

## UPPER WATERSHED WORKSHOP - CASCADE TOOL ASSESSMENT

### **ECO ASSETS**

Biodiversity; wildlife, fowl, mammal	Soil / hummus
Lake	Photo + plankton *
Perseverance, Criukshank	Headwater streams
Fish	Aquifers /groundwater
Wetlands, shoreline, riparian	Snowpack
Recreational opportunities *	Basalt, sediments, minerals
Glacier	Rainfall
Alpine	Elevation
Red-listed species	Protected areas (Strathcona )
Forest, root structure	Carbon capture *

### **ECO SYSTEM FUNCTIONS**

Water storage and release	Snow melts
Soil, trees, vegetation	Water cycle
Bio + chemical cycles	Filtration
Nutrient cycle	Climate – temperature+ precipitation changes
Photosynthesis	Sedimentation and erosion
Carbon capture -- forest sequester	Biodiversity *see previous
Wildlife habitat	Pollintators
Oxygenation of water	'Natural lab'
Photo + zooplankton *see previous	

## **ECO SYSTEM SERVICES**

Recreation opportunities

Flood mitigation

Carbon and storage

H2o storage

Filtration /potable

Oxygen production/air to breath

Water flow reg./slow release / cooling

Habitat

Mental health

Timber \* employment

Spiritual opportunities

Food

Hydro power

Eco- tourism

Climate regulation

Aesthetics

Erosion /sediment control \*

Lake – settling of sediments/sedimentation

Mitigation pollution

Zooplankton\*

Package and removal

Seed dispersal via wind

## **GREEN/GREY INFRASTRUCTURE**

Wind turbines, Solar power

Hydropower Cruikshank

Maintain logging roads + ditching – high velocity flows

Buffers/setbacks

Modified cut blocks based snow + wind

Roads, culverts, ditches - frequency of layout

Retention ponds/engineered infrastructure

Solar power gauges

Swales

Bridges

Dam

Pipeline

Camp ground

Cabins

Trails

Culverts

Landfill

Coal mine

Fish hatcheries

Filtration plant

Treatment system

Deep water intake

Decommissioned roads

Silviculture practices

Agro- forestry \*

Biodiversity\* (many categories )

Watershed restoration

Water monitoring stations

Septic /wastewater

Boardwalks

Town site

### ***BENEFITS TO HUMANS***

Buy watershed

Clean H2 O

Clean air

Saves taxes

Spirit, mental, physical health

Tax revenue to provincial  
government/employment/lumber

Hunting and foraging

Recreational opportunities

Building materials

“Paying it forward” --- Generations to come

Education

Reduced flooding

Fish habitat

Hydro generating

Water storage management for All :Fish,  
hydro, people

Medicinal plants

### ***DRIVERS OF CHANGE***

Climate change

Timber pricing

Real estate value

Population increase

Politics and policy i.e. government change

Age - failing infrastructure

Extraction of “other “resources

Economic trends

New pests/pathogens

Atmospheric pollution

Invasive species

Change in ownership

Technological changes – new harvestation  
methods

Changes in law

A global economic collapse

Forest fire

VIHA policy

PLFM Act

Development and zoning

Taxation

Septic (developments )

Land use agreements

BWN

Natural disasters - landslides , melting glacier

Changing habitats /destruction

KFN and land management

WPP

Advance tech -- incl. assets (expectation for access )"increased pressure "

### **INDICATORS**

Hydrometric measuring – quality + quantity

Soil mapping /monitoring/movement

Green depth + riparian areas

Road network + civility

Mapping ditches +flow

Clear-cut areas

Recreational traffic

Species population

Tracking employment

Roads/stream crossing

Biodiversity \*

Forest coverage annually %

Stream fire rating

Habitat loss

Invasive species

Air quality

KFN: economics, health

Forestry health survey

Water level vs. Sedimentation

WPP monitoring "performance "

Tree rings

Weather station

Planned annual reviews

Fish counts

Slope, slides, stability

Garbage

Photoplankton

Turbidity, temperature

Species count

Inventoried tourism activity

Gastro-intes. Hospital admissions

Snowpack – depth + duration

Roads – density

Cut blocks – reforestation

# MIDDLE WATERSHED - CASCADE TOOL ASSESSMENT

## **ECO-ASSETS**

Wetlands

Urban areas

Salmon/ wildlife biodiversity, microorganism pollinators

Soil/gravel

Riparian systems

Typography

Vegetation / forest

Permeability

ARL lands

## **ECO SYSTEM FUNCTIONS**

Temperature

Food production

Succession + adaption

LIFE in general

Soil formation

Physical & mental health

Hydrological regime

Flood abatement, flooding

Carbon sequestration

Habitat

Oxygen release

Aquafir recharge, discharge

Drainage

Biodiversity

Purification of H2O

## **ECO SYSTEM SERVICES**

Spirituality

Maintaining interflow

Pollution reduction

Cooling --- energy reduction

Flood control

Growing food & wine

Carbon capture  
Recreation  
H2O quality + volume

Pollination  
Fishing  
Soil enrichment

### **INFRASTRUCTURE**

Storm water  
Flood protection  
Water treatment  
Sanitary treatment  
Storm water sources  
Storm water facilities  
Cisterns  
Rain gardens

