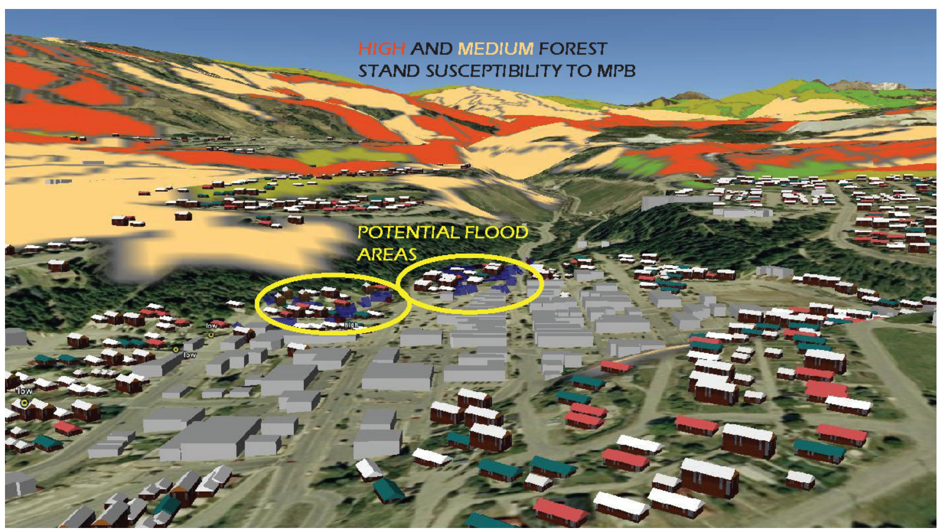
LOCAL CLIMATE CHANGE VISIONING AND LANDSCAPE VISUALIZATIONS

GUIDANCE MANUAL EXECUTIVE SUMMARY



Collaborative for Advanced Landscape Planning
University of British Columbia

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C A L P

What is local climate change visioning?

Local communities face multiple challenges related to climate change, including the need to adapt to uncertain futures and meet deep greenhouse gas reduction (mitigation) targets. Local climate change visioning integrates climate science with local planning, using participatory processes and "virtual reality" techniques based on digital mapping and scientific data to accelerate community awareness, help to build a constituency for change, and support decision-making on climate change options.

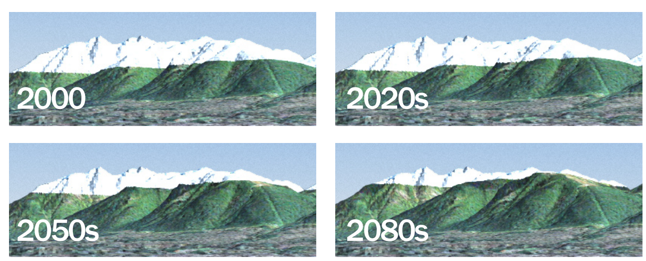
Local climate change visioning is a flexible process that can be adapted to a range of contexts and output needs, from engaging in a full stand-alone visioning process to using smaller components and tools embedded in other ongoing planning or engagement processes. Its critical and distinguishing components include:

PARTICIPATION Participatory processes provide local knowledge, prioritize and evaluate local climate change responses and planning options, and ensure that visualizations are locally credible.

DATA INTEGRATION of local knowledge and the best available scientific data, mapping, and modeling brings climate science, local knowledge, and cross-disciplinary expertise together.

SCENARIO BUILDING provides a framework to address holistic, future climate change possibilities and current and future response options. The objective is to describe complex and uncertain alternative future pathways as simply as possible in "plausible storylines" or scenario narratives.

