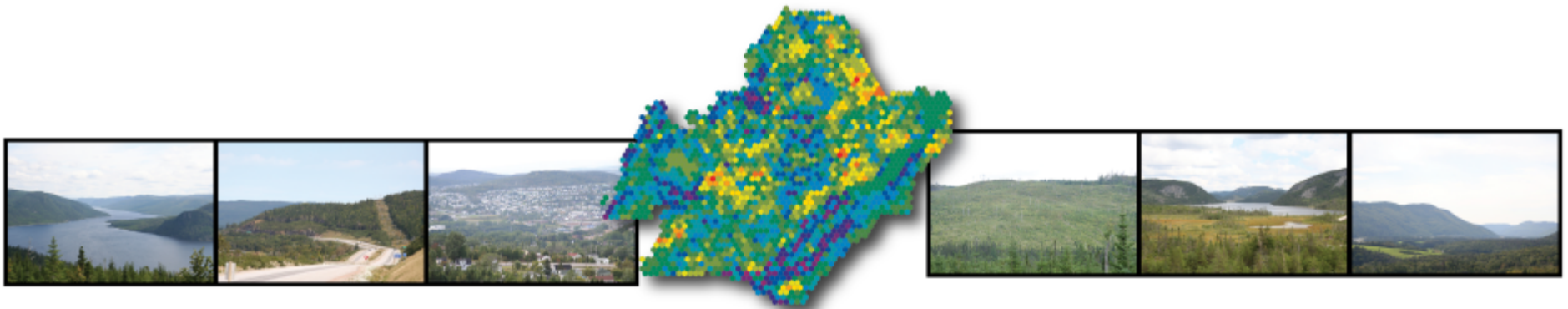


Development of a GIS-Based Model for Quantification of Scenic Resources

Doug Piercey

ESRI International User Conference

August 5, 2008



- Context
- Visual Quality Concepts
- Model Development/Description
- Validation
- Utility
- Next Steps

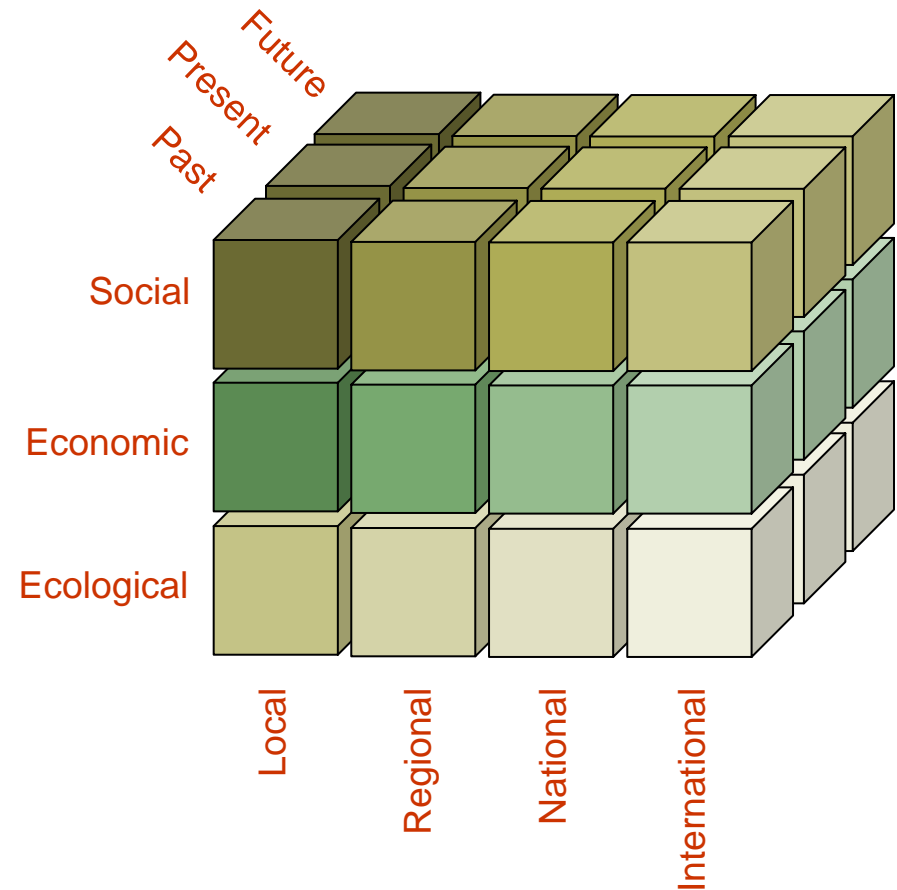
Context

- Increasing demands on the landbase
 - Importance of non-traditional uses
- Holistic management required
 - Maintain sustainability
 - Trade-offs often necessary



