

Jennifer Penney
Director of Research
Clean Air Partnership
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APPROACHES TO ASSESSING CLIMATE CHANGE IMPACTS & ADAPTATION PLANNING

Six Broad Approaches to Impacts/Adaptation Assessment

- Impacts approach
- Natural hazards vulnerability approaches (may involve risk assessment)
- Social vulnerability approach
- Resilience approach
- Integrated approaches
- Adaptation policy approach



Why be concerned about this?

- ◉ Some overlap in the approaches (e.g. most consider climate projections)
- ◉ But significant differences, strengths & weaknesses as well
- ◉ It may be of value for communities to consider these factors before settling on an approach to climate change impact/vulnerability assessments & adaptation planning

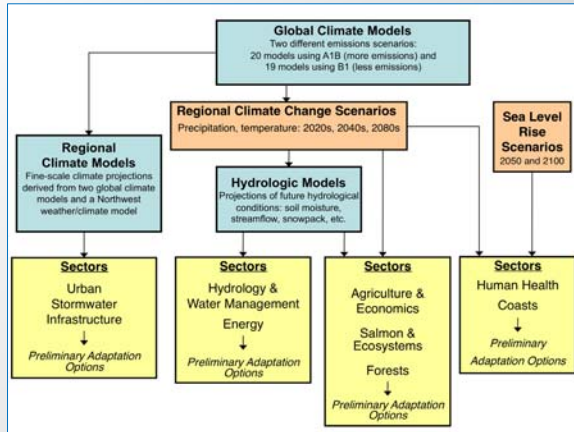


Different Approaches Emphasize Different ...

- ◉ **Knowledge sets & skills**
 - Climate systems/projections
 - Weather trends analysis
 - Engineering
 - Policy analysis
 - Ecosystem dynamics...
- ◉ **Focus**
 - Future climate impacts
 - Hazards to physical/built infrastructure
 - Vulnerable populations/social groups
 - Policy/program options
 - Ecosystems
- ◉ **Goals**
 - Motivate mitigation action
 - Protect current systems
 - Reduce harm and improve outcomes for disadvantaged groups
 - Sustainable/resilient communities
- ◉ **Timescales**
 - Future
 - Present
 - Short- to medium-term...
- ◉ **Geographic scales**
 - Global
 - Regional
 - Local
 - Policy unit
 - Watershed...
- ◉ **Tools**
 - Climate scenarios
 - Socio-economic scenarios
 - Vulnerability mapping
 - Case studies
 - Cost-benefit analysis
- ◉ **Relationships with stakeholders**
 - Clients
 - Participants
 - Decision-makers



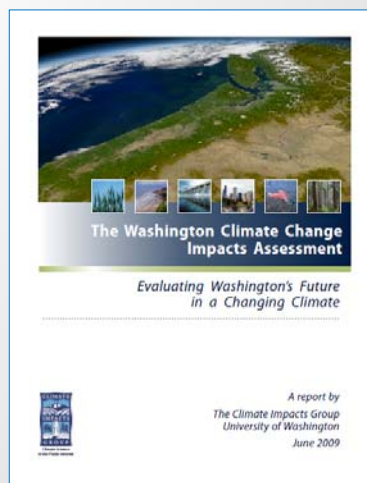
Impacts Approach



Source: Climate Impacts Group, 2009. *Washington Climate Change Impacts Assessment*

- Science & scientist driven
- Dependence on climate models and projections
- Stakeholders are recipients of knowledge
- Emphasis on physical systems
- Important for setting mitigation agenda & for identifying risks of climate change

Example

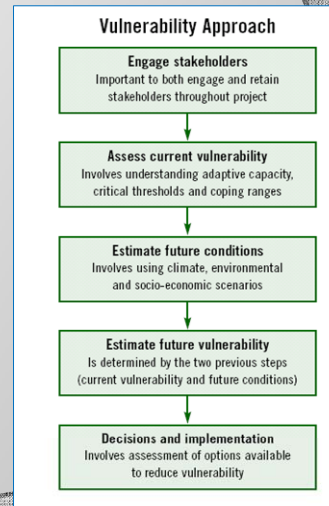


- Sophisticated top-down analysis by 50 scientists of likely climate impacts on Washington state (and Columbia River basin)
- Incorporated analysis of recent climate trends
- Focus mainly on natural/physical systems
- Sectoral analysis (water, energy, agriculture, fisheries, health...)
- Makes very general recommendations for adaptation