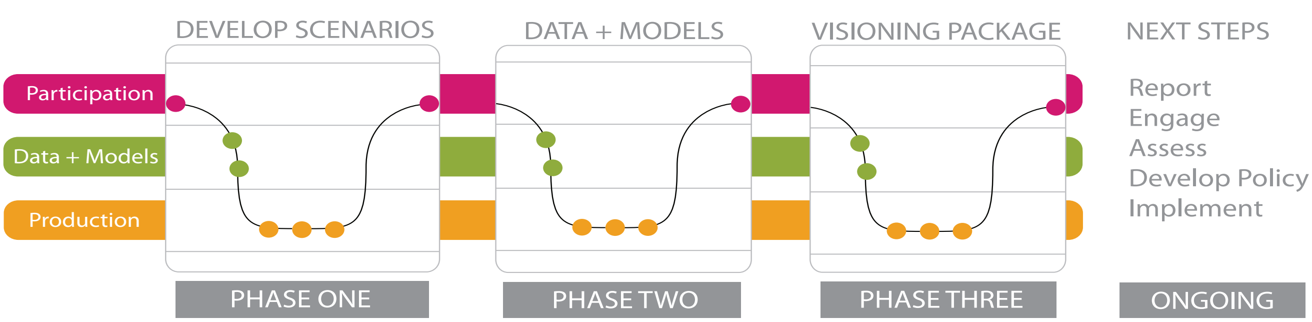
2D,3D&4D (across time) VISUALIZATIONS ("viz") are graphic images that represent scientific and other data. They communicate complex and long-term issues and scenarios to community members and decision-makers in an easy to understand and compelling way.



MetroVancouver April 1st snowline projection

How is climate visioning done?

Climate change visioning is an iterative process, as shown below, that moves through three main phases. Each phase includes the key components of participation, data integration and production.



The full stand-alone climate change visioning process involves 10+ steps

PHASE ONE, PARTICIPATORY SCENARIO BUILDING: initiate project, review local climate science, identify local priorities, develop scenarios

1. Convene Working Group or Team
2. Collect spatial and non-spatial baseline data for scenario development
3. Produce scenario development materials: maps + scenario frameworks
4. Scenario Development Workshop to select and define scenarios

PHASE TWO, DATA + MODELING: data generation and integration, viz development, review

5. Map, model and integrate land use, spatial impacts, and response option data
6. Produce 2D mapping and 3D viz materials to flesh out the scenarios, for review
7. Data and Visualization Review Workshop

PHASE THREE, FULL VISIONING PACKAGE: data + viz refinement, materials production, community/stakeholder presentation

8. Refine and improve spatial and numerical data and modeling
9. Produce final mapping, viz, virtual globes, animations, and technical documents
10. Community Open House, other public engagement to review scenarios/options

NEXT STEPS: Dissemination and Implementation

10+ **Further steps may include:** On-going engagement, reports, assessment, policy development, and implementation, evaluation, monitoring

Visioning is an iterative process, moving through three phases to produce a visioning package.

The process starts by downscaling global climate change **scenarios** to the regional and local level. The scenarios enable consideration of potential future conditions in a coherent and easy-to-grasp manner. They are developed in a participatory process that considers GHG emissions and local trends; provides a structured way to ask "what if" questions exploring risks, options, and possible outcomes; and incorporates both adaptation and mitigation.

Local climate change visioning uses the visual landscape, usually within a geographic information system (GIS), as a platform to synthesize **diverse data sets and modeling**, including current risks and locally prioritized issues, development plans, carbon emissions sources, climate change impacts, and adaptation and mitigation strategies.

Landscape visualizations – or 2D, 3D and 4D (across time) graphics and images - function as a tool to both verify data and modeling, and enhance communication of complex information. The most straightforward visualizations are 2D spatial data draped over 3D terrain, while more complex visualizations involve multiple integrated datasets and photo-realistic 3D renderings of vegetation and buildings. Non-map-based visualizations using photo-editing software can also be useful. Virtual globes (eg. GoogleEarth) that allow for interactive fly-throughs and 3D mapping display of GIS spatial data can make straightforward visualizations realizable with local or regional spatial planning resources.

Visualizations are supported by an underlying set of participatory processes, scenario building, and data and modeling. Final visualizations should be presented in a "**visioning package**" that includes scenario narratives, the background data sources, and the context for the visualizations. They should also adhere to visualization ethics, meeting criteria around drama, defensibility, and disclosure.

Why do local climate change visioning?