Context

- Holistic management occurs
 - across multiple temporal and spatial scales
 - from multiple perspectives
- Difficult to manage for non-traditional values
 - social perspective (eg. visual quality)

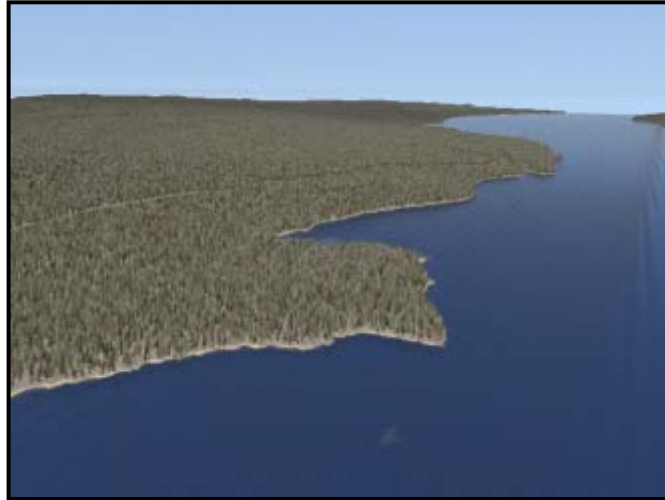


- Why measure visual quality?
 - Indicator or catalyst for other non-traditional land uses (eg. tourism, outdoor recreation).
 - It is what people see.



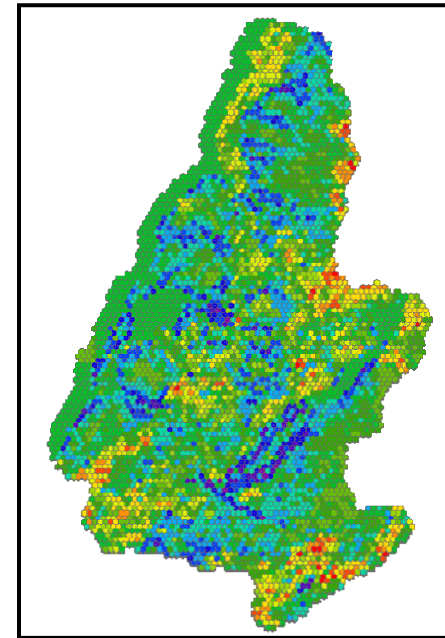
Visual Quality Concepts

○ Mapping visual quality



Local scale

- 3-D rendered landscapes
- High level of detail over small areas
- Exploring options

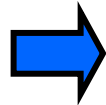


Landscape scale

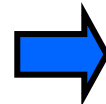
- 2-D numerical representation
- Less detail over large areas
- Planning

Visual Quality Concepts

- How do we quantify perception of visual quality?



