

Visualizing Climate Change

Local Climate Change GIS-databased Visioning Tools for Community Decision-Making

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Climate Change and Sustainable Communities

Room 31 A, 1:30pm – 2:45pm

San Diego July 14, 2010



Lenné3D

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In co-operation with Kimberley's Climate Change Adaptation Project: Visualizing Community Land Use Impacts, Adaptation and Mitigation

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- City of Kimberley
- Columbia Basin Trust
- Real Estate Foundation
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1. The Visioning Framework

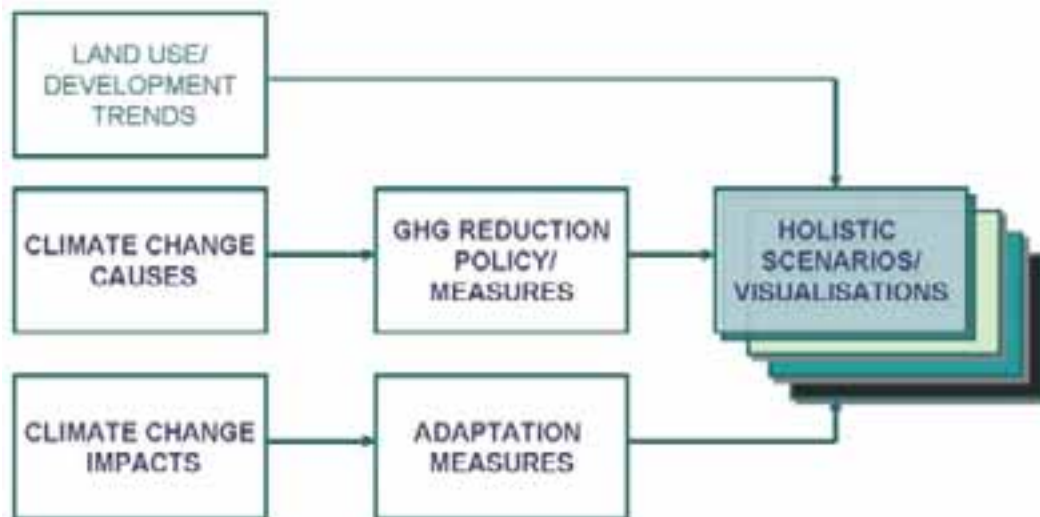
2. The Visioning Process in Kimberley (BC)

1. Participatory scenario building
2. Geodata
3. Geospatial modeling
4. Geovisualization / 3D landscape visualization
5. Policy outcome

3. Societal and scientific effects

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1. The Visioning Framework

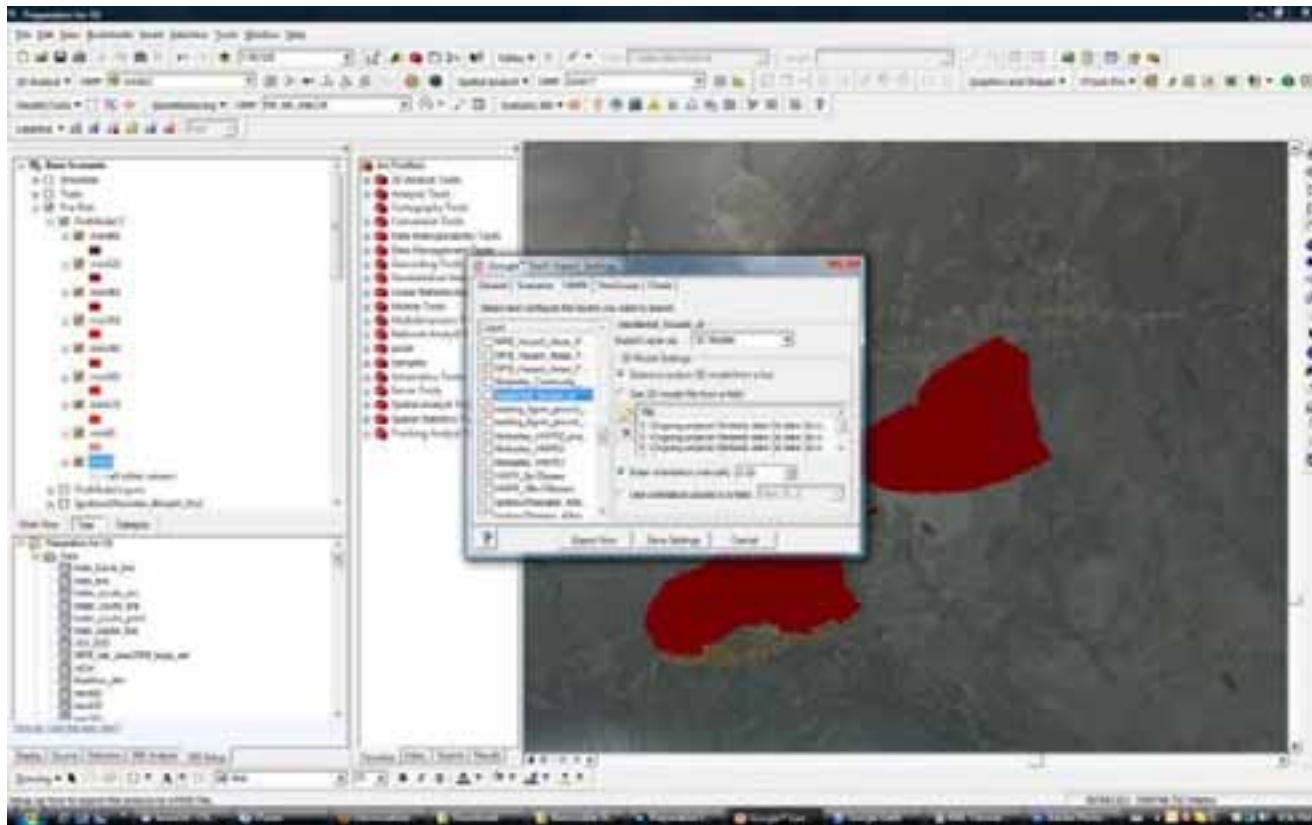


Visioning is more than a tool, it is a process that is

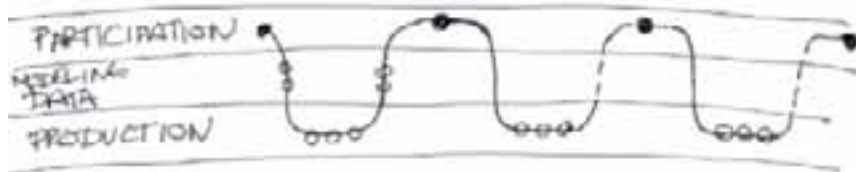
- participatory
- scenario-based
- holistic
- quantitative and qualitative

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Principles: Spatialize – Localize – Visualize



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2. The Visioning Process



2.1 Participation

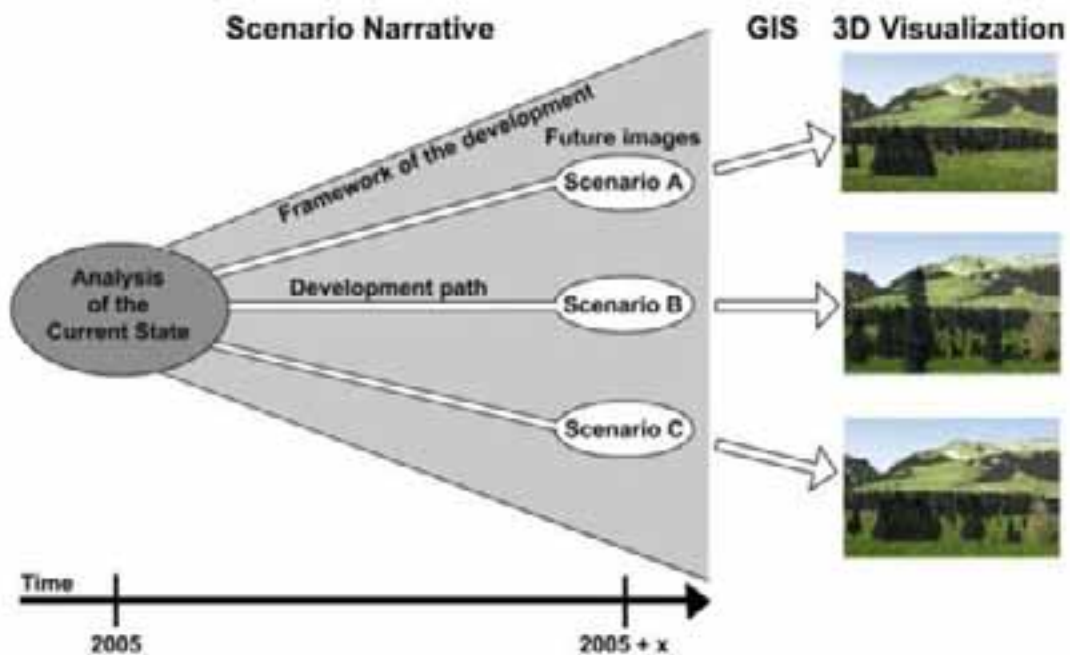
What?

