

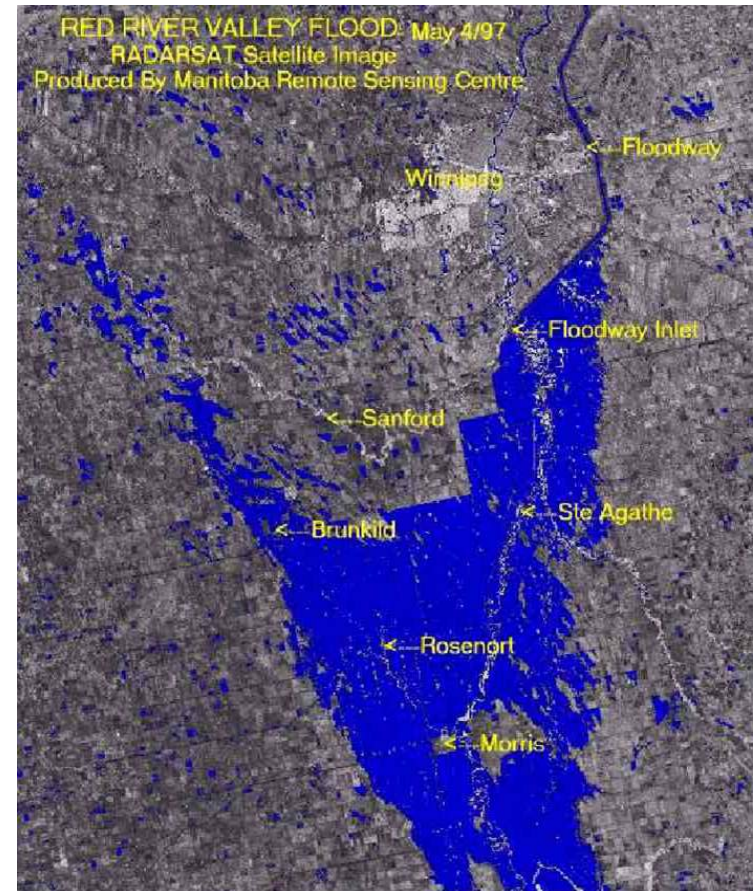
# Importance of Interagency Activities in Effective Flood Management: Red River Basin Case Study



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# Short history

- Flooding in the Red River basin is natural hydrometeorological event
- Historical floods: 1826; 1950; 1997
- Size of the basin and flow direction
- No single solution to the flood mitigation challenge



# 1950 Flood



**Damages: ~ \$700 million**



**100,000 people evacuated**

**10,000 homes flooded**

# 1997 flood

- 4,587 m<sup>3</sup>/sec - flood of the century - 2,000 km<sup>2</sup> Red Sea
- 28,000 people evacuated; 8,700 soldiers
- Many temporary dikes; 6 million sandbags; Brunkild dike (40 km in 72 hours)
- Lost Grand Point and St. Agathe
- Many new programs in place
- International Joint Commission - Red River Basin Task Force (<http://www.ijc.org>)