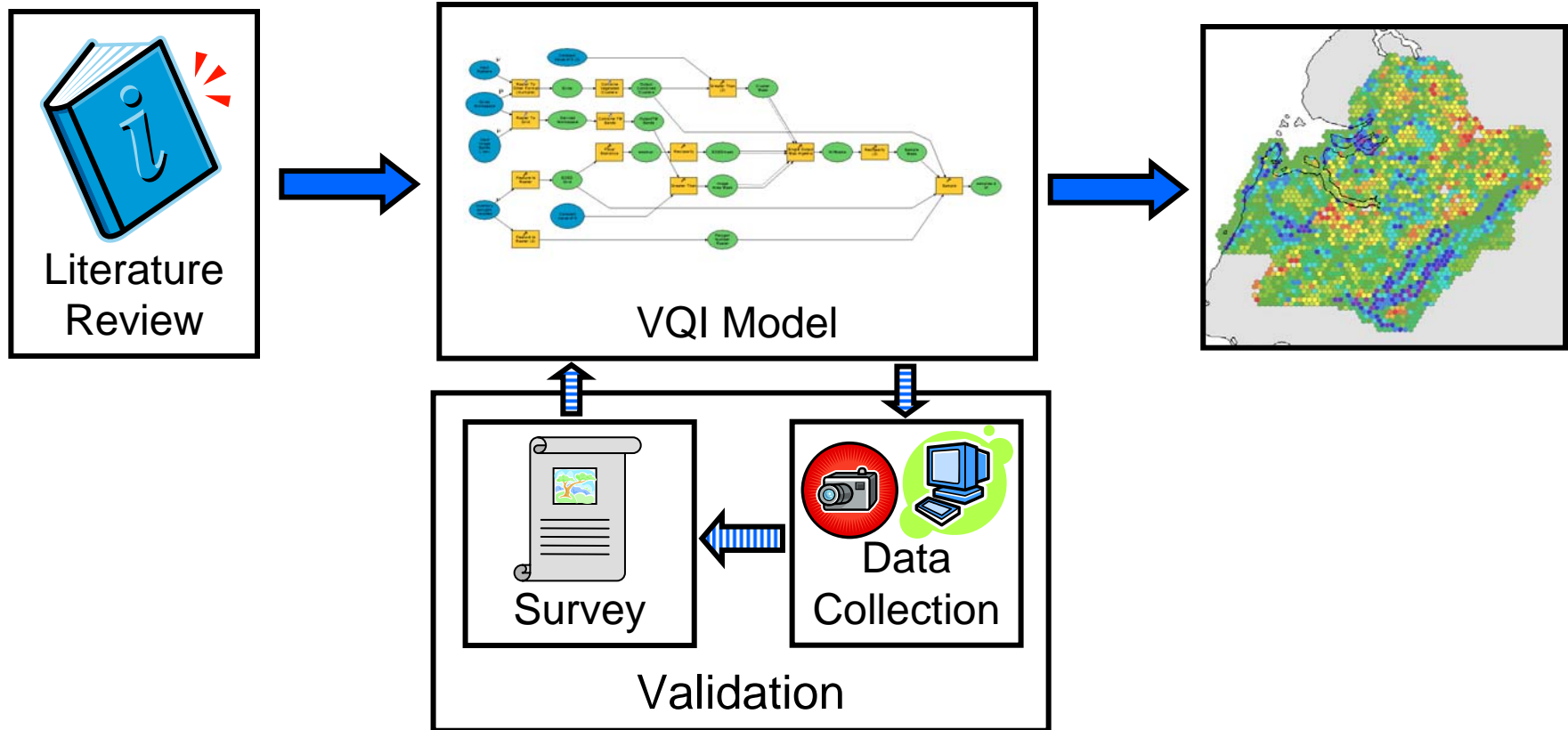
11 1
7 9



8 5
4 3
2 10

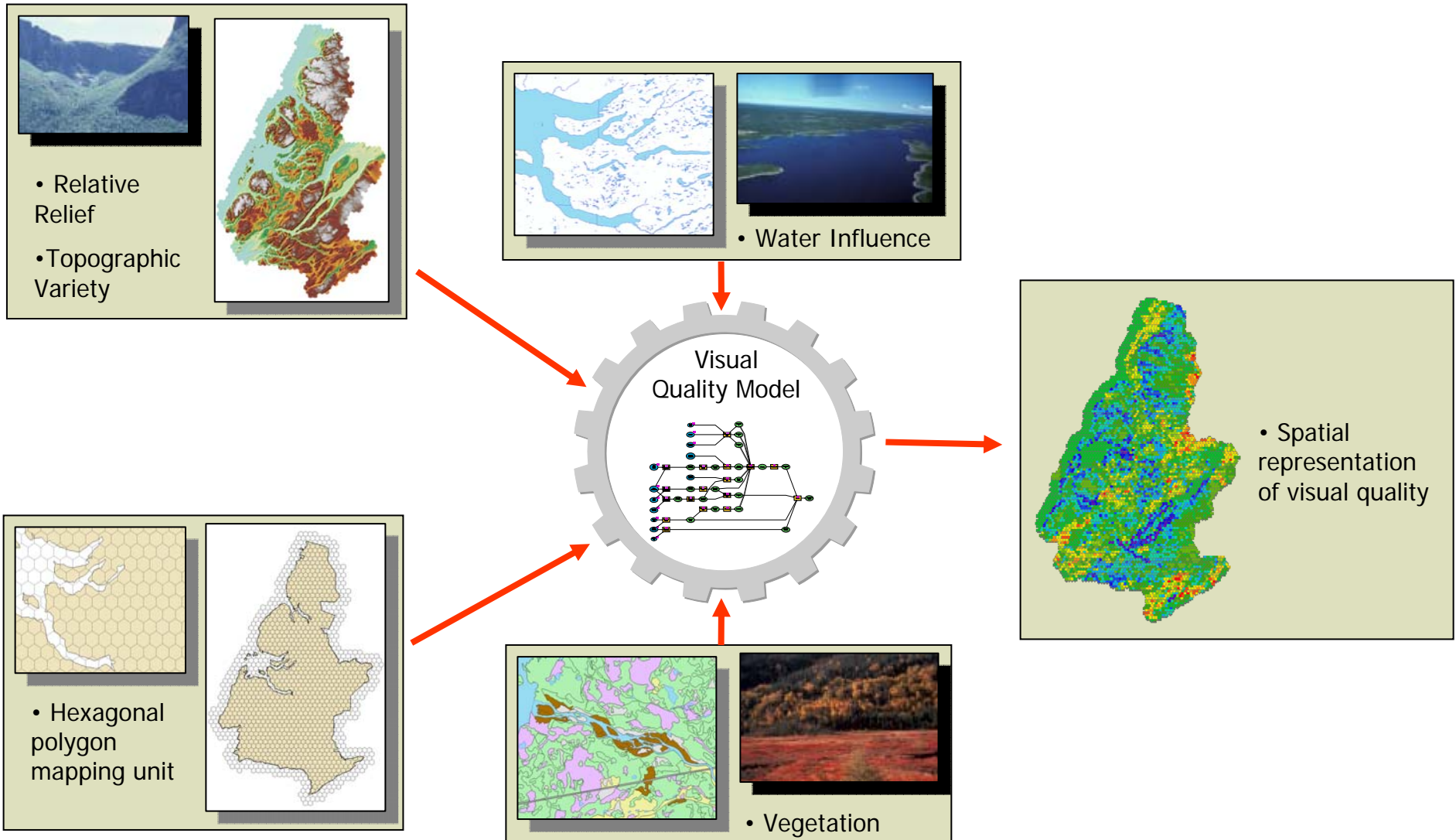
- Need to define a conversion between landscape components and public perception of visual quality.
- Visual Quality Index (VQI)
 - Manual exercise in the past (sometimes subjective)
 - Computer-based model desired (using GIS/RS data).

