



Flood Disasters and Mitigation: Analysis of a Complex Problem

CONTENT OVERVIEW

PART-1: PROBLEM BREAKDOWN

1. DEFINE THE SCOPE OF THE PROBLEM
2. EXPLAIN AGGRAVATING FACTORS
3. HIGHLIGHT UNEQUAL IMPACTS
4. HIGHLIGHT CLIMATE CHANGE IMPACTS
5. DISCUSS GOVERNANCE
6. OVERVIEW OF FEDERAL COSTS

PART-2: SOLUTION ANALYSIS

1. EXPLORE THE COMPLEXITY
 - HOW WELL IS CANADA MANAGING?
 - WHY IS A SOLUTION COMPLICATED?
2. RECOMMENDATIONS

PROBLEM BREAKDOWN

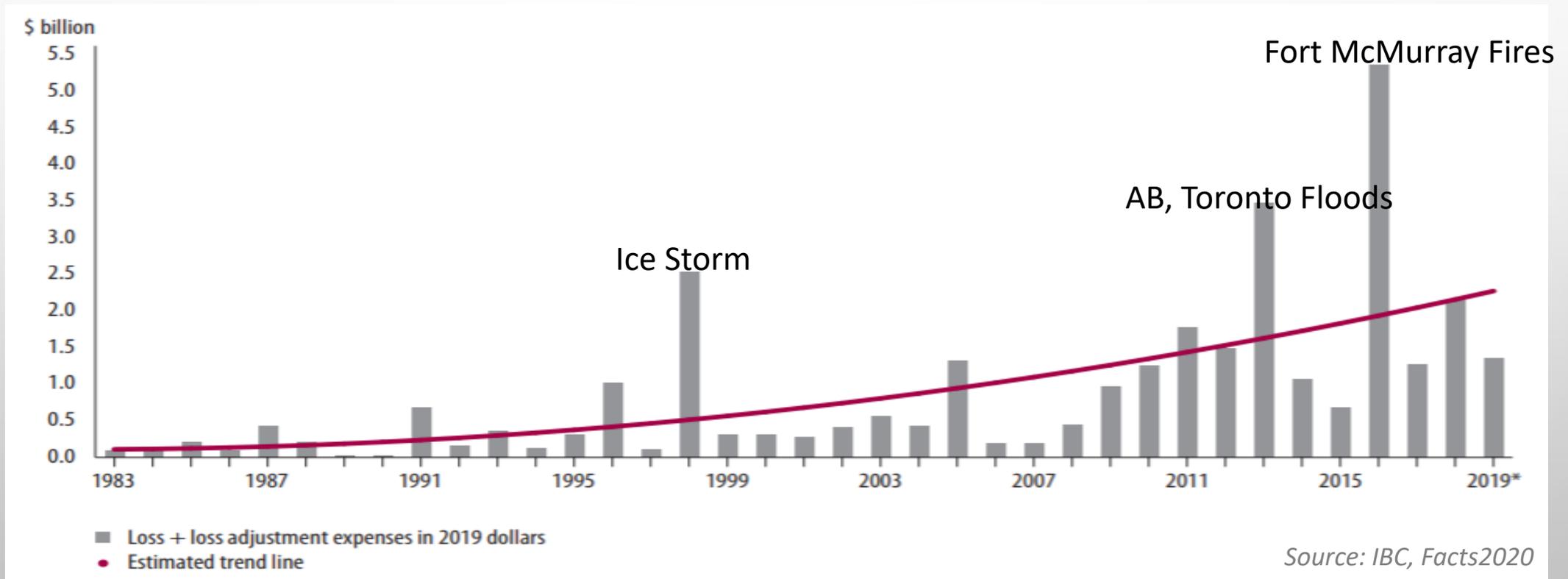
THE WORLD'S MOST FREQUENT NATURAL DISASTER

Figure 1 – Percentages of Occurrence of Natural Disasters by Disaster Type (1998–2017)



PROBLEM BREAKDOWN

CANADA'S INSURANCE INDUSTRY CATASTROPHIC LOSS (OVER 36 YEARS: 1983 TO 2019)



**FOR EVERY \$1 BORNE BY INSURERS,
\$3-4 ARE BORNE BY GOVERNMENTS, HOUSEHOLDS AND BUSINESSES**

PROBLEM BREAKDOWN LOSS TO HUMAN LIFE AND HEALTH



PROBLEM BREAKDOWN

HOW ARE FLOODS MADE WORSE?



