SPACES, PLACES AND POSSIBILITIES

A participatory approach for developing and using systems models and visualizations for integrated community planning

Robert Newell, Royal Roads University

Citations: Newell, R. (2019). Spaces, Places and Possibilities: A participatory approach for developing and using systems models and visualizations for integrated community planning. In Ecocity World Summit 2019. Vancouver, BC: October 7-11, 2019

SPACES, PLACES AND POSSIBILITIES

Abstract

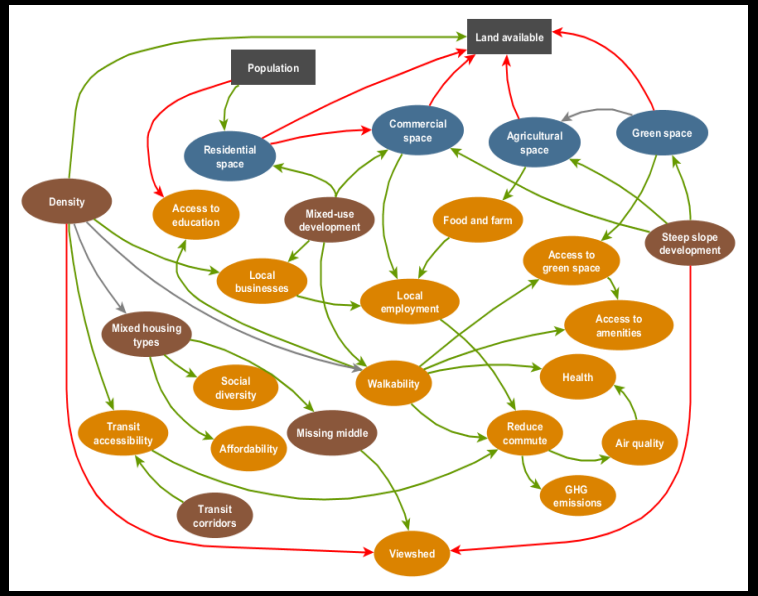
Systems modelling exercises can support integrated community planning efforts because they have the ability to elucidate relationships and outcomes of social and physical infrastructure decisions. However, there are challenges associated with both the modelling process and applying the modelling outcomes. For the former, deciding what to include in models presents a significant challenge: including all aspects of a community and local environment is unfeasible, whereas including too few aspects leads to a non-representative model. For the latter, outcomes of systems modelling can be somewhat abstract to users in the sense that the output may not provide stakeholders and community members with a strong impression of how certain modelled scenarios would look and 'feel' if implemented locally. The *Spaces, Places and Possibilities* research project aimed to address these challenges by incorporating community participation and visualization in a community systems modelling effort.

Conducted in Squamish (BC, Canada), the project consisted of three phases: (1) model and scenario development, (2) scenario modelling, and (3) scenario visualization. Phase 1 involved assembling a local government and community stakeholder focus group to discuss local issues and possible futures for Squamish. Analysis of focus group data informed the design of a community systems model and local development scenarios (i.e., different community development patterns). Phase 2 applied the systems model to examine potential outcomes the community development scenarios. Modelling primarily used ArcGIS, and it explored a variety of factors, including access to amenities and education, walkability, parks/trails, food and farm systems, public transit, housing affordability, threats to critical habitat, etc. Another focus group was held to gain feedback on the model and ideas for developing visualizations of the scenarios. The model and scenarios were refined based on this feedback, and in Phase 3, realistic, interactive visualizations were developed. Visualization development employed a combination of ArcGIS, Trimble SketchUp, Adobe Photoshop, and the Unity 3D gaming engine to (respectively) maintain spatial accuracy, develop realistic objects and textures, and create a dynamic and navigable virtual environment. Users could experience and navigate the visualizations from the first-person perspective, and these tools added salience and place-based meanings to the (otherwise abstract) output produced through the modelling work.

The research found the participatory approach to beneficial for developing community planning tools, and the main recommendation from this work is to develop these tools through iterative processes, where they are refined through multiple stages of feedback to better capture the local 'reality' of a place.