Model Development



- 7 Landscape Components
 - Relative Relief
 - % Water
 - Dominant Water Type
 - Vegetative Variety
 - Topographic Variety
 - Degree of Alteration
 - Type of Alteration
- All components GIS-available
- Hexagonal polygon mapping unit

Model Description



Model Description

Landscape 1	Landscape 2
Flat, primarily agricultural land (40%) with a small lake. Some scattered balsam fir stands.	Coastal plain leading inland to mountain plateau. Minimal disturbance. Balsam fir and white birch dominate

% Water	Value
0 – 5	0
6 – 30	1
>30	2

Water Type	Value
River	0
Lake	1
Ocean	2

Relative Relief	Value
0 – 164	0
165 – 822	1
>822	2

Alteration Type	Value
Cutover	0
Agriculture	1
Built Up	2
None	3

Topographic Variety	Value
Uniform	0
2 general topographic types	1
> 2 topographic types	2

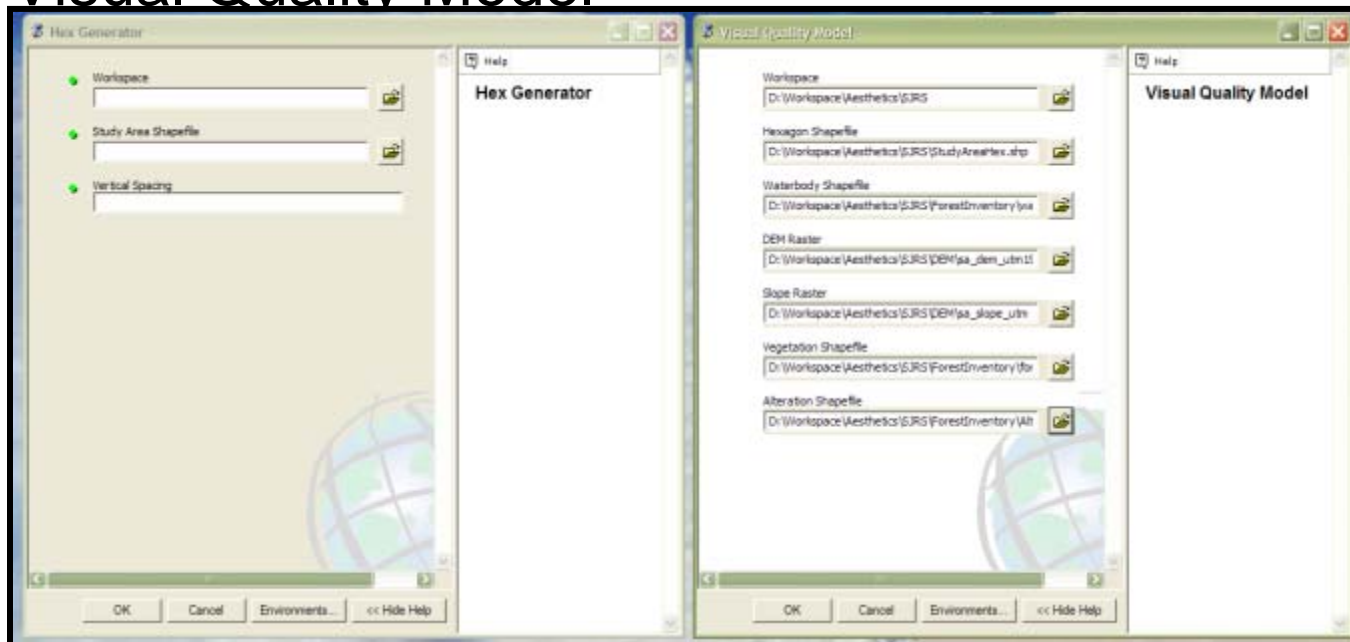
Vegetative Variety	Value
1 type of vegetation	0
2 types of vegetation	1
> 2 types of vegetation	2