OUTDATED BUILDING CODE



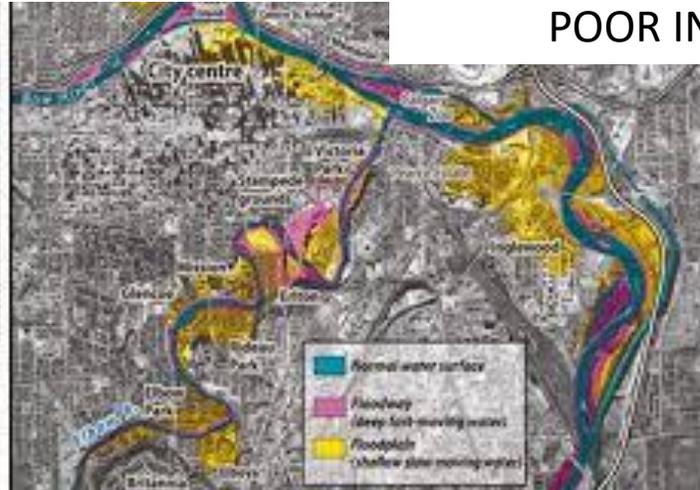
POOR INFRASTRUCTURE



NO INSURANCE



POOR LAND-USE PLANS, ZONES



POOR FLOOD MAPS



POOR ACCESS IN REMOTE LOCATIONS

PROBLEM BREAKDOWN ARE FLOOD DISASTERS ~EQUAL?

DISPROPORTIONATE DEVASTATION FOR FIRST NATIONS LIVING IN REMOTE REGIONS OF CANADA



PROBLEM BREAKDOWN

FLOODS WILL INCREASE IN THE FUTURE

CANADA'S CLIMATE IS WARMING TWICE AS FAST AS THE GLOBAL AVERAGE

- HIGHER AVERAGE RAINFALL IN MOST REGIONS OF CANADA
- MORE FREQUENT EXTREME WEATHER EVENTS, INCLUDING, HIGH RAINFALL
- EARLIER INLAND SNOW MELTS
- RISING SEA LEVELS
- MORE FREQUENT AND SEVERE STORMS IN COASTAL REGIONS



PROBLEM BREAKDOWN FLOOD DISASTER AND MITIGATION GOVERNANCE



EMERGENCY MANAGEMENT CYCLE



RECONCILIATION



CLIMATE CHANGE

PROBLEM BREAKDOWN

FLOOD COSTS TO CANADA

\$5 BILLION IN 2020 TO **\$21–43 BILLION** BY 2050 ARE PROJECTED ANNUAL AVERAGE COST OF RESPONDING TO CLIMATE IMPACTS

 **\$4.1 BILLION** IN DISASTER FINANCIAL ASSISTANCE ARRANGEMENT (DFAA) TO PROVINCES AND TERRITORIES SINCE 1970

 **\$673 MILLION ANNUAL** ESTIMATED FOR FLOODS THROUGH DFAA PAYMENTS

 MITIGATION INVESTMENT FOR FLOOD DISASTERS INCLUDE :

- **\$95 MILLION** SPENT ON NATIONAL DISASTER MITIGATION PROGRAM
- **\$117 MILLION** SET-ASIDE IN A DISASTER MITIGATION FUND
- **\$70 MILLION** SET-ASIDE FOR CLIMATE CHANGE ADAPTATION

 **\$514.6 MILLION** IS PLANNED FOR ALL-HAZARD EMERGENCY MANAGEMENT NEXT FY

SOLUTION ANALYSIS

HOW WELL IS CANADA MANAGING FLOODS?