Green roofs  
In/exiltration galleries  
Wetlands (constructive & natural)  
Ditches  
Roads, highways  
Solar panels  
Puntledge Powerhouse & hatchery

### **BENEFITS TO HUMANS**

Jobs  
Clean H2O  
Recreation  
Lower taxes /costs  
Enjoyment – quality of life, less stress, fresh foods  
Healthier Environment

Happy people  
Farm food  
Personal safety  
Sense of ownership  
Property values increased  
Economic benefits  
Common good

## **DRIVERS OF CHANGE**

Population growth	Private / public balance
Resources extraction	Policies – OCP, Regional growth strategy
Climate change – drought, precipitation,	Sustainability plan
Increased water scarcity & flooding	Earthquakes
Wildfire	(R + D) + new knowledge
Inter/species threat	Consumer trends
Political support	Implement new technology
Development	Change in demographics
Profit regulatory framework	Loss of space
Accounting framework	Demand for recreation
Paradigm shift changing values	War + human made disasters
Support local food movement	Human impacts
Alien invasion	Decrease biodiversity

## **INDICATORS**

H2O quality	Boiled water advisories
Google earth	# of road crossing
Gravel movement	Insurance claims /losses
Rain fall	Ecological inventory
Loss of shoreline	Increase impervious surfaces
Interflow	Decrease returning salmon key species
Ocean ph.	Change in demographics
Land use cover	Species extinction
Water restriction	Diseased trees

## LOWER WATERSHED - CASCADE TOOL ASSESSMENT

### **ECO-ASSETS**

Eelgrass	Mudflats – sand, slope
Salt marsh	IR #2 Puntledge/Tsolum
Intertidal streams (9)	Riparian areas
Shoreline	Fish habitat
Goose spit	Fresh water marsh
Widgeon & other islets	Salmon
Airpark lagoon	Shellfish
Floodplain – farms, hollyhock	Large woody debris
Wildlife	Transition zone – fresh, salt, deposition zone.
Cultural	

### **INFRASTRUCTURE**

Airpark lagoon	Parks
Dike	Commercial development – over river encroaching
Sawmill – sheet	Fish traps
Sewage- pump, lines	Irrigation
Seaplane	Royston wrecks
Hardened shores – riprap past Puntledge/Tsolum, sheet pilings	Roads
Marinas	Bridge (4)
Storm drains	Dredging
Pilings	Power transition
Walkways /boardwalk	Naval base



Docks

Wildlife platforms

Salt marsh

Green shores beach

### **ECO SYSTEM FUNCTIONS**

Carbon sequestration

Secretion and erosion

Water quality

Energy dissipation

Habitat – spawning, breeding, H2O filtration, foraging, feeding, migratory stopover – wildlife sp.

Nutrient mix/deposition exchange , discharge of fresh H2O

Primary productivity + secondary

Storm H2O retention four slash abatement

Soil replenishment

Depositions zone – lg wood

Water conveyance – fish , up / down rivers

Evaporation / evapo trans.

Groundwater

Flood plain –Flood attenuation

### **ECOSYSTEM SERVICES**

Food – farms, flood plain

Recreation – boating, birding

Climate change mitigation

Protection – shoreline erosion, flooding, storms, surges

Storm water discharge

Transportation

(B) Health – Recreation, spiritual

Employment – tourism – aquaculture – seaweed

Cultural – history

Log storage

Places to live, beauty

Economy

Cleans water

Temperature regulation

Harbours / safe haven

Identity

Education/and child development

Oxygen

Indicator

Big picture “think like a watershed “

## ***BENEFITS TO HUMANS***

Aesthetics

Food Security

Water and shelter

To recreation

Spiritual /cultural / history

Transportation

Jobs

Flood mitigation

Storm protection

Tourism

Health

Social

Air quality

Restoration activities – being a part of healing

Physical activity

Increase property value

Broader thinking

## ***DRIVERS OF CHANGE***

Climate change

Resource development

Resource act

Property development

Green infrastructure

Population growth

Pollution

Fish decrease

Ecological consciousness

Combustion/conception /Consumption

Climate

SLR

Rainfall

Steelhead migration

Invasive plants/ species

Biodiversity reduction

Societal values

Regulatory changes

Political will

Dam

Tsunami

Fire

Globalization/economic shifts

Tourism increase

Air base

Technological shift

Human perceptions and attitude

Responses for development

Imbalance feedbacks

First nations

**INDICATORS**

Land use patterns

Flood recurrence

Sediment load

Salmon returning

Calls for service (municipal)

Loss of habitat

Water quality

Governance

Change in species

Trails use

Demographics

Water temperature

Environmental refugees

“Attitude change “

Government structure e.g. First Nation  
governance