



**CLIMATE CHANGE:
2021 and Beyond**

Preparing our communities for the future.

Great Lakes and St. Lawrence Cities Initiative Presents:

Understanding Climate Change – Physical Changes in the Region Over the Next Century

**Dr. Gail Krantzberg/ Climate Change, Water Quality-Quantity
Connections and Community Consequences**



Increased
severity of
storms



More combined
sewer overflows



More sheet runoff



Swimming
in polluted
waters?





Dropping lake levels



Loss of Boat Habitat

Wetland losses



Warmer Air Temperatures



Warmer water temperatures

- algae blooms - taste and odour problems
- changes in chemical reactions and biological productivity
- Proliferation of pathogens

Management Implications:

changes in fish community composition;

threat of exotic, invasive species (thermally limited)

shifting sources and sinks of toxic chemicals

Precipitation:

More winter rainfall – less snow

Implications:

- Less snowmelt, spring runoff decreases; more runoff in winter
- Less snow cover; shorter winter season
- Longer “erosion season”
- More evaporation

Management Challenges:

- Planning for expanded storm sewer infrastructure
- Mitigate sediment, nutrient transport

Projected Consequences



Domestic water use

Infrastructure
location

Hydraulic capacity

Taste and quality
issues



Commercial navigation

Longer season, but
shallower drafts

Higher bulk
transport rates with
decline in levels

Continued



Wetlands

Change in net area
Extreme losses in
shallow nearshore zones



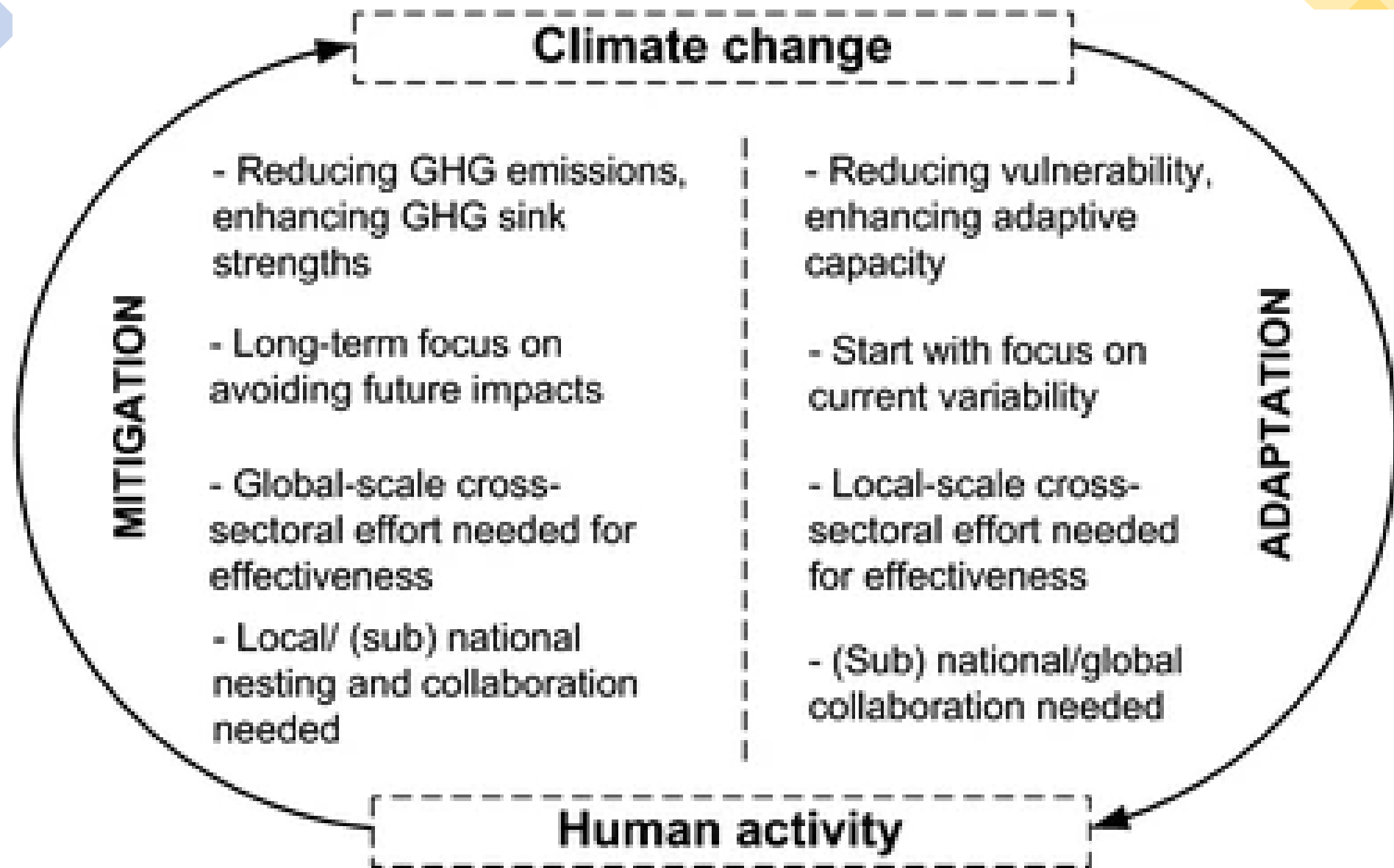
Alien invasive species

Potential increase
due to thermal shifts:
associated costs



Fish Communities

Shift towards warm
water species: angler
implications