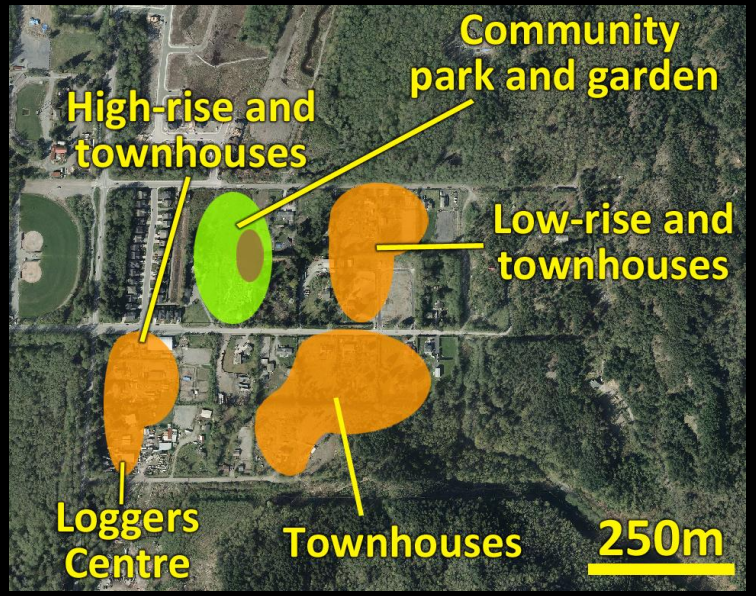
SPACES, PLACES AND POSSIBILITIES

Case study community: *Squamish, British Columbia*



PHASE 1

Community systems model and development scenarios



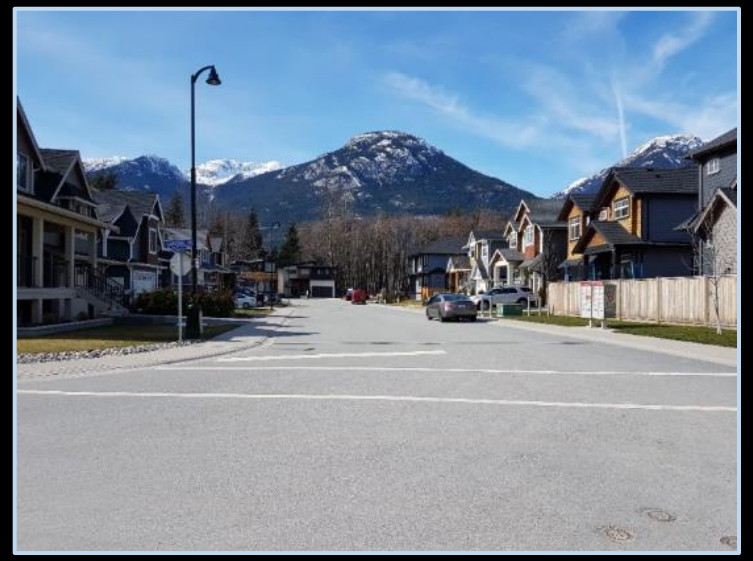
PHASE 2

Integrated model and analysis of community scenarios

PHASE 3

Communication tools (i.e., model explorer and visualization)

Phase 1. Designing the systems model and community scenarios



Focus group 1. Planning department meeting

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

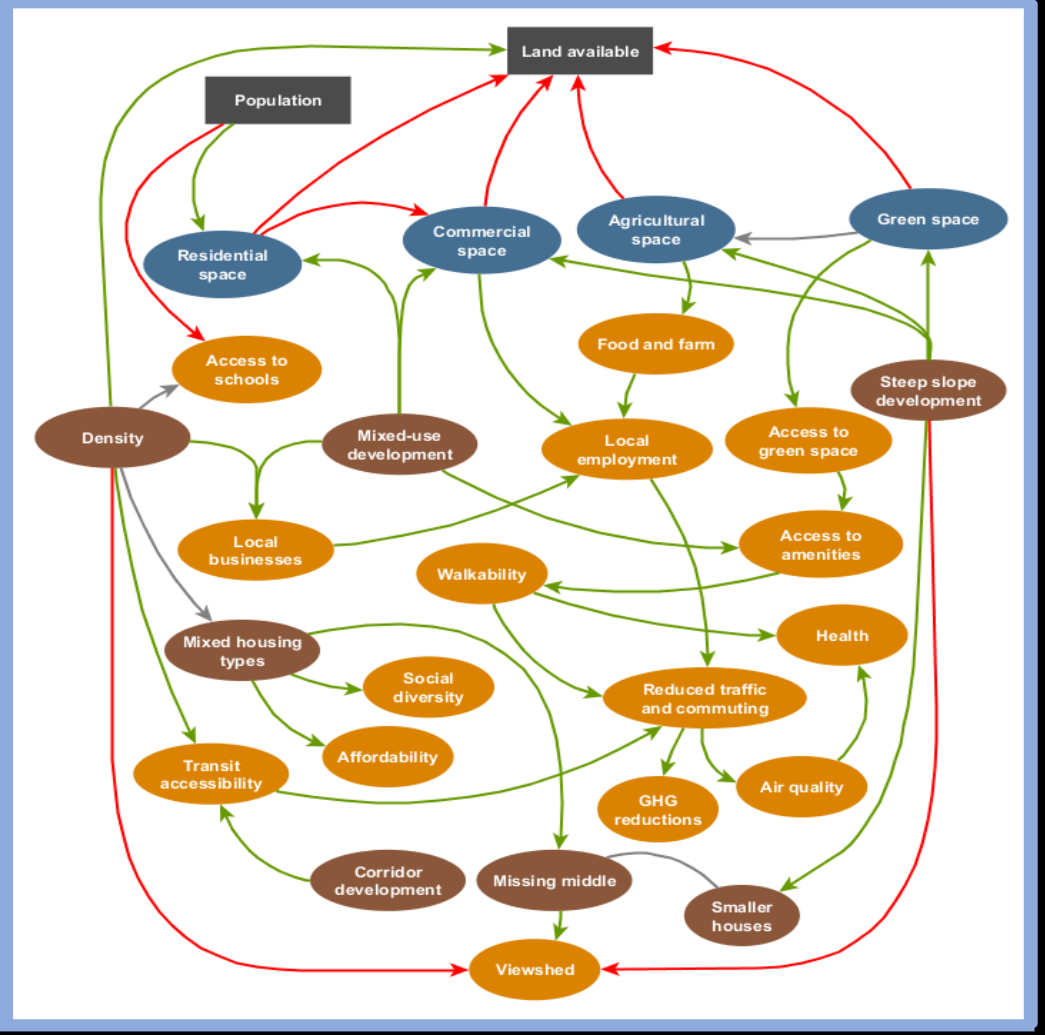
Focus group 2. Community stakeholders focus group

