Involving local government and stakeholders in the design and development of a community systems and scenario modelling exercise



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ABSTRACT

Community engagement and participation is a necessary component of effective integrated community planning and sustainable development. Accordingly, tools used to support planning efforts, such as community systems models, should also incorporate participatory processes in their design and application.

Conducted in Squamish (BC, Canada), this research project employed a participatory approach in a community systems and scenario modelling exercise. A community focus groups was assembled to discuss local issues and possible futures for Squamish. Ideas that emerged from these discussions informed the design of a community systems model and a series of local development scenarios: low-density residential, mixed housing types, high-density neighbourhood nodes, and enhancement of commercial and agricultural lands. Then, the systems model was applied in a scenario analysis. Results of the analysis illustrated how different development patterns can affect factors such as walkability, access to amenities, education, parks/trails, food/farm systems, public transit, housing affordability, threats to critical habitat, etc. Finally, another focus group was assembled to solicit feedback on the scenario analysis and its usefulness for local planning. The feedback was used to refine the model and scenarios.

A participatory approach to modeling yielded many benefits, including effective model scoping, accessing additional information sources and enhancing local investment in the project. In addition, engaging the community in multiple stages of the project was critical for allowing the model to evolve into a tool that more accurately reflected the community, thereby increasing its effectiveness for supporting integrated community planning.

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SYSTEMS MODELS AS TOOLS FOR INTEGRATED PLANNING



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PARTICIPATORY MODEL DESIGN

"The ideal is that participatory planning helps ensure that the 'plan' is grounded in the pluralistic socio-economic and bio-physical context of the community."

Ling et al. (2009)

Ling, C., Hanna, K., and Dale, A. (2009). A template for integrated community sustainability planning. Environmental Management, 44(2), 228-242.

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SPACES, PLACES AND POSSIBILITIES

PHASE 1. Systems model and scenario development

PHASE 2. Scenario modelling and model refinement

PHASE 3. Scenario visualization and public engagement (in progress)



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FOCUS GROUP METHODS

Planning department meeting

- Identify rough ideas for community scenarios
- Which neighbourhoods could be affected by these development scenarios?

Community stakeholders focus group

- Do the scenarios represent possible futures conditions for Squamish?
- What other scenarios would you like to explore?
- What are key questions that emerge when exploring a particular scenario?
- What are the major challenges faced by Squamish?





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ANALYTICAL METHODS

Analysis of community stakeholder focus group data

- Data consisted of written feedback, notes and transcriptions
- Data were coded using NVivo (v. 11) with 31 codes
- Coded data were organized into a series of 'considerations'
- Considerations informed the design of systems model and refinement of scenarios

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RESULTS

Consideration	Codes
Squamish is growing	Population growth, Current development patterns
Development has been planned and approved	Residential neighbourhoods, Downtown development, Current development patterns
Local employment spaces are important	Regional commuters, Local employment, Commercial space, Mixed- use development
Explore a range of densities	Missing middle development, Aesthetics and visuals, Density extremes, Housing availability, Land-use efficiency, Shared lots and infill
What is the 'optimal density'?	Walkability, Economically viable nodes, Transit networks, Corridor- based development, Mixed-use development, Community attitudes
Create an accessible community	Access to green space, Access to education, Access to amenities, Connectivity, Transit corridors, Walkability, Mixed-use development, Community health, Air quality, Greenhouse gases
Develop communities with diverse housing types	Mixed-use development, Mix of housing types, Missing middle development, Social diversity, Shared lots and infill
Housing affordability is a problem	Mix of housing types, Housing affordability
Developing all land as residential is not necessarily desirable	Access to green space, Preserving green space, Food and farm systems Steep slope development

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Community outcome	Measurement methods
Access to amenities	Distance to green space, schools, health services, restaurants, grocery stores
Access to schools	Distances from residences to schools
	School space per number of children
Access to green spaces	Distances from residences to parks and trails
	Percentage of population within parks of different sizes
Preserving green space and	Residential, commercial/industrial and agricultural land encroaching on green space
habitat	Residential density near critical habitat and sensitive ecosystems
Transit accessibility	Density around transit stops and routes
	 Distances from residences to transit stops (both existing and potential)
	Estimated public transportation commuters (based on distance to stops)
Commute reduction	• Estimated change in vehicle kilometers travelled by commuters (based on local employment
	and distance from residences to employment)
Greenhouse gas emissions	• CO ₂ e emissions based on vehicle kilometers travelled by commuters
Air quality	• PM _{2.5} emissions based on vehicle kilometers travelled by commuters
Health	Numbers of walking/biking commuters (based on distances from residences to employment
Food and farm systems	Amount of land reserved for agriculture
	Distance from residences to food services
	• Community garden space available for higher density residents (e.g., apartments)
Local businesses	Amount of space reserved for commercial/industrial purposes
	Number of nearby residents to support local businesses
Local employment	Amount of available commercial/industrial space
	• Number of potential jobs (based on business size and employees per work area estimates)
	Percent of population commuting outside of Squamish
Social diversity	 Inferred through the level of diversity in housing types within neighbourhoods
Housing affordability	Inferred through using average prices for different housing types and mixes of housing types

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COMMUNITY DEVELOPMENT SCENARIOS



- 1. Low density residential neighbourhoods
- 2. Downtown density concentration
- 3. Higher density neighbourhood nodes
- 4. Missing middle medium density
- 5. Enhanced commercial and agricultural lands

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2016 Baseline Scenario Population – 19,602

- Squamish's "current conditions"
- Population distributed among building stock
- Employment distributed among business licenses and institutions

2036 Baseline Scenario Population – 29,920

- Squamish's conditions after approved development
- Population was distributed based on new dwelling units (4% vacancy rate in apartments)
- New employment space added in approved development areas and in vacant employment lands

BASELINE SCENARIOS



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RESIDENTIAL DENSITY AND COMMUNITY SCENARIOS



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LOGGERS EAST AND COMMUNITY SCENARIOS



High Density Neighbourhood Nodes Local population – 2,368 Commercial/Agricultural Enhancement Local population – 1,305

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ACCESS TO AMENITIES

- *Restaurants/cafes* coffee shops, bakeries, pubs, restaurants
- **Retail (non-food)** Clothes, department, pet, home improvement, music, garden, gifts, sports
- *Health* Medical clinics, dental, physiotherapy, chiropractor, message therapy
- Social and mental health Social support centres, counselling services
- *Exercise* Gyms, yoga studios, martial arts, community centres, golf course, climbing gym
- Childcare Daycares, school daycare
- **Grocery** Supermarket, small grocery, convenience stores, farmer's markets
- Parks and trails Trailhead/park access points
- *Elementary schools* Public, independent, and alternative elementary schools

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EDUCATION



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EDUCATION AND GREENHOUSE GAS EMISSIONS



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FOCUS GROUP

Community stakeholder focus group (44% new participants)

• Model is highly complex, and it would be useful to make model input and assumptions more apparent

This can be addressed by developing an interactive interface for exploring model inputs and outcomes

• Ecological factors are underrepresented in the model

This illustrates the importance of ensuring comprehensive perspectives are 'brought to the table' when engaging communities

 Benefits of densifying are observed; however, the suggested building types conflict with the 'character' of Squamish

This demonstrates the importance of engaging community member before developing visualizations

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REFLECTIONS AND CONCLUSIONS

- The participatory approach is useful for creating a systems model that is relevant to the community, but the comprehensiveness of the systems model depends on the diversity of community stakeholders engaged in the process
- Participatory research approaches can build relationships between researchers and the community, and this can be valuable for accessing data and other work that is relevant to the research
- Modelling should be an iterative process, where model is refined through multiple stages of feedback to better capture the local 'reality' of a place (i.e., do not expect to capture all considerations for the model through a single focus group or meeting)