Who?

How?

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Scenario Method: What if?



1. Thinking in alternatives
2. Complex factors
3. Long-term time scales

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Advantages

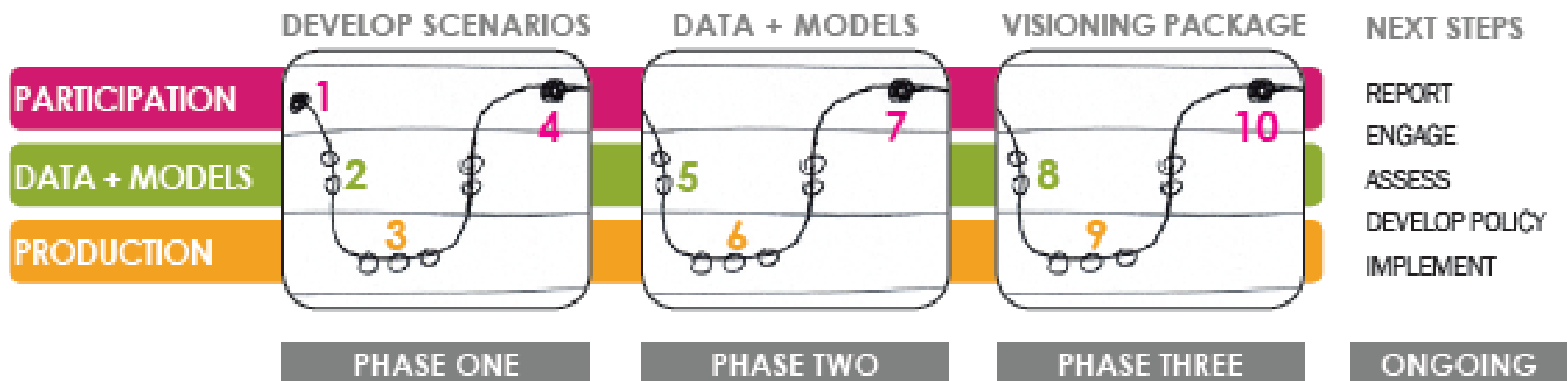
- Spatial references
- Qualitative and quantitative
- Illustrative



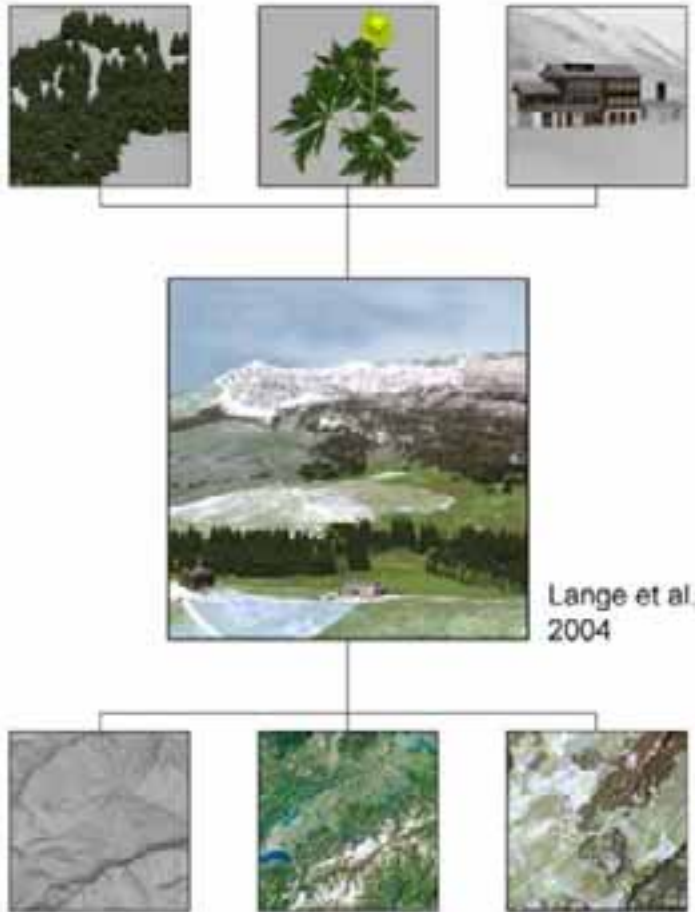
Disadvantages

- Often subjective
- Few formal guidelines
- Often lack of scientific defensibility

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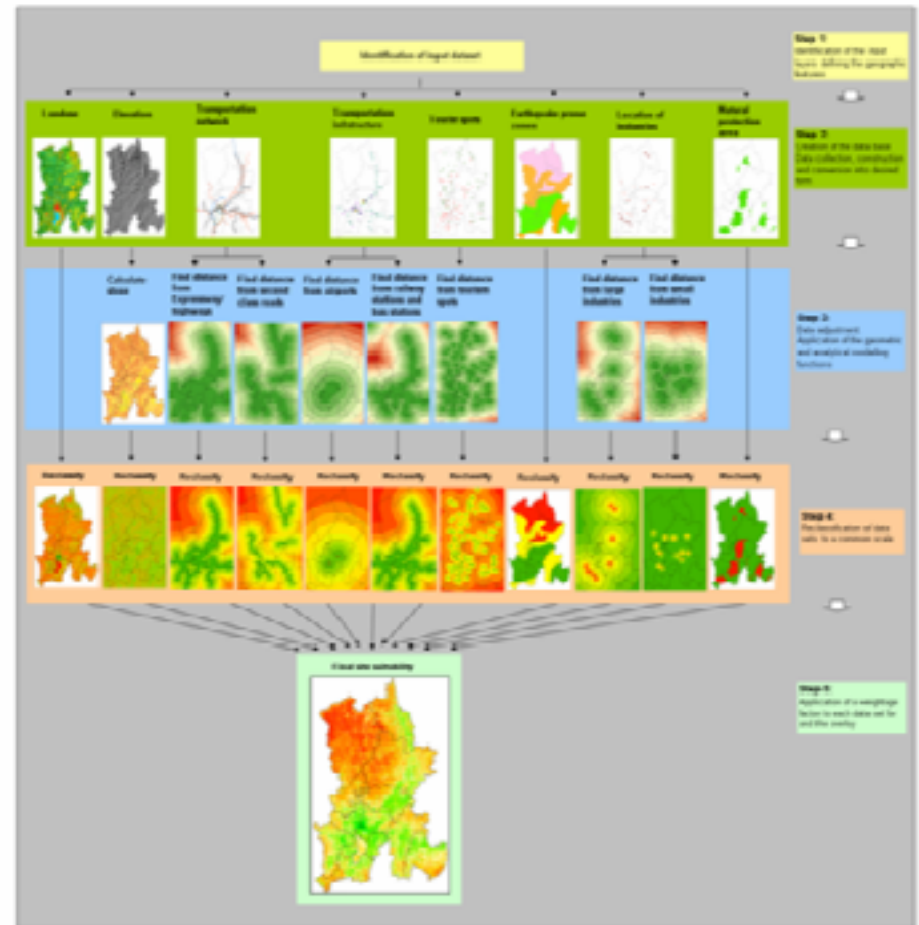
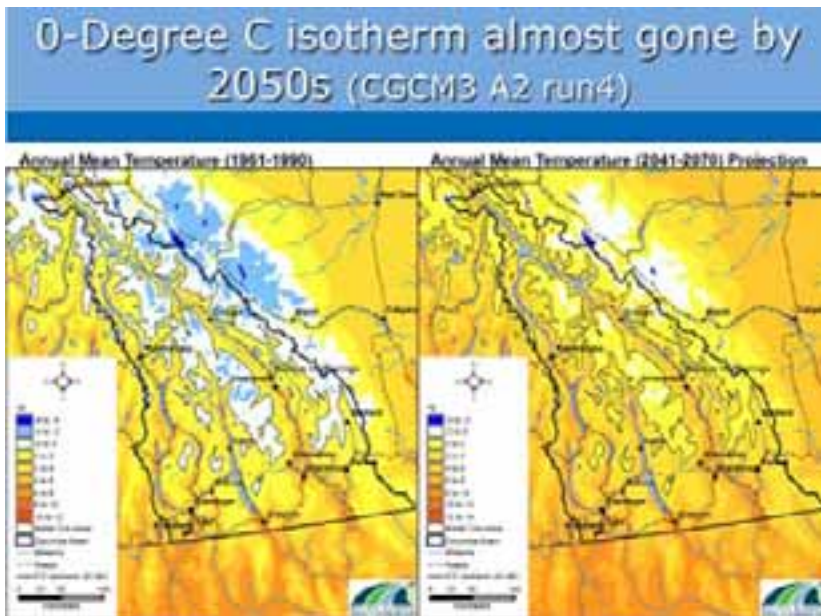
2.2 Geodata