- *Do the scenarios represent possible futures conditions for Squamish?*
- *What other scenarios would you like to explore (what is a ‘desirable future’ for Squamish?*
- *What are key questions that emerge when exploring a particular community scenario?*
- *What are the major challenges faced by Squamish?*

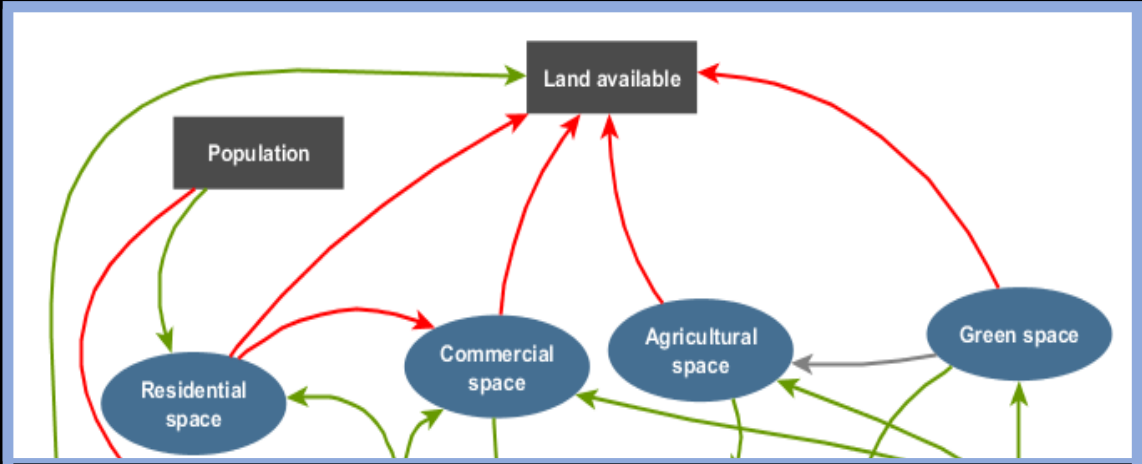
Phase 1. Designing the systems model and community scenarios

