Coastal Resilience Project: towards the development of tools and solutions to adapt to coastal hazards for municipalities in Eastern Quebec
Coastal hazards and territory development: tools in development to improve management and interventions in coastal zones
Transport infrastructures... a diversity of services and stakes!

207 km of road sections including 112 km of provincial roads. 90 km of railroads at less then 15 m from the shoreline. 102 km of road segments exposed to submersion regardless of the sea level rise.
Issues : what are we facing?

To cope with coastal hazards in a context of climate changes

1) Relative sea level rise
   (0,6 à 1,8 m by 2100)
   Vermeer et Rahmstorf, 2009; Grinsted et al., 2009; GIEC, 2013; Horton et al., 2014

2) Substantial decrease of ice cover
   (from 40 to 50 days by 2055)
   Senneville et al., 2014

3) Increase of the impact of the winter storms

Modification of the weather-marine conditions
Vulnerability and resilience of the coastal zone is dependant of coastal hazards in a context of climate changes

Working towards the development of tools and sustainable solutions for coastal municipalities of Eastern Quebec

Goals:

➢ reduce the vulnerability of coastal communities and ecosystems from coastal hazards
➢ develop tools to improve planning and coastal protection
➢ facilitate the choice of climate changes adaptation solutions in the short, medium and long term
➢ consider the coastal zone as an eco-socio system where the safety of people and coastal infrastructure is associated with the protection of coastal ecosystems and the maintenance of their ecological services
9 effective tools...
1) Cartography of the historical evolution of the shore line

Photo: 2010

Cap de l'Hôpital
Îles-de-la-Madeleine

Source photo satellite 2010: Municipalité des Îles-de-la-Madeleine
1) Cartography of the historical evolution of the shore line

Barachois de Paspébiac
Baie-des-Chaleurs

50 m

365 m

Légende
1934
1963
2007

Université du Québec à Rimouski
Fond de carte: Orthophoto 2016, MRNF
2) Cartography of the margins of erosion
3) Cartography of infrastructure and buildings exposed to erosion

To transfer to the municipalities and RCM. Technical help for the integration of results

Tiré de Fraser et al., 2014
4) Cartography of road infrastructures and it’s vulnerability

Indice de Vulnerabilité des Routes aux Aléas Côtières → IVRAC

Maps of the vulnerability of the road network of coastal hazards
(Drejza et al., 2014)
5) Cartography of the coastal infrastructures and it’s vulnerability

Test site for the development and application of the methodology of the CIVI
CIV (Coastal Infrastructures Vulnerability Index) by area
6) Identification tools of coastal protection measures adapted to the coastal dynamic of each coastal segments

Goals:
1) Develop an identification approach of coastal protection measures that takes into account the socio-ecological system, the impacts of climate changes impacts and the identified needs by the local and regional players as well as coastal citizens.

2) Assortment of different measures, as well as adaptation and protection techniques to face coastal hazards.

3) Cartography of adaptation solutions by consistent segment, unsuccessful options and a web platform diffusion.
7) Diagnostical form of the vulnerables areas

- Description of the coast
- Coastal dynamic
- Issues
- Recommendations

Tiré de Fraser et al., 2014
8) Modeling of the weather-marine conditions

- Cartography of erosion and submersion risk zones
- Analysis and implementation of solutions
- Calibration of the coastal and port infrastructures

Bernatchez et al., 2017
9) Web platform diffusion, knowledge sharing and interactive cartography

Make available to all the scientific information in order to ensure a better management of coastal hazards
A SPECIAL THANKS TO...

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