

Integrating Governance in Water Indicator Assessment: Developing a Water Security Indicator Method

This research is part of the CWN-funded project “Developing a Canadian Water Security Framework as a tool for improved Governance for Watersheds” (2008-2012)

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Receptor groups: This research is primarily aimed at community watershed groups, water managers, and municipal water policy and decision makers.

This poster presents a Water Security Assessment Framework (WSAF), which includes a Water Security Status Indicators (WSSI) assessment method, and a Water Security Risk Indicators (WSRI) assessment method.

We define water security as:
“sustainable access, on a watershed basis, to adequate quantities of water of acceptable quality, to ensure human and ecosystem health”.

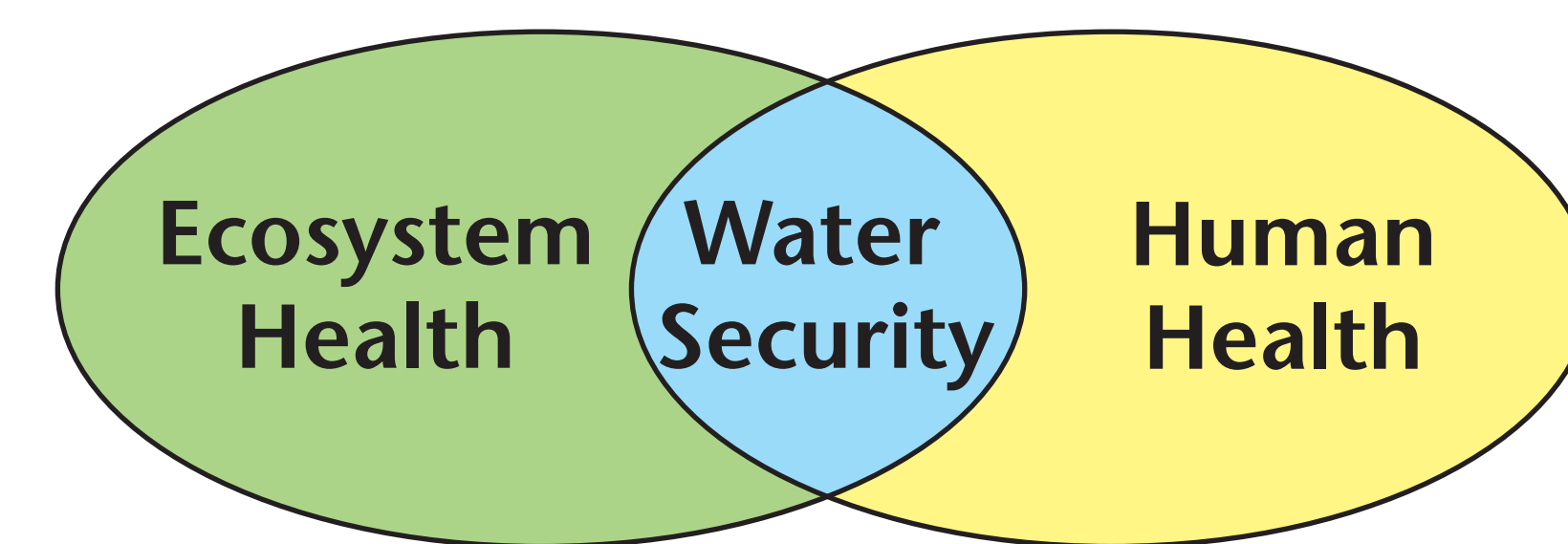


Figure 1: The water security nexus where ecosystem health and human (or public) health, in terms of both quality and quantity, intersect.

Assessing Water Security

This study addresses three gaps in water assessment methods for local communities in Canada:

- Whilst many water-related indicators are being developed to measure and assess water, few assessment methods are user-friendly at the local scale (watershed or sub-watershed).
- Currently in Canada there are a large number of indicators focusing on a small range of issues (e.g. solely on drinking water), which do not consider the broader balance of ecosystem health and human health.
- Narrowly-focused indices are of limited utility to water managers and communities grappling with competing users and integrated water systems, in which balancing trade-offs is a key management challenge.