Data Types:

- Digital Elevation Model (DEM)
- Orthophotos
- Geospatial vector data
- CAD vector data
- Census data
- Other data

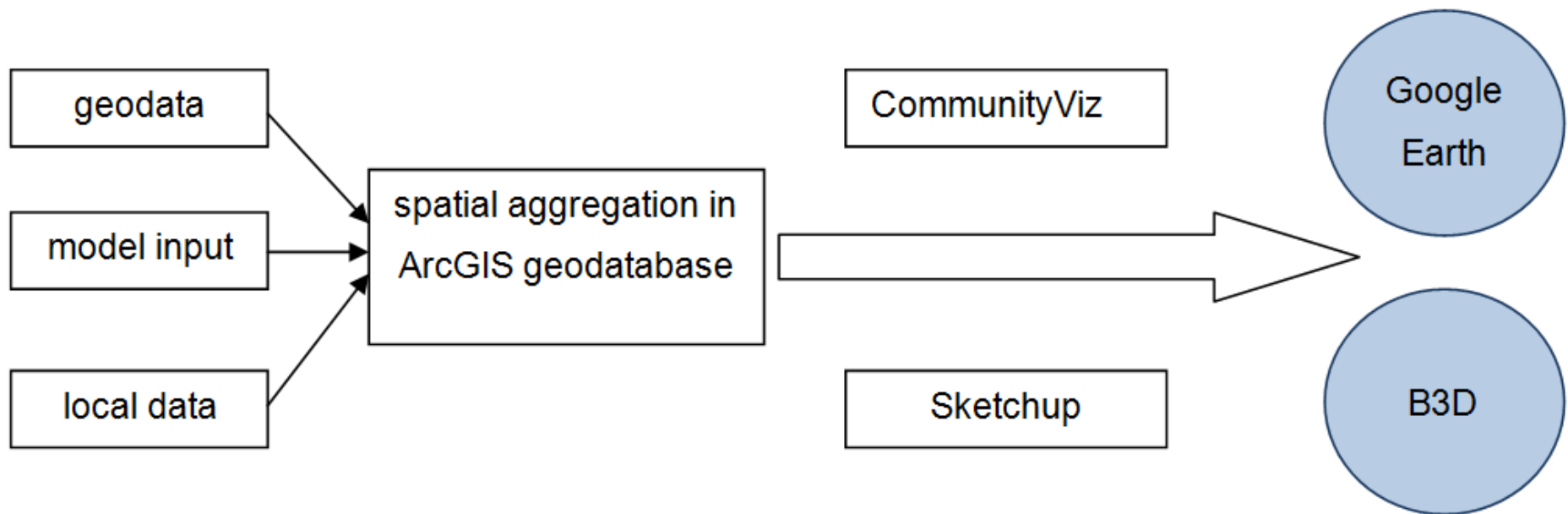
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2.3 Geospatial Modeling