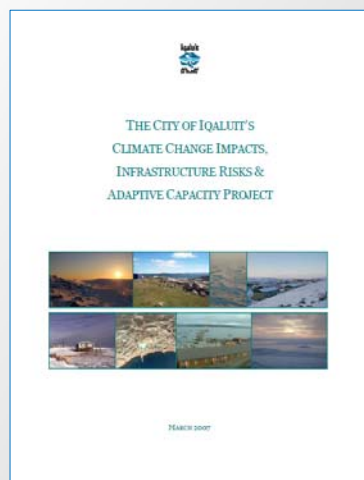
Natural Hazards Vulnerability/ Risk Assessment Approach

- Evolved from impacts approach
- Retains focus on natural systems & built infrastructure
- Usually sectoral analysis
- More emphasis on work with and by stakeholders
- Starts with *current* weather trends & vulnerabilities
- May utilize climate projections
- Often involves formal risk assessment processes
- Adaptation is focused on preserving current systems



Source: NRCAN, 2004 *Climate Change Impacts & Adaptation: A Canadian Perspective*

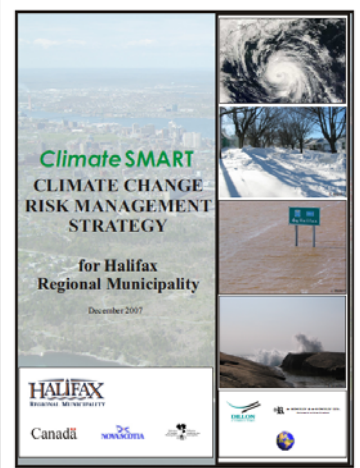
Example



- Followed natural hazards vulnerability assessment model
- Drew on scientific literature/projections
- Consultation with stakeholders, especially local, territorial & federal government reps
- Identified past & present experiences of and responses to climate variability
- Mainly narrative, qualitative approach
- Focus on near future



Example



- Emphasis on physical systems – broader focus than the Iqaluit report
- Included formal risk assessment approach
- Qualitative and quantitative assessment of probability and potential consequences
- Involved consultants, HRM staff, EC staff on research team
- Workshops to gather observations from and engage with municipal staff



Social Vulnerability Approach

- Focus on social & economic factors that contribute to individual and/or collective vulnerability, e.g.
 - Poverty
 - Lack of resources/basic infrastructure
 - Economic dependence
 - Governance (corruption, “clientelism” ...)
 - Capacity (education, scientific & technical resources...)
- Investigates how climate change interacts with these factors to increase vulnerability
“Adaptation” includes improving social conditions & thereby reducing vulnerability



Social Vulnerability Approach

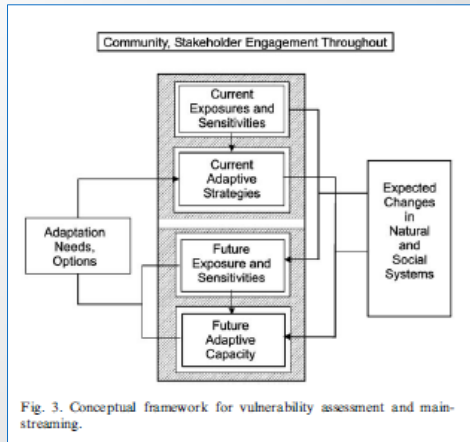


Fig. 3. Conceptual framework for vulnerability assessment and mainstreaming.

Smit & Wandel (2006) Adaptation, adaptive capacity & vulnerability *Global Environmental Change* 16 (282-292)

- Emphasis on dialogue with & mobilization of affected communities (“bottom-up approach”)
- Used in assessing current vulnerabilities & adaptation in poor & very vulnerable communities internationally & in Canada’s north
- Recommendations focus on the present & near future



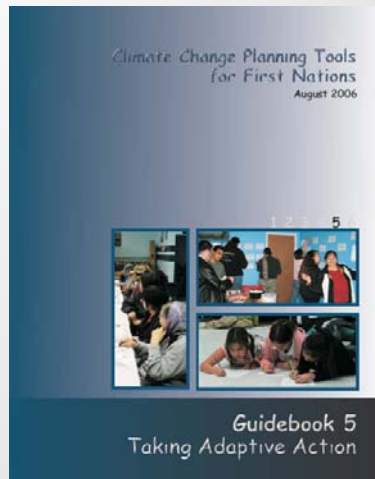
International Example



- Investigates recent & projected climate changes impacts on physical systems
- Examines how poverty & inequality affect vulnerability
- Explores the institutional & policy environment for adaptation response
- Current & potential adaptations include investment to support livelihood options for the poor