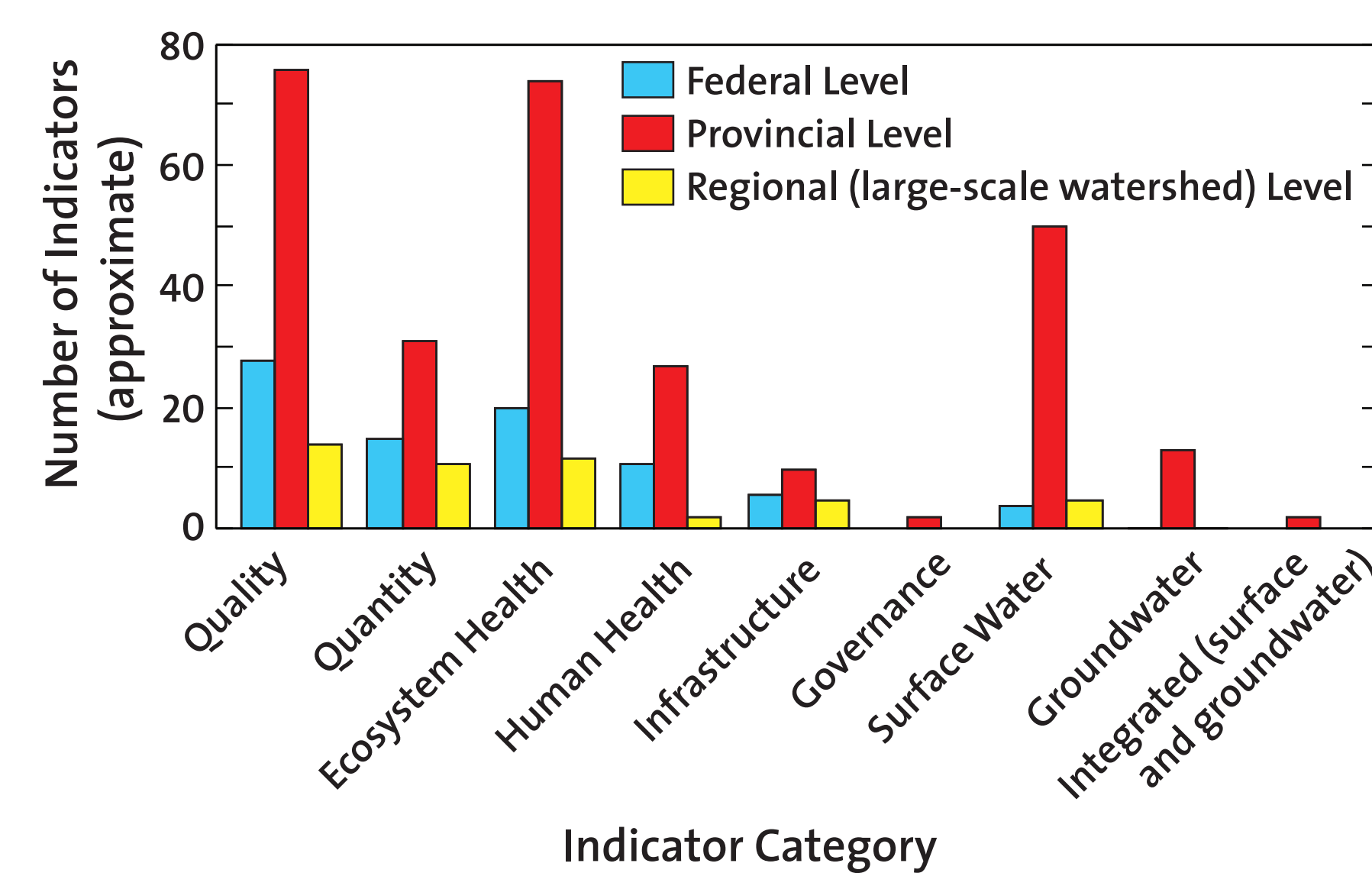