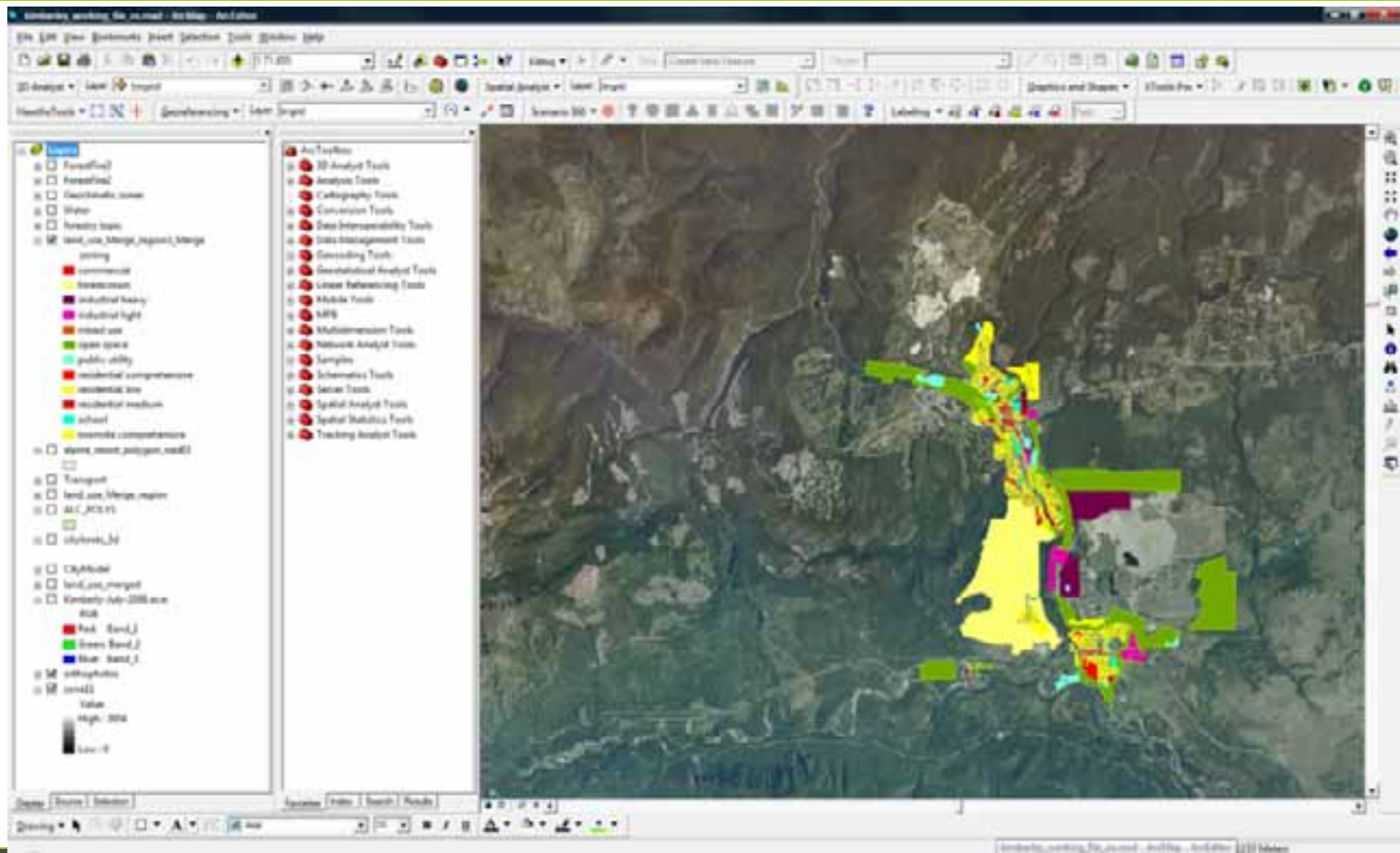


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2.4 Geovisualization



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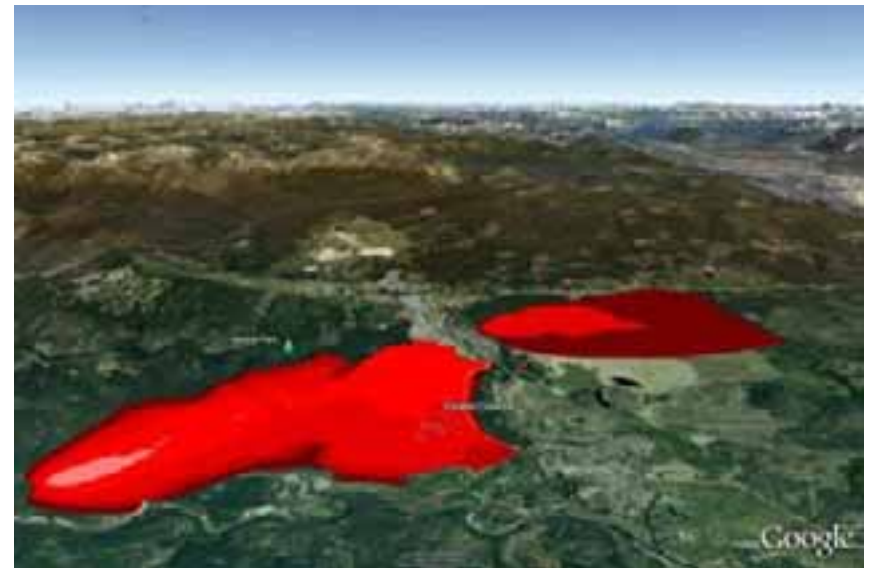
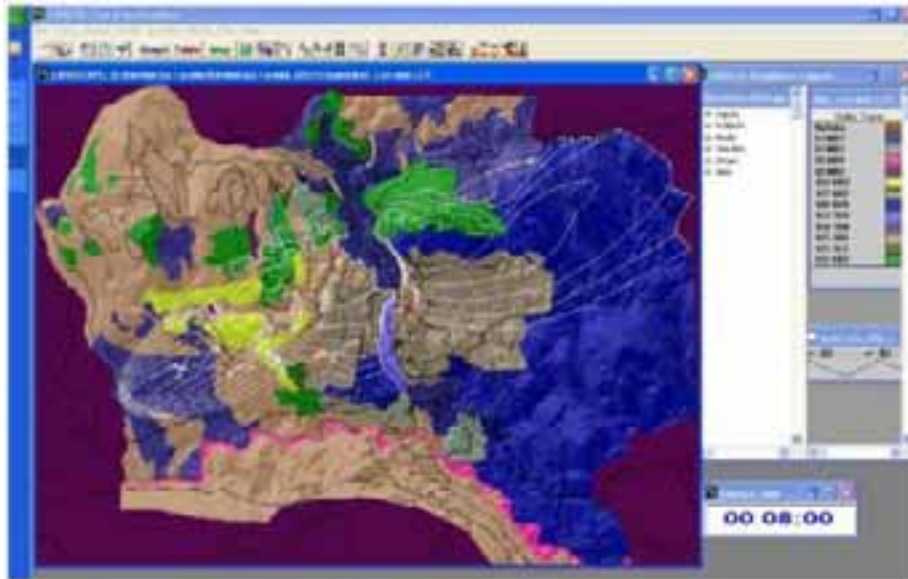


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2D GIS map



3D landscape visualization



2.4 3D Landscape Visualization

KCAP Kimberley (BC)





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Climate Change Responses in Planning

- Adaptation = adapt to climate change impacts
- Mitigation = reduce greenhouse gas emissions that cause the changing climate