Alteration Level	Value
51 – 100	0
26 – 50	1
11 – 25	2
1 – 10	3
0	4

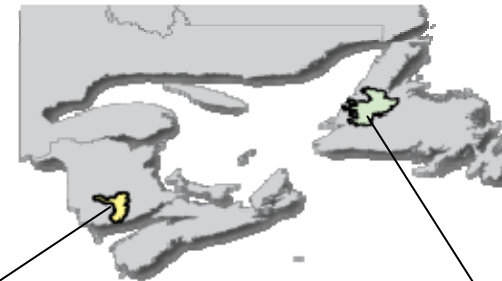
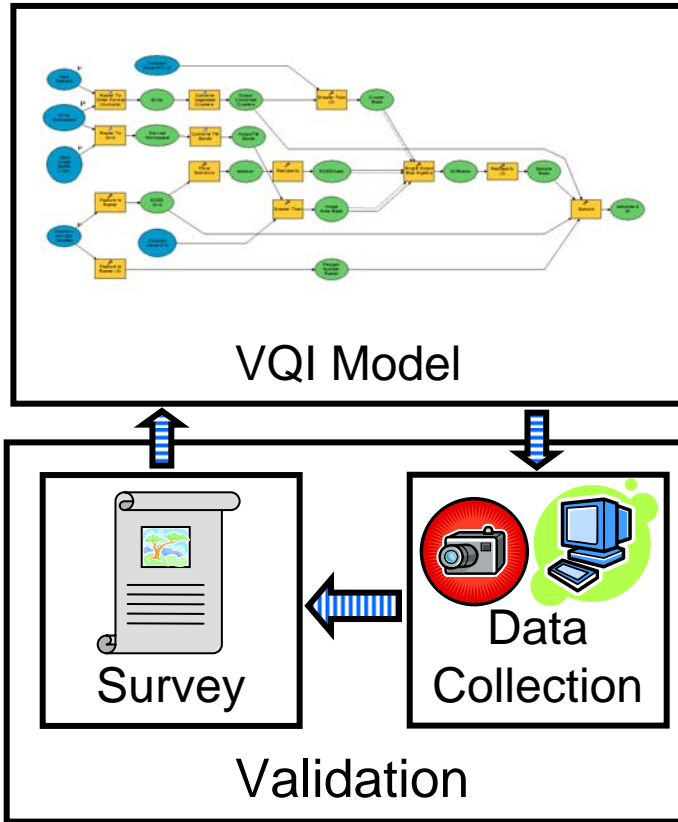


Model Description

- Model includes 2 Python scripts in an ArcToolbox
 - Hex Generator
 - Visual Quality Model