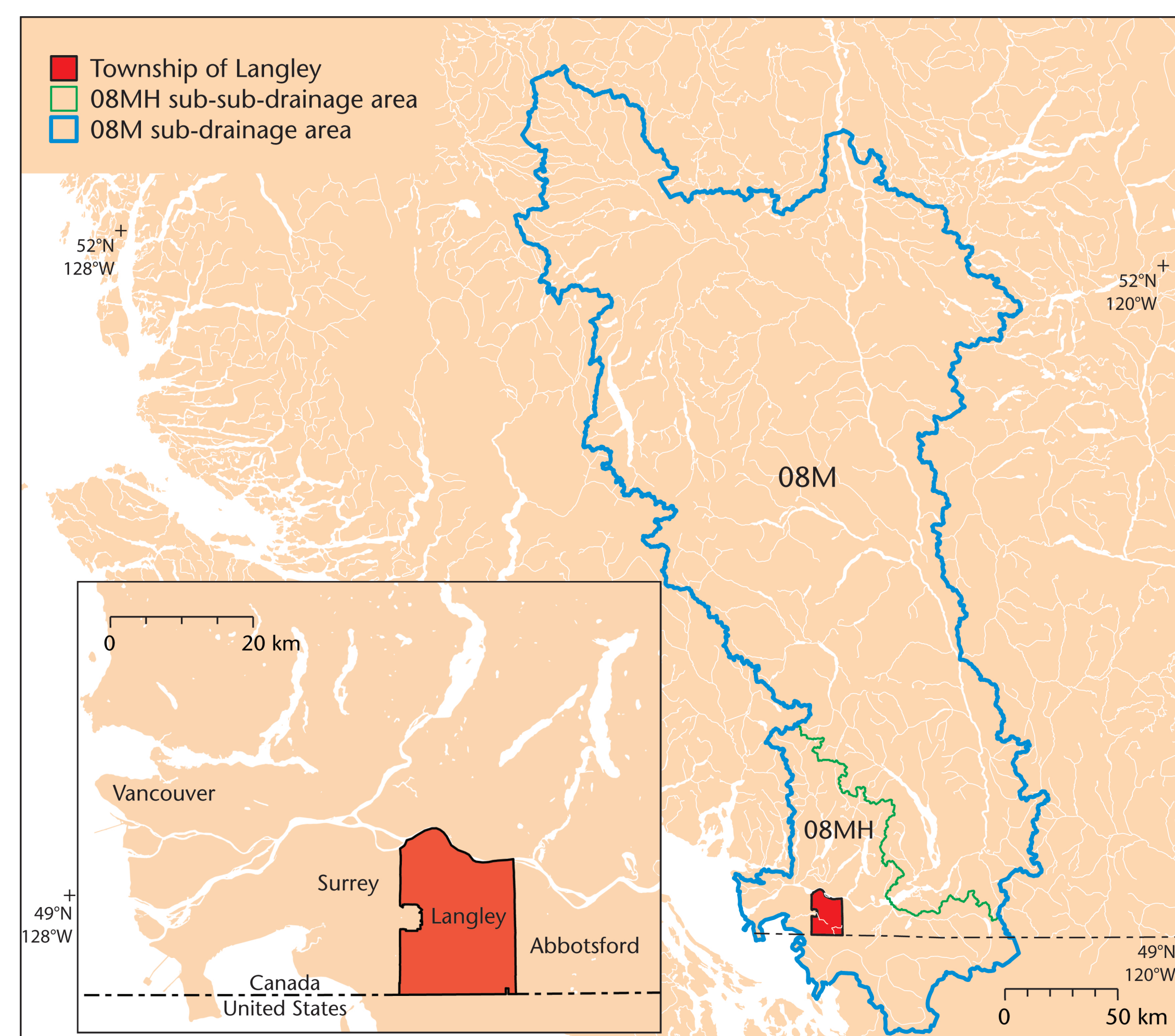