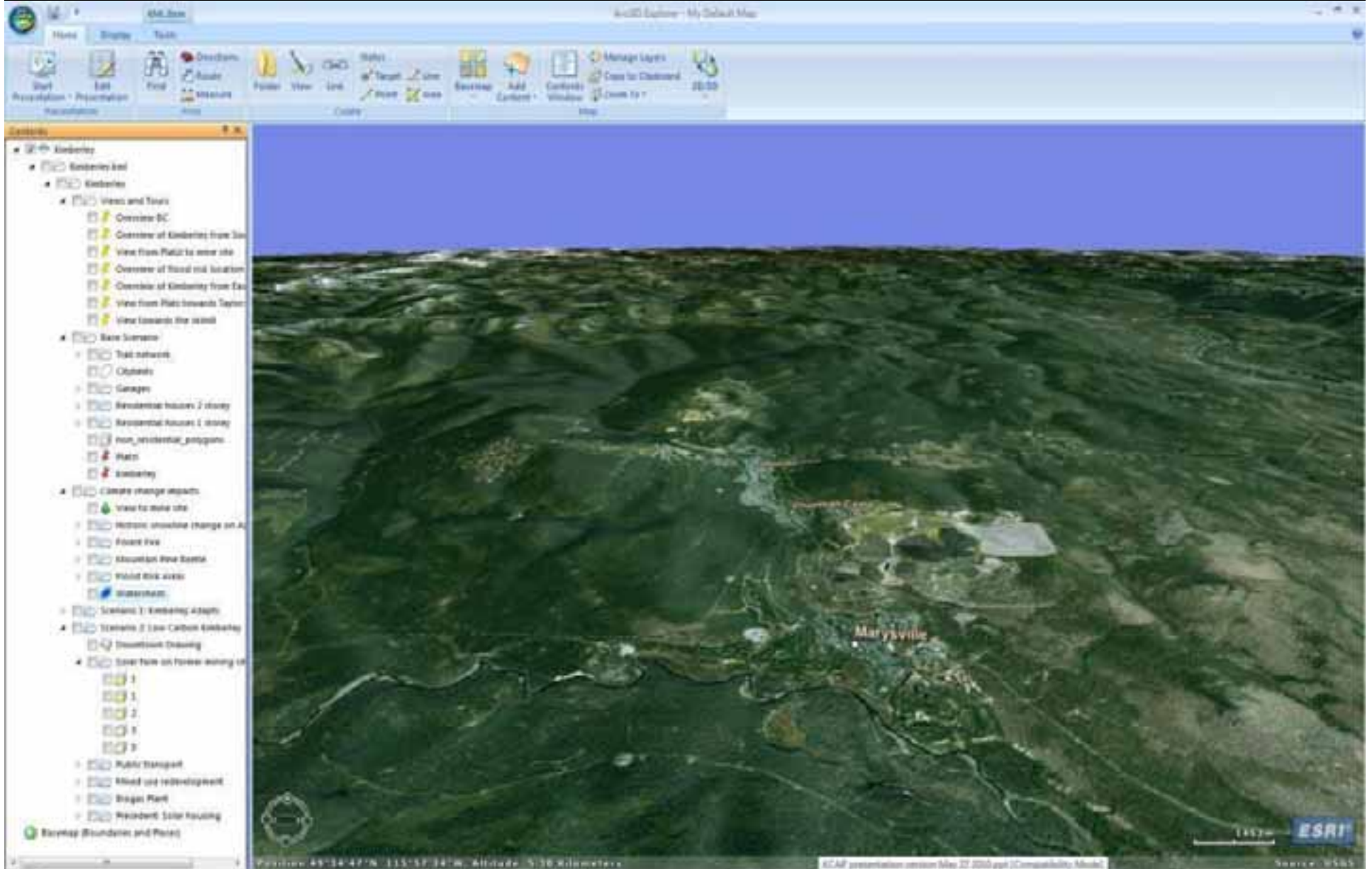


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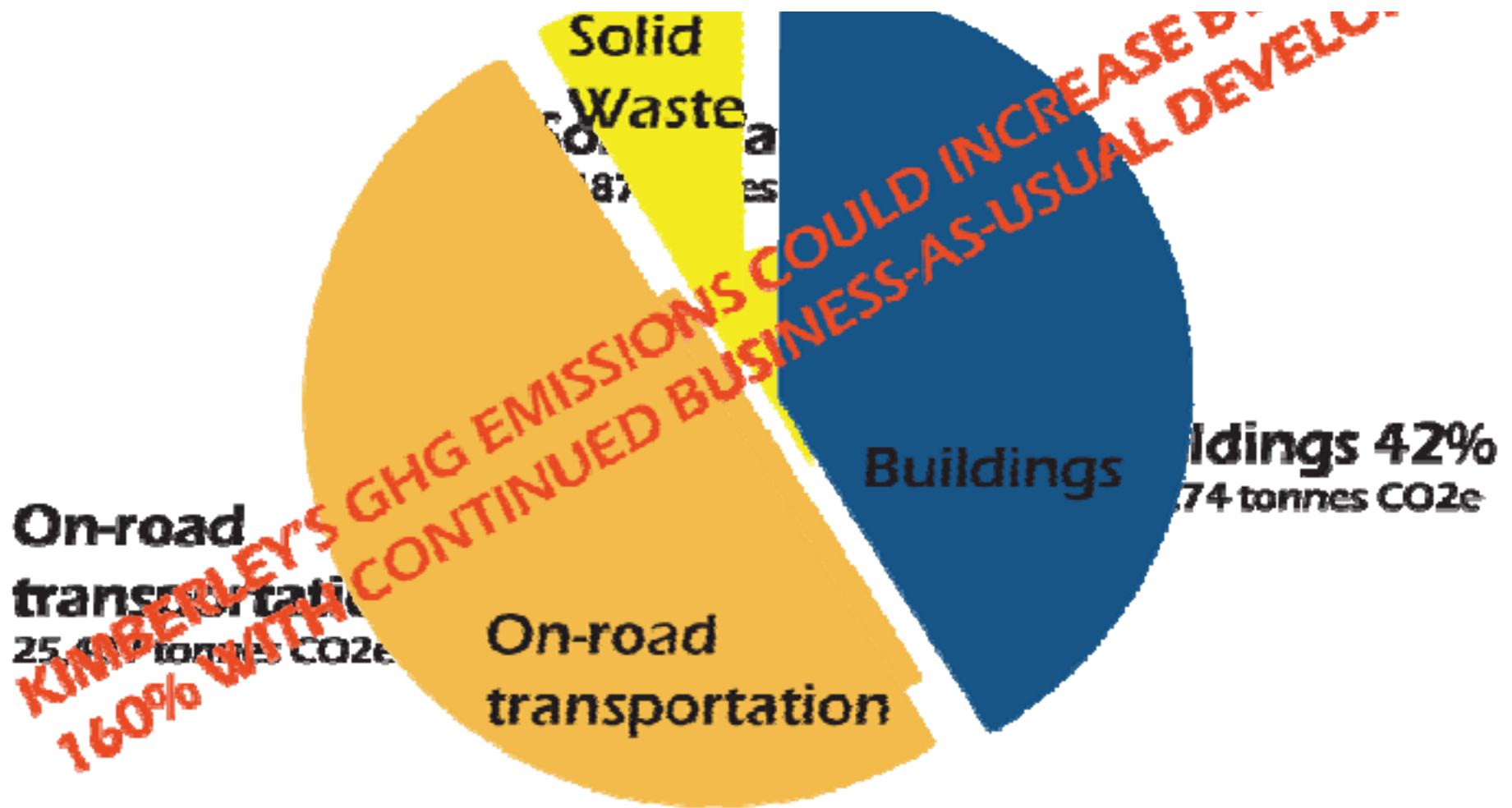
Virtual Tours in ArcGIS Explorer, Google Earth, Biosphere3D

- Overview, and planned expansion
- Forestry: Mountain pine beetle and forest fire
- Precipitation: Snow and water/flood
- Adaptation options
- Mitigation options
- Resilient, low-carbon vision

Orientation



Kimberley Emissions



• BASED ON GREENHOUSE GAS EMISSIONS ACCOUNTING BY CALP, 2009, USING SPATIAL METHOD FOR GHG CALCULATIONS

Forest: Mountain Pine Beetle



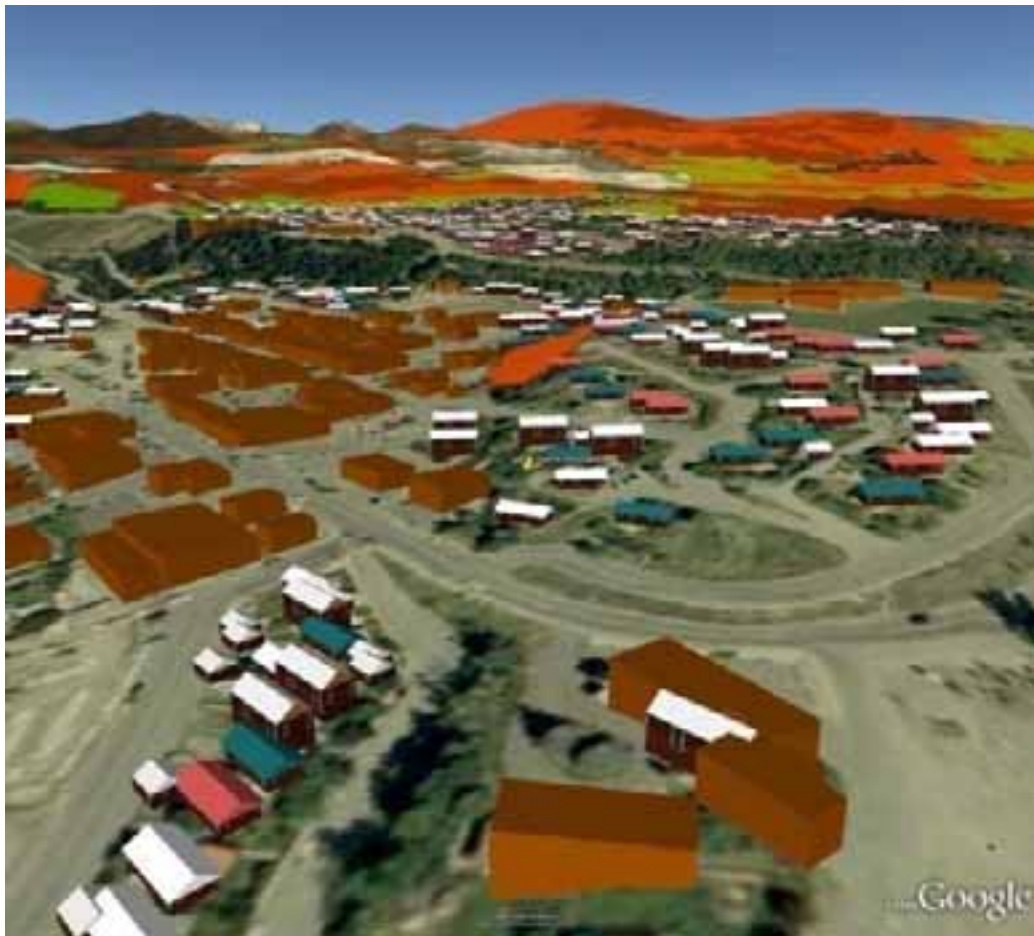
- High susceptibility for MPB infection, especially in the watersheds
- Higher vulnerability through climate change