CANADA'S PATCHWORK QUILT

Our system of governance carves-out areas of responsibilities between local, provincial / territorial, and Federal government that water does not respect.



CANADA'S FREE-RIDER PROBLEM

Our Disaster Assistance framework unwittingly creates dependencies that muddle the whole-of-society responsibility for managing floods.



SOLUTION ANALYSIS

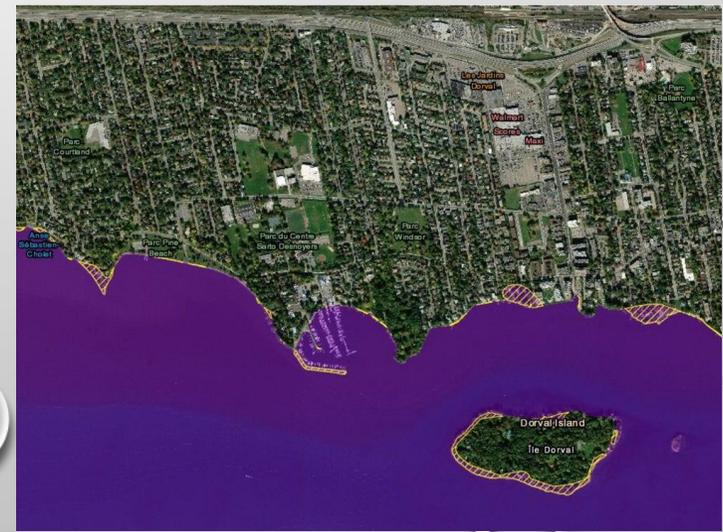
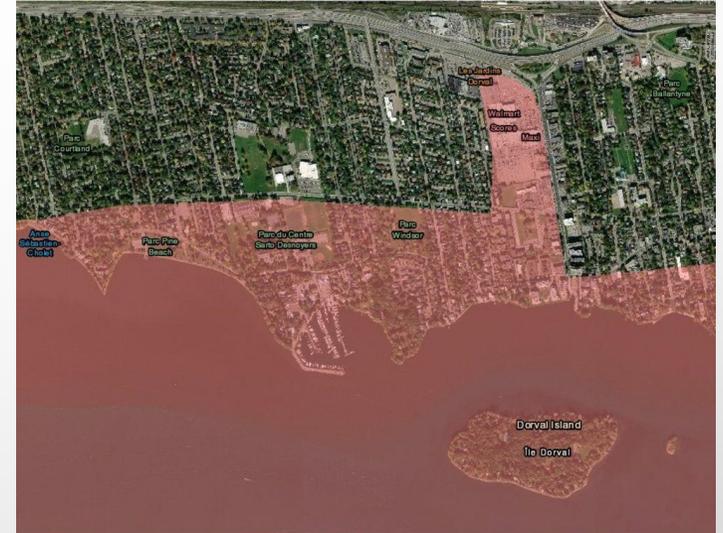
WHY IS A SOLUTION COMPLICATED?

FLOOD MAPS ARE CONTROVERSIAL

PEOPLE ARE OVERCONFIDENT

INFRASTRUCTURE MITIGATION IS A HARD SELL

REGULATORY INTERVENTION IS RISKY



RECOMMENDATIONS

FOR PUBLIC SAFETY CANADA



LIMIT INVOLVEMENT IN FLOOD MAPS



BE ACTIVE IN CREATION OF CANADA WATER AGENCY



LEVERAGE PROGRAMS TO ENCOURAGE MITIGATION



PARTNER WITH INSURANCE INDUSTRY



BUILD-ON OTHER COUNTRIES' SUCCESSES

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Career Development for Regulatory Professionals

Certificate Program

Capstone Project 2019-2020

Carleton University