Community development scenarios

Community systems model

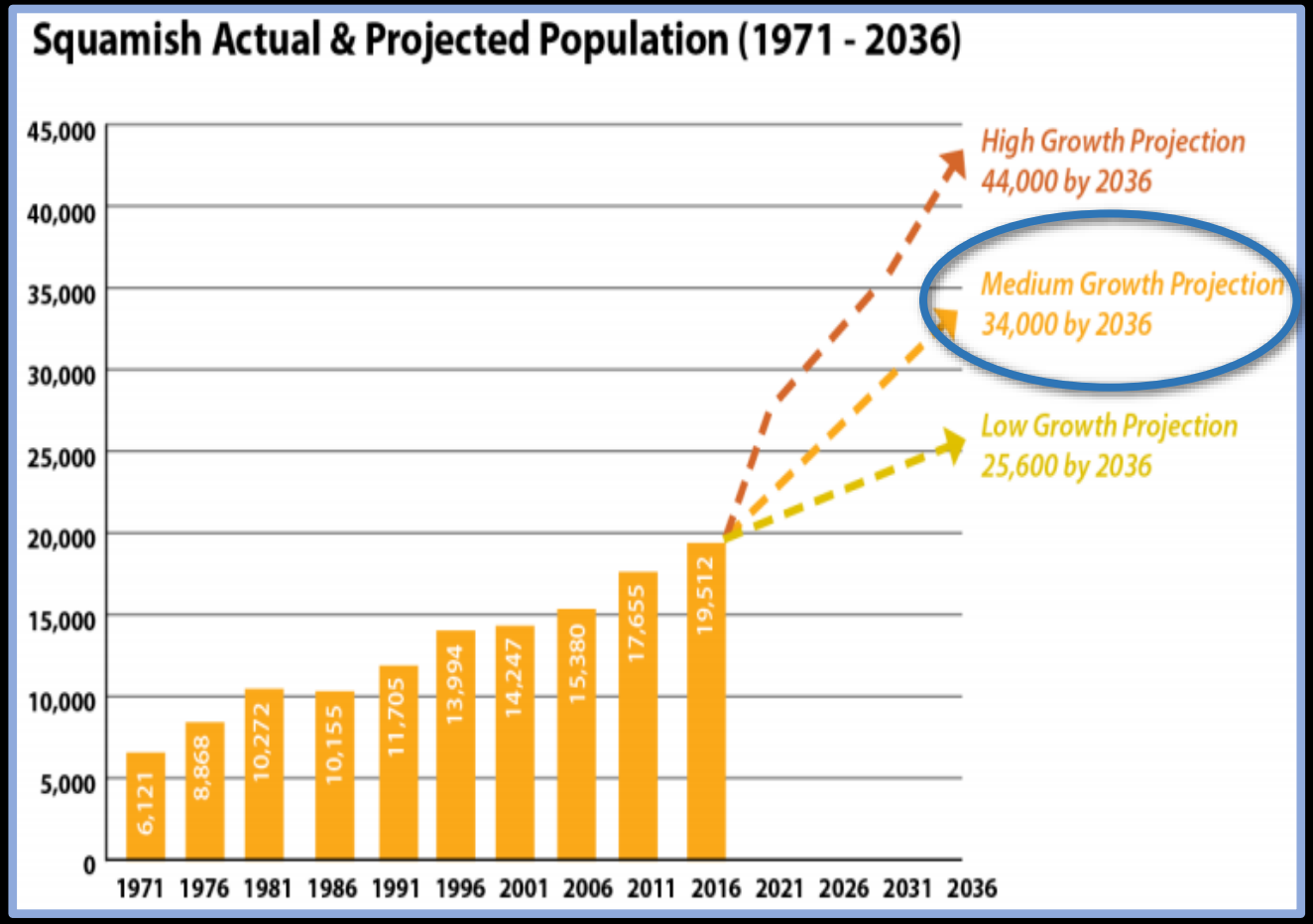


Phase 2. Modelling community scenarios and refining the model



Population growth
model driver

Land availability
model constraint



District of Squamish (2017). District of Squamish OCP Update. Phase 3: Community engagement summary report. Squamish, Canada: District of Squamish.