Pine Beetle Susceptibility



Forest: Mountain Pine Beetle

- View northwards



Pine Beetle Susceptibility

- High
- Middle
- Low

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Forest Fire

History:

Forest fires are part of this landscape

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Today:

High amount of
“fuel” in the forest

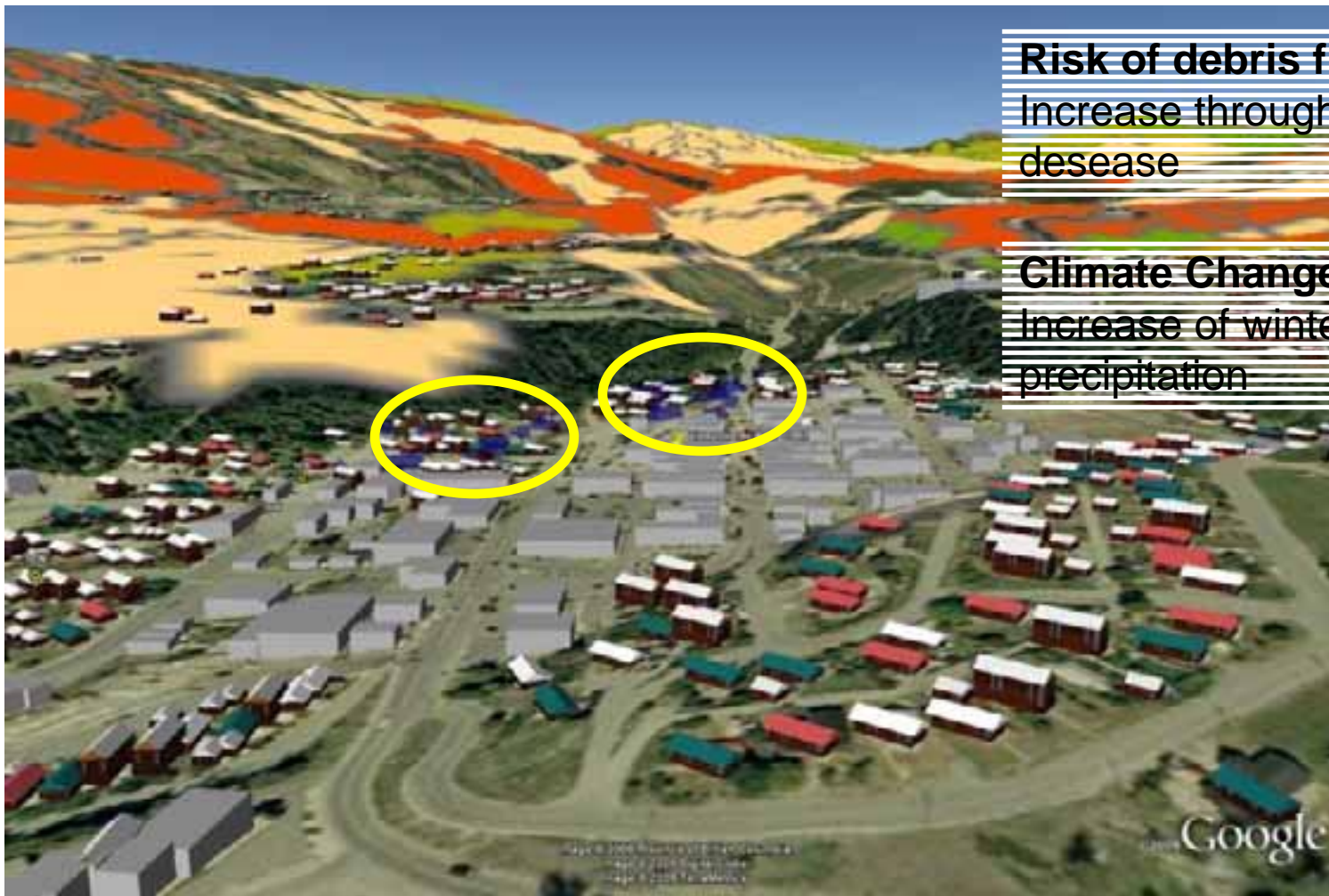
Climate change:

Fire season gets
longer

FARSITE Fire Model:

Spread of fire within
8 hours

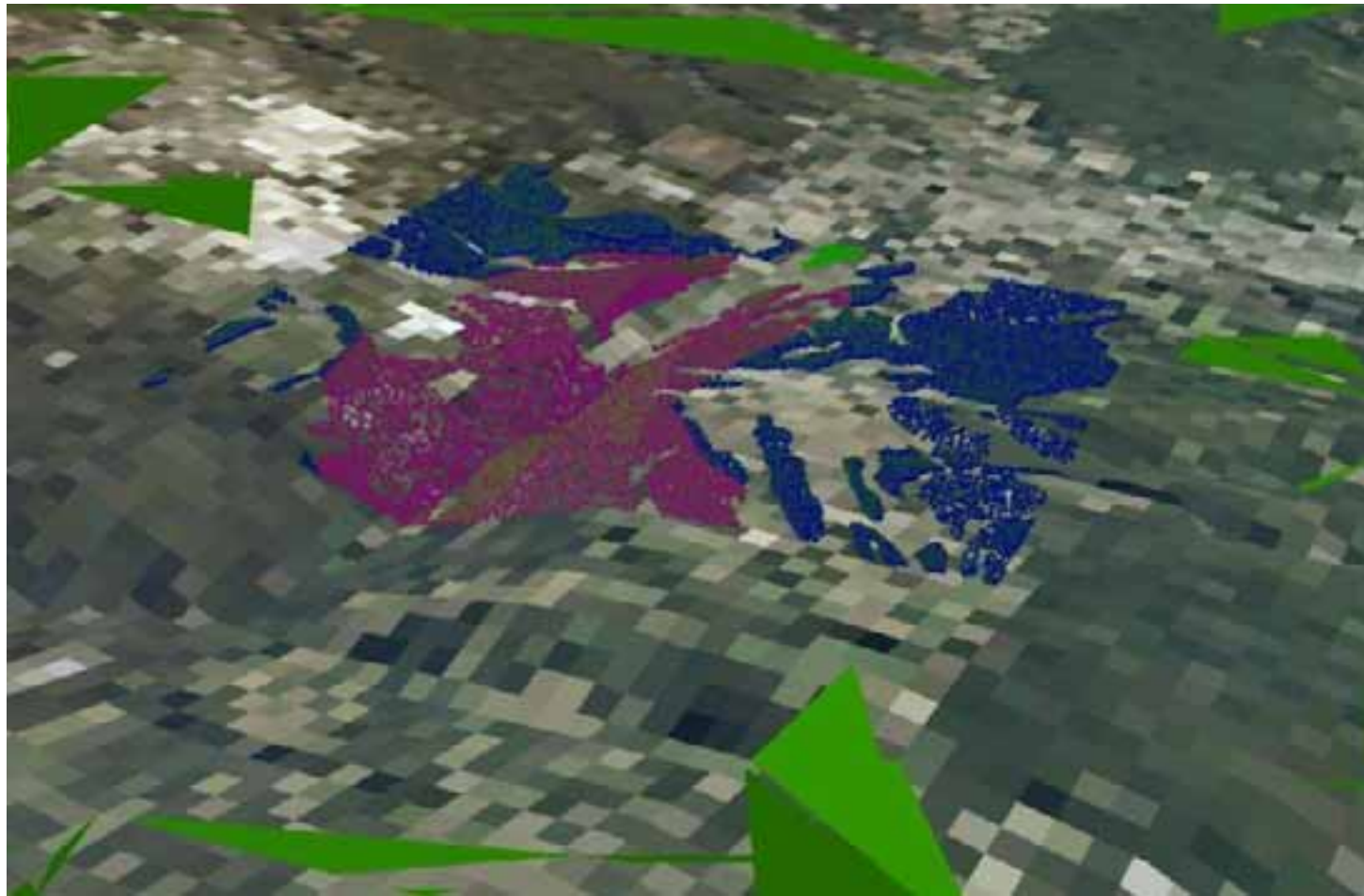
Water: Flooding



Risk of debris flooding
Increase through MPB
disease

Climate Change:
Increase of winter
precipitation

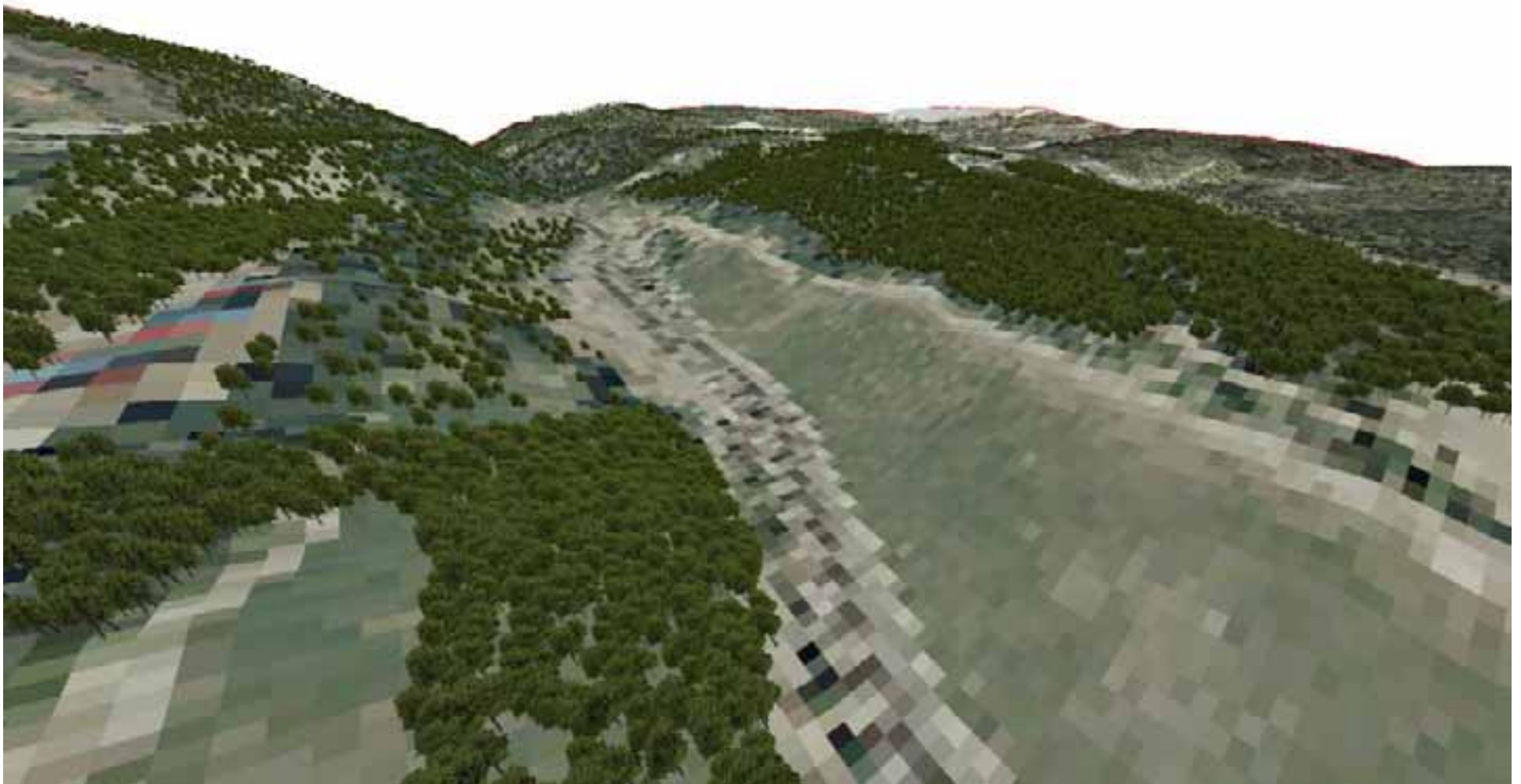
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Lenne3D Plugin for ArcScene

57000 trees
on a HP 8530w
laptop

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Adaptation Options in Forestry