Figure 2: Fresh water-related indicators in Canada

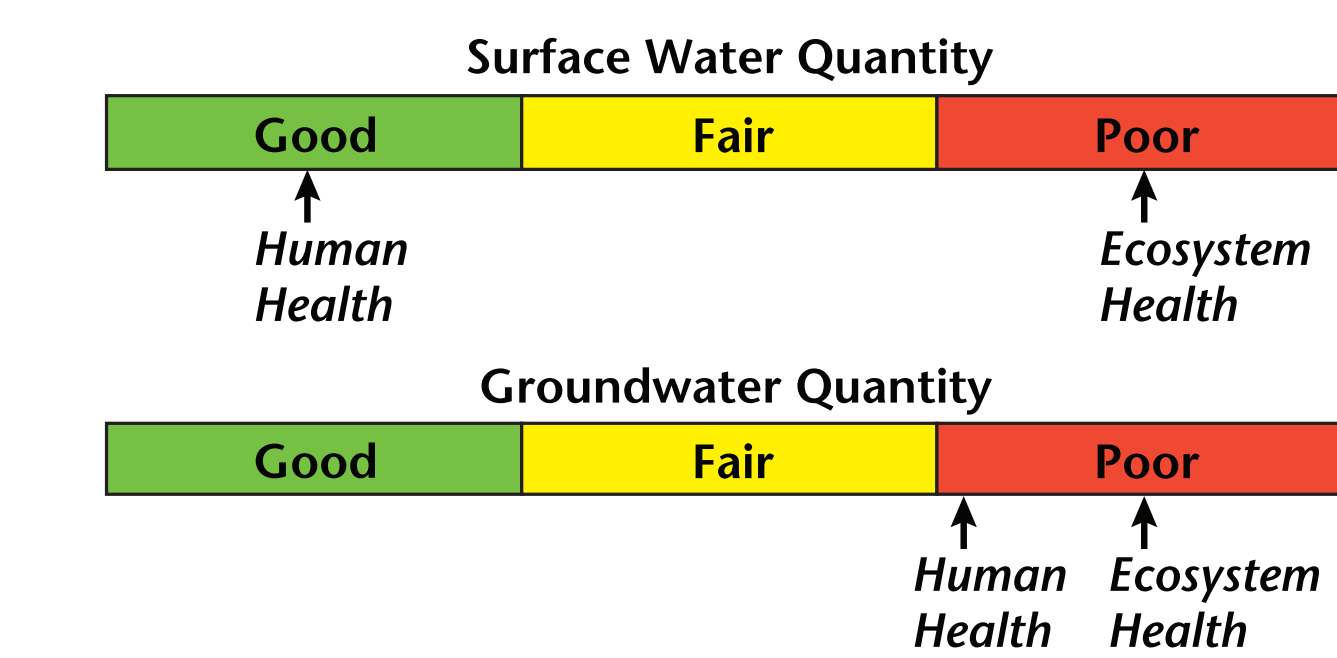


Map 1: Case study site: Township of Langley, BC

- Located 47 kilometers southeast of Vancouver, British Columbia (BC)
- Predominantly rural community of approximately 100,000 residents.
- Mix of agricultural with commercial, industrial and residential customers
- 75% of its land base in an Agricultural Land Reserve (ALR)
- Groundwater abstraction in BC is unregulated
- 80% water supplied from groundwater (including 5,000 private wells)
- Increasing demand with some areas peak summer demand almost exceeding capacity
- Elevated levels of nitrate in groundwater (anthropogenic sources)
- Elevated levels of arsenic in groundwater (naturally occurring)
- The area contains critically important fish habitat, including approximately 700 kilometers of fish bearing streams and numerous wetlands

Water Security Status Indicators: The WSSI assessment method provides practitioners with an integrated framework for selecting water quality and water quantity indicators that address ecosystem and human health. This effects-based framework also allows communities to engage in the indicator selection process, making participation by end-users central to its method.

	Water Quality	Water Quantity
Indicators that define safe water for Human Health	1) Canadian Council of Ministers for the Environment (CCME) Water Quality Index (WQI)	1) Environment Canada (EC) Water Availability Index (WAI) 2) Township of Langley Water Management Plan
Indicators that define safe water for Ecosystem Health	1) Canadian Council of Ministers for the Environment (CCME) Water Quality Index (WQI) 2) Community Assessment, British Columbia Fish Protection Act	1) Environment Canada (EC) Water Availability Index (WAI) 2) Community Assessment, British Columbia Fish Protection Act



- Ecosystem Habitat is poor as preferred egg-laying sites are at groundwater discharge areas, which are declining.
- Surface water quantity for human health is good with drinking water available from Greater Vancouver Water District (although at a high price)
- Groundwater quantity for human health (drinking water) is poor/fair with growing demands and declining well levels