Phase 2. Modelling community scenarios and refining the model

2016 Baseline Scenario

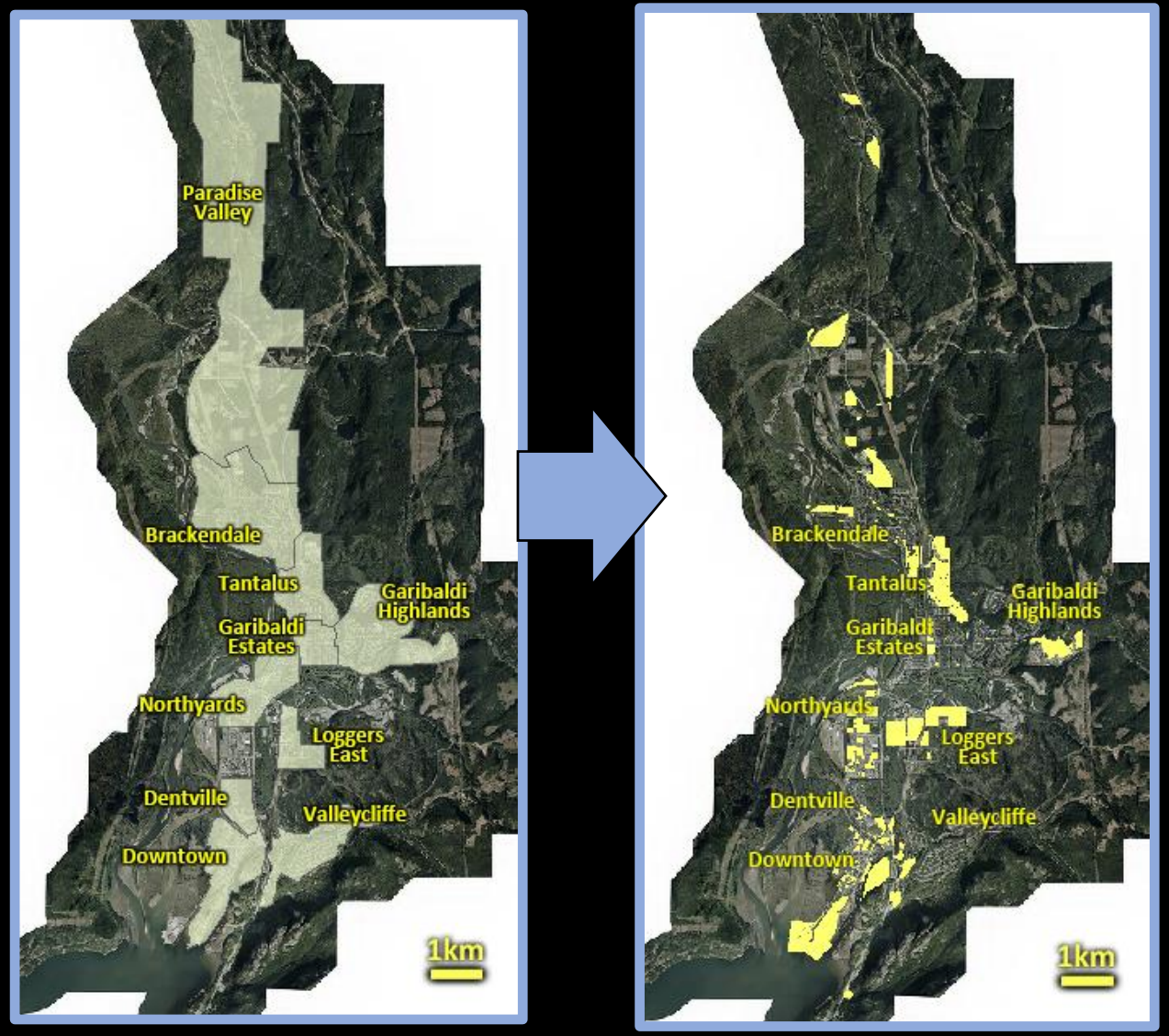
Population – 19,600

- 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

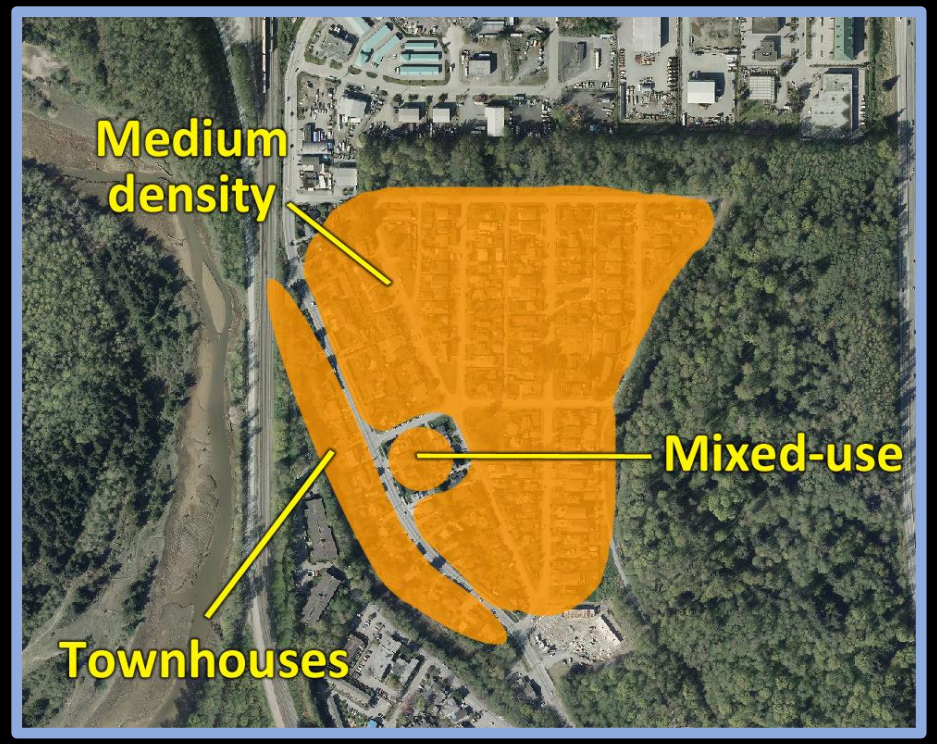


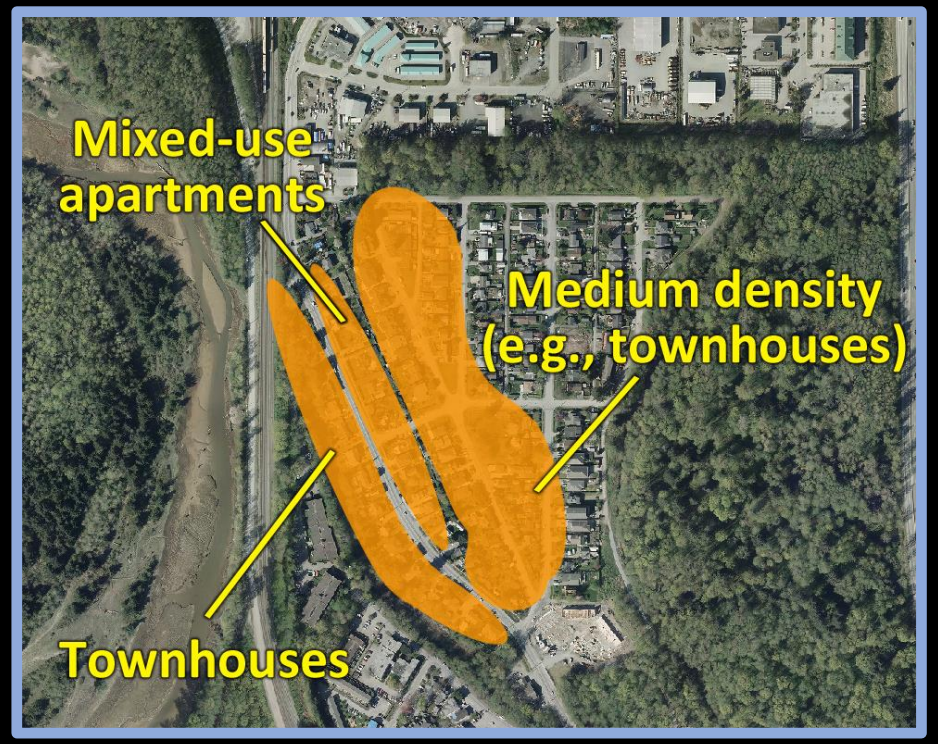
Phase 2. Modelling community scenarios and refining the model

Community Development Scenarios

Population – 34,000

- Assumed population will follow a medium growth trajectory, and targeted future populations of 34,000
- Approximately 4,100 were distributed throughout neighbourhoods in different ways
- Added agricultural land, commercial land, amenities, community gardens and/or parks (depending on the scenario)