Shared Learning, Decision-Support

Using collaborative participation, the **local climate change visioning process emphasizes shared learning** around climate change, its impacts and local response options in order to communicate complex information more clearly to citizens and stakeholders. Local climate change visioning localizes, spatializes and visualizes complex data to support improved local decision-making on climate change.

The process can:
• Increase community and practitioner awareness & understanding of local climate change impacts and response options
• Increase public engagement
• Provide a platform for discussing and evaluating adaptation and mitigation options
• Support decision-making on tough climate change choices
• Help to build support for local climate change adaptation and mitigation policies.

The visioning process may be used as a stand-alone **engagement process**, such as developing a community climate change plan or sustainability strategic vision. Alternately, select components may be used for smaller stand-alone efforts such as wildfire management planning, or visioning steps may be embedded in larger ongoing planning and engagement processes, such as an Official Community Plan (OCP) review, or a community-led process such as Transition Towns[38].

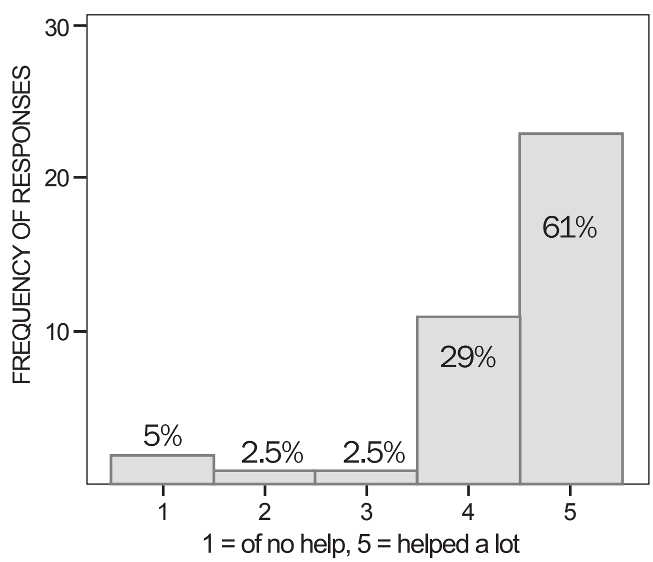
Local climate change visioning provides an opportunity to **find solutions that fit the community** and incorporate local knowledge into policy development. Visioning considers outcomes at all scales – from the landscape scale (watershed and beyond) to individual parcels, including exploration across jurisdictions and legal boundaries. The **desired outcome is moving communities forward** towards low carbon, resilient communities in the face of climate change.

Research findings on visualizations

Visualizations help people to understand complex spatial data more quickly. Thus, visualizations can enhance the communication of and engagement with complex and future-oriented information within a local setting: people may for the first time "see" future climate change in their own backyards, and better understand their choices. Visualizations clarify and illustrate climate change for local participants, in the context of known landscapes, increasing participant comprehension. Visualizations also verify scientific modeling, enhance citizen engagement, and provide decision-support.

Research in Kimberley at a Community Open House asked the following: "If you were asked for your opinion on mitigation and adaptation strategies for climate change in Kimberley, **would the visualizations you have seen help you?**"

The majority participant response (90%) was that they either "(4) helped a little" or "(5) helped a lot".



Participant rating of the visualization benefits in Kimberley
(38 respondents, Mean 4.370, Standard Deviation 1.051)

Guidance manual contents and use

The guide is **intended to be used by local communities: decision-makers/practitioners, sustainability citizen groups, consultants, and others**, to help develop resilient local communities in an uncertain climate change future.

The guide is **intended for use BC-wide**. Supportive bodies similar to the Columbia Basin Trust, which funded the community component of the Kimberley project, and local or regional GIS support similar to the services provided within the Columbia Basin by the Selkirk College Geospatial Research Centre in Castlegar, could aid visioning feasibility in smaller communities.

The guide should be seen as a living document, to which are added locally relevant resource materials and climate scenarios. The process can also be re-worked to fit each community's particular needs, including identifying and prioritizing key local issues. Local citizens and local experts will be a strong asset to local Visioning processes, while external experts such as climate scientists can provide helpful data. The collaboration between "locals and outsiders" can prove very fruitful.