Figure 3: Water Security Status Indicators Slider Bar

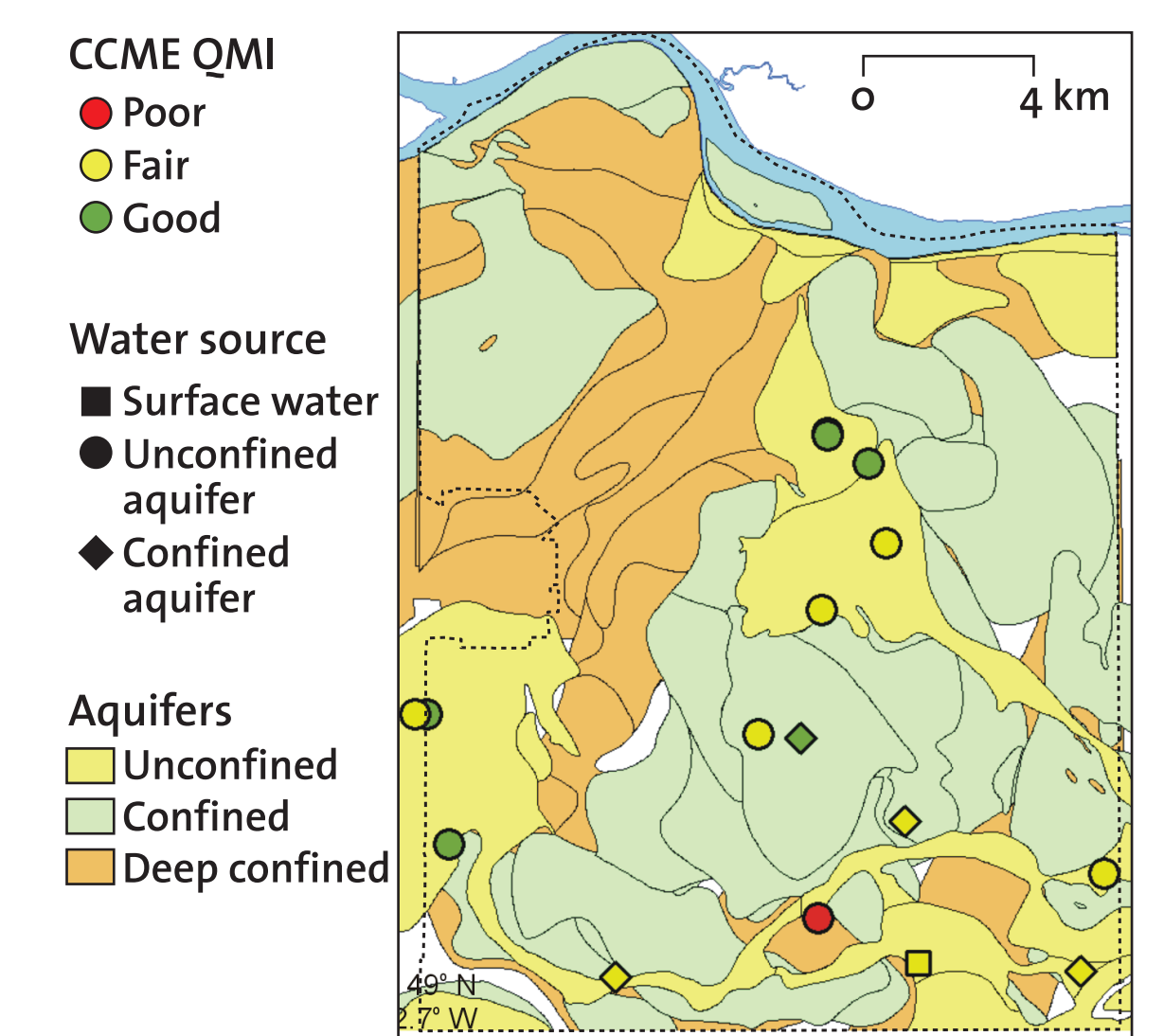
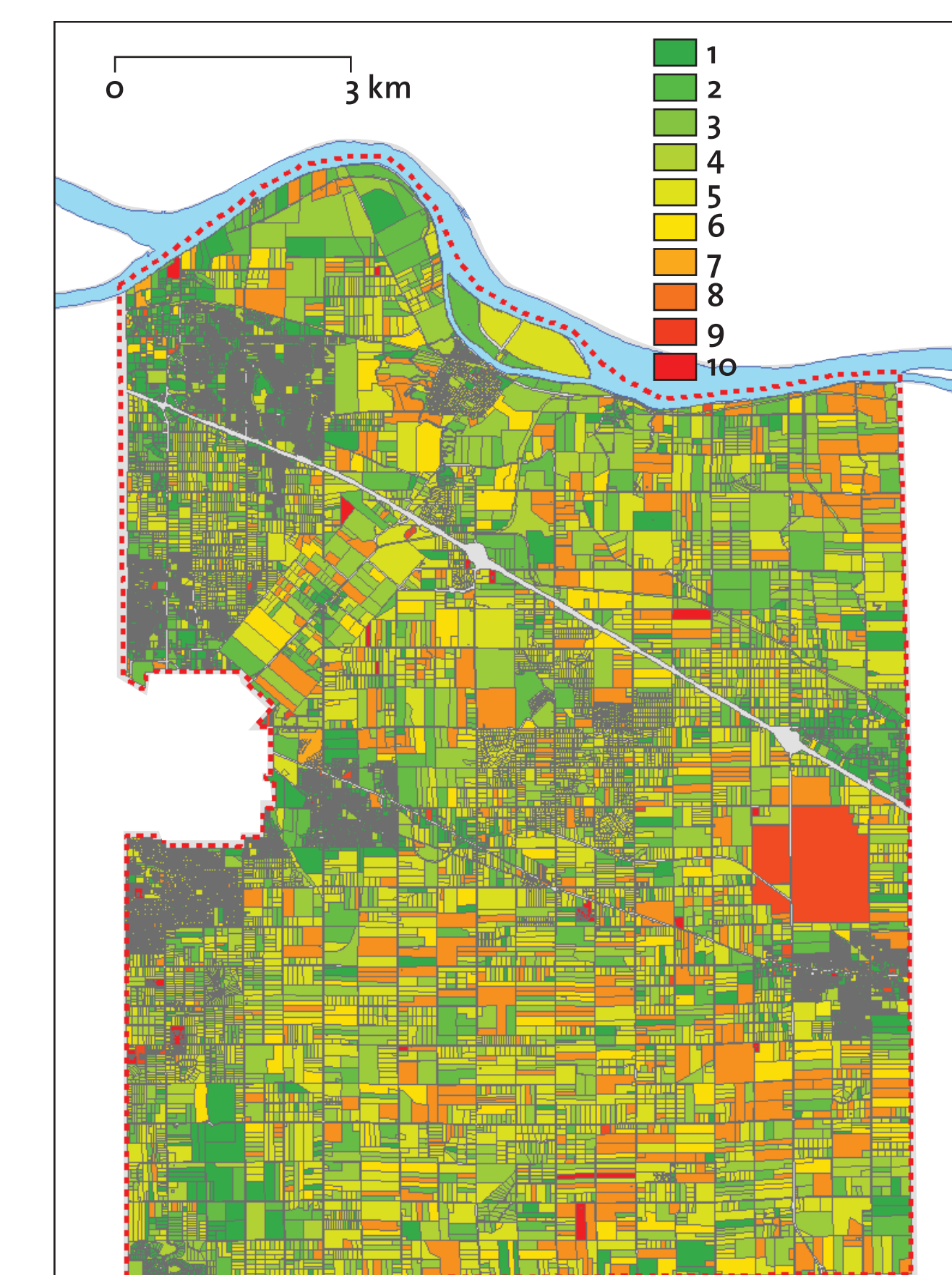


