociale - Composante Situation de précarité
Zone d'étude globale

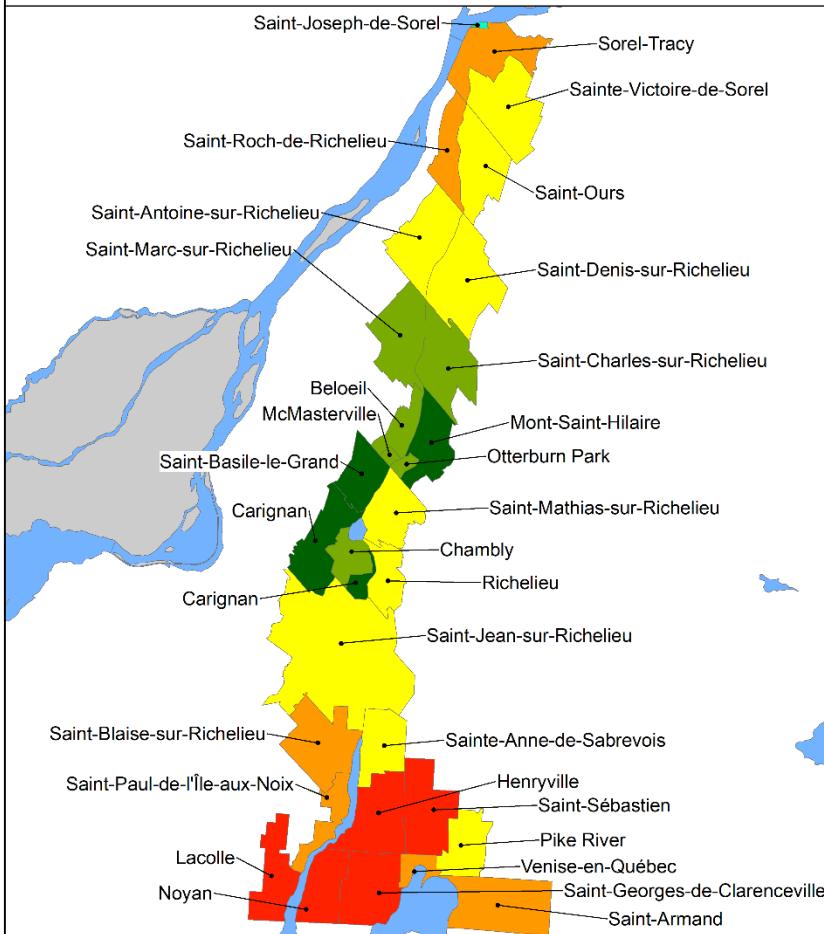


Légende

- [Blue square] Lac
- [Grey square] Île
- Sensibilité relative à la zone globale d'étude**
- Très faible sensibilité (Dark Green)
- Faible sensibilité (Medium Green)
- Moyenne sensibilité (Yellow)
- Forte sensibilité (Orange)
- Très forte sensibilité (Red)
- Très forte sensibilité avec un écart significatif (Cyan)

0 5 10 20 Km

Sensibilité sociale - Ressources et leviers
Zone d'étude globale

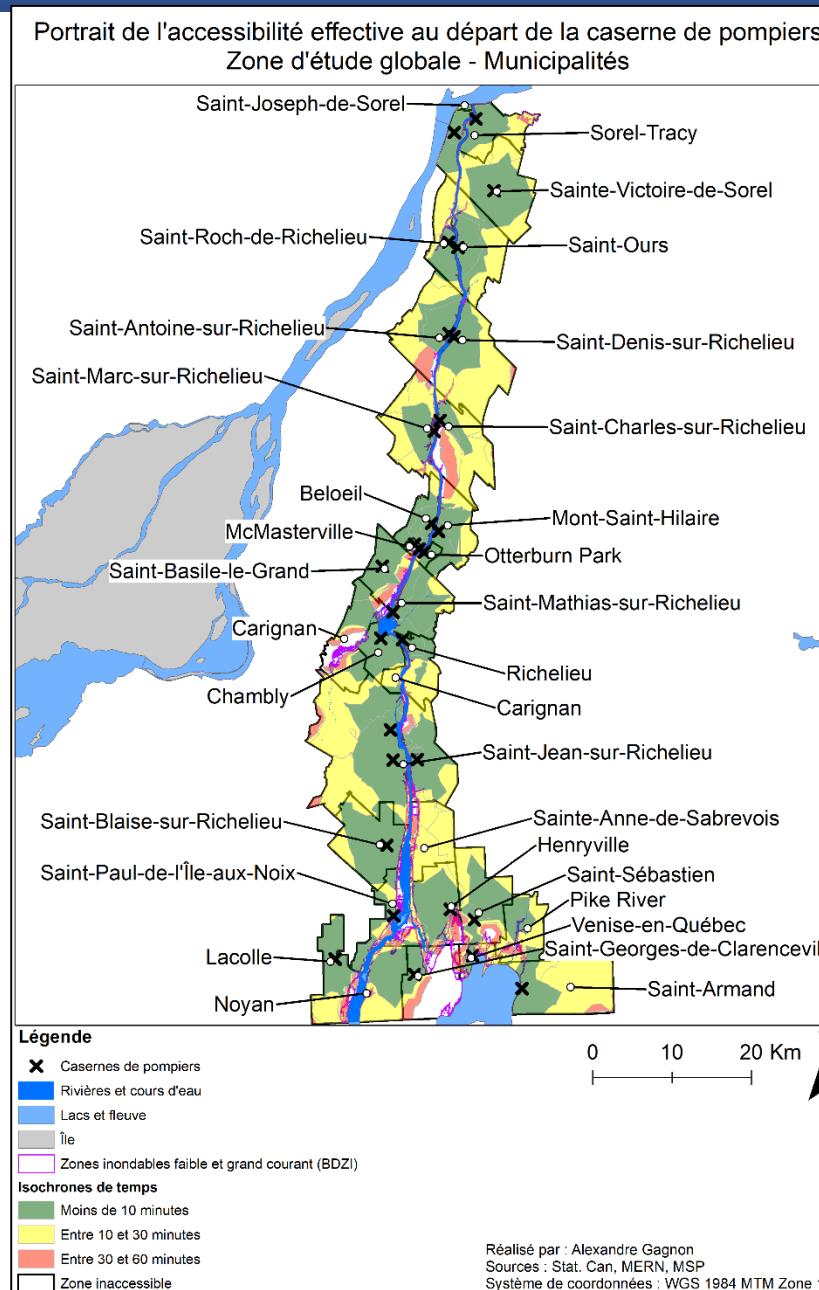


Légende

- [Blue square] Lac
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- Très faible sensibilité (Dark Green)
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- Moyenne sensibilité (Yellow)
- Forte sensibilité (Orange)
- Très forte sensibilité (Red)
- Très forte sensibilité avec un écart significatif (Cyan)

0 5 10 20 Km

ACCESSIBILITY (THEMATIC)



CITIZENS SURVEYS



Municipalité de
Sainte-Anne-de-Sabrevois

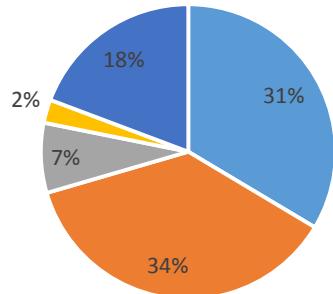


CITIZENS SURVEYS

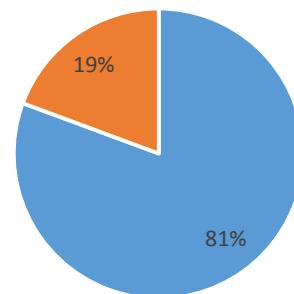
Citizen of Saint-Anne-de-Sabrevois

Flood risk perception:

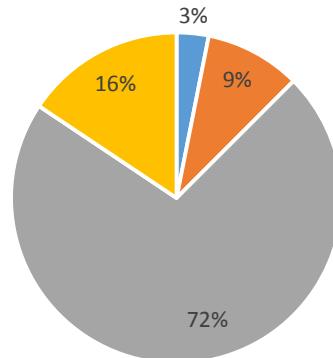
Situation en 2011



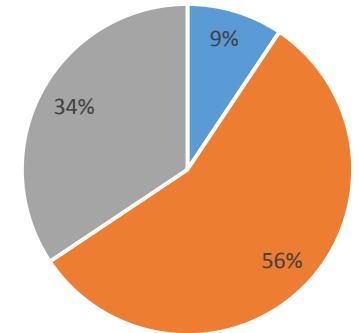
Capable de faire face à une inondation



Niveau de risque d'exposition du logement



Sentiment de vulnérabilité



■ Résidence inondée et évacuation temporaire

■ Résidence inondée sans évacuation

■ Résidence non-inondée mais isolée entraînant une évacuation temporaire

■ Affecté de façon indirecte (ex : proches/ voisins, lieu de travail, routes fréquentés inondés)

■ N'a pas été affecté par les inondations de 2011

■ Oui ■ Non

■ Très élevé ■ Élevé ■ Modéré ■ Absent

■ Tout à fait vulnérable ■ Plutôt vulnérable ■ Pas du tout vulnérable

3.2 Adaptation strategies to climate at a regional level: the case of the Memphremagog MRC

Challenges



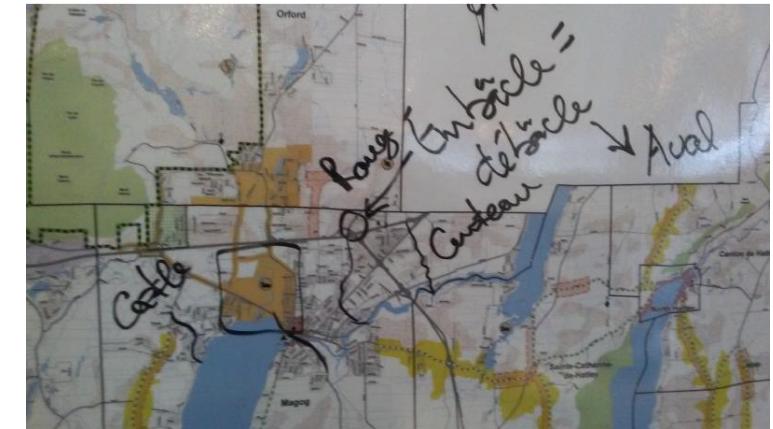
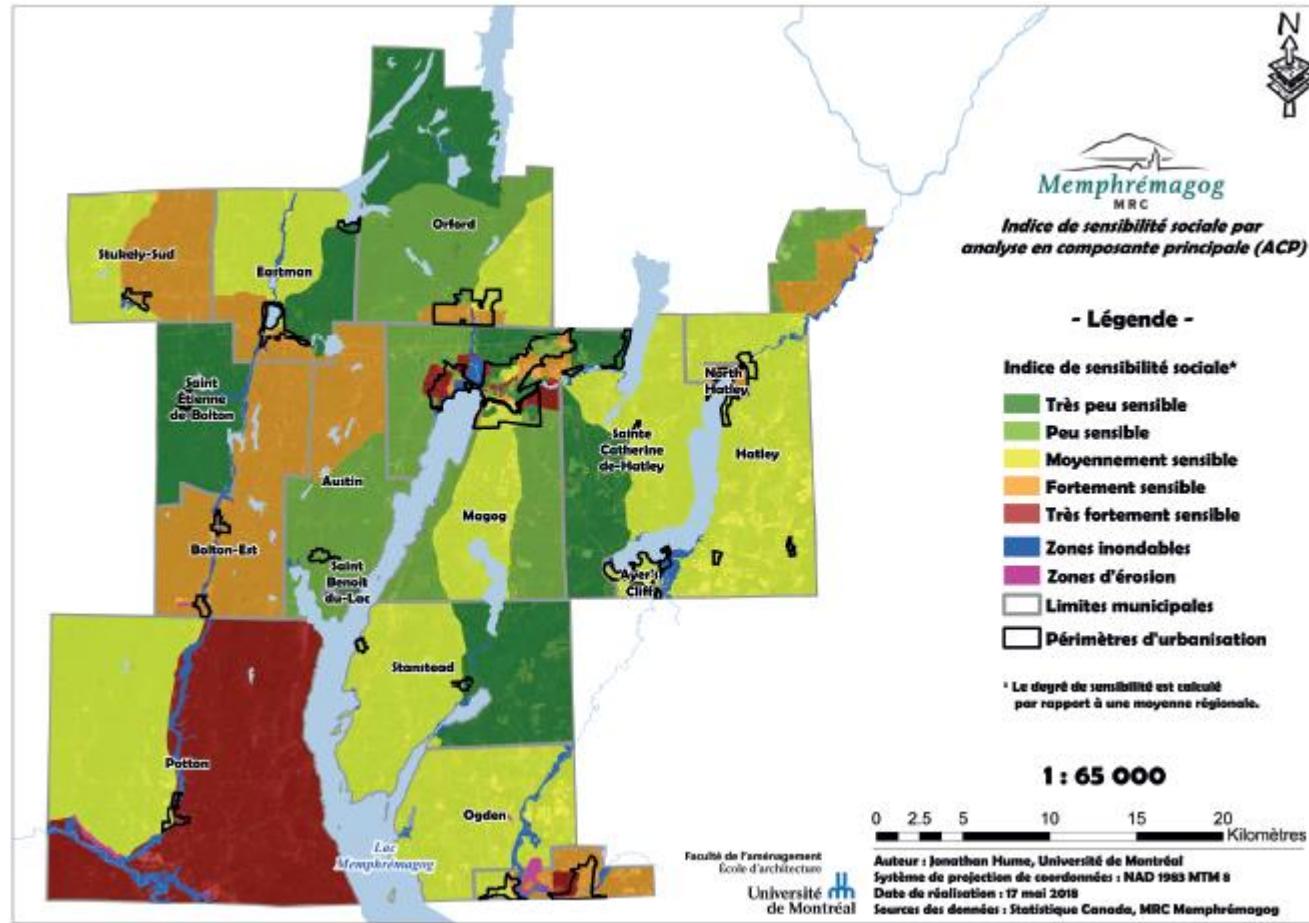
© Photos: G. Turrennes