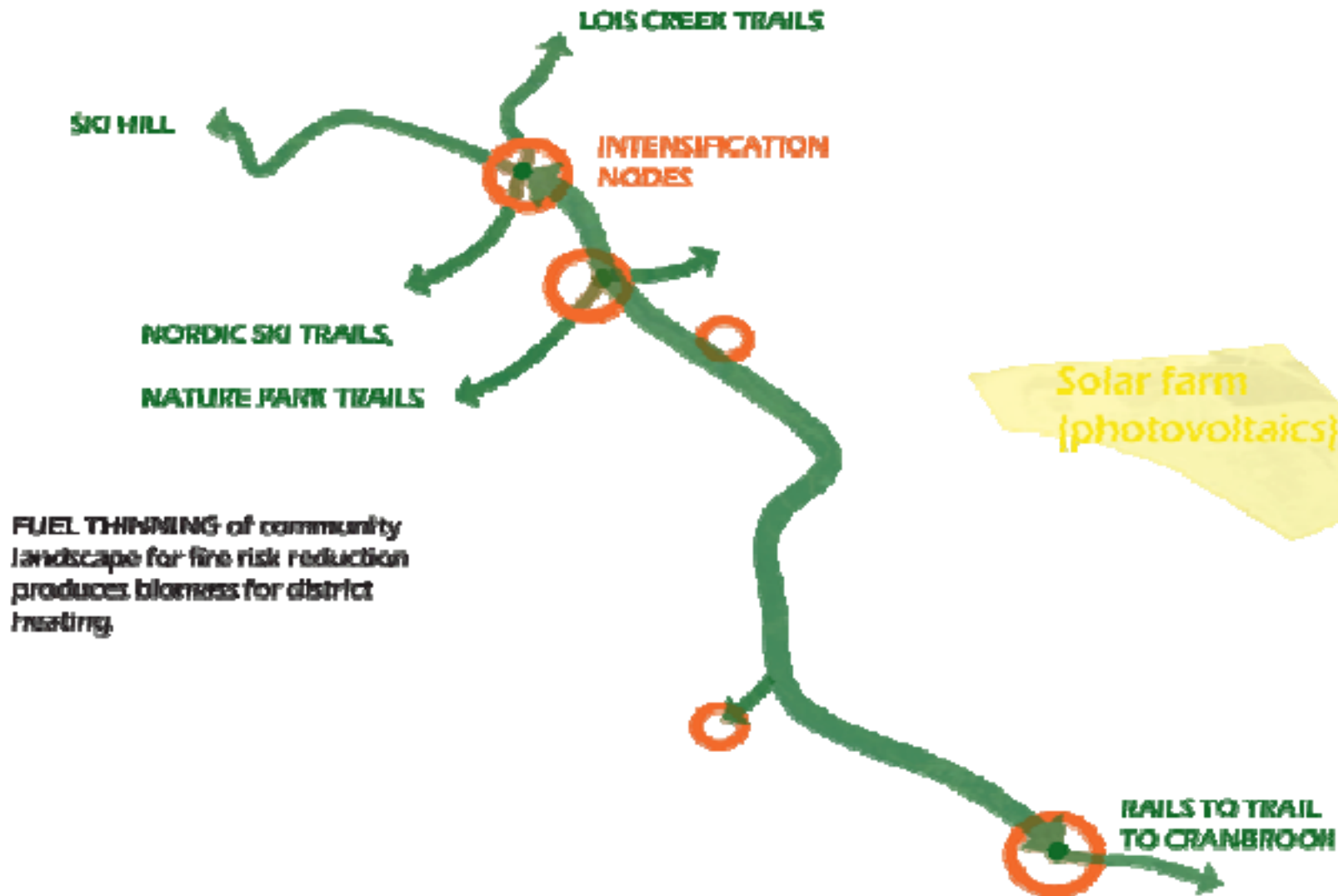




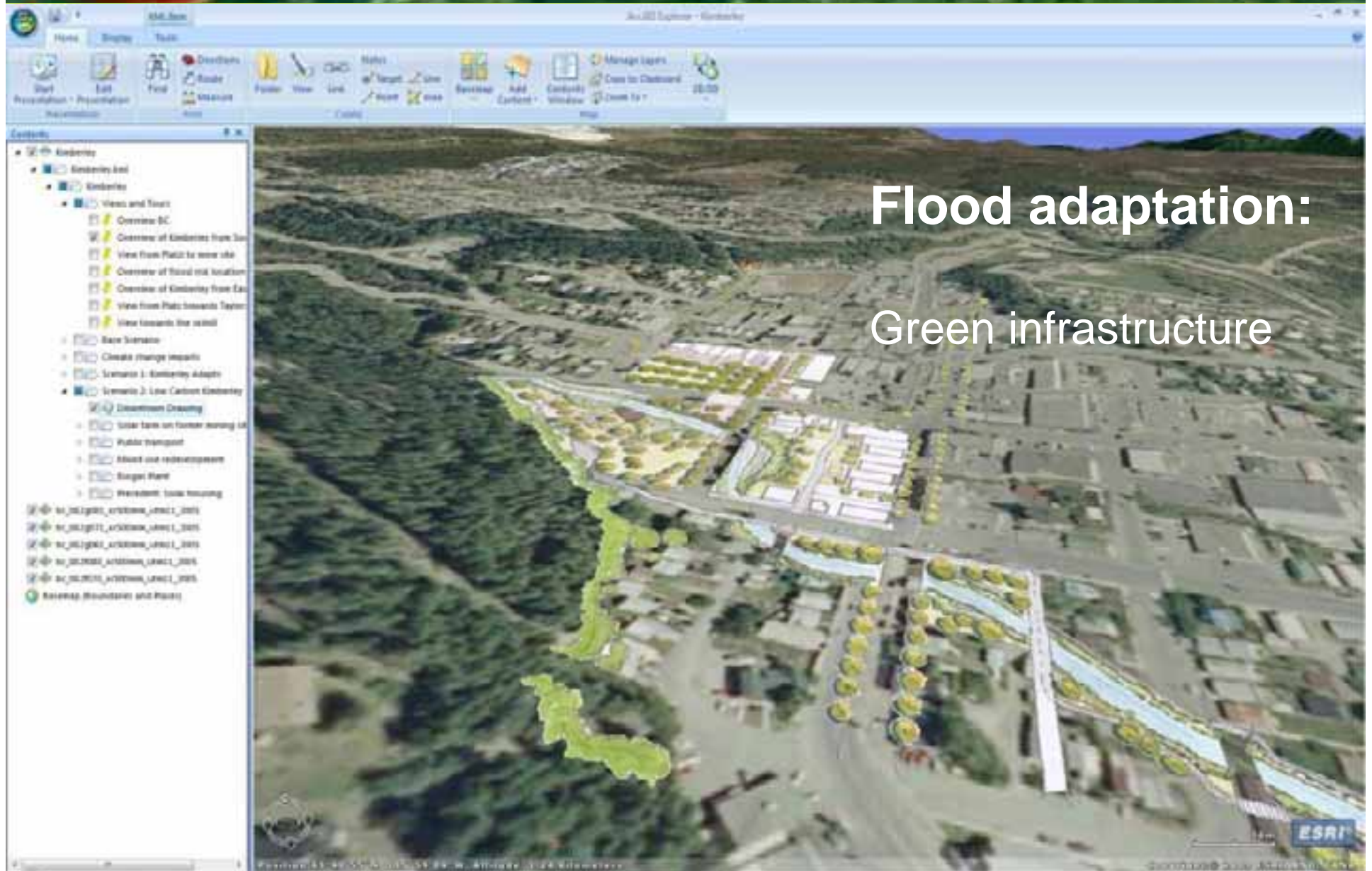
Mitigation: Low-carbon options

GREEN RIBBON CONTEXT

Surrounded by a fire-smart, biomass-producing community landscape, a green ribbon of trails links compact nodes along the Mark Creek corridor, with connections to recreational amenities.



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Flood adaptation:
Green infrastructure





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3. Conclusions

3.1 Societal Effects

- Public awareness: Exhibitions
- Impact on private stakeholder decision-making
- Impact on policy making

- Open long-term outcome?
- Focus on adaptation?



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3.1 Scientific Effects

Interactive visualizations

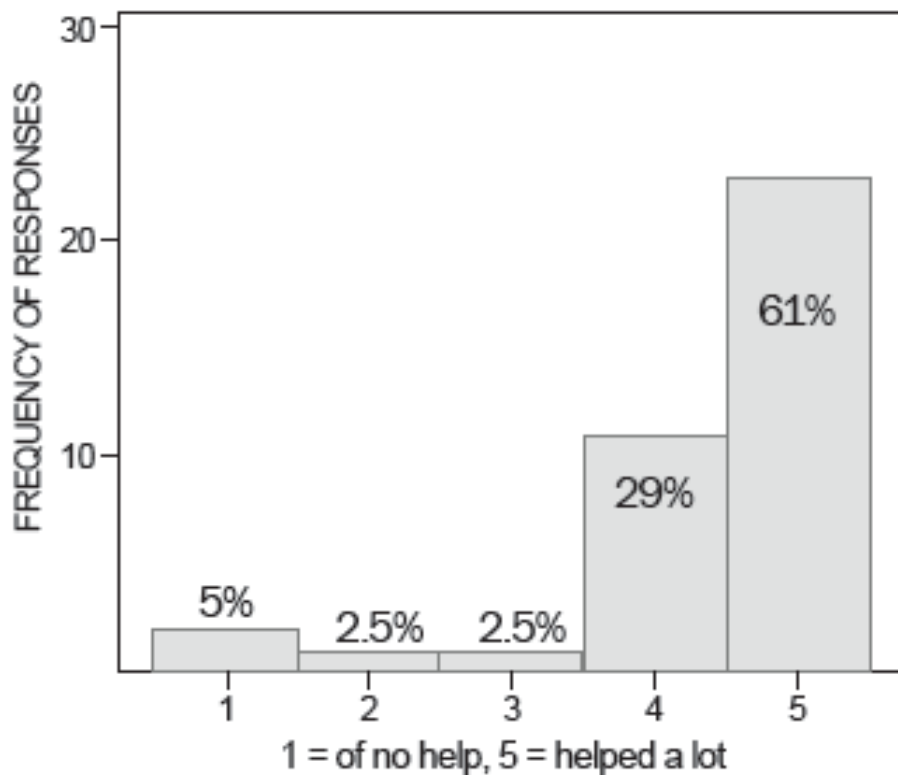
- made complex climate-change comprehensible
- facilitated understanding of spatio-temporal processes
- helped distinguishing alternative scenario pathways

Although the globe metaphor

- might alienate users
- does not appeal to all user groups
- adds drama

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3.1 Scientific Effects



Participant rating of the visualization

Benefits in Kimberley
Respondents n=38,
Mean: 4.370,
Standard Deviation 1.051

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LOCAL CLIMATE CHANGE VISIONING
AND LANDSCAPE VISUALIZATIONS

GUIDANCE MANUAL



Based on the pilot Kimberley Climate Adaptation project, funded by the Columbia Basin Trust. Visioning and visualizations funded by the Ministry of Community and Rural Development and the Red Lake Foundation.

Collaborative for Advanced Landscape Planning
University of British Columbia

VERSION 1.0, February 2010



Need for different media

- Virtual Globes *and* posters
- Different topics
- Diverse user groups and learning styles
- See Guidance Manual



Visioning and Visualization Process

Visioning case studies in Kimberley (BC)



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3.1 Open Questions and Discussion

- Visioning as a combination of participatory scenario methods, climate change risk assessment and interactive geospatial visualization seems to be beneficial
- Potential of ArcGIS Explorer
- Link between climate change models and visualizations?
- Adaptation and Mitigation?
- Long-term impact on policy-making and change of behaviour?



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