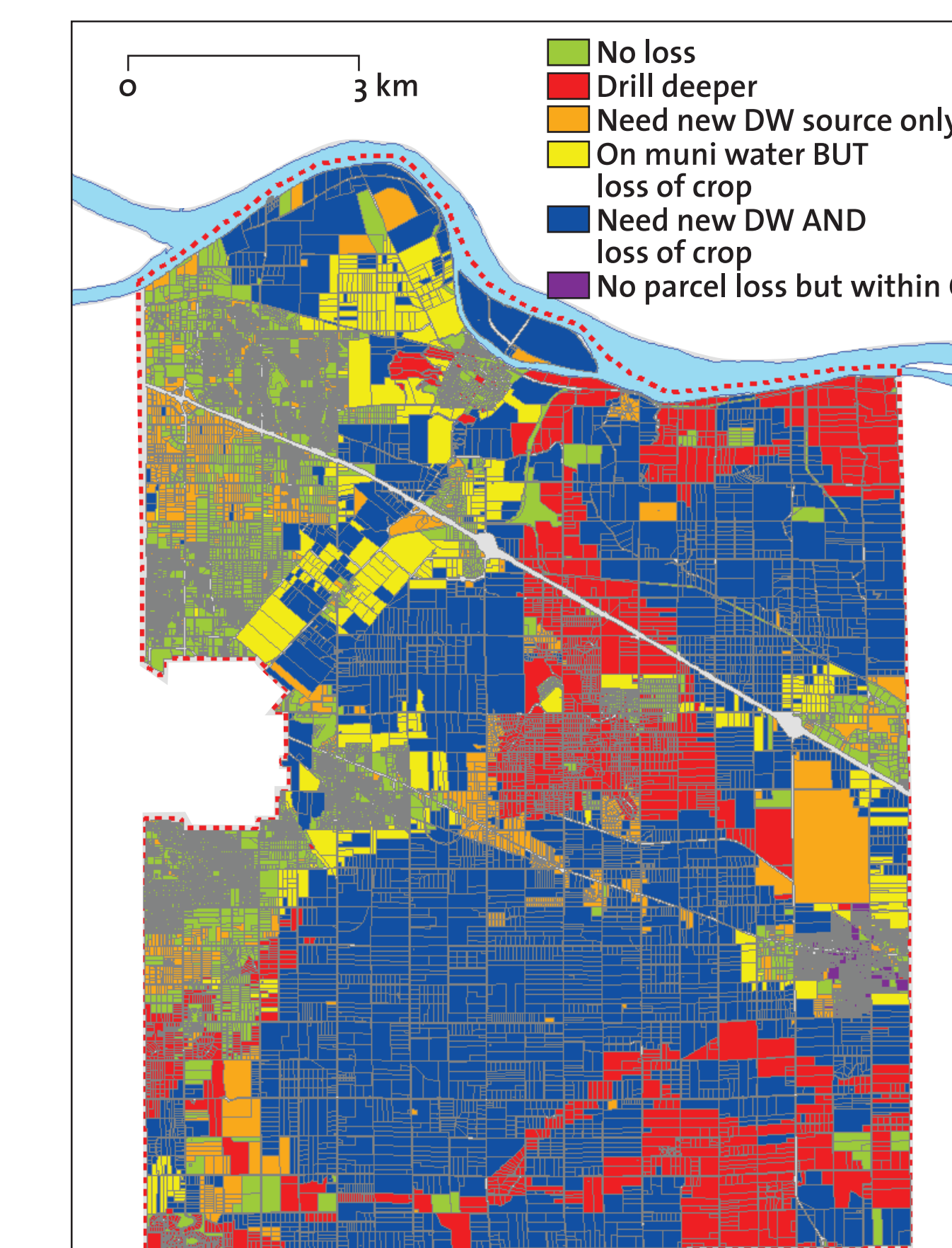
Figure 4: Drinking water quality

Table 1: Water Security Status Indicators Assessment Matrix (indicators used by the Township of Langley)