Section 1 explains WHAT visioning is and WHY it is a valuable tool, as well as WHAT and WHY for scenarios and visualizations in climate change planning. Note that Visioning refers to a participatory process to develop local climate change responses and planning, while 3D visualizations are products that come out of the Visioning process.

Section 2 provides an overview of the actual process, a basic "how to" do visioning, develop scenarios, and produce 3D visualizations.

Section 3 works through the 10 Steps in Three Phases that comprise the core of the Visioning Process. Each phase goes through an iteration of participation, data/modeling, and materials production. The third phase produces a final Visioning Package: the set of tangible products including scenario storylines, visual outputs/visualizations, presentations, and technical background materials that can be used to improve public outreach and decision-making.

The process is flexible and iterative - phases may be repeated and steps added or omitted depending on local needs.

Section 4 has references organized by theme, such as Adaptation, Scenarios, or Participatory Processes. Each reference is numbered with corresponding reference numbers in the text.

Section 5, the Appendices, includes an introduction to CALP's Kimberley project, an overview of Visualization Ethics, European Union research findings on types of visualizations and audiences, and a brief discussion of spatial greenhouse gas (GHG) emissions.

The PINK BOXES give examples from case studies.

The full Guidance Manual can be downloaded from www.calp.forestry.ubc.ca/publications/.

PROJECT TEAM AND FUNDERS

The Collaborative for Advanced Landscape Planning (CALP) at the University of British Columbia specializes in sustainable landscape planning and design, and landscape visualization, with a focus on visualizing local climate change impacts and solutions. CALP has been leading the development of tools and processes for visioning future climate impacts, adaptation, and mitigation strategies at the local level using 2D Geographic Information Systems (GIS), 3D visualization techniques, and "4D visioning" of alternative futures.

CALP's tools and processes have been previously tested in several locations across BC: for forestry planning in the Slocan Valley/Arrow Lakes, for First Nations land planning in the Fraser Valley and Shuswap, for sustainable development planning on Bowen Island, and for climate change planning in MetroVancouver (Delta, North Vancouver). The Guidance Manual's main case study is the 2008-2009 climate change adaptation project in the City of Kimberley, BC.

CALP's ongoing research on Local Climate Change Visioning has been funded by the GEOIDE National Centre of Excellence.

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CALP's Kimberley work would not have been possible without the collaboration of:

For the Kimberley case study, CALP wishes to thank: the City of Kimberley including Mayor Jim Ogilvie, all the Councilors, and the staff, particularly Operations staff, Troy Pollock in Planning, and Al Collinson the Fire Chief; the Kimberley Climate Adaptation Project team, particularly Project Coordinator Ingrid Liepa, the Steering Committee, and all the members of the Working Groups; all the residents of Kimberley who participated in workshops and public open houses; the CALP team including Dr. Duncan Cavens, Nicole Miller, Adelle Airey and Courtney Miller; the Swiss National Science Foundation; the Selkirk College Geospatial Research Centre, particularly Paul Sneed; the Pacific Climate Impacts Consortium, particularly Trevor Murdock; the Columbia Basin Trust and their Climate Advisory Committee, particularly Dr. Stewart Cohen; Art Stock, Entomologist, BC Forest Service; Bob Gray, Fire Consultant with the City of Kimberley; The British Columbia Ministry of Community and Rural Development, particularly Cathy LeBlanc; and, the Real Estate Foundation.

Guidance manual review was kindly provided by: Ingrid Liepa, Troy Pollock (City of Kimberley), Dr. Stewart Cohen (Environment Canada), Cathy LeBlanc (MCRD), Laurie Cordell (Fraser Basin Council), and Diana Brooks (Rural Secretariat, MCRD).

Guidance Manual Author Team: Ellen Pond, Olaf Schroth, Stephen Sheppard, Sara Muir-Owen, Ingrid Liepa, Cam Campbell, Jon Salter, Kristi Tatebe, and David Flanders.

Compilation + design: Ellen Pond.

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