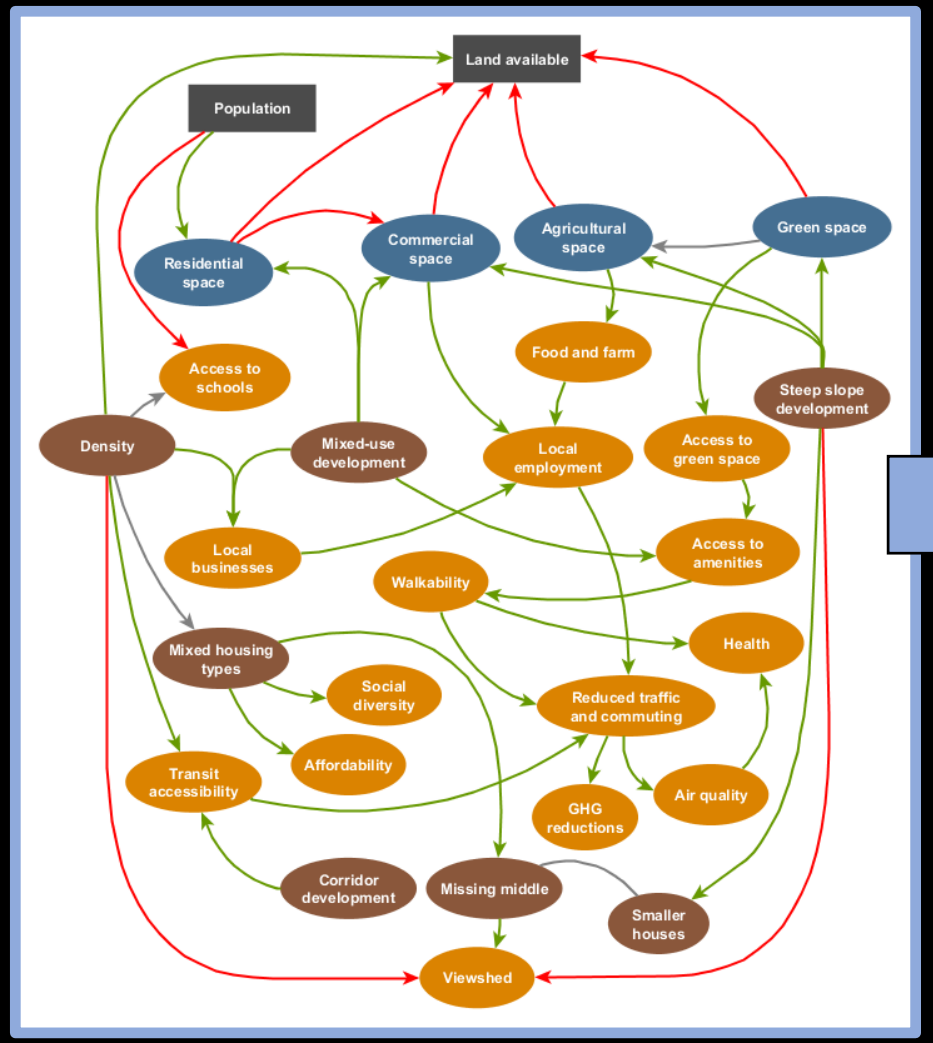


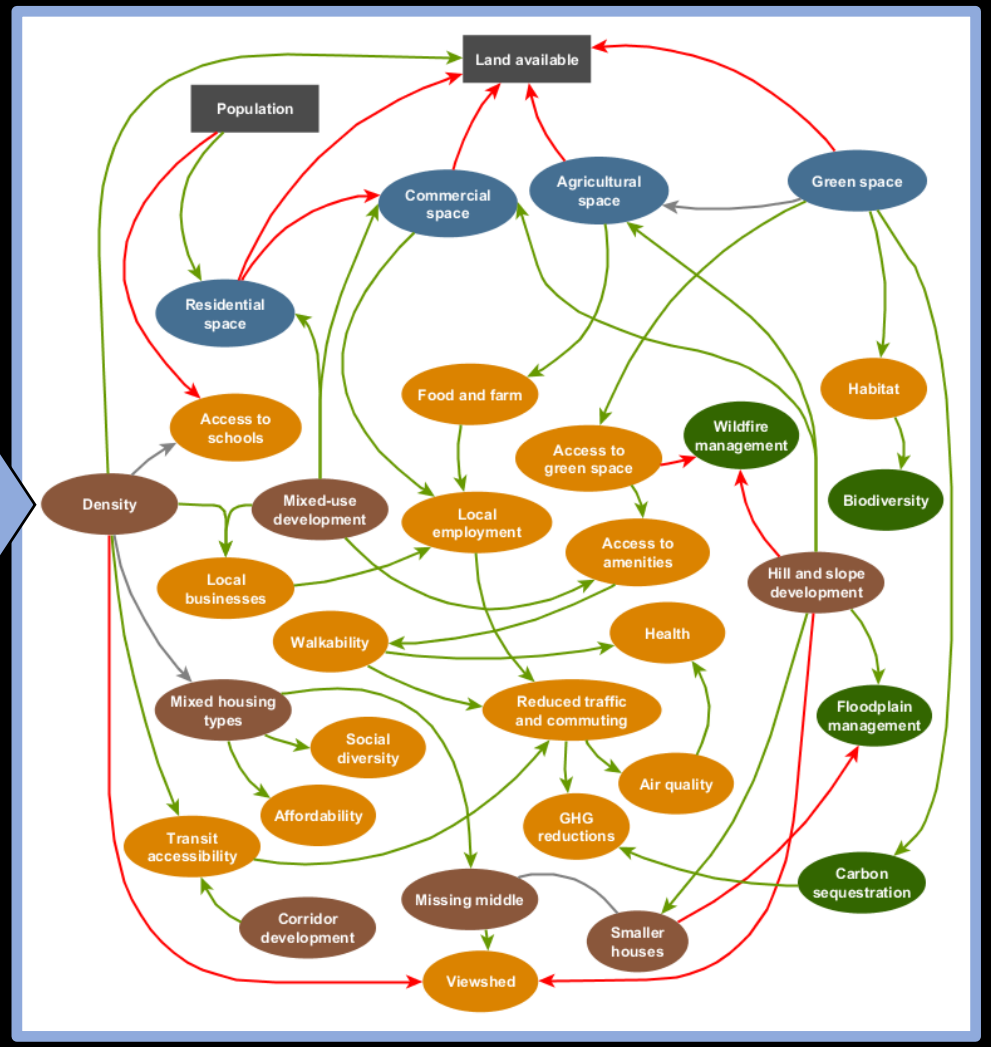
Phase 2. Modelling community scenarios and refining the model