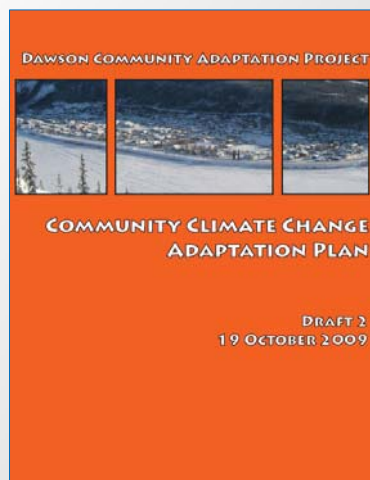
Canadian Example



- Guide for community-based working groups to identify vulnerabilities & incorporate climate change into sustainable community planning
- Emphasis on dialogue with the community (and tools to do it)
- Current knowledge about ways climate is changing and might affect this vision
- Includes “lessons from other communities” in tackling these issues
- Participative planning processes



Canadian Example



- Attention to climate change effects on local economy & livelihoods, including those of First Nations members of the community
- Strong involvement of community members in the assessment (though differences in vulnerability and capacity not deeply explored)
- Adaptation suggestions focus on near future

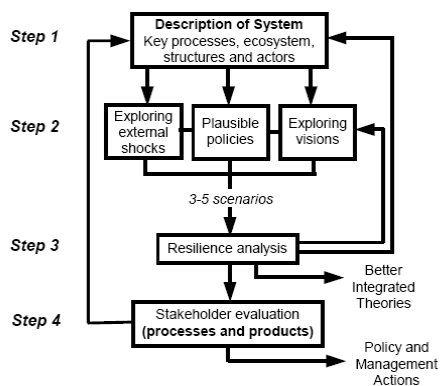
Resilience Approaches

- History
 - Began with investigation of resilience in ecological systems (wetlands, forests, coastal ecosystems)
 - Expanded to “social-ecological” systems (fishing communities,
 - More recently used in disaster planning
- Resilience implies the capacity to:
 - Adapt and live with change and surprises
 - Recover rapidly from shocks and disturbances
 - Learn and reorganize to ensure continuity
- Important characteristics of resilient systems:
 - Diversity
 - Flexibility
 - Redundancy



Resilience Approaches

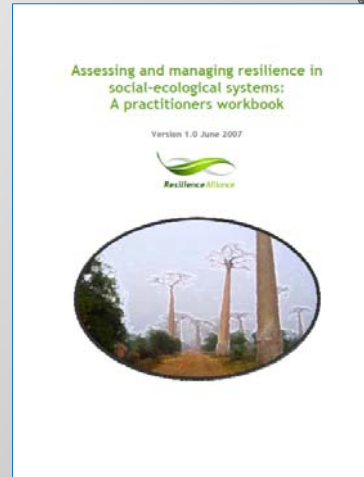
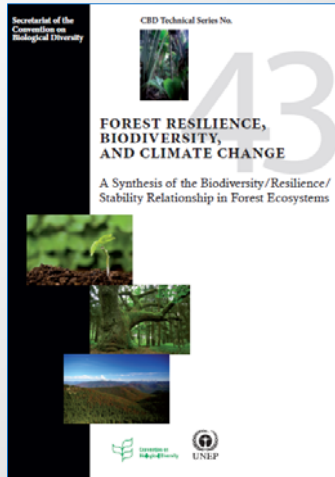
Fig. 1. A framework for the analysis of resilience in social-ecological systems.



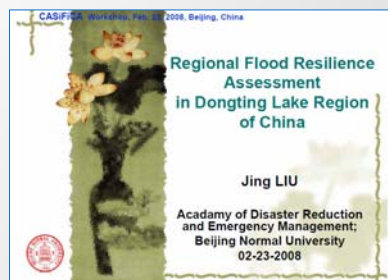
- Resilience approaches are still mainly focused on ecological systems
- Some discussion of application to social-ecological systems but tends to be fairly theoretical



Examples



Recent Application to Disaster Management

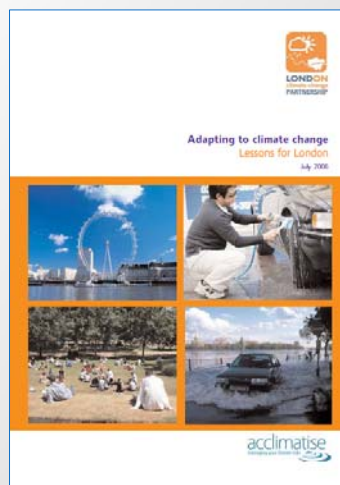


- Refers to and analyzes:
 - **Technical** capacity of physical systems to withstand shocks
 - **Organizational** ability to respond to emergencies & carry out critical functions
 - **Social** capacity to reduce negative consequences
 - **Economic** capacity to reduce direct & indirect financial losses