Barriers to Adaptation

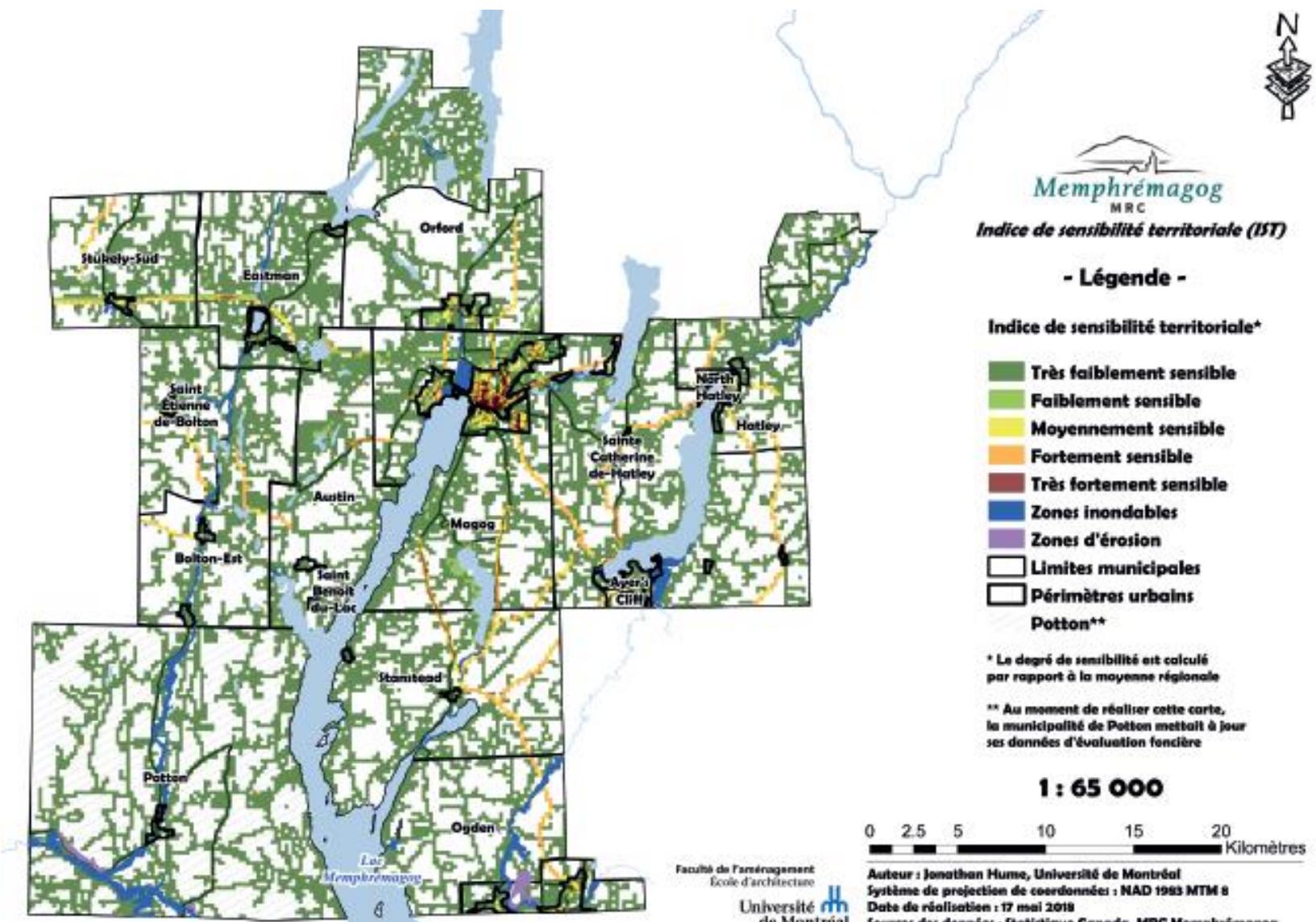
| Conceptual | Knowledge-based | Socio-political |
|----------------------------------|---------------------------|--|
| Semantics of Adaptation | Lack of Local Expertise | Jurisdictional Boundaries of Climate Change Adaptation |
| Temporal Scales | Lack of Behavioural Focus | Political Alignment |
| Adaptation as 'Too' Reductionist | Uncertainty of Impacts | 'Adaptation Bubble' |
| High Burden of Proof | Benefits Unclear | Absence in Political Discourse Impact Communication |

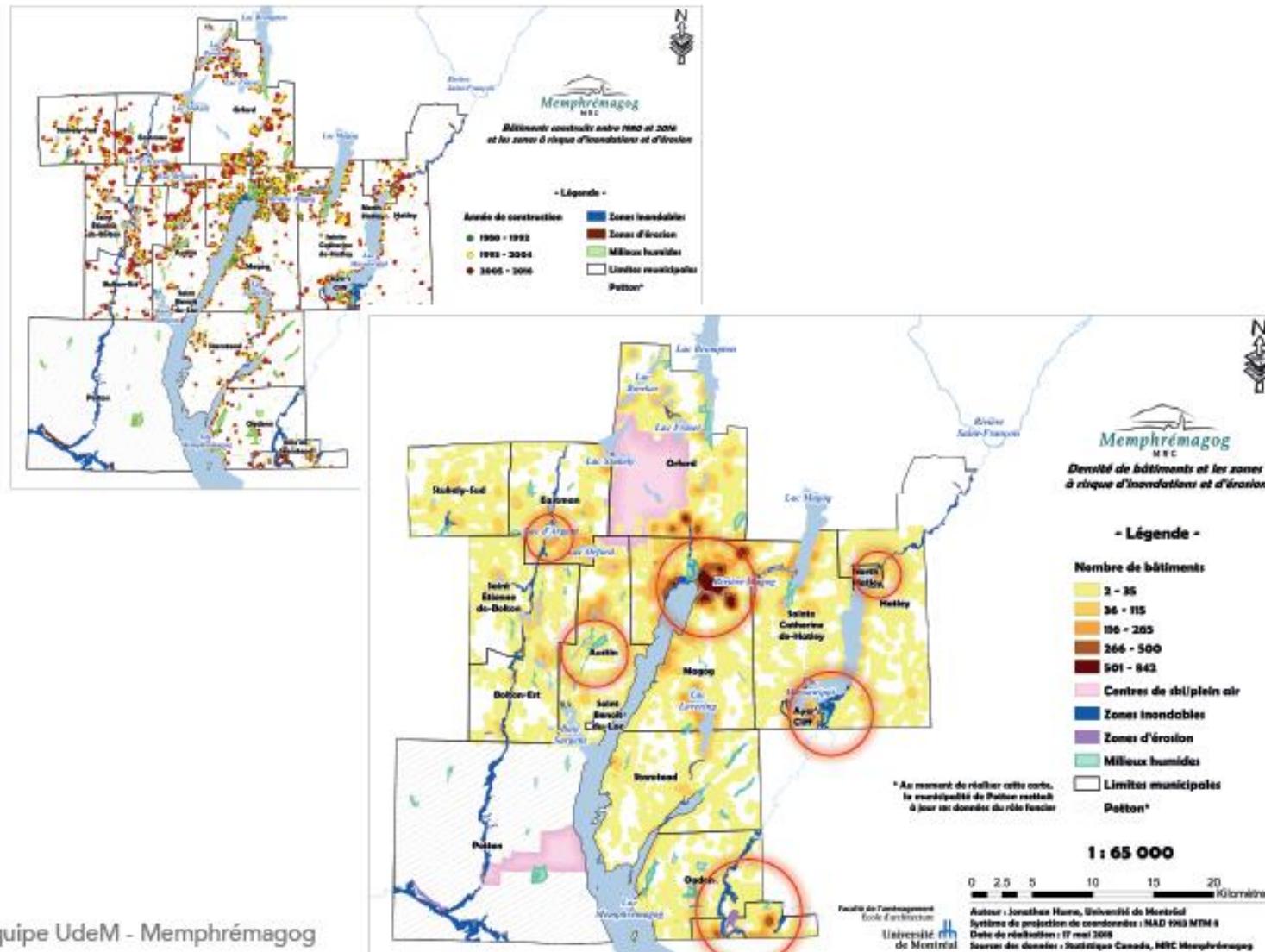
Bednar, D., Raikes, J., & McBean, G. (2018). *The governance of climate change adaptation in Canada*. p.27.