Validation Overview



St. John River Valley,
New Brunswick

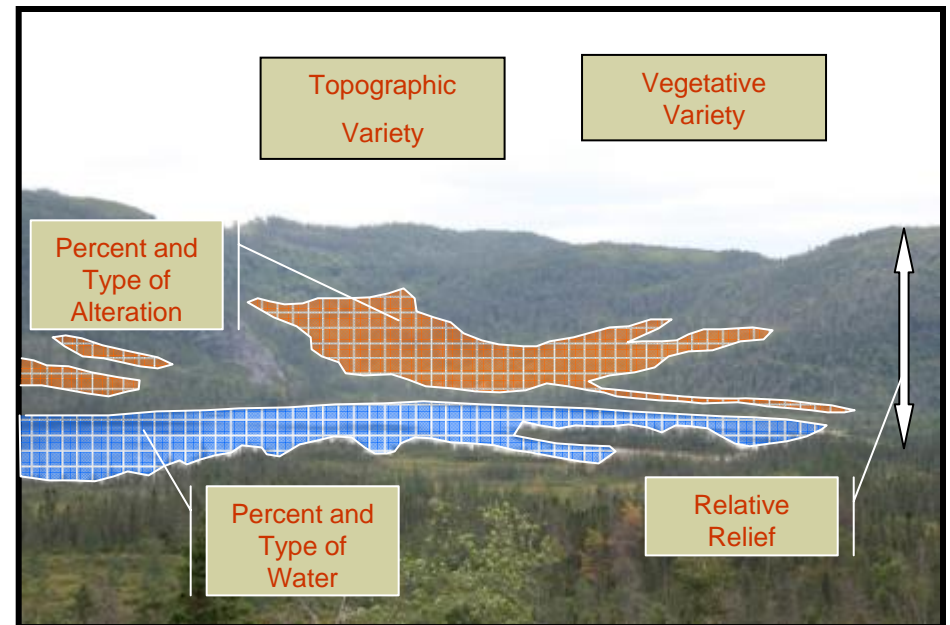
Humber River Basin,
Newfoundland

Future Validation

Current Validation

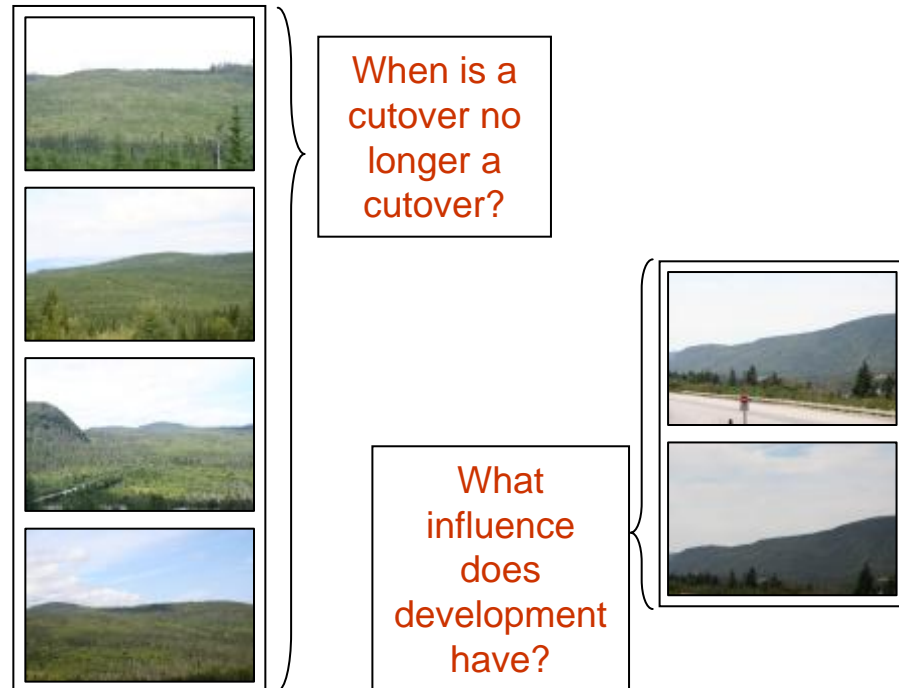
Validation

- Field photographs manually rated using landscape components and associated sub-indices from visual quality model



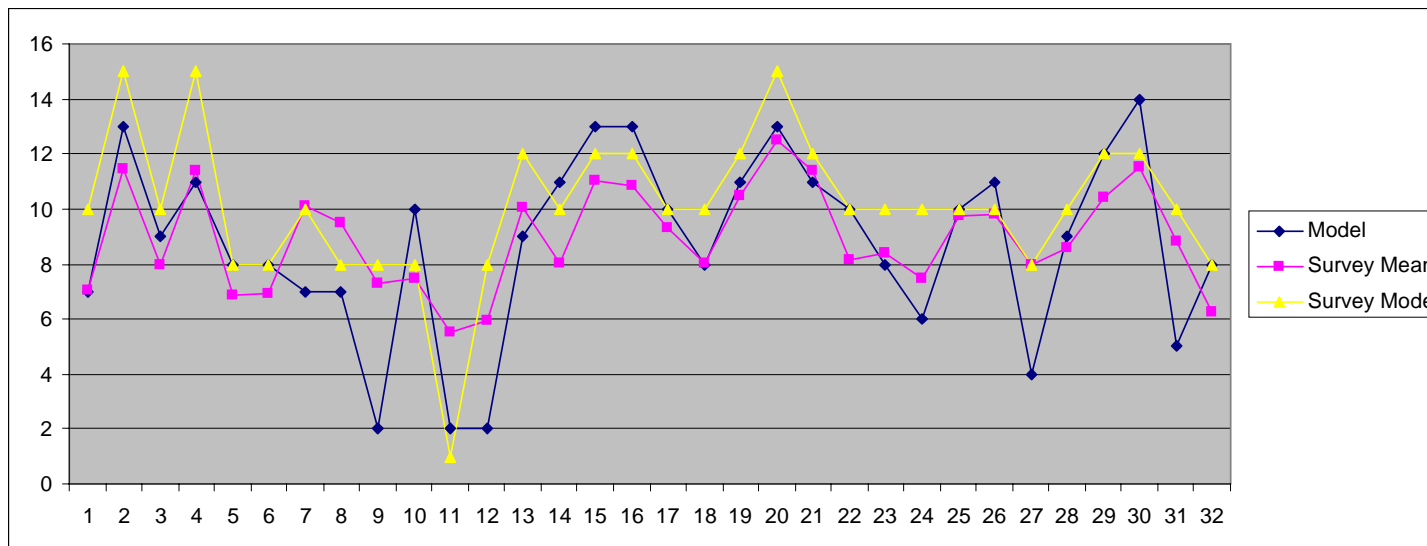
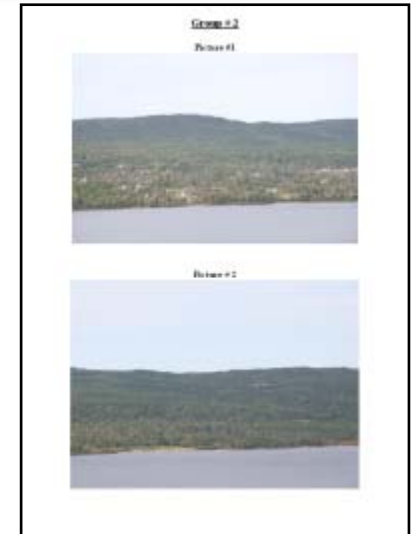
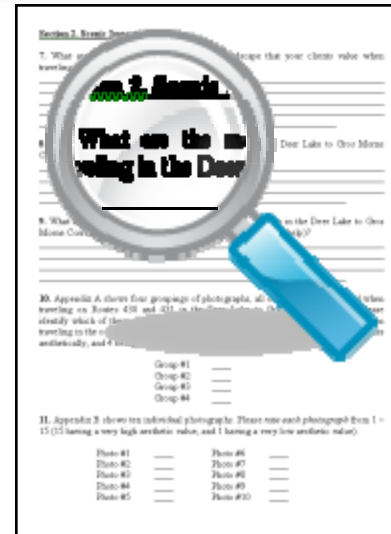
Validation