Adaptation Policy Approaches

- ◉ Focus on identifying, evaluating & choosing among adaptation options, programs and policies
- ◉ Consider:
 - Current variability and existing *policies* to respond to it
 - Future risks and possible policies/programs to reduce risk
 - Feasibility of implementation including:
 - Access to knowledge and data
 - Engagement
 - Availability of technical and financial resources
 - Barriers...
 - Compatibility with other policy goals
- ◉ May utilize
 - Standard policy analysis/policy cycle frameworks
 - Case studies
 - Alternative decision pathways
 - Multi-criteria decision analysis...

Example



- ◉ Focused on three key impacts
 - Flooding
 - Heat
 - Limited water resources
- ◉ Reviewed actions in 18 cities to identify how they address these problems including
 - Policy drivers
 - Costs and benefits
 - Difficulties with application
 - Effectiveness
- ◉ Analyzed opportunities for applying these strategies in London context



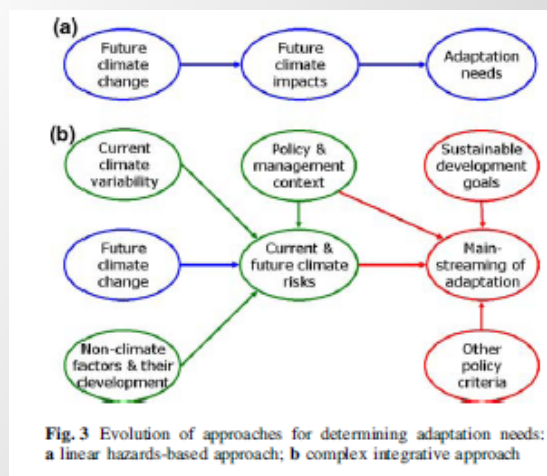
Example



- Outlines risks
- Describes existing responses
- Includes short-term adaptation plans
- Outlines adaptation policy *process* for developing longer-term program and policies
- Doesn't analyze or suggest alternative adaptation options and strategies



Integrated Approaches

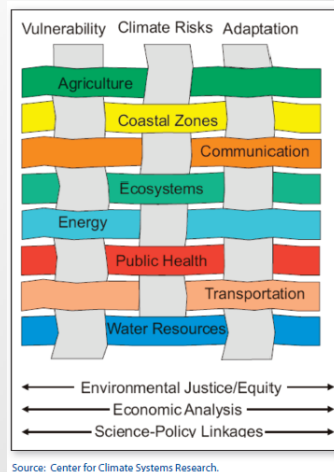


- Considers current & future climate, social & economic factors, existing policy context, other policy goals & other factors in assessing vulnerability & proposing adaptation action

Füssel (2007) Adaptation planning for climate change
Sustainable Science 2:265-275



Example



- Work with stakeholders to:
 - Identify current & projected impacts
 - Identify potential adaptation options (sectoral & inter-sectoral)
 - Include economic, social (equity) & policy analysis
 - Develop a set of guidelines for “flexible, yet prioritized” adaptation strategies

NYSERDA (2009) Integrated Assessment for Effective Climate Change Adaptation: Strategies for New York State

Questions to ask when choosing an approach ...

- What is the main goal of the assessment and adaptation planning?
 - To engage politicians and the community?
 - To protect existing community resources and infrastructure ?
 - To incorporate climate change into forward planning?
 - To identify & protect the most vulnerable?
 - To create a more sustainable & resilient community?
- How important is the scientific background of the work?
 - Do you need to make the case for action to a sceptical audience?
 - Do you need scientifically defensible quantitative estimates about future changes and impacts or is it sufficient to show historical trends and current extremes?



Questions continued...

- What resources can you muster?
 - Information on current climate variability and extremes?
 - Climate change projections/scenarios?
 - Analysis of impacts of recent weather events?
 - Studies of vulnerable systems/sectors/hazards?
 - Information about potentially vulnerable populations?
 - Assessment guidelines/templates?
 - Stakeholder facilitation skills?
 - Engagement of community members?



Questions continued...

- What is the timeframe you are concerned about ?
 - Current and near future vulnerabilities?
 - Lifetime of planned new infrastructure?
- Whose involvement do you want or need (and at what stage of the project)?
 - Scientists? Technical experts?
 - Staff of municipalities and/or other levels of government?
 - NGOs?
 - Community members?