- Sectorial tables: Vulnerability and challenges
- TRACC: Régional collaboration itérative planning



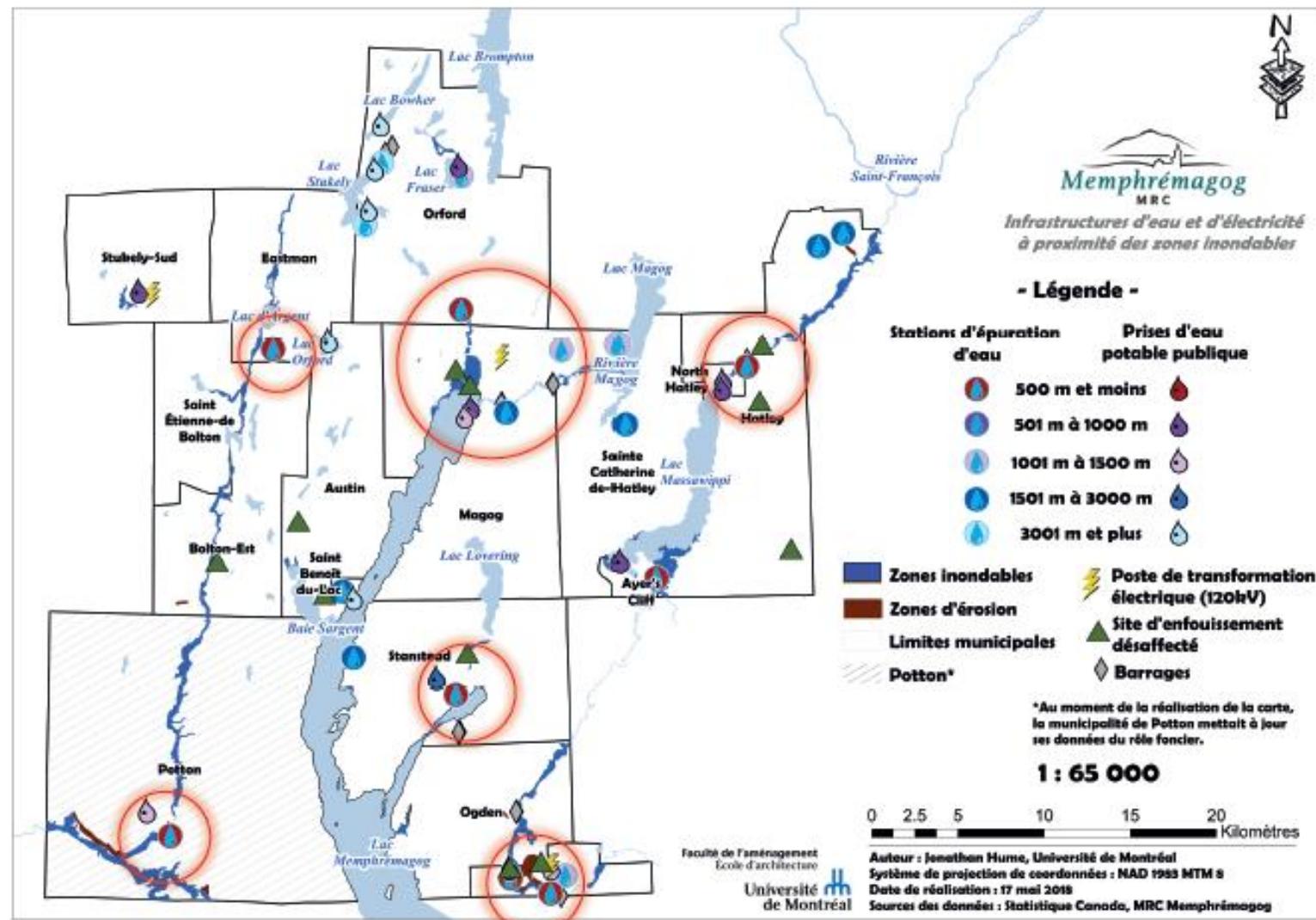
© Photos: G. Turrennes





Par l'équipe UdeM - Memphrémagog

© Équipe de recherche UdeM



Strength of iterative planning and stakeholders collaboration



Photos: Noé Bunzli

Collaborators:

MRC Memphremagog
Ouranos
Centre Seve
Ivanohé Cambridge
University of Montreal
University of Sherbrooke
Cities



Photos: Guillaume Turennnes

4. Leaving with risks: enhancing adaptation and communication



4.1 Risk perception and plans, the case of New Orleans



Resilient New Orleans. Strategic Actions to Shape Our Future City, 2015

Adapt to Thrive



Connect to Opportunity



Transform City Systems



We are a city that embraces our changing environment.

We will:

- Advance coastal protection and restoration
- Invest in comprehensive and innovative urban water management
- Incentivize property owners to invest in risk reduction
- Create a culture of environmental awareness at every stage of life
- Commit to mitigating our climate impact

We are an equitable city.

We will:

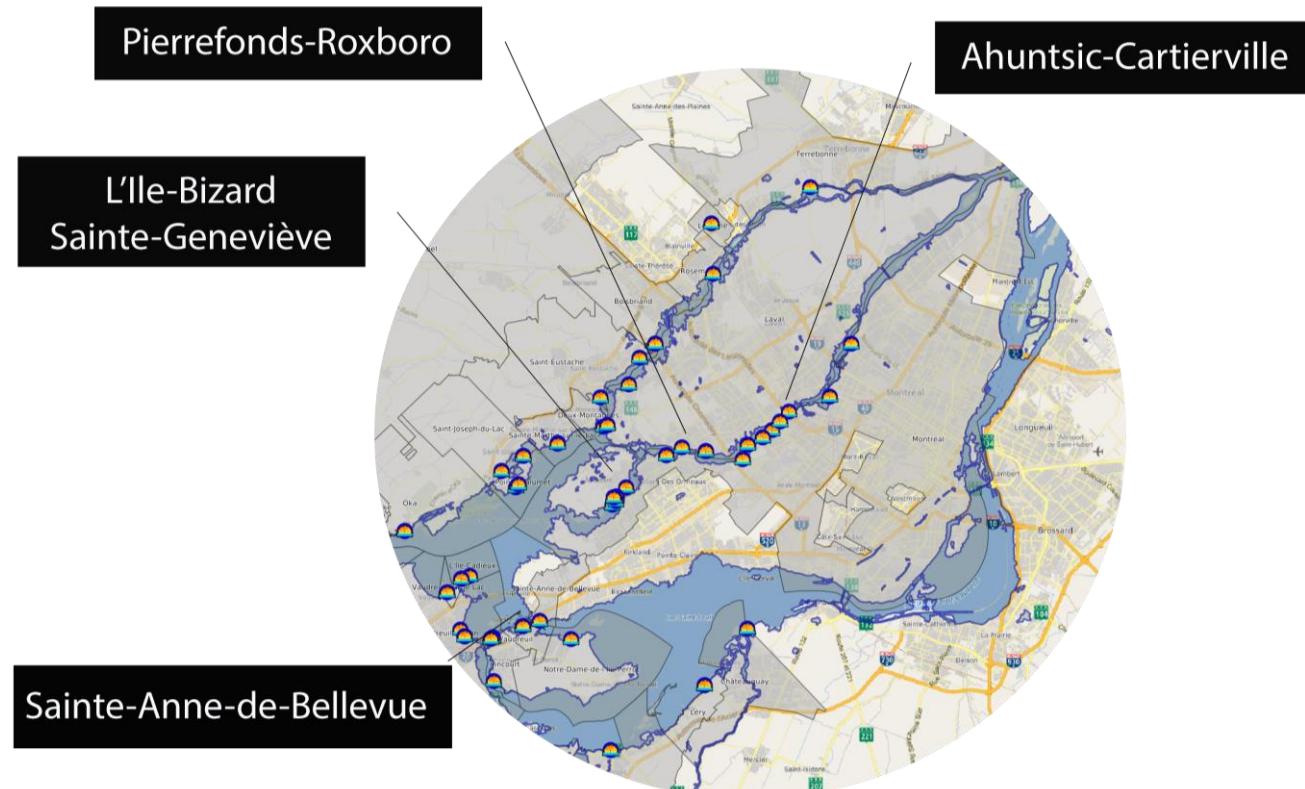
- Invest in household financial stability
- Lower barriers to workforce participation
- Continue to promote equitable public health outcomes
- Continue to build social cohesion
- Expand access to safe and affordable housing