Greater productivity in
upper Great Lakes



Climate change

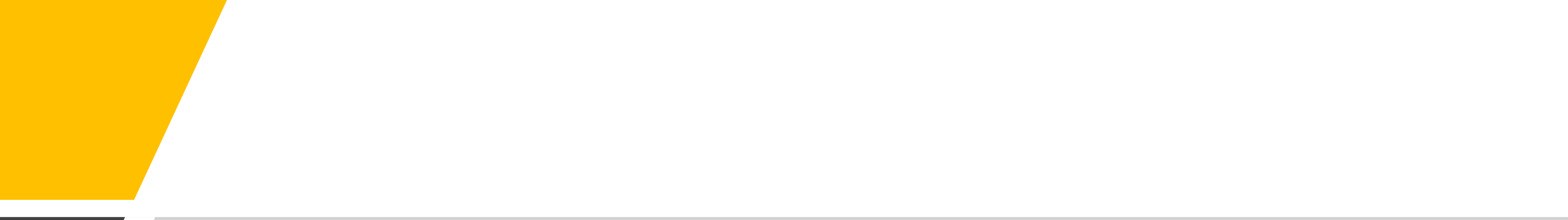
MITIGATION

- Reducing GHG emissions, enhancing GHG sink strengths
- Long-term focus on avoiding future impacts
- Global-scale cross-sectoral effort needed for effectiveness
- Local/ (sub) national nesting and collaboration needed

ADAPTATION

- Reducing vulnerability, enhancing adaptive capacity
- Start with focus on current variability
- Local-scale cross-sectoral effort needed for effectiveness
- (Sub) national/global collaboration needed

Human activity

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- ▶ Successful adaptation does not mean that negative impacts will not occur, only that they will be less severe than would be experienced had no adaptation occurred.
 - ▶ In deciding what adaptation option is most appropriate for a particular situation, attention must be paid to feasibility, likelihood and mechanisms for uptake.



Adaptation

An adjustment in human or natural systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities

Water Quality

- Assess changes in assimilative capacity, effluent discharge standards
- Adapt drinking water treatment technologies to address taste and odour problems
- Separate combined sewers; build detention facilities to contain CSOs
- Update and upgrade STPs
- Manure management plans
- Protect ground water recharge





Human Health

- Source water protection
- Improve measures to identify and address vector-borne and rodent-borne disease
- Develop and institute insect and pest controls
- Develop health care system emergency plans (extreme events and disease outbreaks)



Thank you for
Making the
Lakes Great

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