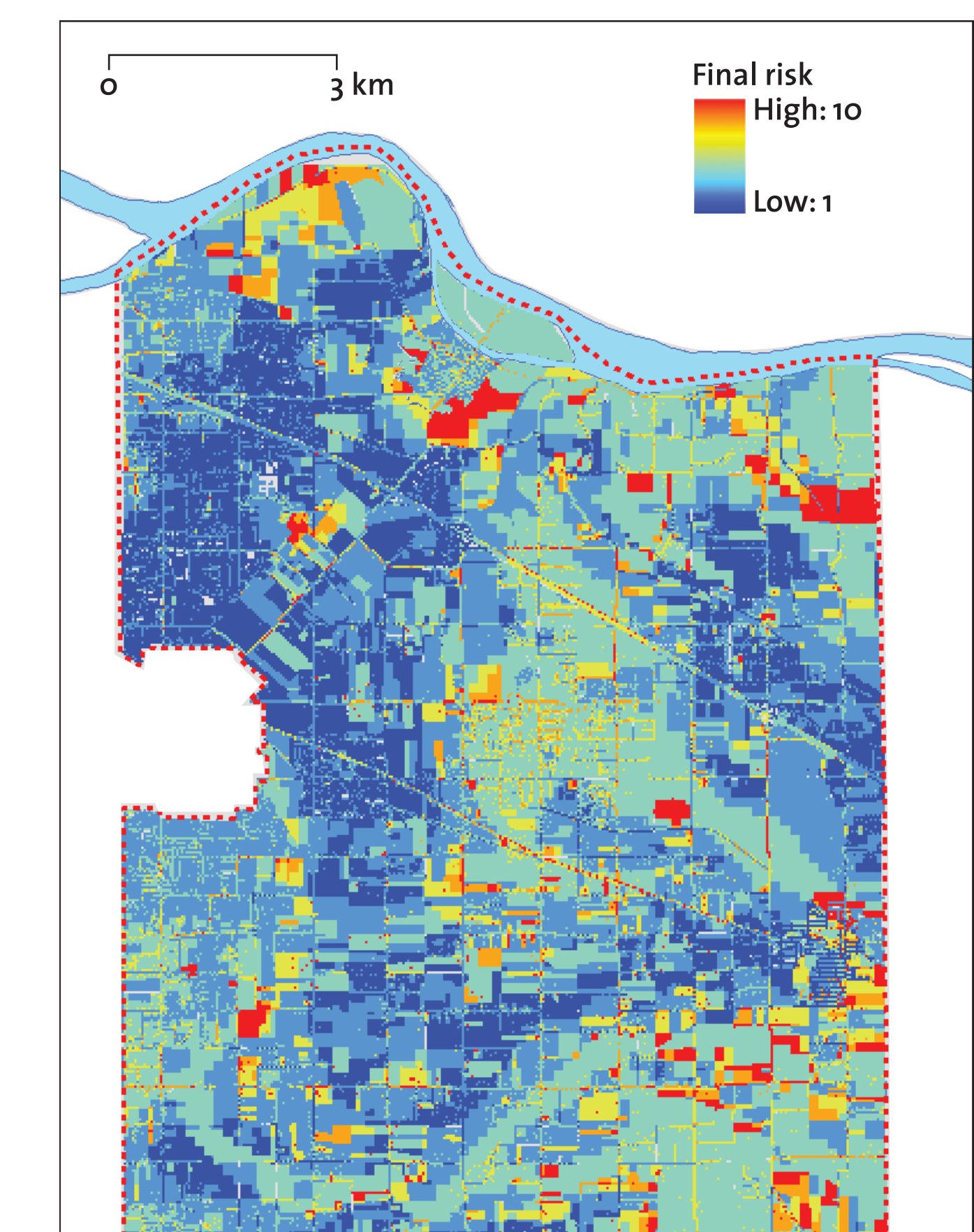
Water Security Risk Indicators: The WSRI assessment method considers stressors, (risks of uncertain future events) which may be associated with current land use practices, changes in land use, climate change, or changes in water demand.



Map 2: Potential hazards (including sources of contamination; point and diffuse)



Map 3: Potential Economic Loss (if hazard were to occur) e.g. Cost to replace drinking water source (depending on options) and any economic loss of say a blueberry farmer losing his crop.



Map 4: Overall risk (areas of increased risk to groundwater)

Summary:

The assessment framework integrates the social sciences with natural science, engineering (infrastructure), and public health. It addresses critical water-related challenges, including the relationship between water and land use dynamics, the integration of aquatic ecosystem and human health concerns, and the alignment of governance with water management imperatives.

For further information on the Water Security Assessment Framework project visit our website: www.watersecurity.ca or email water.security@ubc.ca

Acknowledgements:

