A participatory approach for creating community systems models and development scenarios



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ABSTRACT

Sustainable community development requires integrated approaches to planning that recognize how local policy and land use can affect interconnected aspects of human wellbeing and the environment. Systems modelling exercises can support integrated planning because they can elucidate relationships and outcomes of social and physical infrastructure decisions. However, modelling community systems presents the significant challenge of deciding what to include in the model, since including all aspects of a community and its local environment is unfeasible. This challenge can be addressed through participatory approaches to model development. Through engaging local government and diverse stakeholders, models can be designed to capture a comprehensive range of key interests, concerns and values, thereby increasing their relevance to the community and usefulness in local planning efforts.

This study explores such a participatory approach. The research involved assembling a focus group representing diverse sectors/interests in Squamish, BC, to discuss local issues and possible futures for the community. Focus group data were analyzed using NVivo, resulting in a series of considerations that informed the development a systems model. In turn, the model can be used to support integrated planning by serving as tool for guiding investigations into possible outcomes associated with developing the community in different ways.

SPACES, PLACES AND POSSIBILITIES

- 1. Modelling community development scenarios
- 2. Visualizing community development scenarios



SYSTEMS MODELS AND INTEGRATED PLANNING



SYSTEMS MODELS, INTEGRATED PLANNING AND SUSTAINABILITY



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Change in average age of municipal infrastructure by type

Source: The Places + Spaces research project, https://www.crcresearch.org/places-and-spaces

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PLACES + SPACES



Source: The Places + Spaces research project, https://www.crcresearch.org/places-and-spaces

SPACES, PLACES AND POSSIBILITIES

- 1. Designing systems model and defining scenarios
- 2. Modelling community development scenarios
- 3. Visualizing community development scenarios



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.

METHODS

Preliminary meeting with planning department

- What are rough ideas for community development scenarios?
- What neighbourhoods could be affected by these scenarios?



METHODS

Preliminary meeting with planning department

- What are rough ideas for community development scenarios?
- What neighbourhoods could be affected by these scenarios?



- Low density residential neighbourhoods
- Medium density row housing and low-rise condo neighbourhoods
- Medium density high-rise neighbourhoods
- High density vibrant community nodes

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METHODS

Focus group with community stakeholders (e.g., non-profit, local government, chamber of commerce, development, academia, transit, etc.)

- Do the presented scenarios represent possible futures situations in Squamish that are worth exploring? What could be added or changed?
- What other development directions or focuses would you like to explore for Squamish? What would be a desirable 'potential future' for the community of and neighbourhoods in Squamish?
- What are key questions that emerge when exploring a particular scenario?
- What are the major planning and development challenges Squamish faces?

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METHODS

Analysis of focus group data

- Data consisted of written feedback, notes and transcriptions
- Data were coded using NVivo (v. 11) with 31 codes

Access to amenities, Access to education, Access to green space, Aesthetics and viewshed, Air quality, Community attitudes, Community health, Commercial space, Connectivity, Current development patterns, Density extremes, Downtown development, Economically viable nodes, Food and farm systems, Greenhouse gases, Housing availability, Housing affordability, Local employment, Land-use efficiency, Mix of housing types, Mixed-use development, Missing middle development, Population growth, Preserving green space, Residential neighbourhoods, Regional commuters, Shared lots and infill, Social diversity, Steep slope development, Transit corridors, Walkability

- 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	Potential measurement methods
Access to amenities	 Distance to green space, schools, health, 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
	 Park area per person within a neighbourhood
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 ridership
Commute reduction	Estimated change in number of vehicle kilometers travelled
Air quality	 PM_{2.5} emissions based on vehicle kilometers travelled
Greenhouse gas emissions	 CO₂e emissions based on vehicle kilometers travelled
Health	Air quality variable
	• Estimated numbers of people walking based on distances from residences to employment
Food and farm systems	Amount of land reserved for agriculture
	Distance from residences to food services
	 Distance from high-density residences to community gardens
Local businesses	 Amount of space reserved for commercial/industrial
	Number of nearby residents to support local businesses
Local employment	Amount of space reserved for commercial/industrial purposes
	 Number of potential jobs using estimates on business sizes
	Percent of population commuting outside of Squamish
Social diversity	 Inferred through the level of diversity in housing types within a neighbourhood
Housing affordability	Inferred through using average prices for different housing types and mixes of housing types

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REFINED SCENARIOS

- Low-density residential neighbourhoods
- Mixed housing types
- High-density neighbourhood nodes
- Increased non-residential lands (i.e., commercial and agricultural)



REFLECTIONS AND CONCLUSIONS

- The participatory approach to systems model and scenario development provided a reasonable scope of work, while ensuring the modelling is relevant and useful to the community
- The preliminary meeting was useful for focusing the stakeholder discussion; however, it is possible that it also constrained this discussion

• The comprehensiveness of a systems model developed through a participatory approach depends on the diversity of participants