We are a dynamic and prepared city.

We will:

- Redesign our regional transit systems to connect people, employment, and essential services
- Promote sustainability as a growth strategy
- Improve the redundancy and reliability of our energy infrastructure
- Integrate resilience-driven decision making across public agencies
- Invest in pre-disaster planning for post-disaster recovery
- Develop the preparedness of our businesses and neighborhoods

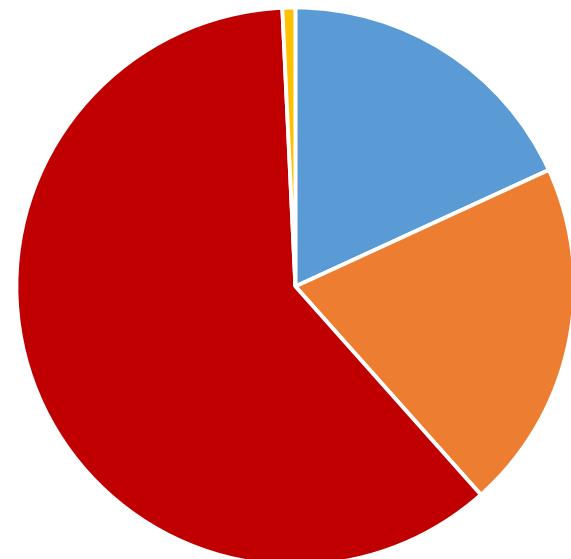
4.2 Risk perception and communication tools: what can we learn from Montreal, Quebec?



Source: Gouvernement du Québec, RADARSAT-2, 9 mai 2017

Pierrefonds-Roxboro

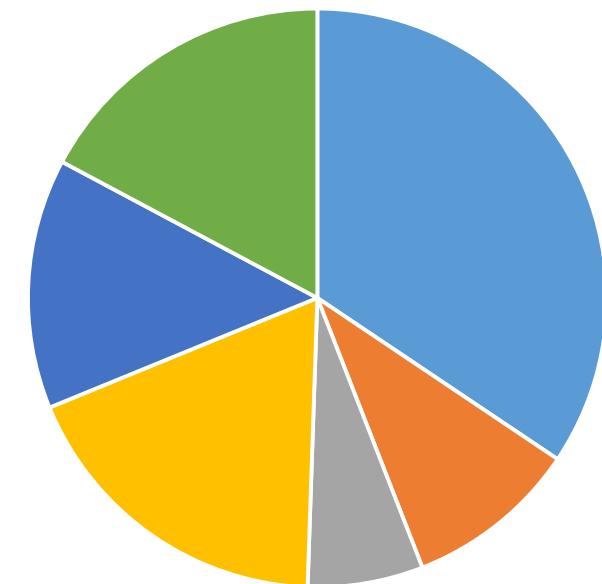
Were you ready for last flood?



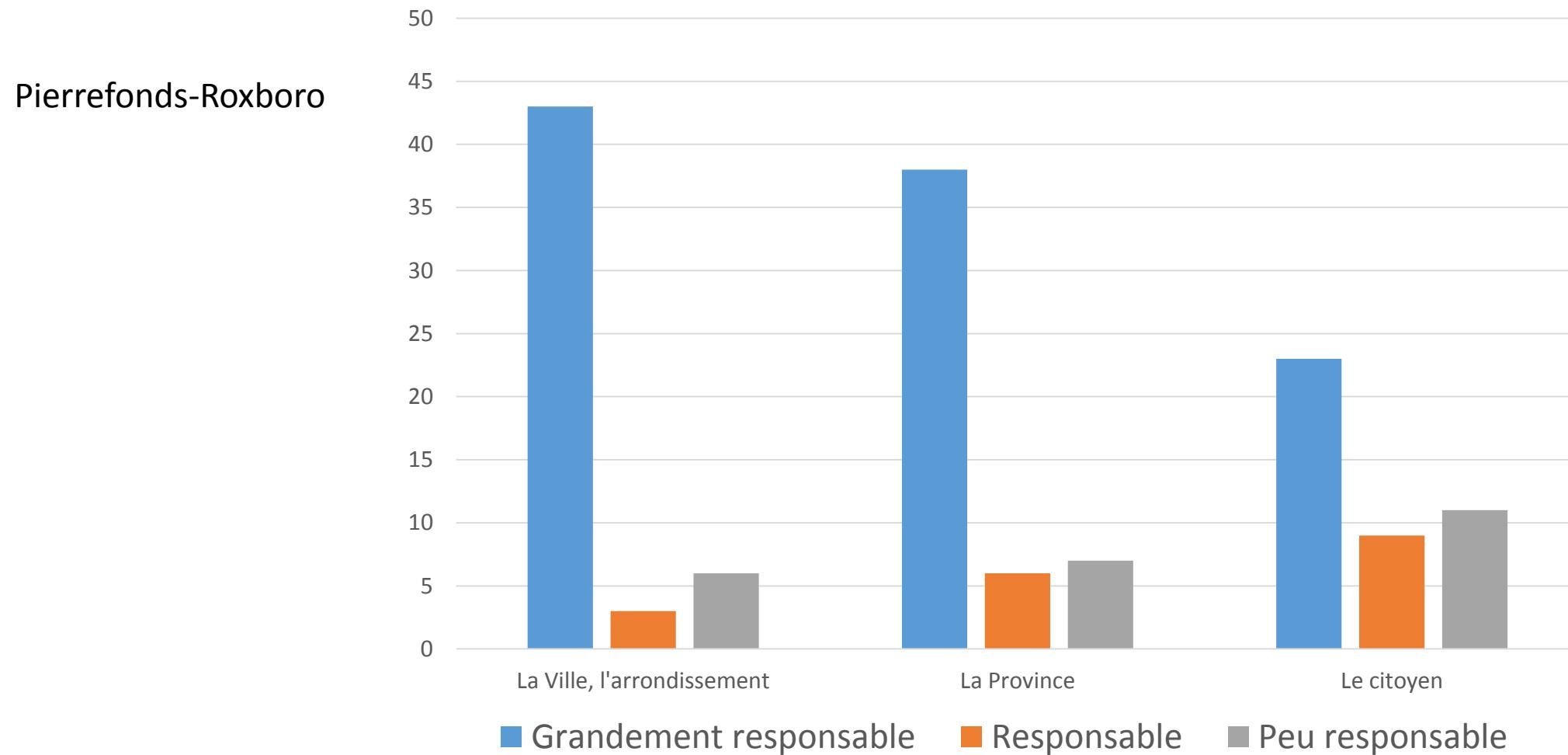
- Tout à fait prêt
- Pas du tout prêt
- Plutôt prêt
- Ne s'applique pas

How were you informed about floods and adaption strategies?

- Télévision
- Radio
- Arrondissement
- Service incendie
- Site web de la Ville de Montréal
- Aucune - Je ne sais pas quelles mesures prendre



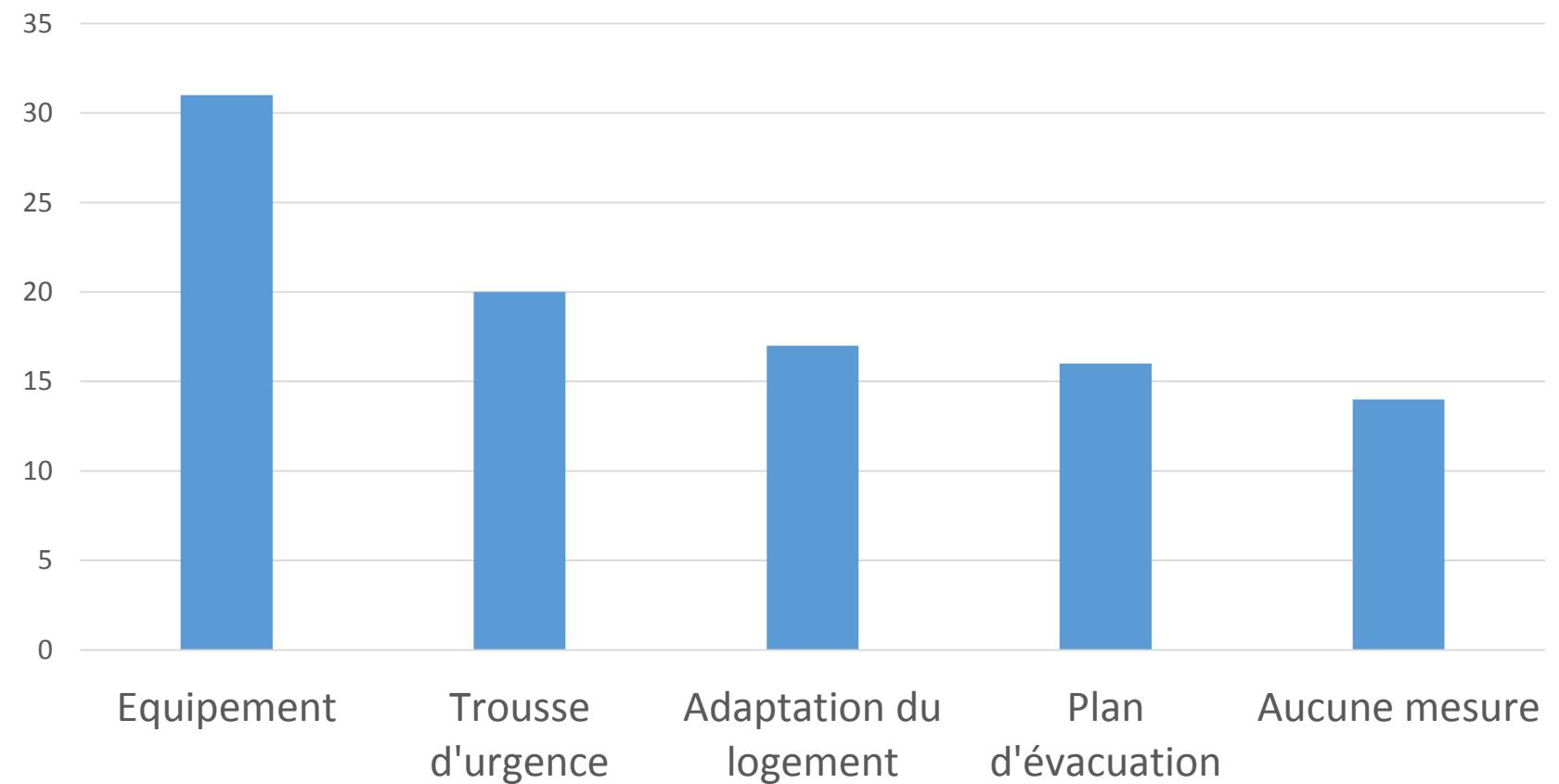
Who is responsible for risk preparation ?



What are your strategies to get ready for next flood?