1. Community scenarios are modelled and outcomes are estimated

2. Focus group evaluates model

3. The systems model was refined based on feedback





Phase 2. Modelling community scenarios and refining the model

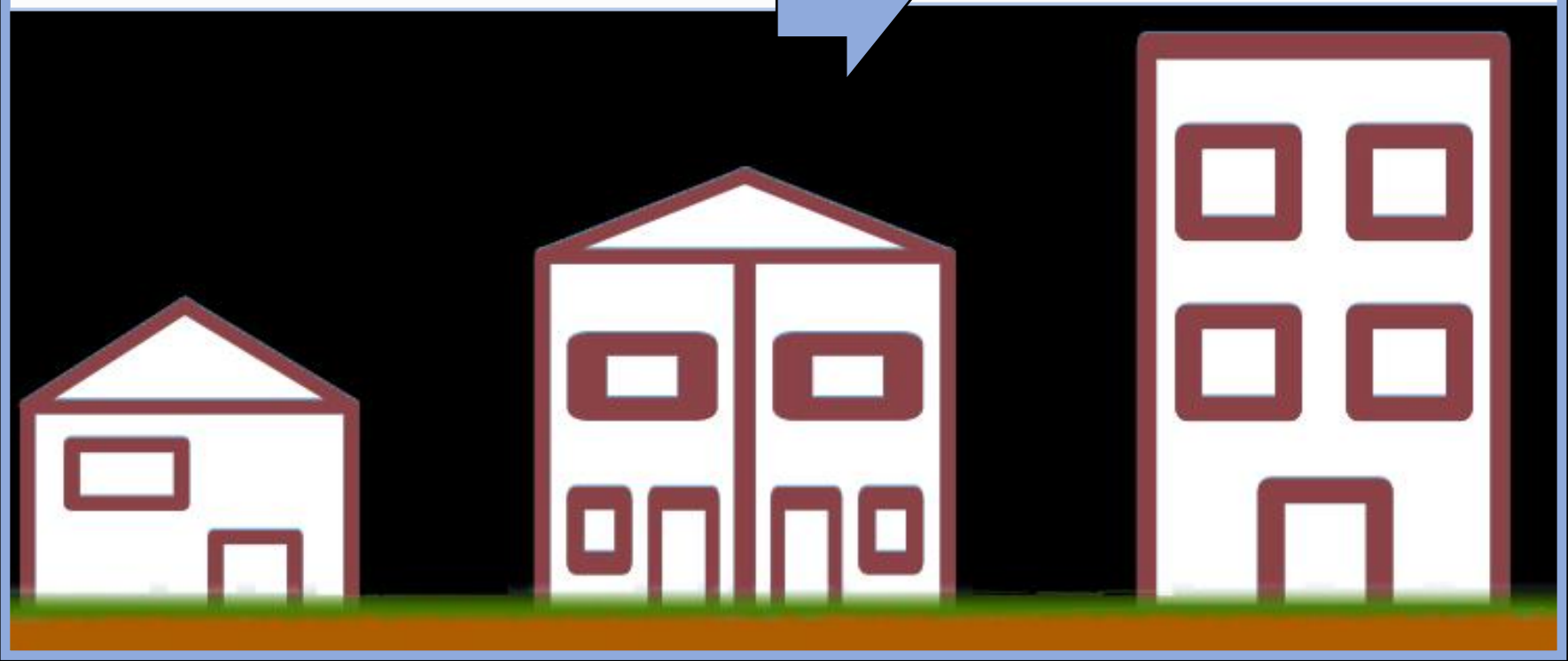
1. Community scenarios were modelled and outcomes were estimated

2. Focus group evaluated model

3. The community scenarios were refined based on feedback

1. Low density residential neighbourhoods
2. Downtown density concentration
3. High density neighbourhood nodes
4. “Missing middle” medium density
5. Enhanced commercial space and agricultural lands

1. Low density residential neighbourhoods
2. Medium density and enhanced agricultural lands
3. High density neighbourhood nodes and downtown densification



Phase 3. Developing communication tools

Model explorer

Demonstration video: www.vimeo.com/366583215

Phase 3. Developing communication tools

Scenario visualization

Demonstration video: www.vimeo.com/359693417

Reflections and conclusions

- The participatory approach led to a model that was relevant to the community; however, the comprehensiveness of the model depended on the diversity of the community members who were engaged in the process

- Modelling and the development of planning tools should be iterative processes, where they are refined through multiple stages of feedback to better capture the local ‘reality’ of a place (i.e., do not expect capture everything through one meeting)

- The participatory approach built relationships between researchers and the community, and this was valuable for accessing data and other relevant work

SPACES, PLACES AND POSSIBILITIES

www.crcresearch.org/spaces-places-and-possibilities