- Photographs are grouped according to ratings and/or landscape characteristics for public survey



Public Survey

- Mail routes used to define survey zones
- Intercept at Gros Morne National Park
- ~300 returns

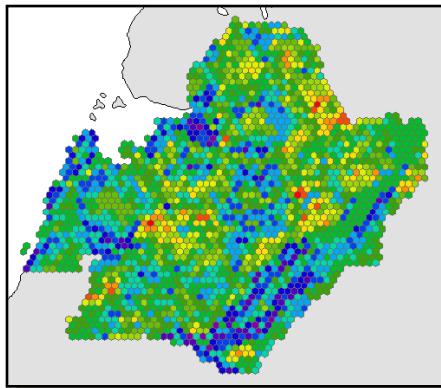


Survey Findings – Model Adjustments

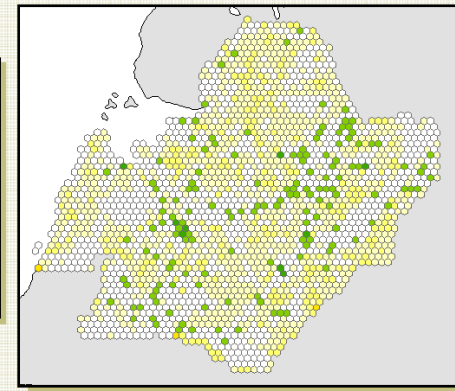
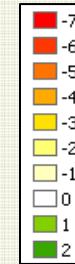
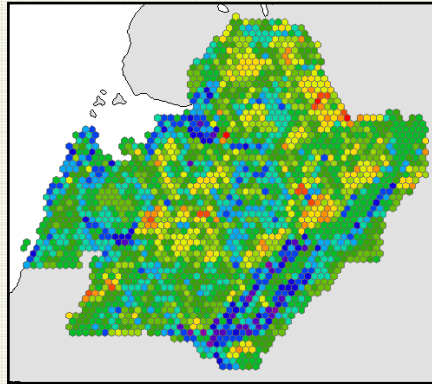
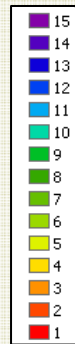
- Cutovers not seen as negative once regenerating (~5 years) – time since harvest needs to be included in model
- Stand remnants after harvest lessen negative impact of cutover – not always captured in forest inventory procedures
- Green space within built-up areas have positive impacts
- Open field agriculture not as negative an impact as in literature – farms in the study area are integrated in the landscape
- Golf courses not considered developed
- Familiarity has slight positive impact on perceived values

Model Utility

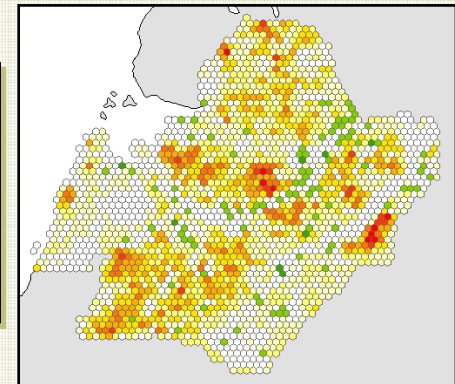
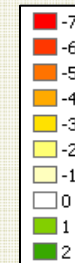
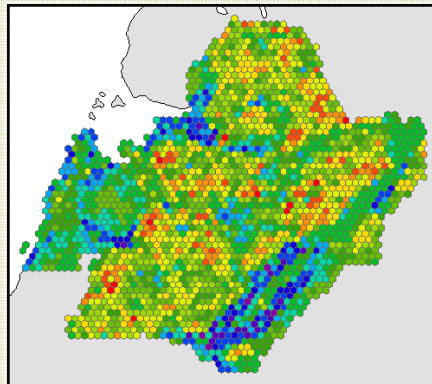
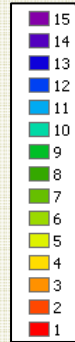
Integrated with other model outputs in trade-off analysis