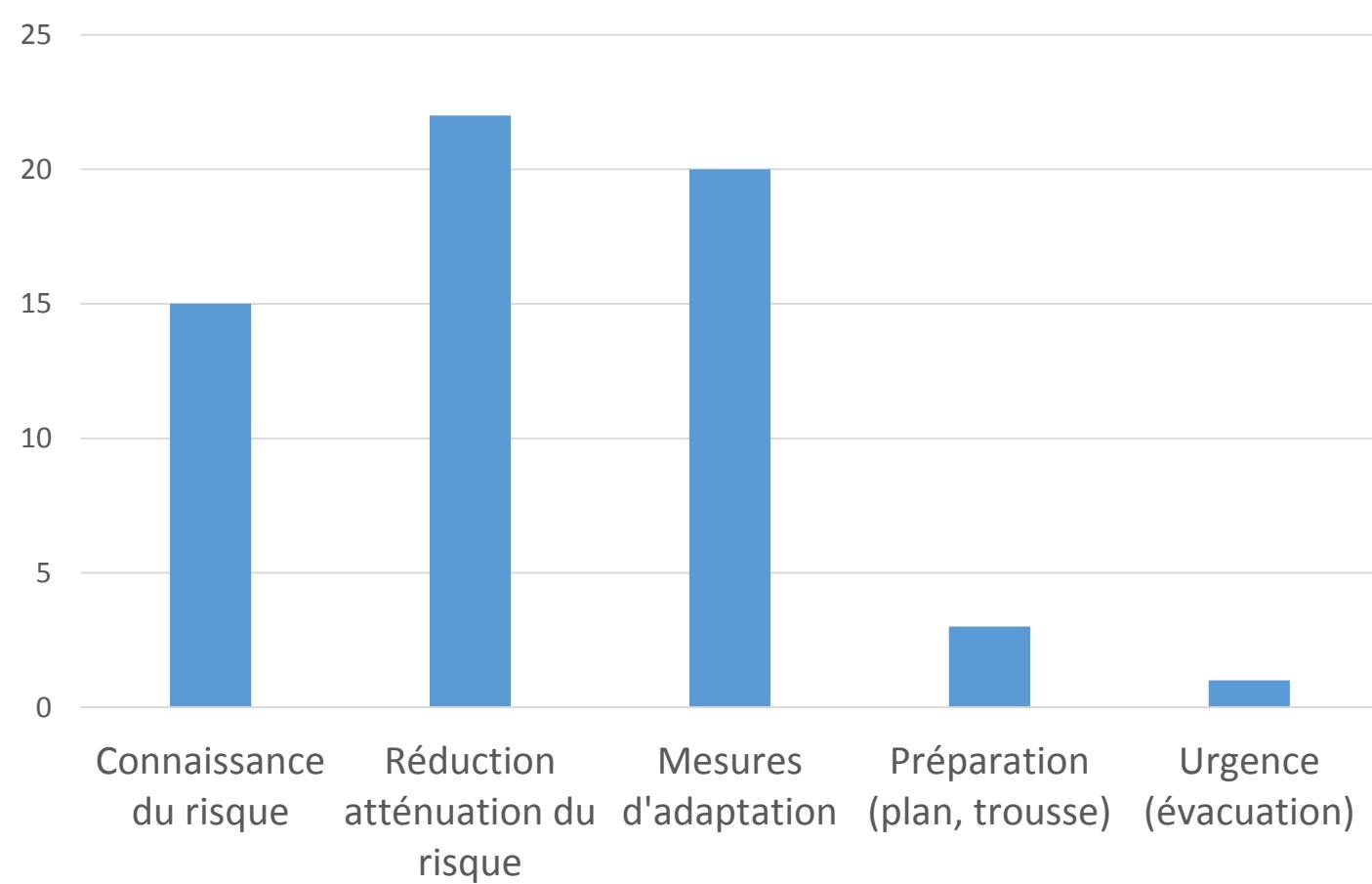
Pierrefonds-Roxboro

Mesures prises par les citoyens



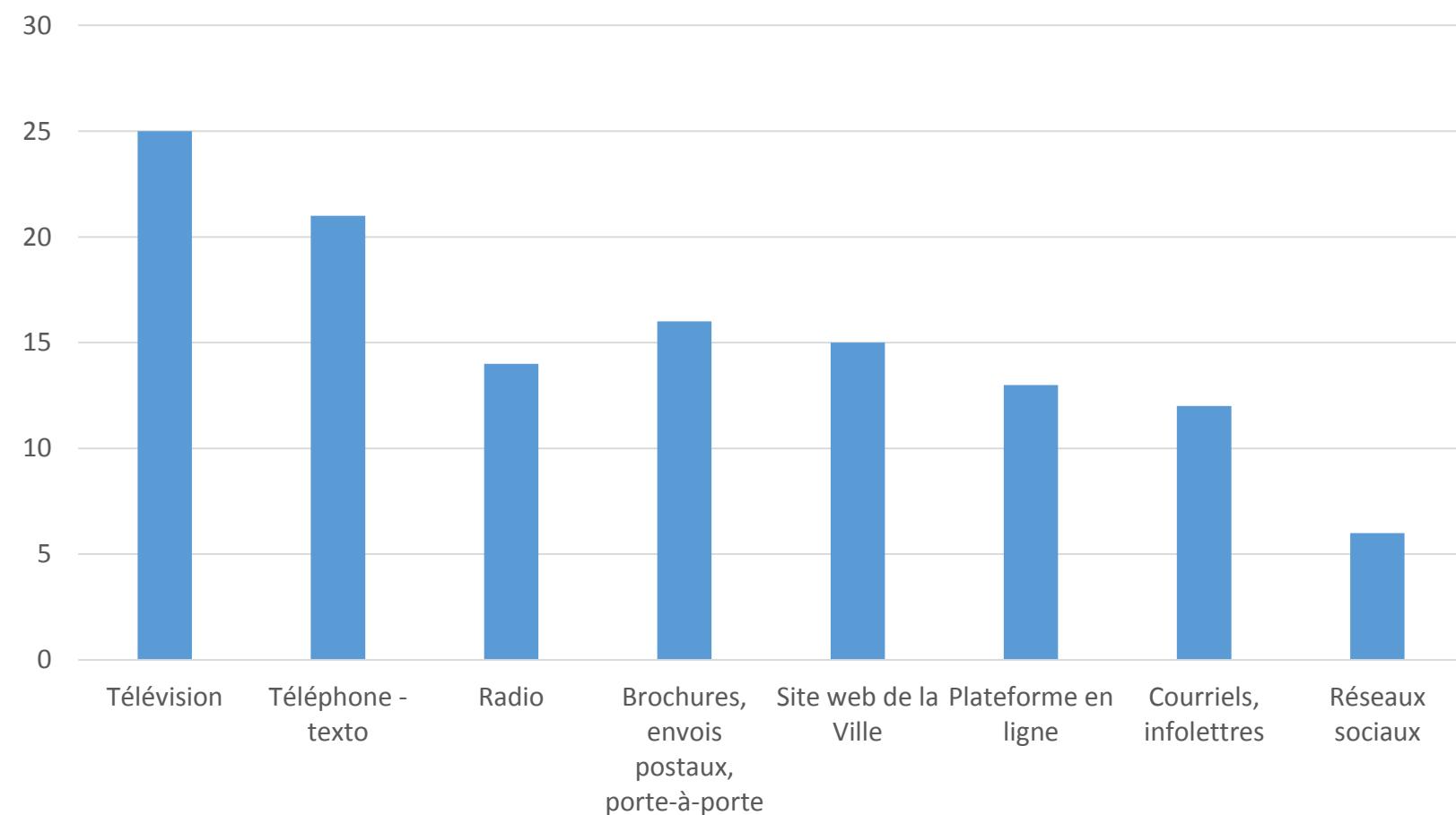
Pierrefonds-Roxboro

What type of information should be provided to citizens ?



Which communication tools should be used to foster preparedness ?

Pierrefonds-Roxboro



Communication strategy ?



1



2



3

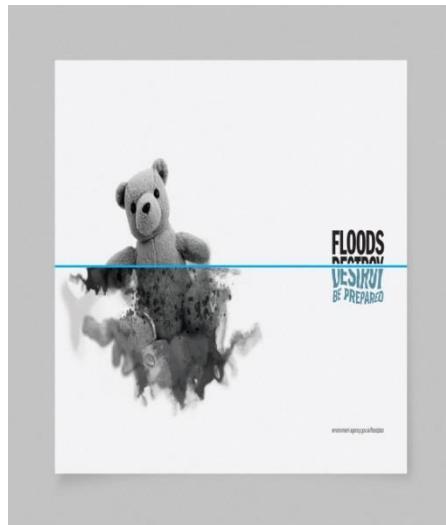


4

- 1: Awareness
2. Education
3. Mobilization
4. Valorization

Communication tools ?

Mix use of tools : awareness : urgency



Floods Online @FloodsOnline · 16 janv.
FLOOD ALERT #Oxfordshire #floodaware
Find your flood risk at: floodsonline.co.uk/individual

Flood alert
Mon 16 Jan
15:55
RIVER...

The River and Flooding forecast is as follows: Property flooding is not currently expected. Levels on the River Evenlode and River Glyme have been rising steadily throughout the day in response to recent rainfall. Levels are expected to continue to rise this evening and flooding of low lying land and roads is expected, especially in the Evenlode Bridge area. The weather prospects are as follows: Showers should clear to leave a largely...
...more info on our site





Check your risk



Get signed up



Make a plan

Source: Campagne Flood destroy, Royaume-Uni

Follow NOLA Ready

Tweets by @nolaready



NOLA Ready
@nolaready

Before the summer heat, spruce up your yard & reduce your flood risk.

- ✓ Plant a rain garden
- ✓ Collect & reuse rain runoff in a rain barrel
- ✓ Clean your gutters
- ✓ Install permeable pavement to allow water to soak into the ground

More May #PrepTips at lnks.gd/27Dvt7Z



Sign up for Emergency Alerts



Learn about City-Assisted Evacuation



Sign up for the Special Needs Registry



Get Traffic Info and Street Flooding Reports



Get Seasonal Preparedness Info

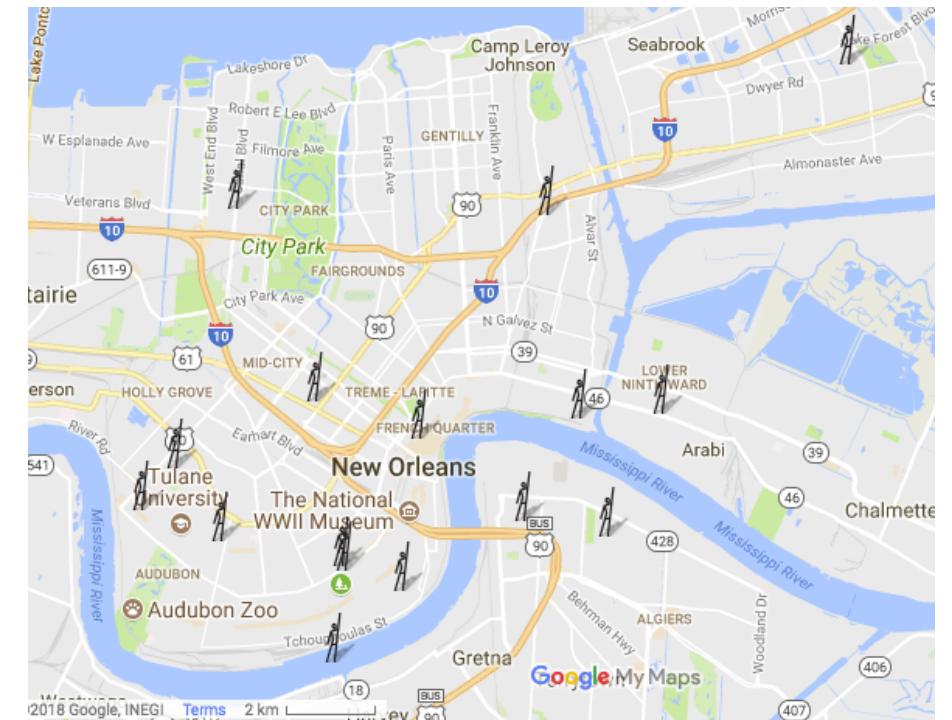
Source: NOLA Ready, Nouvelle-Orléans, États-Unis

Communication tools ?

Mix use of tools : evacuation information



Source: evacuteer.org, New Orleans

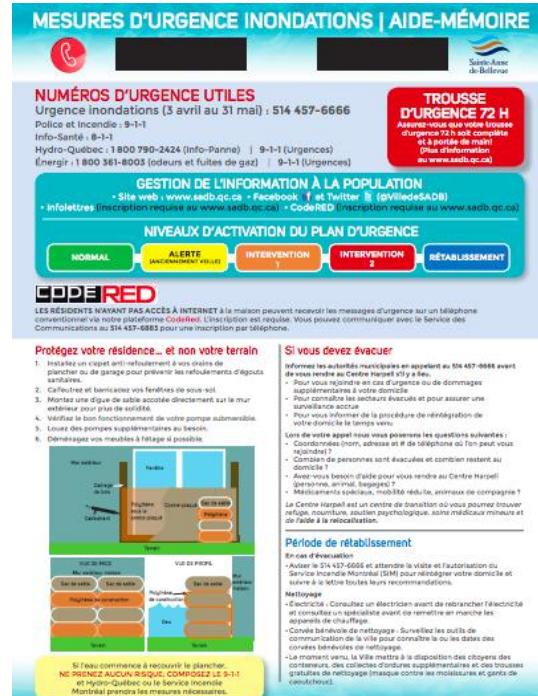


Communication tools ?

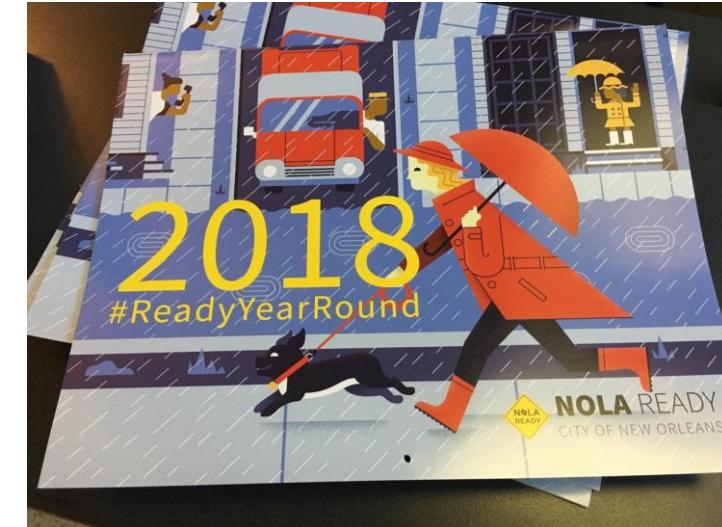
Mix use of tools : awareness



Source : Arrondissement de Pierrefonds-Roxboro



Source : Ville de Sainte-Anne-de-Bellevue



Source : NOLA Ready

Communication tools ?

Mix use of tools : education



Prenez garde à l'eau!

Pour plus de conseils et ressources
#PréventionInondation

visitez

Canada.ca/Prevention-Inondation

Source : Preparez-vous.gc.ca

Canada



[https://www.chatelaillonplage.fr/
Cadre-de-vie/Protection-du-littoral/
S-informer](https://www.chatelaillonplage.fr/Cadre-de-vie/Protection-du-littoral/S-informer)



Communication tools ?

Mix use of tools : mobilization



Communication tools ?

Mix use of tools : Valorization

- Experts
- Workshops
- Short education training



Source: Waterwise, NOLA



Certified house

Mix use of tools : Valorization



CONTACT



CONNECT



COMPLETE

Source: Front Yard Initiative, Nouvelle-Orléans

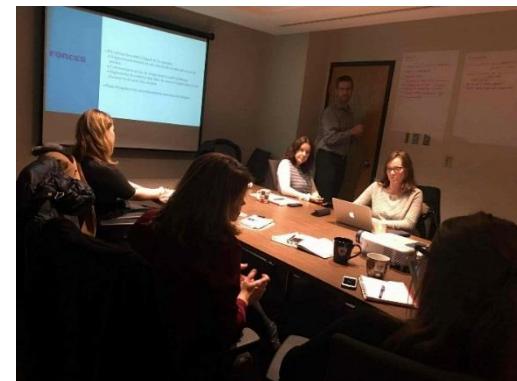
Collaborators:

City of Montreal

MSP

University of Montreal

CRI Agency



Montréal 

Sécurité publique
Québec 

Université 
de Montréal

Ce travail a été financé par le ministère de la Sécurité publique pour un montant total de 25000\$.

Photos: Isabelle Thomas

5. Conclusion What are ingredients of a resilient community?

«A resilient city builds its actions on **collaborative methods and indicators** answering to challenges linked with specific **local contexts**, in a strategy of **co-construction** and **inclusive acceptability of local stakeholders** ».

Thomas I., Da Cunha A., 2017: La ville résiliente, comment la construire? PUM, p. 298

Thank you

The research team: <http://copari.info/>



**COOPÉRATION FRANCO-
QUÉBÉCOISE POUR
L'APPRÉCIATION DU RISQUE
D'INONDATION ET DE SON
ATTÉNUATION**