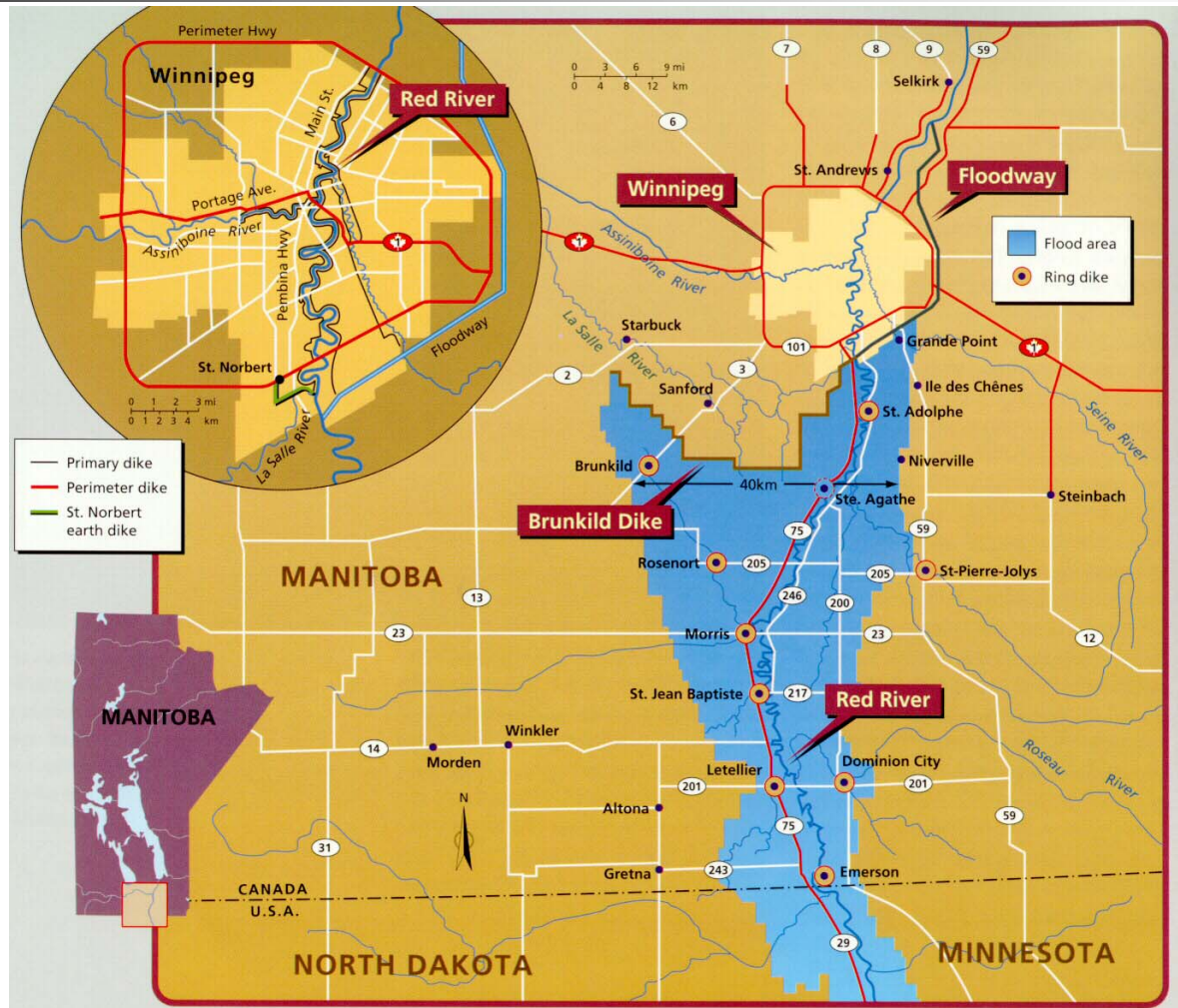


# Interagency activities

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- Hierarchical involvement
  - Local
  - Regional
  - Federal
- Measures
  - Structural
  - Non-structural

# Flood protection measures



# Flood protection measures

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- Structural
  - Red River floodway
  - Shellmouth reservoir
  - Portage diversion
  - Primary dikes
  - Ring dikes

# Red River floodway





# Shellmouth Reservoir



# Portage diversion



# Primary dikes



# Ring dikes – Morris



# Red River floodway

<b>Measure</b>	<ul style="list-style-type: none"> <li>excavated channel about 48 km long; capacity 1,698 cms</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>on advisement of 1958 Royal Commission , based on benefit-cost analysis</li> <li>completed in 1968, at cost of \$62.7 million</li> </ul>
<b>Responsibility</b>	<ul style="list-style-type: none"> <li>operation and maintenance done by Manitoba Water Stewardship</li> </ul>
<b>Goal</b>	<ul style="list-style-type: none"> <li>to divert flood waters in excess of 30,000 cfs around the city of Winnipeg from south to north</li> </ul>
<b>Efficiency</b>	<ul style="list-style-type: none"> <li>highly successful at protecting Winnipeg, within technological limitations</li> </ul>
<b>Issues</b>	<ul style="list-style-type: none"> <li>inappropriate development in highly vulnerable areas due to exaggerated sense of security within the protected area</li> <li>institutionalization of flood damage reduction (perception that flood damage reduction is a government function and not a public issue)</li> <li>if flood waters exceed channel capacity, damages could be extremely high</li> <li>capacity insufficient to handle flood equal to that of greatest flood on record (i.e.1826)</li> <li>operation is poorly understood by the public, prompting criticism</li> <li>allegations that operation caused excessive flooding south of structure</li> <li>currently the Floodway is being refurbished , a three year project costing over \$3 million</li> <li>provincial government claims Floodway has saved over \$4.5 billion in potential damages to Winnipeg</li> </ul>



# Flood protection measures

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- Non-structural measures
  - Flood fighting
  - Flood forecasting and warning
  - Post flood recovery
  - Land use regulation and mapping
  - Flood proofing









# Flood fighting

<b>Measure</b>	<ul style="list-style-type: none"> <li>Flood fighting includes those activities done prior to or during a flood with the intent of reducing damages from the flood</li> </ul>
<b>Responsibility</b>	<ul style="list-style-type: none"> <li>Manitoba Water Stewardship</li> <li>EMO (Manitoba Emergency Measures Organization)</li> <li>three levels of government</li> <li>individual property owners</li> <li>NGOs</li> </ul>
<b>Issues</b>	<ul style="list-style-type: none"> <li>need for <i>ongoing</i> emergency preparedness and planning, to ensure adequate needs assessment and timely access to human and other resources</li> <li>proactive and long-term planning required versus reactive</li> <li>optimal use of forecasts to determine flood fighting strategies, and provide sufficient warning to at-risk areas</li> <li>improve flood response in some rural municipalities</li> <li>improve public awareness of provincial government's flood fighting activities, including more specific information on the operation of the Floodway gates</li> <li>establish nature of government liability, if any, for damages resulting from inaccurate predictions of water levels</li> <li>improve individual property owners' and communities' emergency response</li> </ul>



# Management and policy instruments

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- Canada Water Conservation Assistance Act (1953)
- Canada Water Act (1970)
- Flood Damage Reduction Program (1975)



# Agents

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- Federal
  - Environment Canada
  - PFRA
  - PSEP
- Provincial
  - Manitoba Water Stewardship - Water Resources Branch
  - Manitoba Water Stewardship – Regional Operations
  - Manitoba Water Stewardship - Regional Engineering Staff
  - Manitoba Emergency Measures Organization (EMO)

# Agents

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- Provincial cont.
  - Manitoba transportation department
- Municipal governments
- NGOs
  - Manitoba Hydro
  - Red Cross
  - ....



# Lessons learned

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- There is no 'silver bullet' solution.
- Coordination of hierarchical involvement.
- Land use regulations requires particular attention (inconsistency in implementation).
- Flood proofing programs quite successful (only up to 100-year levels).
- Risk management on a municipal level.
- Institutionalization of flood mitigation (lack of personal responsibility).
- Public participation and transparency of decision making.

# Instead of conclusions