Time 0 Visual Quality

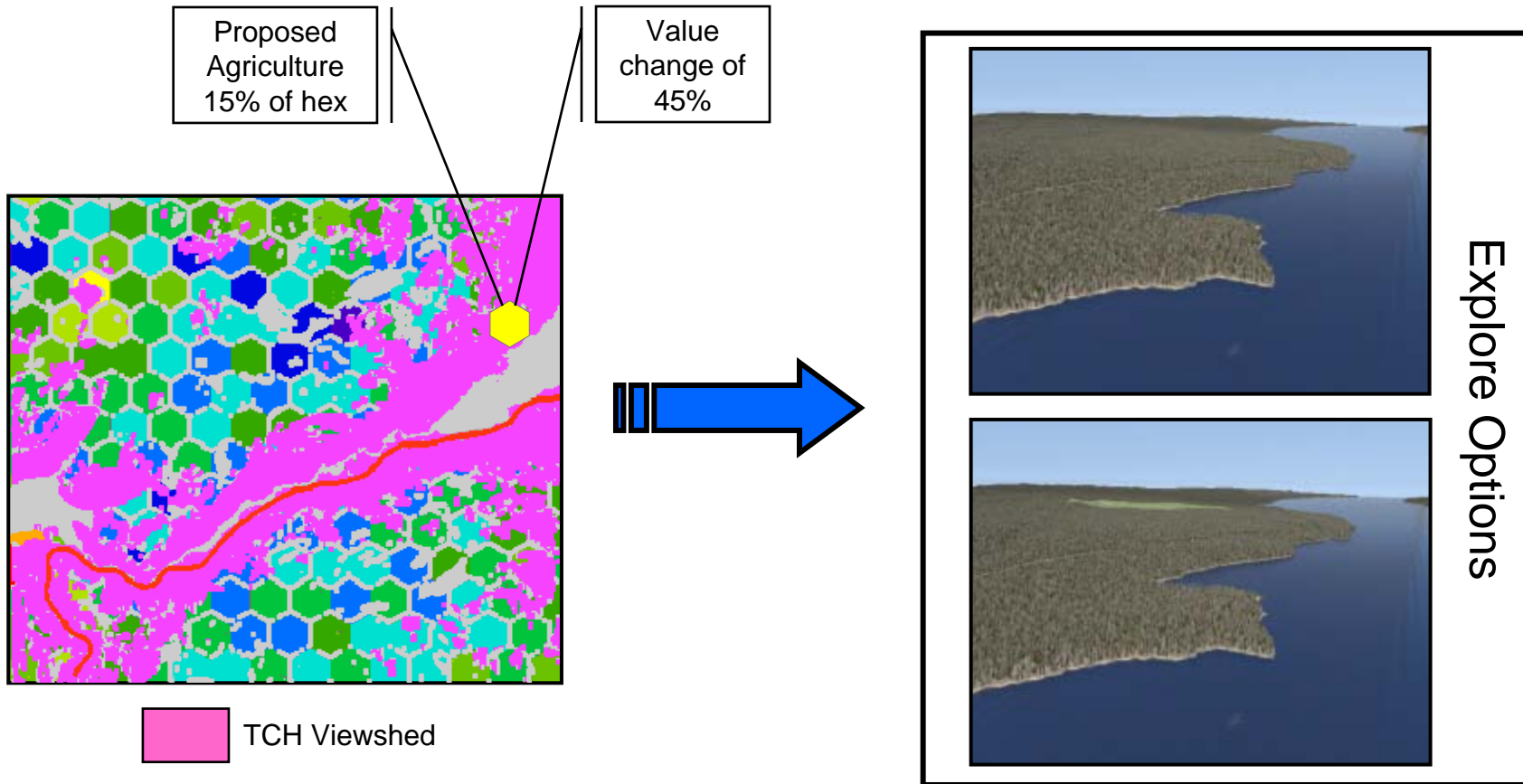


Time 30 Visual Quality – Natural Succession Scenario



Time 30 Visual Quality – Forest Management Scenario

Local Scale Planning



Next Steps

- Adapt model according to survey findings.
- Finalize ArcGIS toolbox with updated scripts and help files.

Acknowledgements



Thank You!